TRACO POWER

DC/DC Railway Converter — TER 100WIR Series, 100 Watt

- **Wide 4:1 input range**
- **EN 50155 and EN 61373 certified**
- **EN 45545-2 fire behavior**
- **Encapsulated quarter-brick (2.3”x1.45”x0.5”) package**
- **–40°C up to +80°C operating temperature without derating**
- **Up to 4'242 VDC I/O isolation**
- **Remote on/off and trim function**
- **Undervoltage lockout (UVLO), short-circuit protection (SCP), overvoltage protection (OVP) and overtemperature protection (OTP)**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The TER 100WIR is a series of high-performance 100 Watt DC/DC converters with a wide 4:1 input voltage range. The TER 100WIR comes in a compact, fully encapsulated quarter-brick package for highest reliability. The converter features continuous short-circuit protection and automatic recovery from over-temperature events, guaranteeing safe and dependable operation. The TER 100WIR is EN 50155 certified for rolling stock applications, EN 61373 certified for mechanical shock and vibration, and EN 45545-2 certified for fire behavior. It comes with IEC/EN/UL 62368-1 safety approvals.

Models

Order Code	Input Voltage Range	Output Voltage nom. (adjustable)	Output Current max. (Forced air cooling)	Efficiency typ.
TER 100-2411WIR	9 - 36 VDC (24 VDC nom.)	5 VDC (4.0 - 5.5 VDC)	20'000 mA	91 %
TER 100-2412WIR		12 VDC (9.6 - 13.2 VDC)	8'330 mA	92 %
TER 100-2413WIR		15 VDC (12.0 - 16.5 VDC)	6'670 mA	92 %
TER 100-2415WIR		24 VDC (19.2 - 26.4 VDC)	4'170 mA	92 %
TER 100-2418WIR		48 VDC (38.4 - 52.8 VDC)	2'080 mA	92 %
TER 100-4811WIR	18 - 75 VDC (48 VDC nom.)	5 VDC (4.0 - 5.5 VDC)	20'000 mA	91 %
TER 100-4812WIR		12 VDC (9.6 - 13.2 VDC)	8'330 mA	92 %
TER 100-4813WIR		15 VDC (12.0 - 16.5 VDC)	6'670 mA	92 %
TER 100-4815WIR		24 VDC (19.2 - 26.4 VDC)	4'170 mA	92 %
TER 100-4818WIR		48 VDC (38.4 - 52.8 VDC)	2'080 mA	92 %
TER 100-7211WIR	40 - 160 VDC (110 VDC nom.)	5 VDC (4.0 - 5.5 VDC)	20'000 mA	91 %
TER 100-7212WIR		12 VDC (9.6 - 13.2 VDC)	8'330 mA	92 %
TER 100-7213WIR		15 VDC (12.0 - 16.5 VDC)	6'670 mA	92 %
TER 100-7215WIR		24 VDC (19.2 - 26.4 VDC)	4'170 mA	92 %
TER 100-7218WIR		48 VDC (38.4 - 52.8 VDC)	2'080 mA	91 %

Options

T4B-HS10	- Optional Heat Sink: www.tracopower.com/overview/t4b-hs10
on demand (backorder with MOQ non stocking item)	- Optional Heat Sink: www.tracopower.com/overview/t4b-hs11 - Optional model(s) with different ratings - Optional models with pre-assembled heatsink - Optional models with inverse Remote On/Off function (passive = off) - Optional models without threads

