

### Features

- ◆ 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 EN55032 class B
- ◆ Overtemperature protection
- ◆ Wide Operating temperature range:  
–40°C to +75°C
- ◆ Reverse input protection
- ◆ Under voltage lock-out
- ◆ I/O isolation 2250 VDC
- ◆ 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 EN50155 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	Output voltage	Output current max.	Efficiency typ.
TEP 150-2412WI	9 – 36 VDC (24 VDC nominal)	12 VDC	12.5 A	86 %
TEP 150-2413WI		15 VDC	10 A	86 %
TEP 150-2415WI		24 VDC	6.3 A	87 %
TEP 150-2416WI		28 VDC	5.4 A	87 %
TEP 150-2418WI		48 VDC	3.2 A	86 %
TEP 150-4812WI	18 – 75 VDC (48 VDC nominal)	12 VDC	12.5 A	88 %
TEP 150-4813WI		15 VDC	10 A	89 %
TEP 150-4815WI		24 VDC	6.3 A	89 %
TEP 150-4816WI		28 VDC	5.4 A	89 %
TEP 150-4818WI		48 VDC	3.2 A	88 %
TEP 150-7212WI	43 – 160 VDC (110 VDC nominal)	12 VDC	12.5 A	88 %
TEP 150-7213WI		15 VDC	10 A	89 %
TEP 150-7215WI		24 VDC	6.3 A	89 %
TEP 150-7216WI		28 VDC	5.4 A	89 %
TEP 150-7218WI		48 VDC	3.2 A	88 %

### Options

suffix –F	Modules with input filter to meet EN 55032 class B, see page 2
on demand	Negative (passive = Off) remote On/Off function (standard is passive = On)range

### Input Specifications

Input current (no load)	24 Vin, 12 – 24 VDC models:	80 mA typ.
	24 Vin, 28 – 48 VDC models:	130 mA typ.
	48 Vin, 12 – 24 VDC models:	60 mA typ.
	48 Vin, 28 – 48 VDC models:	70 mA typ.
	110 Vin, 12 – 24 VDC models:	25 mA typ.
	110 Vin, 28 – 48 VDC models:	35 mA typ.
Start-up voltage / under voltage lock-out	24 Vin models:	9 VDC / 8.2 VDC typ.
	48 Vin models:	18 VDC / 16.2 VDC typ.
	110 Vin models:	43 VDC / 34.5 VDC typ.
Surge voltage (1 s max.)	24 Vin models:	50 V
	48 Vin models:	100 V
	110 Vin models:	185 V
Conducted noise (input)		EN 55032 class A, FCC part 15, class A without external components. optional filter for class B – suffix F
EMC immunity		EN 50121-3-2
	– ESD (electrostatic discharge)	EN 61000-4-2, air $\pm 8$ kV, contact $\pm 6$ kV, perf. criteria A
	– Radiated immunity	EN 61000-4-3, 10 V/m, perf. criteria A
	– Fast transient / surge	EN 61000-4-4, $\pm 2$ kV, perf. criteria A
	(with input capacitor for models without filter module)	EN 61000-4-5, $\pm 1$ kV perf. criteria A
	– Input capacitor:	24 Vin models: Nippon chemi-con KY 470 $\mu$ F, 50 V, ESR 45 mOhm
		48 Vin models: Nippon chemi-con KY 220 $\mu$ F, 100 V, ESR 48 mOhm
	110 Vin models: Nippon chemi-con KXJ series, 150 $\mu$ F, 200V	
	models with filter module (suffix F): no input capacitor required	
– Conducted immunity	EN 61000-4-6, 10 Vrms, perf. criteria A	
– Power frequency magnetic field	EN 61000-4-8, 100 A/m conti., 1000 A/m 1 s	
Reverse voltage protection		parallel diode (input fuse required)
Recommended input fuse (slow blow)	24 Vin models:	30 A
	48 Vin models:	15 A
	110 Vin models:	7 A

### Output Specifications

Voltage set accuracy		1 %
Output voltage adjustment		+20 % by external resistor (see application note)
Regulation	– Input variation (Vin min. to Vin max.)	$\pm 0.2$ % max.
	– Load variation (0 to 100 %)	$\pm 0.4$ % max.
Temperature coefficient		$\pm 0.02$ %/K
Minimum load		not required
Ripple and noise (20 MHz Bandwidth)	12 & 15 VDC models:	100 mVpk-pk max.
	24 & 28 VDC models:	200 mVpk-pk max.
	48 VDC models:	350 mVpk-pk max.
Start up time (nominal Vin and constant resistive load)		35 ms typ. (at power On or remote On)
Transient response (25 % load step change)		200 $\mu$ s typ.
Output current	– Constant voltage (CV)	up to 110 % of Iout max.
	– Constant current (CC)	above 110 % of Iout max.
Over voltage protection		at 125 –140 % of Vout nom.
Short circuit protection		indefinite, automatic recovery
Capacitive load	12 VDC models:	40'000 $\mu$ F max.
	15 VDC models:	26'000 $\mu$ F max.
	24 VDC models:	10'000 $\mu$ F max.
	28 VDC models:	7'600 $\mu$ F max.
	48 VDC models:	2'600 $\mu$ F max.

