# DC/DC Converters

## TEP 100WIR Series, 100 Watt

### Features

- Compact metal package
- Ultra wide 4:1 input voltage ranges 8.5–36, 16.5–75, 43–160 VDC
- EN 50155 approval for railway applications
- Very high efficiency up to 92%
- No minimum load
- Soft start
- Ajustable output voltage +10/-20%
- Sense line
- Remote On/Off input
- Under voltage lock-out circuit
- Reverse input voltage protection
- Over temperature protection
- Optional Heatsink
- Optional as chassis mount models with screw terminal block and EMI Filter
- 3-year product warranty

(Models pictured with optional heatsink)

The TEP 100WIR 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 industry standard half brick package.
A very high efficiency allows full power operation without forced air cooling at 60°C This temperature can be increased to 70°C with optional mounted heatsink or up to 85°C when mounted on an iron base plate. The very wide input voltage range and reverse input voltage protection make these converters interesting solution for battery operated systems. Typical applications are in telecom/datacom, industry control and railway systems for on board power distribution.
These series is available in many optional designs on demand --> see options.

### Standard Models

| Order code | Input voltage | Output voltage | Output current max. | Efficiency typ. |
|---|---|---|---|---|
| TEP 100–2412WIR | 8.5 – 36 VDC (24 VDC nominal) | 12 VDC | 8.4 A | 90 % |
| TEP 100–2415WIR | | 24 VDC | 4.2 A | 90 % |
| TEP 100–2416WIR | | 28 VDC | 3.6 A | 90 % |
| TEP 100–2418WIR | | 48 VDC | 2.1 A | 90 % |
| TEP 100–4812WIR | 16.5 – 75 VDC (48 VDC nominal) | 12 VDC | 8.4 A | 90 % |
| TEP 100–4815WIR | | 24 VDC | 4.2 A | 90 % |
| TEP 100–4816WIR | | 28 VDC | 3.6 A | 92 % |
| TEP 100–4818WIR | | 48 VDC | 2.1 A | 91 % |
| TEP 100–7212WIR | 43 – 160 VDC (110 VDC nominal) | 12 VDC | 8.4 A | 90 % |
| TEP 100–7215WIR | | 24 VDC | 4.2 A | 90 % |
| TEP 100–7216WIR | | 28 VDC | 3.6 A | 90 % |
| TEP 100–7218WIR | | 48 VDC | 2.1 A | 91 % |

### Options

| | |
|---|---|
| TEP-HS1 | Heat-sink for standard version (incl. mounting screws and thermal pad) |
| TEP-MK1 | Din-rail mounting kit for chassis mount models (incl. mounting screws) |
| TCK-xxx | Common mode chokes for filter proposals to meet EN55022 class A/B --> see application note |
| on demand | Models with 3.3 VDC/~ 25 A or 5.0 VDC/~ 20 A or 15 VDC/~ 6.7 A output |
| | Chassis mount models with screw terminal block |
| | Chassis mount models with screw terminal block and input filter to meet EN 555022 class A |
| | Negative (passive = Off) Remote On/Off function (standard is passive = On) |
| | Sync pin to synchronize switching frequency of up to 3 units (EMC reason) |

## Input Specifications

| | | |
|---|---|---|
| Input current at no load (nominal input voltage) | 24 Vin models:<br>48 Vin models:<br>110 Vin models: | 25 mA typ.<br>20 mA typ.<br>10 mA typ. |
| Start-up voltage | 24 Vin models:<br>48 Vin models:<br>110 Vin models: | 9.0 VDC max.<br>18 VDC max.<br>43 VDC max. |
| Under voltage shut down (lock-out circuit) | 24 Vin models:<br>48 Vin models:<br>110 Vin models: | 7.3 – 8.1 VDC<br>15.5 – 16.3 VDC<br>33.0 – 36.0 VDC |
| Surge voltage (1 sec. max.) | 24 Vin models:<br>48 Vin models:<br>110 Vin models: | 50 VDC<br>100 VDC<br>185 VDC |
| Conducted noise | | EN 55022 class A/B with external components<br>see application note |
| ESD (electrostatic discharge) | | EN 61000-4-2, air ±8 kV, contact ±6 kV,<br>perf. criteria A |
| Radiated immunity | | EN 61000-4-3, 20 V/m, perf. criteria A |
| Fast transient / Surge | | EN 61000-4-4, ±2 kV, perf. criteria A<br>EN 61000-4-5, ±2 kV perf. criteria A<br>With external input capacitor: |
| | 24 / 48 Vin models:<br>110 Vin models: | 2 chemi-con KY 220 µF, 100 V, ESR 48 mOhm<br>2 chemi-con KXJ 150 µF, 250 V |
| Conducted immunity | | EN 61000-4-6, 10 Vrms, perf. criteria A |
| Reverse voltage protection | | parallel diode |
| Recommended input fuse (slow blow) | 24 Vin models:<br>48/110 Vin models: | 20 A<br>10 A |

