DC/DC Converter

THR 40WI Series, 40 Watt

- Reinforced I/O-isolation 3000 VAC
- Shock and vibration resistance according to EN 61373
- Wide 4:1 input voltage range: 36-160 VDC
- Operating temperature range -40 to +80°C
- High efficiency up to 90%
- Protection against overload, overvoltage and short circuit
- 3-year product warranty

The THR 40WI is 40 Watt DC/DC converters series with reinforced isolation (3000 VAC). These regulated DC/DC converters come in either a 2"x1" package and also feature increased resistance against shock and vibration according to EN 61373. High efficiencies up to 90% allow safe operation from -40°C to +70°C (with derating). All models have a wide 4:1 input voltage range and precisely regulated, isolated output voltages. With the latest IT safety certifications (IEC/EN/UL 62368-1) the THR 40WI series is the perfect choice for many demanding applications in the industrial, transportation and instrumentation sectors.

### Models

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Input Voltage Range</th>
<th>Output 1</th>
<th>Output 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vnom</td>
<td>Imax</td>
<td>Vnom</td>
</tr>
<tr>
<td>THR 40-7211WI</td>
<td>5 VDC</td>
<td>8'000 mA</td>
<td></td>
</tr>
<tr>
<td>THR 40-7212WI</td>
<td>12 VDC</td>
<td>3'330 mA</td>
<td></td>
</tr>
<tr>
<td>THR 40-7213WI</td>
<td>15 VDC</td>
<td>2'670 mA</td>
<td></td>
</tr>
<tr>
<td>THR 40-7215WI</td>
<td>24 VDC</td>
<td>1'670 mA</td>
<td></td>
</tr>
<tr>
<td>THR 40-7214WI</td>
<td>54 VDC</td>
<td>741 mA</td>
<td></td>
</tr>
<tr>
<td>THR 40-7222WI</td>
<td>+12 VDC</td>
<td>1'670 mA</td>
<td>-12 VDC</td>
</tr>
<tr>
<td>THR 40-7223WI</td>
<td>+15 VDC</td>
<td>1'330 mA</td>
<td>-15 VDC</td>
</tr>
</tbody>
</table>

### Options

- Optional models with heatsink

[www.tracopower.com](http://www.tracopower.com)
### Input Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Current</strong></td>
<td>- At no load: 40 mA typ.</td>
</tr>
<tr>
<td></td>
<td>- At full load: 409 mA typ.</td>
</tr>
<tr>
<td><strong>Surge Voltage</strong></td>
<td>170 VDC max. (100 ms max.)</td>
</tr>
<tr>
<td><strong>Under Voltage Lockout</strong></td>
<td>30 VDC min. / 33 VDC typ. / 35.5 VDC max.</td>
</tr>
<tr>
<td><strong>Recommended Input Fuse</strong></td>
<td>(The need of an external fuse has to be assessed in the final application.)</td>
</tr>
<tr>
<td><strong>Input Filter</strong></td>
<td>Internal Pi-Type</td>
</tr>
</tbody>
</table>

### Output Specifications

#### Output Voltage Adjustment

- **Input Variation (Vmin - Vmax)**
  - single output models: 0.2% max.
  - dual output models: 0.2% max.
- **Load Variation (0 - 100%)**
  - single output models: 0.5% max.
  - dual output models: 1% max. (Output 1)
  - 1% max. (Output 2)
- **Voltage Balance (symmetrical load)**
  - dual output models: 2% max.

#### Ripple and Noise (20 MHz Bandwidth)

- **single output**
  - 5 Vout models: 75 mVp-p typ. (w/ 1 µF, 100 V MLCC)
  - 12 Vout models: 125 mVp-p typ. (w/ 1 µF, 100 V MLCC)
  - 15 Vout models: 125 mVp-p typ. (w/ 1 µF, 100 V MLCC)
  - 24 Vout models: 150 mVp-p typ. (w/ 1 µF, 100 V MLCC)
  - 54 Vout models: 250 mVp-p typ. (w/ 1 µF, 100 V MLCC)
- **dual output**
  - 12 / -12 Vout models: 125 / 125 mVp-p typ. (w/ 1 µF, 100 V MLCC)
  - 15 / -15 Vout models: 125 / 125 mVp-p typ. (w/ 1 µF, 100 V MLCC)
- **single output**
  - 5 Vout models: 85 mVp-p max. (w/ 1 µF, 100 V MLCC)
  - 12 Vout models: 140 mVp-p max. (w/ 1 µF, 100 V MLCC)
  - 15 Vout models: 140 mVp-p max. (w/ 1 µF, 100 V MLCC)
  - 24 Vout models: 170 mVp-p max. (w/ 1 µF, 100 V MLCC)
  - 54 Vout models: 280 mVp-p max. (w/ 1 µF, 100 V MLCC)
- **dual output**
  - 12 / -12 Vout models: 140 / 140 mVp-p max. (w/ 1 µF, 100 V MLCC)
  - 15 / -15 Vout models: 140 / 140 mVp-p max. (w/ 1 µF, 100 V MLCC)

#### Capacitive Load

- **single output**
  - 5 Vout models: 13.8600 µF max.
  - 12 Vout models: 2.4000 µF max.
  - 15 Vout models: 1.5000 µF max.
  - 24 Vout models: 600 µF max.
  - 54 Vout models: 130 µF max.
- **dual output**
  - 12 / -12 Vout models: 1’200 / 1’200 µF max.
  - 15 / -15 Vout models: 750 / 750 µF max.

