

DC/DC Converter

TEQ 160WIR Series, 160 Watt

- High power block with excellent thermal convection
- Operating temperature -40°C to +75°C without derating
- Increased shock & vibration resistance
- Ultra wide 4:1 input voltage range
- EN 50155 approval for railway applications
- Excellent efficiency up to 90%
- Input filter meet EN 55022, class A
- I/O insulation 1591 VAC
- Under voltage lock-out circuit
- Soft start



The TEQ 160WIR Series is a family of isolated high performance DC/DC converter modules with ultra-wide 4:1 input voltage ranges which come in a rugged, sealed metal case.

These converters are suitable for a wide range of applications, but the product is designed particularly also for industrial applications where often no PCB mounting is possible but the module has to be mounted on a chassis. A very high efficiency and the overall heatsink construction allows an operating temperature up to +75°C with natural convection cooling without power derating and up to +90°C with power derating. Further features include output voltage trimming, Remote On/Off and under voltage lockout. The very wide input voltage range and reverse input voltage protection make these converters also an interesting solution for battery operated systems.

Models				
Order Code	Input Voltage Range	Output Voltage nom.	Output Current max.	Efficiency typ.
TEQ 160-4812WIR	19 - 75 VDC (48 VDC nom.)	12 VDC	13'000 mA	90 %
TEQ 160-4815WIR		24 VDC	6'500 mA	90 %
TEQ 160-4816WIR		28 VDC	5'500 mA	90 %
TEQ 160-4818WIR		48 VDC	3'200 mA	90 %
TEQ 160-7212WIR	43 - 160 VDC (110 VDC nom.)	12 VDC	15'000 mA	89 %
TEQ 160-7215WIR		24 VDC	7'500 mA	89 %
TEQ 160-7216WIR		28 VDC	6'500 mA	89 %
TEQ 160-7218WIR		48 VDC	3'800 mA	89 %

Options	
TEQ-MK1	- Optional DIN-Rail Clip: www.tracopower.com/products/teq-mk1.pdf

Input Specifications

Input Current	- At no load	48 Vin models: 20 mA typ. 110 Vin models: 10 mA typ.
Surge Voltage		48 Vin models: 100 VDC max. (1 s max.) 110 Vin models: 185 VDC max. (1 s max.)
Under Voltage Lockout		48 Vin models: 15.8 - 17 VDC 110 Vin models: 34.5 - 37.5 VDC
Input Filter		Internal Common Mode Choke + Pi-Type

Output Specifications

Output Voltage Adjustment		-20% to +10% (By trim potentiometer) Output power must not exceed rated power!
Voltage Set Accuracy		±1% max.
Regulation	- Input Variation (Vmin - Vmax) - Load Variation (0 - 100%)	0.1% max. 0.1% max.
Ripple and Noise (20 MHz Bandwidth)		12 Vout models: 125 mVp-p max. 24 Vout models: 250 mVp-p max. 28 Vout models: 250 mVp-p max. 48 Vout models: 350 mVp-p max. 12 Vout models: 100 mVp-p typ. 24 Vout models: 200 mVp-p typ. 28 Vout models: 200 mVp-p typ. 48 Vout models: 300 mVp-p typ.
Capacitive Load	- 48 Vin input - 110 Vin input	12 Vout models: 10'800 µF max. 24 Vout models: 2'700 µF max. 28 Vout models: 1'900 µF max. 48 Vout models: 660 µF max. 12 Vout models: 12'500 µF max. 24 Vout models: 3'100 µF max. 28 Vout models: 2'300 µF max. 48 Vout models: 790 µF max.
Minimum Load		Not required
Temperature Coefficient		±0.02 %/K max.
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

Safety Standards	- IT / Multimedia Equipment - Industrial Control Equipment - Railway Applications - Certification Documents	IEC 60950-1 EN 60950-1 UL 60950-1 UL 508 CSA-C22.2, No 107.1 EN 50155 www.tracopower.com/overview/teq160wir
Pollution Degree		PD 2

EMC Specifications

EMI Emissions	- Conducted Emissions - Radiated Emissions	EN 50121-3-2 (EMC for Rolling Stock) EN 55011 class A (internal filter) EN 55032 class A (internal filter) EN 55011 class A (internal filter) EN 55032 class A (internal filter)
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All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.