## General Specifications

Temperature ranges	<ul style="list-style-type: none"> <li>- Operating</li> <li>- Case temperature</li> <li>- Storage</li> </ul>	-40°C to +75°C +100°C max. -55°C to +125°C
Thermal consideration	<ul style="list-style-type: none"> <li>- Mounting surface</li> <li>- Derating and temperature test point</li> </ul>	Optimize thermal coupling to heat conducting surface. Not to mount on flammable surface! see application note
Over temperature protection		at 110°C (auto restart)
Shock, vibration and thermal shock	<ul style="list-style-type: none"> <li>- Vibration</li> <li>- Shock</li> </ul>	acc. MIL-STD-810F 7.76G / 3 axis / random wavforms / 1h each axis 50G / 3 axis / terminal-peak sawtooth / 11ms
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +70°C, ground benign)		>495'000 h
Isolation voltage (60 s)	<ul style="list-style-type: none"> <li>- Input to Output</li> <li>- Input/Output to Case</li> </ul>	2250 VDC (functional insulation) 1600 VDC
Isolation capacitance	- Input to Output	3500 pF max.
Isolation resistance	- Input to Output (500 VDC)	>1 GOhm min.
Switching frequency		203 – 330 kHz depending on model (puls width modulation)
Safety standards		UL 60950-1, IEC/EN 60950-1
Safety approvals	<ul style="list-style-type: none"> <li>- UL/cUL 60950-1</li> <li>- CB test certificate</li> <li>- Railway</li> <li>- Certification documents</li> </ul>	<a href="http://www.ul.com">www.ul.com</a> -> certifications -> File e188913 IEC 60950-1 EN 50155 <a href="http://www.tracopower.com/overview/tep150wi">www.tracopower.com/overview/tep150wi</a>
Remote On/Off	<ul style="list-style-type: none"> <li>- positive logic (standard)</li> <li>- negative logic (option -N)</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 5 and 3</li> <li>- On: 0 to 1.2 VDC or short circuit pin 5 and 3</li> <li>- Off: 3 to 12 VDC or open circuit 3 mA</li> </ul>
Environmental compliance	<ul style="list-style-type: none"> <li>- Reach</li> <li>- RoHS</li> <li>- Flamability 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>

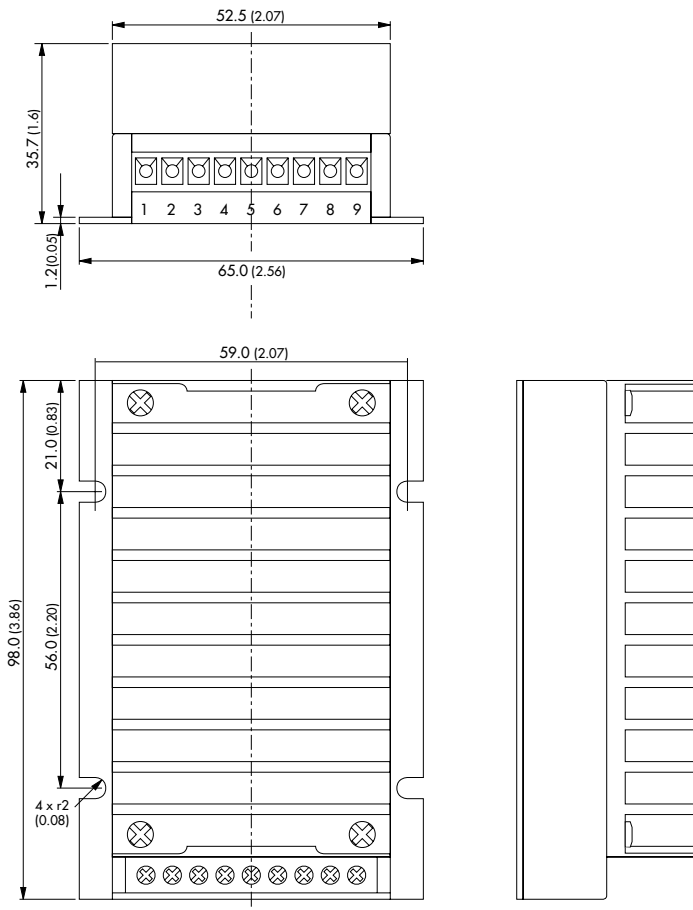
## Physical Specifications

Casing material	metal
Potting material	silicone (UL 94V-0 rated)
Case protection	IP 50 (in accordance to IEC/EN 60529)
Weight	300 g (10.6 oz)

