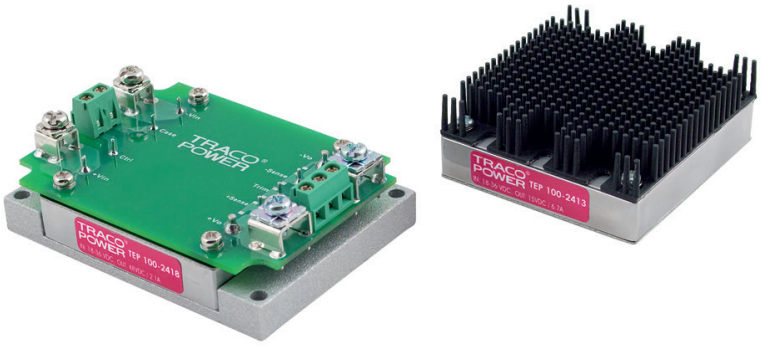
DC/DC Converters

TEP 75WI Series, 75 Watt

UL 60950-1

Features

- Rugged, compact metal case
- Screw terminal adaptor available for easy connection
- EN 50155 approval for railway applications
- Optional DIN-rail mounting kit
- Ultra wide 4:1 input voltage range
- Full load operation up to 60°C with convection cooling
- Undervoltage lockout
- Reverse input voltage protection
- Input protection filter
- 3-year product warranty



(Models pictured with chassis mount adaptor / optional heatsink)

The TEP-75WI 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. Four threaded M3 inserts in the module makes chassis mount or attachment of a heatsink for optimal thermal management very simple. For easy connection there is also an unique adaptor available with screw terminals. A very high efficiency allows an operating temperature up to +60°C with natural convection cooling without 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	Output voltage	Output current max.	Efficiency typ.
TEP 75-2411WI	9 – 36 VDC (24 VDC nominal)	5.0 VDC	15.0 A	88 %
TEP 75-2412WI		12 VDC	6.3 A	88 %
TEP 75-2413WI		15 VDC	5.0 A	88 %
TEP 75-2415WI		24 VDC	3.2 A	87 %
TEP 75-2416WI		28 VDC	2.7 A	87 %
TEP 75-2418WI		48 VDC	1.6 A	88 %
TEP 75-4811WI	18 – 75 VDC (48 VDC nominal)	5.0 VDC	15 A	90 %
TEP 75-4812WI		12 VDC	6.3 A	90 %
TEP 75-4813WI		15 VDC	5.0 A	89 %
TEP 75-4815WI		24 VDC	3.2 A	88 %
TEP 75-4816WI		28 VDC	2.7 A	88 %
TEP 75-4818WI		48 VDC	1.6 A	87 %
TEP 75-7211WI	43 – 160 VDC (72 VDC nominal)	5.0 VDC	15 A	91 %
TEP 75-7212WI		12 VDC	6.3 A	91 %
TEP 75-7213WI		15 VDC	5.0 A	91 %
TEP 75-7215WI		24 VDC	3.2 A	90 %
TEP 75-7216WI		28 VDC	2.7 A	90 %
TEP 75-7218WI		48 VDC	1.6 A	90 %
on demand	Models with 3.3 VDC /~ 20 A			
	Negative (passive = Off) Remote On/Off function (standard is passive = On)			

Options	
suffix **–CM**	Chassis mount models with screw terminal block, see page 5
suffix **–CMF**	Chassis mount models with screw terminal block and input filter to meet EN 555022 class A, see page 5
TEP-HS1	Heat-sink for standard version (incl. mounting screws and thermal pad), see page 4
TEP-MK1	Din-rail mounting kit for chassis mount models (incl. mounting screws), see page 6
TCK-xxx	Common mode chokes for filter proposals to meet EN55022 class A/B --> see application note

Input Specifications

Input current at no load	24 Vin; 5 – 15 VDC models:	185 mA typ.
	24 Vin; 24 – 48 VDC models:	85 mA typ.
	48 Vin; 5 – 15 VDC models:	90 mA typ.
	48 Vin; 24 – 48 VDC models:	50 mA typ.
	72 Vin; 5 – 15 VDC models:	40 mA typ.
	72 Vin; 24 – 48 VDC models:	25 mA typ.
Input current at full load	24 Vin models:	3600 mA typ. (see Note 1)
	48 Vin models:	1800 mA typ.
	72 Vin models:	1350 mA typ.
Start-up voltage / under voltage lockout	24 Vin models:	9 VDC / 7.5 VDC (or lower)
	48 Vin models:	18 VDC / 16 VDC (or lower)
	72 Vin models:	43 VDC / 36 VDC (or lower)
Surge voltage (100 msec. max.)	24 Vin models:	50 V max.
	48 Vin models:	100 V max.
	72 Vin models:	185 V max.
Conducted noise – with option –CMF		EN 55022 class A, FCC part 15, level A
– for PCB mount version		See application note for to meet EN 55022 class A or B
ESD (electrostatic discharge)		EN 61000-4-2, air ±8 kV, contact ±6 kV, perf. criteria A
Radiated immunity		EN 61000-4-3, 10 V/m, perf. criteria A
Fast transient / Surge (with external input capacitor)		EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±1 kV perf. criteria A
– input capacitor 24, 48VDC		Nippon chemi-con KY 200 µF, 100V, ESR 48 mOhm
– input capacitor 72VDC		Ruby-con BXF series, 100µF/250V
– CMF option		capacitor included
Conducted immunity		EN 61000-4-6, 10 Vrms, perf. criteria A
Reverse voltage protection		parallel diode (external input fuse required)
Recommended input fuse (slow blow)	24 Vin models:	10 A
	48 Vin models:	5 A
	72 Vin models:	3.15 A

