TRACO POWER

DC/DC Railway Converter

TEP 200WIRCMF Series, 200 Watt

- **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**
- **3-year product warranty**

UL 62368-1 IEC 62368-1

The TEP 200WIRCMF 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 makes these converters interesting solution for battery operated systems. Typical applications are in telecom/datacom, industry control and railway systems for onboard power distribution.

Models

Order Code	Input Voltage Range	Output Voltage nom. (adjustable)	Output Current max.	Efficiency typ.
TEP 200-2412WIRCMF	9 - 36 VDC (24 VDC nom.)	12 VDC (9.6 - 13.2 VDC)	15'000 mA	89 %
TEP 200-2413WIRCMF		15 VDC (12.0 - 16.5 VDC)	12'000 mA	90 %
TEP 200-2415WIRCMF		24 VDC (19.2 - 26.4 VDC)	7'500 mA	90 %
TEP 200-2416WIRCMF		28 VDC (22.4 - 30.8 VDC)	6'500 mA	90 %
TEP 200-2418WIRCMF		48 VDC (38.4 - 52.8 VDC)	3'700 mA	89 %
TEP 200-4812WIRCMF	18 - 75 VDC (48 VDC nom.)	12 VDC (9.6 - 13.2 VDC)	18'000 mA	90 %
TEP 200-4813WIRCMF		15 VDC (12.0 - 16.5 VDC)	14'000 mA	91 %
TEP 200-4815WIRCMF		24 VDC (19.2 - 26.4 VDC)	9'000 mA	90 %
TEP 200-4816WIRCMF		28 VDC (22.4 - 30.8 VDC)	7'500 mA	91 %
TEP 200-4818WIRCMF		48 VDC (38.4 - 52.8 VDC)	4'500 mA	90 %
TEP 200-7212WIRCMF	43 - 160 VDC (110 VDC nom.)	12 VDC (9.6 - 13.2 VDC)	20'000 mA	89 %
TEP 200-7213WIRCMF		15 VDC (12.0 - 16.5 VDC)	16'000 mA	90 %
TEP 200-7215WIRCMF		24 VDC (19.2 - 26.4 VDC)	10'000 mA	89 %
TEP 200-7216WIRCMF		28 VDC (22.4 - 30.8 VDC)	8'500 mA	90 %
TEP 200-7218WIRCMF		48 VDC (38.4 - 52.8 VDC)	5'000 mA	89 %

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Options

TEP-MK1	- Optional DIN-Rail Mounting Kit: www.tracopower.com/overview/tep-mk1
on demand (backorder with MOQ non stocking item)	- Optional model with 3.3 VDC and 50'000 mA Output, and 9 - 36 VDC Input - Optional model with 5 VDC and 36'000 mA Output, and 9 - 36 VDC Input - Optional model with 3.3 VDC and 50'000 mA Output, and 18 - 75 VDC Input - Optional model with 5 VDC and 40'000 mA Output, and 18 - 75 VDC Input - Optional model with 3.3 VDC and 57'000 mA Output, and 43 - 160 VDC Input - Optional model with 5 VDC and 44'000 mA Output, and 43 - 160 VDC Input - Optional models with 2:1 Input - Chassis mount models w/o filter: www.tracopower.com/overview/tep200wircm - Optional models with inverse Remote On/Off function (passive = off)

Input Specifications

Input Current	- At no load	24 Vin models:	**35 mA typ.**
		48 Vin models:	**20 mA typ.**
		110 Vin models:	**10 mA typ.**
Surge Voltage		24 Vin models:	**50 VDC max.** (1 s max.)
		48 Vin models:	**100 VDC max.** (1 s max.)
		110 Vin models:	**185 VDC max.** (1 s max.)
Under Voltage Lockout		24 Vin models:	**7.3 VDC min. / 7.7 VDC typ. / 8.1 VDC max.**
		48 Vin models:	**15.5 VDC min. / 16 VDC typ. / 16.3 VDC max.**
		110 Vin models:	**33 VDC min. / 34.5 VDC typ. / 36 VDC max.**
Recommended Input Fuse		24 Vin models:	**32'000 mA** (fast acting)
		48 Vin models:	**20'000 mA** (fast acting)
		110 Vin models:	**10'000 mA** (fast acting)
			(The need of an external fuse has to be assessed in the final application.)
Input Filter			Internal Pi-Type