## Output Specifications

| | | |
|---|---|---|
| Voltage set accuracy (at full load, nominal input) | | ±1 % |
| Output voltage adjustment | | +10 % / –20 % by external resistor<br>see application note |
| Regulation | – Input variation Vin min. to Vin max.<br>– Load variation (0 – 100%) | 0.1 % max.<br>0.1 % max. |
| Temperature coefficient | | ±0.02 %/K |
| Minimum load | | not required |
| Remote sense | | 10 % max. of Vout nom.<br>(trim up value to subtract) |
| Ripple and noise (20 MHz Bandwidth) | 12 VDC models:<br>24 / 28 VDC models:<br>48 VDC models: | 100 mVp-p typ.<br>200 mVp-p typ.<br>300 mVp-p typ. |
| Start up time (nominal Vin and constant resistive load) | | 75 ms typ. (at power On or remote On) |
| Transient response (25% load step change) | | 250 µs max. |
| Output current limitation | | at 120 – 150 % of Iout max. |
| Over voltage protection | | at 115 – 130 % of Vout nom. |
| Short circuit protection | | continuous, automatic recovery. |
| Max. capacitive load | 12 VDC models:<br>24 VDC models:<br>28 VDC models:<br>48 VDC models: | 7'000 µF<br>1'750 µF<br>1'280 µF<br>430 µF |

## General Specifications

| | | | |
|---|---|---|---|
| Temperature ranges | – Operating | | –40°C to +75°C (with derating) |
| | – Case temperature | | +115°C max. |
| | – Storage | | –55°C to +125°C |
| Thermal impedance | – without heat-sink | | 6.7°C/W |
| | – with heat-sink | | 4.7°C/W |
| Power Derating | | | depending on installation! |
| | – without heat-sink | | 3.3 %/K above +55°C |
| | – with heat-sink | | 4.0 %/K above +65°C |
| | – with iron base plate (19" x 3.5" x 0.063") | | 6.7 %/K above +85°C |
| | | | please refer to application note for temperature measure point that should not exceed 115°C. |
| Over temperature protection | | | at +120°C |
| Thermal shock, mechanical shock & vibration | | | EN 61373, MIL-STD-810F |
| | – Test conditions | | www.tracopower.com/products/mil810.pdf |
| Humidity (non condensing) | | | 95 % rel H max. |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign) | | | 400'000 h |
| Isolation voltage (60sec.) | – Input/Output | 110 Vin models: | 3'000 VDC (reinforced insulation) |
| | – Input/ Case | | 1'500 VDC |
| | – Input/Ouput | other models: | 2'250 VDC (basic insulation) |
| | – Input/Case | | 1'600 VDC |
| Isolation capacitance | – Input/Output | | 2500 pF max. |
| Isolation resistance | – Input/Output (500 VDC) | | >1 GOhm min. |
| Switching frequency | | 24 / 48 Vin models: | 250 kHz typ. (pulse width modulation) |
| | | 110 Vin models: | 300 kHz typ. (pulse width modulation) |
| Safety standards | | | EN 50155, UL 60950-1, IEC/EN 60950-1 |
| Safety approvals | – UL/cUL | | www.ul.com -> certifications -> File e188913 |
| | – Railway | | www.tracopower.com/products/tep-coc.pdf pending |
| Remote On/Off | – positive logic (standard) | – On: | 3 to 12 VDC or open circuit |
| | | – Off: | 0 to 1.2 VDC or short circuit pin 1 and 3 |
| | – negative logic (option) | – On: | 0 to 1.2 VDC or short circuit pin 1 and 3 |
| | | – Off: | 3 to 12 VDC or open circuit |
| | – Off idle current: | | 3 mA |
| Environmental compliance | – Reach | | www.tracopower.com/products/reach-declaration.pdf |
| | – RoHS | | RoHS directive 2011/65/EU |