Input Specifications

Input Current	- At no load	24 Vin models:	8 mA typ.
		48 Vin models:	15 mA typ.
		110 Vin models:	30 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:	7.5 VDC min. / 8 VDC typ. / 8.8 VDC max.
		48 Vin models:	15.5 VDC min. / 16.2 VDC typ. / 17.5 VDC max.
		110 Vin models:	32 VDC min. / 34 VDC typ. / 36 VDC max.
Recommended Input Fuse		24 Vin models:	20'000 mA (fast acting)
		48 Vin models:	12'000 mA (fast acting)
		110 Vin models:	5'000 mA (slow blow)
			(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% (except 54 Vout models)
			−20% to 0% (54 Vout models)
			(By external trim resistor)
		See application note:	www.tracopower.com/ter100wir-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%)		0.2% max. (3.3 & 5 Vout models)
			0.1% max. (other models)
Ripple and Noise	- 20 MHz Bandwidth		100 mVp-p max. (3.3/5 Vout) (w/ 1µF/25V || 47µF/20V)
			75 mVp-p typ. (3.3/5 Vout) (w/ 1µF/25V || 47µF/20V)
			130 mVp-p max. (12/15 Vout) (w/ 22µF/25V)
			90 mVp-p typ. (12/15 Vout) (w/ 22µF/25V)
			265 mVp-p max. (24/28 Vout) (w/ 4.7µF/50V)
			200 mVp-p typ. (24/28 Vout) (w/ 4.7µF/50V)
			400 mVp-p max. (48/54 Vout) (w/ 4.7µF/100V)
			290 mVp-p typ. (48/54 Vout) (w/ 4.7µF/100V)
Capacitive Load		3.3 Vout models:	76'500 µF max.
		5 Vout models:	40'000 µF max.
		12 Vout models:	7'150 µF max.
		15 Vout models:	4'500 µF max.
		24 Vout models:	1'850 µF max.
		28 Vout models:	1'300 µF max.
		48 Vout models:	450 µF max.
		54 Vout models:	370 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			70 ms typ. / 100 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			125 - 170% of Iout max.
			155% typ. of Iout max.

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

Overvoltage Protection		112 - 125% of Vout nom. (48 Vout models) 102 - 111 % of Vout nom. (54 Vout models) 115 - 130 % of Vout nom. (other models)
Transient Response	- Response Deviation	5% typ. / 10% max. (25% Load Step)
	- Response Time	250 µs typ. (25% Load Step)

Safety Specifications

Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Railway Applications	EN 50155
	- Certification Documents	www.tracopower.com/ter100wir-safety-cert/
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 55032 class A (with external filter)
			EN 55032 class B (with external filter)
	- Radiated Emissions		EN 55032 class A (with external filter)
			EN 55032 class B (with external filter)
		External filter proposal:	www.tracopower.com/ter100wir-emc-filter/
EMS (Immunity)			EN 50121-3-2 (EMC for Rolling Stock)
			EN 55035 (Multimedia)
	- 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:	2x 330µF/100V/KY (24 & 48 Vin models) 2x 150µF/200V/KXJ (110 Vin models)
	- 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

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	–40°C to +60°C –40°C to +82°C (with heatsink T4B-HS10) –40°C to +87°C (with heatsink T4B-HS11)
	- Case Temperature	+105°C max.
	- Storage Temperature	–55°C to +125°C
Power Derating	- High Temperature	Depending on model Depending on model (with heatsink T4B-HS10) Depending on model (with heatsink T4B-HS11)
	See application note:	www.tracopower.com/ter100wir-cc/
Over Temperature Protection Switch Off	- Protection Mode	108°C typ. (Automatic recovery at 103°C typ.)
	- Measurement Point	Base-Plate
Cooling System	- Option 1	Forced air cooling (with external fan, 400 LFM)
	- Option 2	Conduction Cooling (with a 450 x 450 x 3.0 mm aluminum plate)
Sense Function		10% max. of Vout nom. (If sense function is not used, sense pins must be connected to corresponding polarity output pins.)