Output Specifications

Output Voltage Adjustment			**−20% to +10%** (By external trim resistor)
		See application note:	www.tracopower.com/tep200wircmf-adj/
			Output power must not exceed rated power!
Voltage Set Accuracy			**±1% max.**
Regulation	- Input Variation (Vmin - Vmax)		**0.1% max.**
	- Load Variation (0 - 100%)		**0.1% max.**
Ripple and Noise (20 MHz Bandwidth)		3.3 Vout models:	**75 mVp-p max.** (w/ 1 µF X7R || 25 µF poscap)
		5 Vout models:	**75 mVp-p max.** (w/ 1 µF X7R || 25 µF poscap)
		12 Vout models:	**100 mVp-p max.** (w/ 1 µF X7R || 25 µF poscap)
		15 Vout models:	**100 mVp-p max.** (w/ 1 µF X7R || 25 µF poscap)
		24 Vout models:	**200 mVp-p max.** (w/ 4.7 µF X7R)
		28 Vout models:	**200 mVp-p max.** (w/ 4.7 µF X7R)
		48 Vout models:	**300 mVp-p max.** (w/ 2.2 µF X7R)

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

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Capacitive Load	- 24 Vin input	3.3 Vout models:	151'000 µF max.
		5 Vout models:	72'000 µF max.
		12 Vout models:	12'500 µF max.
		15 Vout models:	8'000 µF max.
		24 Vout models:	3'100 µF max.
		28 Vout models:	2'300 µF max.
		48 Vout models:	770 µF max.
	- 48 Vin input	3.3 Vout models:	151'000 µF max.
		5 Vout models:	80'000 µF max.
		12 Vout models:	15'000 µF max.
		15 Vout models:	9'300 µF max.
		24 Vout models:	3'700 µF max.
		28 Vout models:	2'600 µF max.
		48 Vout models:	930 µF max.
	- 110 Vin input	3.3 Vout models:	172'000 µF max.
		5 Vout models:	88'000 µF max.
		12 Vout models:	16'600 µF max.
		15 Vout models:	10'600 µF max.
		24 Vout models:	4'100 µF max.
		28 Vout models:	3'000 µF max.
		48 Vout models:	1'000 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Hold-up Time			10 ms min. (acc. to EN 50155 Class S2, see application note for ext. capacitor calculation: www.tracopower.com/info/holdup_en50155.pdf)
Start-up Time			75 ms typ.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			120 - 150% of Iout max.
Overvoltage Protection			115 - 130% of Vout 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	EN 50155
	- Certification Documents	www.tracopower.com/tep200wircmf-safety-cert/
Energy Source	- Output, acc. to 62368-1	ES2 (48 Vout models) ES1
Power Source	- Output, acc. to 62368-1	PS3
Pollution Degree		PD 2
Over Voltage Category		Not mains connected

EMC Specifications

EMI (Emissions)		EN 50121-3-2 (EMC for Rolling Stock)
	- Conducted Emissions	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)

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EMS (Immunity)			EN 50121-3-2 (EMC for Rolling Stock)
	- Electrostatic Discharge	Air:	EN 61000-4-2, ±8 kV, perf. criteria A
		Contact:	EN 61000-4-2, ±6 kV, perf. criteria A
	- RF Electromagnetic Field		EN 61000-4-3, 20 V/m, perf. criteria A
	- EFT (Burst) / Surge		EN 61000-4-4, ±2 kV, perf. criteria A
			EN 61000-4-5, ±2 kV, perf. criteria A
		Ext. input component:	24 & 48 Vin models: 2 x KY 220 µF 110 Vin models: 2 x KXJ 150 µF
	- Conducted RF Disturbances		EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous:	EN 61000-4-8, 100 A/m, perf. criteria A
		1 s:	EN 61000-4-8, 1000 A/m, perf. criteria A
EMC / Environmental	- Certification Documents		www.tracopower.com/tep200wircmf-emc-cert/