**Application note:** www.tracopower.com/products/tep100wir-application.pdf pending

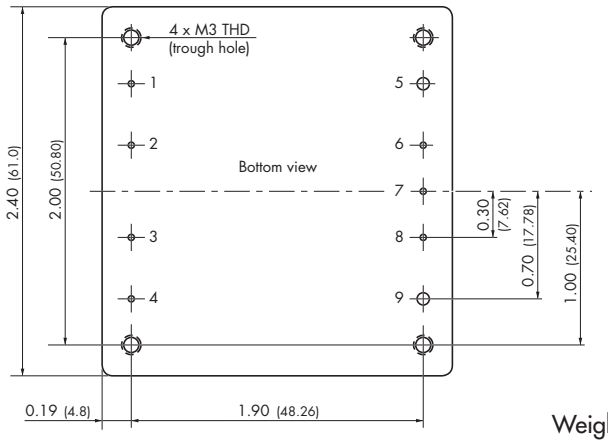
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

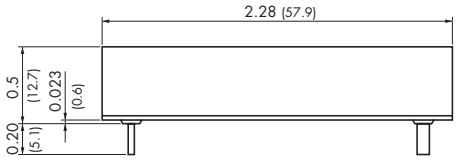
## General Specifications

| | | |
|---|---|---|
| Casing material | 24 / 48 Vin models:<br>110 Vin models: | metal<br>aluminium base-plate with plastic case |
| Potting material | | silicone (UL94V-0 rated) |
| Base material | | FR4 |

## Dimensions

TEP 100WIR module




Weight: 105g (3.70oz)

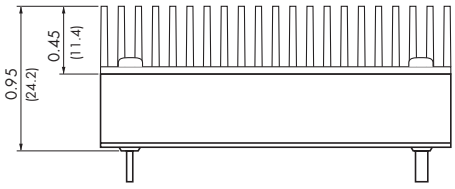
Pin diameter pin 5 & 9: 0.08 (2.0)
Pin diameter other pins: 0.04 (1.0)

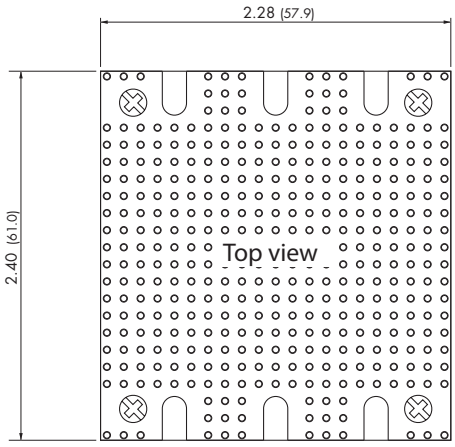
### Pin-Out

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

*Sense line to be connected to the output either at the module or at the load under regard of polarity.

## TEP-HS1 Heatsink (pictured with heatsink mounted)



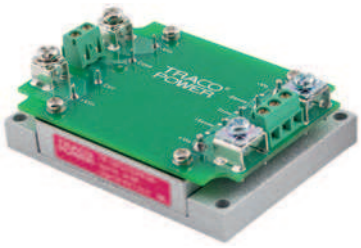

Order code: TEP-HS1
Includes heatsink with termal pad and mounting screws
To order modules with mounted heatsink ask factory.

Weight: 142g (5.01oz)
(Heatsink + Converter)

Dimensions in Inch, () = mm
Tolerances ±0.02 (±0.5)
Pin pich tolerances ±0.01 (±0.25)
Mounting hole pich tolerances ±0.01 (±0.25)

## Options (on demand)

Chassis mount models with screw terminal block



Chassis mount models with screw terminal block and input filter to meet EN 555022 class A

DIN-rail clip for chassis mount models