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

Remote Control	- Voltage Controlled Remote (passive = on)	On: 3.0 to 15 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		5'000 m max.
Regulator Topology		Flyback Converter
Switching Frequency		145 - 245 kHz (PWM) 190 kHz typ. (PWM)
Insulation System		Reinforced Insulation (110 Vin models) Basic Insulation (other models)
Working Voltage (rated)	- IEC/EN 62368-1	384 VAC
Isolation Test Voltage	- Input to Output, 60 s	4'242 VDC (110 Vin models) 2'500 VDC (other models)
	- Input to Case, 60 s	2'500 VDC (110 Vin models) 1'600 VDC (other models)
	- Output to Case, 60 s	2'500 VDC (110 Vin models) 1'600 VDC (other models)
Creepage	- Input to Output	4.5 mm min.
Clearance	- Input to Output	4.5 mm min.
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	1'470 pF max.
Distance Through Isolation		0.4 mm
Reliability	- Calculated MTBF	688'300 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
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
Housing Material		Alu base-plate w. plastic case
Base Material		Non-conductive FR4 (UL 94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Tinned Copper
Pin Foundation Plating		Nickel (3 - 5 µm)
Pin Surface Plating		Tin (5 - 7 µm), matte
Housing Type		Plastic Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		Quarter-Brick
Soldering Profile		Lead-Free Wave Soldering 260°C / 6 s max.
Weight		70 g
Thermal Impedance	- Case to Ambient	9.0 K/W typ. 4.2 K/W typ. (with heatsink T4B-HS10) 3.4 K/W typ. (with heatsink T4B-HS11)

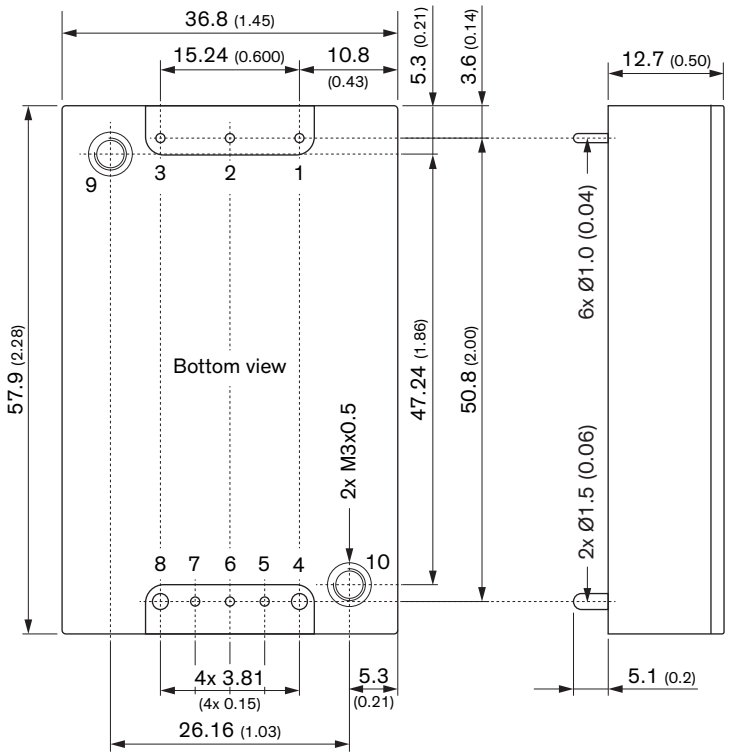
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Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7(a), 7(c)-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	a916626d-5176-4822-b4c5-a06f8de6b4a7

Additional Information

Supporting Documents	www.tracopower.com/overview/ter100wir
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf
Service Portal	www.tracoserviceportal.com
Product Notification Subscription	www.tracopower.com/pcn-sub/ter100wir

Outline Dimensions



Dimensions in mm (inch)
Tolerances: x.x ±0.5 (±0.02)
x.xx ±0.25 (±0.01)
Pin diameter tolerances: ±0.1 (±0.004)
Mounting screw tightening torque: Max. 0.34 N·m (3.5 kgf·cm)

Pinout

Pin	Function
1	–Vin
2	Remote On/Off
3	+Vin
4	–Vout
5	–Sense
6	Trim
7	+Sense
8	+Vout
9	Case
10	Case

Avoid routing PCB traces under the converter.

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