EMS Immunity		EN 50155 (Railway Applications) EN 50121-3-2 (EMC for Rolling Stock) EN 55024 (IT Equipment) EN 61204-3 (Low Voltage Power Supplies)
	- Electrostatic Discharge	Air: EN 61000-4-2, ± 8 kV, perf. criteria A
	- RF Electromagnetic Field	Contact: EN 61000-4-2, ± 6 kV, perf. criteria A
	- EFT (Burst)	EN 61000-4-3, 20 V/m, perf. criteria A
	- Surge	EN 61000-4-4, ± 2 kV, perf. criteria A
	- Conducted RF Disturbances	EN 61000-4-5, ± 1 kV, perf. criteria A
	- PF Magnetic Field	EN 61000-4-5, ± 2 kV, perf. criteria A
		EN 61000-4-6, 10 Vrms, perf. criteria A
		Continuous: EN 61000-4-8, 100 A/m, perf. criteria A

General Specifications

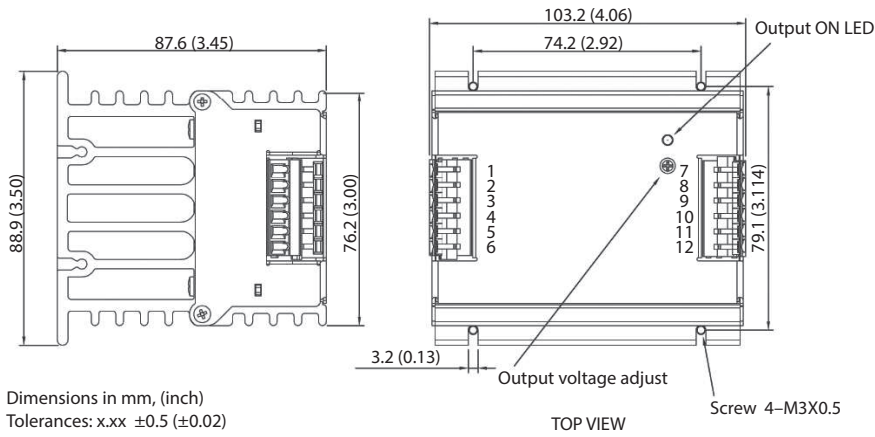
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature - Storage Temperature	-40°C to +90°C -40°C to +105°C
Power Derating	- High Temperature	See application note: www.tracopower.com/overview/teq160wir
Over Temperature Protection Switch Off		105°C min. / 115°C typ. / 120°C max. (Automatic recovery)
Cooling System		Natural convection (20 LFM)
Sense Function		10% max. of V_{out} nom.
Remote Control	- Voltage Controlled Remote - Off Idle Input Current - Remote Pin Input Current	On: 3.0 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit 8 mA max. -0.5 to 1.0 mA
Altitude During Operation		2'000 m max.
Switching Frequency		225 - 275 kHz (PWM) 250 kHz typ. (PWM)
Insulation System		Reinforced Insulation
Isolation Test Voltage	- Input to Output, 60 s - Input to Case, 60 s - Output to Case, 60 s	1'591 VAC 1'131 VAC 1'131 VAC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MOhm min.
Reliability	- Calculated MTBF	400'000 h (MIL-HDBK-217F at 55°C, ground benign)
Environment	- Vibration - Mechanical Shock - Thermal Shock	MIL-STD-810F EN 61373 MIL-STD-810F EN 61373 MIL-STD-810F
Housing Material		Aluminium
Potting Material		Silicone (UL 94 V-0 rated)
Connection Type		Clip
Weight		800 g
Thermal Impedance		1.45 K/W
Environmental Compliance	- Reach - RoHS - Flammability (EN 45545-2)	www.tracopower.com/info/reach-declaration.pdf www.tracopower.com/info/rohs-declaration.pdf www.tracopower.com/info/en45545-declaration.pdf

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/teq160wir
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All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.

Outline Dimensions



Terminal connection		
Terminal	Pin Function	Recommended Wire
1,2	-Vin	12 AWG
3	NC	NC
4	On/Off Ctrl	14 - 18 AWG
5, 6	+Vin	12 AWG
7, 8	-Vout	12 AWG
9	-Sense*	14 - 18 AWG
10	+Sense*	14 - 18 AWG
11, 12	+Vout	12 AWG

NC: No Connection

- * Sense line to be connected to the output either at the module or at the load under regard of polarity.
- The current rating of the terminal block is 15 A/pole.
- Using 2 poles in parallel if the peak output current can exceed 15 A.
- Wire size shall be selected to withstand the peak output current (I_{out max} + Current limitation).