

DC/DC Railway 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
- 3-year product warranty



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 makes these converters also an interesting solution for battery operated systems.

Models

| Order Code | Input Voltage Range | Output Voltage nom. (adjustable) | Output Current max. | Efficiency typ. |
|-----------------|--------------------------------|----------------------------------|---------------------|-----------------|
| TEQ 160-4812WIR | 19 - 75 VDC (48 VDC nom.) | 12 VDC (9.6 - 13.2 VDC) | 13'000 mA | 90 % |
| TEQ 160-4815WIR | | 24 VDC (19.2 - 26.4 VDC) | 6'500 mA | 90 % |
| TEQ 160-4816WIR | | 28 VDC (22.4 - 30.8 VDC) | 5'500 mA | 90 % |
| TEQ 160-4818WIR | | 48 VDC (38.4 - 52.8 VDC) | 3'200 mA | 90 % |
| TEQ 160-7212WIR | 43 - 160 VDC (110 VDC nom.) | 12 VDC (9.6 - 13.2 VDC) | 15'000 mA | 89 % |
| TEQ 160-7215WIR | | 24 VDC (19.2 - 26.4 VDC) | 7'500 mA | 89 % |
| TEQ 160-7216WIR | | 28 VDC (22.4 - 30.8 VDC) | 6'500 mA | 89 % |
| TEQ 160-7218WIR | | 48 VDC (38.4 - 52.8 VDC) | 3'800 mA | 89 % |

Options

| | |
|---------|--|
| TEQ-MK1 | - Optional DIN-Rail Mounting Kit: www.tracopower.com/overview/teq-mk1 |
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Input Specifications

| | | |
|------------------------|--------------|--|
| Input Current | - At no load | 110 Vin models: 10 mA typ. 48 Vin models: 20 mA typ. (12 Vout model) 20 mA typ. (24 Vout model) 20 mA typ. (28 Vout model) 25 mA typ. (48 Vout model) |
| 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: 15.5 VDC min. / 16.5 VDC typ. / 18 VDC max. 110 Vin models: 33 VDC min. / 35.5 VDC typ. / 38 VDC max. |
| Recommended Input Fuse | | (The need of an external fuse has to be assessed in the final application.) |
| Input Filter | | Internal Common Mode Choke + Pi-Type |

Output Specifications

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| 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. |
| 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

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|------------------|--|---|
| Standards | - IT / Multimedia Equipment - Industrial Control Equipment - Railway Applications - Certification Documents | EN 62368-1 IEC 62368-1 UL 62368-1 UL 508 CSA-C22.2, No. 107.1 EN 50155 www.tracopower.com/overview/teq160wir |
| Pollution Degree | | PD 2 |

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

EMC Specifications

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|---------------------|--|--|
| EMI (Emissions) | - Conducted Emissions | EN 50121-3-2 (EMC for Rolling Stock) 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) |
| EMS (Immunity) | | EN 61204-3 (Low Voltage Power Supplies) EN 50121-3-2 (EMC for Rolling Stock) EN 55024 (IT Equipment) 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, ± 1 kV, perf. criteria A EN 61000-4-5, ± 2 kV, perf. criteria A |
| | - Conducted RF Disturbances - PF Magnetic Field | EN 61000-4-6, 10 Vrms, perf. criteria A Continuous: EN 61000-4-8, 100 A/m, perf. criteria A |
| EMC / Environmental | - Certification Documents | www.tracopower.com/overview/teq160wir |

General Specifications

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| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature | -40°C to +90°C |
| | - Storage Temperature | -40°C to +105°C |
| Power Derating | - High Temperature | Depending on model |
| | | See application note: www.tracopower.com/overview/teq160wir |
| Over Temperature Protection Switch Off | - Protection Mode | 105°C min. / 115°C typ. / 120°C max. (Automatic recovery) |
| Cooling System | | Natural convection (20 LFM) |
| Sense Function | | 10% max. of Vout nom. |
| 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 | 8 mA max. |
| | - Remote Pin Input Current | -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 |
| Working Voltage (rated) | | 182 VAC |
| Isolation Test Voltage | - Input to Output, 60 s | 2'250 VDC |
| | - Input to Case, 60 s | 1'600 VDC |
| | - Output to Case, 60 s | 1'600 VDC |
| Isolation Resistance | - Input to Output, 500 VDC | 1'000 M Ω min. |
| Reliability | - Calculated MTBF | 400'000 h (MIL-HDBK-217F at 55°C, 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 |
| Housing Material | | Aluminum |
| Potting Material | | Silicone (UL 94 V-0 rated) |
| Housing Type | | Metal Case |

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

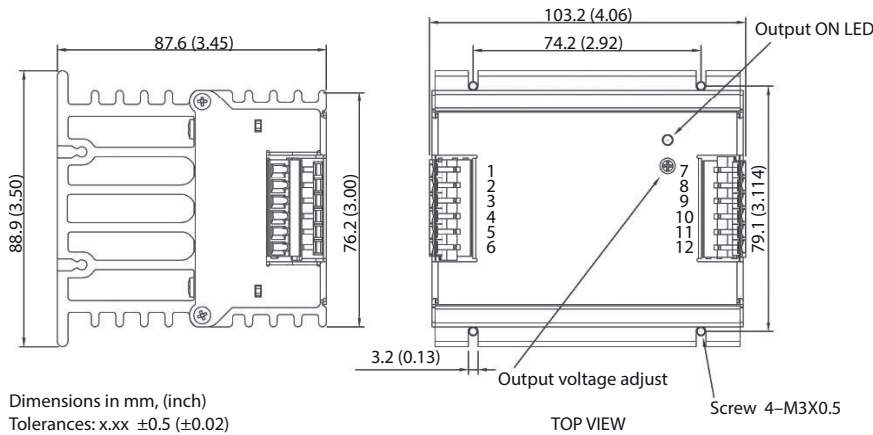
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|--------------------------|---|
| Mounting Type | Chassis Mount |
| Connection Type | Spring Clamps |
| Weight | 800 g |
| Thermal Impedance | - Case to Ambient 1.45 K/W typ. |
| Environmental Compliance | - REACH Declaration www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant - RoHS Declaration www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a, 7c-l (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule.)) - SCIP Reference Number 2ff38252-a003-4575-ab82-5cf26842ecfe |

Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/teq160wir

Outline Dimensions



| Terminal connection | | |
|---------------------|--------------|------------------|
| Terminal | Pin Function | Recommended Wire |
| 1,2 | -Vin | 12 AWG |
| 3 | 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: Not connected

- * 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).

Dimensions in mm, (inch)
Tolerances: x.xx ±0.5 (±0.02)
Mounting screw locked torque: max. 5.0 kgfcm / 0.49 Nm