DC/DC Converter

**TEN 40WIE Series, 40 Watt**

- Developed to maximize quality in a cost efficient design
- Excellent temperature capabilities
- 2” x 1” metal package (6-side shielded)
- Wide 4:1 input voltage range: 9-36, 18-75 VDC
- Minimal heat development due to high efficiencies up to 93%
- Operating temperature range -40 to +85°C
- 1600 VDC I/O-isolation
- Remote On/Off and Trim function
- Protection against short circuit, overvoltage and overtemperature
- 3-year product warranty

The TEN 40WIE is rounding out Traco Power’s existing 40 Watt product range. Driven by current market trends this series was developed to maximize quality and cost efficiency in one product. Due to a new design approach the TEN 40WIE thus offers a cost efficient solution with not only no concession on quality or reliability but even improved specifications compared to its predecessor. It comes in a standard 2” x 1” metal package with a 4:1 input voltage range. High efficiencies of up to 93% allow for an operating temperature range (natural convection) of -40 to +70°C without power derating (model dependent). Certified according to the latest IT standard (IEC/EN/UL 62368-1) and equipped with additional features like remote on/off function and protection against short circuit, overvoltage and over temperature the TEN 40WIE series is suitable for many industrial applications.

### Models

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Input Voltage Range</th>
<th>Output 1</th>
<th>Output 2</th>
<th>Efficiency typ.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEN 40-2410WIE</td>
<td>9 - 36 VDC</td>
<td>3.3 VDC</td>
<td>12’200 mA</td>
<td>90 %</td>
</tr>
<tr>
<td>TEN 40-2411WIE</td>
<td>5 - 36 VDC</td>
<td>5 VDC</td>
<td>8’000 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TEN 40-2412WIE</td>
<td>12 VDC</td>
<td>12 VDC</td>
<td>3’333 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TEN 40-2413WIE</td>
<td>15 VDC</td>
<td>15 VDC</td>
<td>2’666 mA</td>
<td>93 %</td>
</tr>
<tr>
<td>TEN 40-2415WIE</td>
<td>24 VDC</td>
<td>24 VDC</td>
<td>1’666 mA</td>
<td>91 %</td>
</tr>
<tr>
<td>TEN 40-2422WIE</td>
<td>+12 VDC</td>
<td>+12 VDC</td>
<td>1’666 mA</td>
<td>91 %</td>
</tr>
<tr>
<td>TEN 40-2423WIE</td>
<td>+15 VDC</td>
<td>+15 VDC</td>
<td>1’333 mA</td>
<td>91 %</td>
</tr>
<tr>
<td>TEN 40-2425WIE</td>
<td>+24 VDC</td>
<td>+24 VDC</td>
<td>833 mA</td>
<td>91 %</td>
</tr>
<tr>
<td>TEN 40-4810WIE</td>
<td>18 - 75 VDC</td>
<td>3.3 VDC</td>
<td>12’200 mA</td>
<td>90 %</td>
</tr>
<tr>
<td>TEN 40-4811WIE</td>
<td>5 VDC</td>
<td>5 VDC</td>
<td>8’000 mA</td>
<td>91 %</td>
</tr>
<tr>
<td>TEN 40-4812WIE</td>
<td>12 VDC</td>
<td>12 VDC</td>
<td>3’333 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TEN 40-4813WIE</td>
<td>15 VDC</td>
<td>15 VDC</td>
<td>2’666 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TEN 40-4815WIE</td>
<td>24 VDC</td>
<td>24 VDC</td>
<td>1’666 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TEN 40-4822WIE</td>
<td>+12 VDC</td>
<td>+12 VDC</td>
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<td>91 %</td>
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<td>TEN 40-4823WIE</td>
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<td>91 %</td>
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<td>+24 VDC</td>
<td>+24 VDC</td>
<td>833 mA</td>
<td>91 %</td>
</tr>
</tbody>
</table>

### Options

- Models with factory assembled heat-sink
- Models with inverse remote control

www.tracopower.com  January 27, 2021
### Input Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>24 Vin models</th>
<th>48 Vin models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current at no load</td>
<td>15 mA typ.</td>
<td>10 mA typ.</td>
</tr>
<tr>
<td>Surge Voltage</td>
<td>50 VDC max. (1 s max)</td>
<td>100 VDC max. (1 s max)</td>
</tr>
<tr>
<td>Under Voltage Lockout</td>
<td>7 VDC min. / 8 VDC typ. / 8.8 VDC max.</td>
<td>15 VDC min. / 16 VDC typ. / 17.5 VDC max.</td>
</tr>
<tr>
<td>Recommended Input Fuse</td>
<td>8'000 mA (fast acting)</td>
<td>4'000 mA (slow blow)</td>
</tr>
<tr>
<td></td>
<td>(The need of an external fuse has to be assessed in the final application)</td>
<td></td>
</tr>
<tr>
<td>Filter</td>
<td>Internal Pi-Type</td>
<td></td>
</tr>
</tbody>
</table>

### Output Specifications

#### Output Voltage Adjustment

<table>
<thead>
<tr>
<th>Voltage Set Accuracy</th>
<th>±1% max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulation - Input Variation (Vmin - Vmax)</td>
<td>±10% (other models)</td>
</tr>
<tr>
<td></td>
<td>(Single models only)</td>
</tr>
<tr>
<td></td>
<td>(By external trim resistor)</td>
</tr>
<tr>
<td>Load Variation (0 - 100%)</td>
<td>0.2% max.</td>
</tr>
<tr>
<td>Cross Regulation (25% / 100% asym. load)</td>
<td>0.3% max.</td>
</tr>
<tr>
<td></td>
<td>0.5% max. (Output 1)</td>
</tr>
<tr>
<td></td>
<td>0.5% max. (Output 2)</td>
</tr>
<tr>
<td></td>
<td>5% max.</td>
</tr>
</tbody>
</table>