General Specifications

Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		−40°C to +75°C
	- Case Temperature		+115°C max.
	- Storage Temperature		−40°C to +105°C
Power Derating	- High Temperature		Depending on model
		See application note:	www.tracopower.com/tep200wircmf-cc/
Over Temperature Protection Switch Off	- Protection Mode		120°C typ. (Automatic recovery at 105°C typ.)
	- Measurement Point		Base-Plate
Cooling System			Natural convection (20 LFM)
Sense Function			10% max. of Vout nom. (If sense function is not used, sense pins must be connected to corresponding polarity output pins.)
		See application note:	www.tracopower.com/tep200wircmf-sense/
Remote Control	- Voltage Controlled Remote (passive = on)		On: 3.0 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current		3 mA typ.
	- Remote Pin Input Current		-0.5 to 1.0 mA (Optional models with inverse Remote On/Off function (passive = off))
Altitude During Operation			2'000 m max. (for reinforced insulation) 5'000 m max. (for functional insulation))
Regulator Topology			Forward Converter
Switching Frequency			225 - 275 kHz (PWM) 250 kHz typ. (PWM)
Insulation System			Reinforced Insulation
Working Voltage (rated)			145 VAC (3.3/5 Vout models) 185 VAC (48/53 Vout models) 172 VAC (other Vout models)
Isolation Test Voltage	- Input to Output, 60 s		3'000 VAC
	- Input to Case, 60 s		1'500 VAC
	- Output to Case, 60 s		1'500 VAC
Isolation Resistance	- Input to Output, 500 VDC		1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V		2'500 pF max.
Reliability	- Calculated MTBF		300'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration		MIL-STD-810F EN 61373
	- Mechanical Shock		MIL-STD-810F EN 61373
	- Thermal Shock		MIL-STD-810F
	- Flammability		EN 45545-2 www.tracopower.com/info/en45545-declaration.pdf

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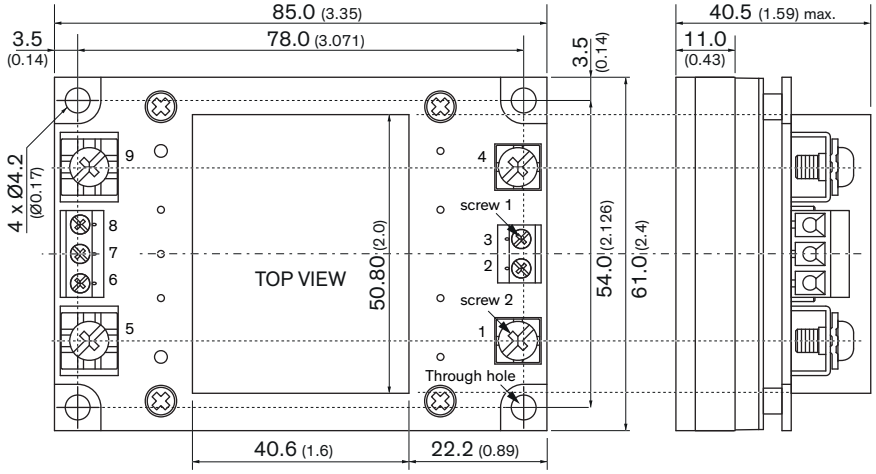
Housing Material		Alu base-plate w. metal case (24 and 48 Vin models) Alu base-plate w. plastic case (110 Vin models)
Base Material		Non-conductive FR4 (UL 94 V-0 rated) (24 and 48 Vin models only)
Potting Material		Silicone (UL 94 V-0 rated)
Housing Type		Metal Case (24 and 48 Vin models) Plastic Case (110 Vin models)
Mounting Type		Chassis Mount
Connection Type		Screw Terminal
Weight		287 g
Thermal Impedance	- Case to Ambient	6.1 K/W typ.
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7(a), 7(c)-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	814f10c5-0fbd-4350-bd50-90d0539e5374

Additional Information

Supporting Documents	www.tracopower.com/overview/tep200wircmf
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf
Service Portal	www.tracoserviceportal.com

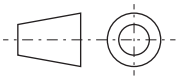
Outline Dimensions



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 M5
Head diameter 8.9 (0.350)
Rated current: 65 A

The screw 1 locked torque: max. 5.2 kgfcm / 0.51 Nm
The screw 2 locked torque: max. 16.5 kgfcm / 1.65 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 dimension:
AWG 14 max.

Note: The size of the wires has to be assessed in the final application.

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