#### Minimum Load

- Not required

#### Temperature Coefficient

- ±0.02 %/K max.

#### Start-up Time

- 30 ms typ.

#### Short Circuit Protection

- Continuous, Automatic recovery

#### Output Current Limitation

- 110 - 185% of Iout max.
- 150% typ. of Iout max.

#### Overvoltage Protection

- 125% typ. of Vout nom.

#### Transient Response

- **Response Deviation**
  - 3% typ. / 5% max. (75% to 100% Load Step)
- **Response Time**
  - 250 µs typ. (75% to 100% Load Step)

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

---

www.tracopower.com  January 31, 2022  Page 2 / 4
## Safety Specifications

<table>
<thead>
<tr>
<th>Safety Standards</th>
<th>EN 62368-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>- IT / Multimedia Equipment</td>
<td>IEC 62368-1</td>
</tr>
<tr>
<td>- Certification Documents</td>
<td>UL 62368-1</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.tracopower.com/overview/thr40wi">www.tracopower.com/overview/thr40wi</a></td>
</tr>
</tbody>
</table>

## EMC Specifications

<table>
<thead>
<tr>
<th>EMI Emissions</th>
<th>- Conducted Emissions</th>
<th>EN 55032 class A (with external filter)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>EN 55032 class B (with external filter)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FCC Part 15 class A (with external filter)</td>
</tr>
<tr>
<td>- Radiated Emissions</td>
<td>EN 55032 class A (with external filter)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EN 55032 class B (with external filter)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FCC Part 15 class A (with external filter)</td>
<td></td>
</tr>
</tbody>
</table>

**External filter proposal:** www.tracopower.com/overview/thr40wi

<table>
<thead>
<tr>
<th>EMS Immunity</th>
<th>- Electrostatic Discharge</th>
<th>EN 55035 (Multimedia)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Air:</td>
<td>EN 61000-4-2, ±8 kV, perf. criteria A</td>
</tr>
<tr>
<td></td>
<td>Contact:</td>
<td>EN 61000-4-2, ±6 kV, perf. criteria A</td>
</tr>
<tr>
<td></td>
<td>- RF Electromagnetic Field</td>
<td>EN 61000-4-3, 20 V/m, perf. criteria A</td>
</tr>
<tr>
<td></td>
<td>- EFT (Burst) / Surge</td>
<td>EN 61000-4-4, ±2 kV, perf. criteria A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EN 61000-4-5, ±2 kV, perf. criteria A</td>
</tr>
</tbody>
</table>

**External filter proposal:** www.tracopower.com/overview/thr40wi

| - Conducted RF Disturbances | Continuous: | EN 61000-4-6, 10 Vrms, perf. criteria A |
| - PF Magnetic Field |                         | 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 +70°C
- Case Temperature: +105°C max.
- Storage Temperature: ±50°C to +125°C

### Power Derating

- See application note: www.tracopower.com/overview/thr40wi
- Natural convection (20 LFM)

### Remote Control

- Voltage Controlled Remote: On: 3.5 to 12 VDC or open circuit
  Off: 0 to 1.2 VDC or short circuit
  Refers to 'Remote' and '-Vin' Pin
  2.5 mA typ.
- Off Idle Input Current: -0.5 to 0.5 mA

### Altitude During Operation

- 4'000 m max.

### Switching Frequency

- 220 - 310 kHz (PWM)
- 265 kHz typ. (PWM)

### Insulation System

- Reinforced Insulation

### Working Voltage (rated)

- 250 VAC

### Isolation Test Voltage

- Input to Output: 60 s
- Input to Case: 60 s
- Output to Case: 60 s
- 3'000 VAC
- 1'500 VAC
- 1'500 VAC

### Isolation Resistance

- Input to Output: 500 VDC
- 1'000 MΩ min.

### Isolation Capacitance

- Input to Output: 100 kHz, 1 V
- 1'500 pF typ.

### Reliability

- Calculated MTBF: 900'000 h (MIL-HDBK-217F, ground benign)

### Washing Process

- Allowed (hermetical product)

### Environment

- Vibration: EN 61373
- Mechanical Shock: EN 61373

### Housing Material

- Plastic base-plate w. metal case

### Base Material

- Non-conductive FR4 (UL 94 V-0 rated)

### Isolation Frame Material

- Non-conductive Plastic (UL 94 V-0 rated)

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
Potting Material | Silicone (UL 94 V-0 rated)
---|---
Pin Material | Copper Alloy (C6801)
Pin Foundation Plating | Nickel (2 - 4 µm)
Pin Surface Plating | Tin (3 - 5 µm), matte
Housing Type | Metal Case
Mounting Type | PCB Mount
Connection Type | THD (Through-Hole Device)
Footprint Type | 2" x 1"
Soldering Profile | 260°C / 10 s max.
Weight | 51.5 g

Environmental Compliance
- REACH Declaration
  [www.tracopower.com/info/reach-declaration.pdf](http://www.tracopower.com/info/reach-declaration.pdf)
  - REACH SVHC list compliant
  - REACH Annex XVII compliant
- RoHS Declaration
  Exemptions: 7a
  (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)

Supporting Documents
Overview Link (for additional Documents) [www.tracopower.com/overview/thr40wi](http://www.tracopower.com/overview/thr40wi)

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: x.x ±0.75 (±0.03) x.xx ±0.25 (±0.01) Pin diameter ±0.05 (±0.002)