#### Ripple and Noise

- Single output: 3.3 Vout models: 75 mVp-p typ. 5 Vout models: 75 mVp-p typ. 12 Vout models: 100 mVp-p typ. 15 Vout models: 100 mVp-p typ. 24 Vout models: 150 mVp-p typ.
- Dual output: 12 / -12 Vout models: 100 / 100 mVp-p typ. 15 / -15 Vout models: 100 / 100 mVp-p typ. 24 / -24 Vout models: 150 / 150 mVp-p typ.

#### Capacitive Load

- Single output: 3.3 Vout models: 22'000 µF max. 5 Vout models: 12'000 µF max. 12 Vout models: 2'000 µF max. 15 Vout models: 1'300 µF max. 24 Vout models: 490 µF max.
- Dual output: 12 / -12 Vout models: 980 / 980 µF max. 15 / -15 Vout models: 630 / 630 µF max. 24 / -24 Vout models: 250 / 250 µF max.

#### Minimum Load

- Not required

#### Temperature Coefficient

- ±0.02 %/K max.

#### Start-up Time

- 30 ms typ. / 60 ms max.

#### Short Circuit Protection

- Continuous, Automatic recovery

#### Output Current Limitation

- 150% typ. of Iout max.

#### Overvoltage Protection

- 125% typ. of Vout nom. (By Zener diode)

#### Transient Response

- Response Time: 250 µs typ. (25% Load Step)

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

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### Safety Specifications

**Safety Standards**
- IT / Multimedia Equipment
  - EN 62368-1
  - IEC 62368-1
  - UL 62368-1
  - www.tracopower.com/overview/ten40wie

**EMC Specifications**

**EMI Emissions**
- Conducted Emissions
  - EN 55032 class A (with external filter)
- Radiated Emissions
  - EN 55032 class B (with external filter)

**EMS Immunity**
- 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
  - EFT (Burst) / Surge
  - EN 61000-4-4, ±2 kV, perf. criteria A
- Conducted RF Disturbances
  - Continuous: EN 61000-4-6, 10 Vrms, perf. criteria A
  - PF Magnetic Field
  - Ext. input component: 2 x KY 220 µF // SMDJ36A (12 Vin models)
  - 2 x KY 220 µF // SMDJ58A (24 Vin models)
  - 2 x KY 220 µF // SMDJ120A (48 Vin models)

**General Specifications**

**Relative Humidity**
- 95% max. (non condensing)

**Temperature Ranges**
- Operating Temperature
  - -40°C to +85°C
- Case Temperature
  - +105°C max.
- Storage Temperature
  - -55°C to +125°C

**Power Derating**
- High Temperature
  - See application note: www.tracopower.com/overview/ten40wie
  - Protection Mode
  - 115°C typ. (Automatic recovery)

**Cooling System**
- Natural convection (20 LFM)

**Remote Control**
- Voltage Controlled Remote
  - 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

**Altitude During Operation**
- 2'000 m max.

**Switching Frequency**
- 225 - 275 kHz (PWM)
- 250 kHz typ. (PWM)

**Insulation System**
- Functional insulation

**Isolation Test Voltage**
- Input to Output, 60 s
  - 1'600 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 MΩ min.

**Isolation Capacitance**
- Input to Output, 100 kHz, 1 V
  - 1'500 pf max.

**Reliability**
- MTBF
  - 1'245'000 h (MIL-HDBK-217F, ground benign)

**Environment**
- Vibration
- Mechanical Shock
- Thermal Shock
  - MIL-STD-810F
  - MIL-STD-810F
  - MIL-STD-810F

**Housing Material**
- Copper

**Base Material**
- Non-conductive FR4 (UL94 V-0 rated)

**Potting Material**
- Silicone (UL 94 V-0 rated)

**Pin Material**
- Copper

All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.
**Pin Foundation Plating**  
**Nickel** (2 - 3 µm)

**Pin Surface Plating**  
**Tin** (3 - 5 µm), matte

**Connection Type**  
**THD** (Through-Hole Device)

**Weight**  
34 g

**Thermal Impedance**  
10.8 K/W  
10.3 K/W (with Heat Sink)

**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-1

**Supporting Documents**  
Overview Link (for additional Documents)  
www.tracopower.com/overview/ten40wie

**Outline Dimensions**

**Pinout**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Single</th>
<th>Dual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Vin (Vcc)</td>
<td>+Vin (Vcc)</td>
</tr>
<tr>
<td>2</td>
<td>–Vin (GND)</td>
<td>–Vin (GND)</td>
</tr>
<tr>
<td>3</td>
<td>Remote On/Off</td>
<td>Remote On/Off</td>
</tr>
<tr>
<td>4</td>
<td>+Vout</td>
<td>+Vout</td>
</tr>
<tr>
<td>5</td>
<td>–Vout</td>
<td>Common</td>
</tr>
<tr>
<td>6</td>
<td>Trim</td>
<td>–Vout</td>
</tr>
</tbody>
</table>

**Dimensions in mm (inch)**  
Tolerances:  
xx ±0.5 (±0.02)  
xxx ±0.25 (±0.01)  
Pin dimension tolerance ±0.1 (±0.004)