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

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

**Outline Dimensions**

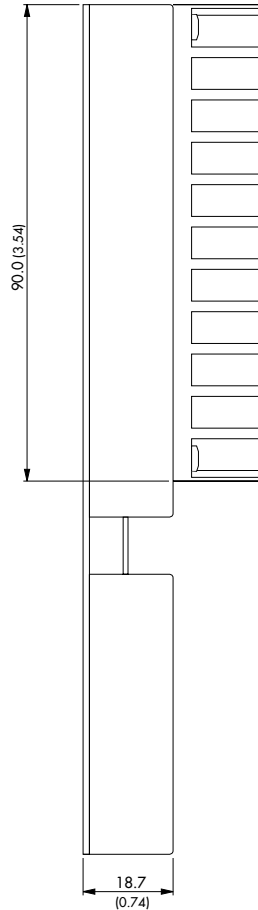
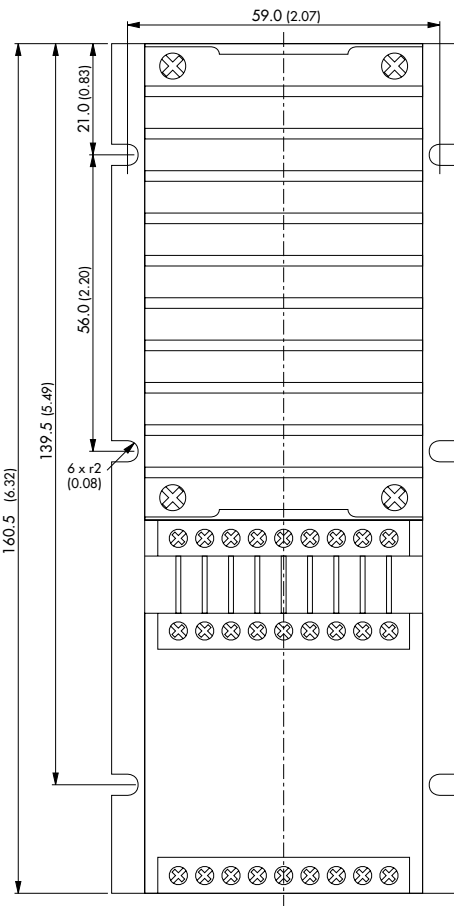
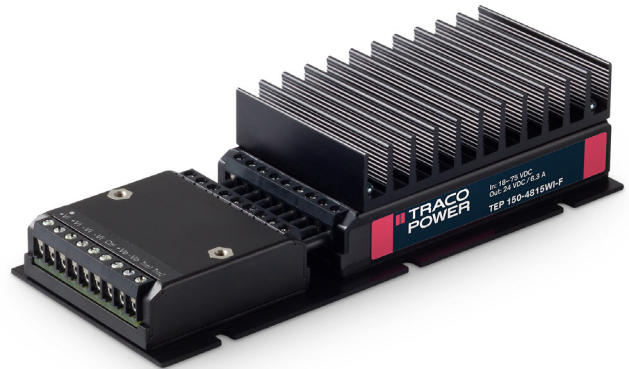
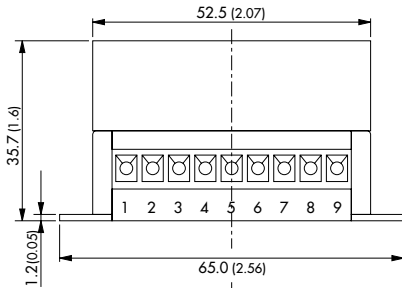


Pin Connection		
pin	function	recommended wire
1	+ Vin	14 - 16 AWG
2	+ Vin	14 - 16 AWG
3	- Vin	14 - 16 AWG
4	- Vin	14 - 16 AWG
5	Remote On/Off	14 - 24 AWG
6	+ Vout	14 - 16 AWG
7	- Vout	14 - 16 AWG
8	Trim	14 - 24 AWG
9	Trim	14 - 24 AWG

Weight: 300 g (10.6oz)

Dimensions in [mm], ( ) = Inch  
Mounting slot tolerance:  $\pm 0.25$  ( $\pm 0.001$ )  
Case tolerances:  $\pm 0.5$  ( $\pm 0.02$ )

**Outline Dimensions**



Pin Connection		
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 On/Off	14 – 24 AWG
6	+ Vout	14 – 16 AWG
7	- Vout	14 – 16 AWG
8	Trim	14 – 24 AWG
9	Trim	14 – 24 AWG

Weight: 435 g (15.3oz)

Dimensions in [mm], ( ) = Inch  
Mounting slot tolerance:  $\pm 0.25$  ( $\pm 0.001$ )  
Case tolerances:  $\pm 0.5$  ( $\pm 0.02$ )

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

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