Output Specifications

Voltage set accuracy		±1 %
Output voltage adjustment		+10 % / –20 % by external resistor see application note:
Regulation – Input variation Vin min. to Vin max.		0.1 % max.
– Load variation (0 – 100 %)	5 – 15 VDC models:	0.1 % max.
	24 – 48 VDC models:	0.1 % max.
Temperature coefficient		±0.02 %/K
Minimum load		not required

Note 1:

For 24 VDC input voltage models an input capacitor 4.7µF/50V X7R MLCC or 68µF/100V, 110mOhm Nippon chemi-con KY series is recommended for a reliable supply of the pulse current. Capacitor is already include with chassis mount option –CM and –CMF

Output Specifications

Remote sense		10 % max. of Vout nom. (trim up value to subtract)
Ripple and noise (20 MHz Bandwidth)	5 VDC models: 12 & 15 VDC models: 24 & 28 VDC models: 48 VDC models:	75 mVpk-pk max. 100 mVpk-pk max. 200 mVpk-pk max. 300 mVpk-pk max.
Start up time (nominal Vin and constant resistive load)	72VDC input: Others:	60 ms typ. (at power On or remote On) 25 ms typ. (at power On or remote On)
Transient response (25 % load step change)		200 µs typ.
Output current limitation	72VDC input: Others:	at 150 % of Iout max. at 110 – 140 % of Iout max.
Over voltage protection		at 115 – 130 % of Vout nom.
Short circuit protection		indefinite, automatic recovery.
Capacitive load	5 VDC models: 12 VDC models: 15 VDC models: 24 VDC models: 28 VDC models: 48 VDC models:	30'000 µF max. 5'250 µF max. 3'330 µF max. 1'330 µF max. 960 µF max. 330 µF max.

General Specifications

Temperature ranges	– Operating – Case temperature – Storage		–40°C to +75°C +105°C max. –55°C to +125°C
Thermal impedance	– without Heatsink – with Heatsink		6.7°C/W 4.7°C/W
Derating			see application note
Over temperature protection			at +115°C
Thermal shock, mechanical shock & vibration	– Test conditions		EN 61373, MIL-STD-810F www.tracopower.com/products/mil810.pdf
Humidity (non condensing)			95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)			75'000 h
Isolation voltage (60sec.)	– Input/Output – Input/Case		2'250 VDC (basic insulation) 1'500 VDC
Isolation capacitance	– Input/Output		2500 pF max.
Isolation resistance	– Input/Output (500 VDC)		>1 GOhm min.
Switching frequency			300 kHz typ. (puls width modulation)
Safety standards			UL 60950-1, IEC/EN 60950-1, EN50155
Safety approvals	– UL/cUL – Railway		www.ul.com -> certifications -> File e188913 www.tracopower.com/products/tep-50155.rar
Remote On/Off	– positive logic (standard) – negative logic (optional on demand) – Off idle current:	– On: – Off: – On: – Off:	3 to 12 VDC or open circuit 0 to 1.2 VDC or short circuit pin 1 and 3 0 to 1.2 VDC or short circuit pin 1 and 3 3 to 12 VDC or open circuit 3 mA
Environmental compliance	– Reach – RoHS		www.tracopower.com/products/tep75wi-reach.pdf RoHS directive 2011/65/EU

Application note: www.tracopower.com/products/tep75wi-application.pdf

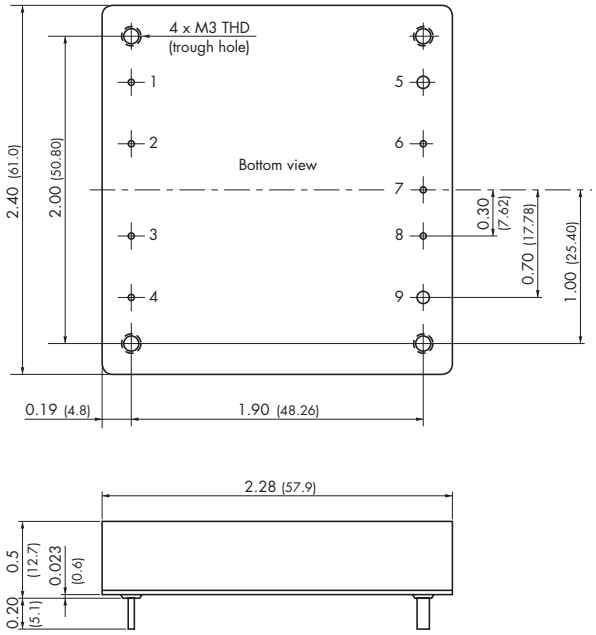
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

General Specifications

Casing material	24, 48VDC input:	metal
	72VDC input:	aluminium base-plate with plastic case
Potting material		silicone (UL94V-0 rated)
Base material	24, 48VDC input:	FR4

Dimensions

TEP 75 module





Weight: 97g (3.42 oz)

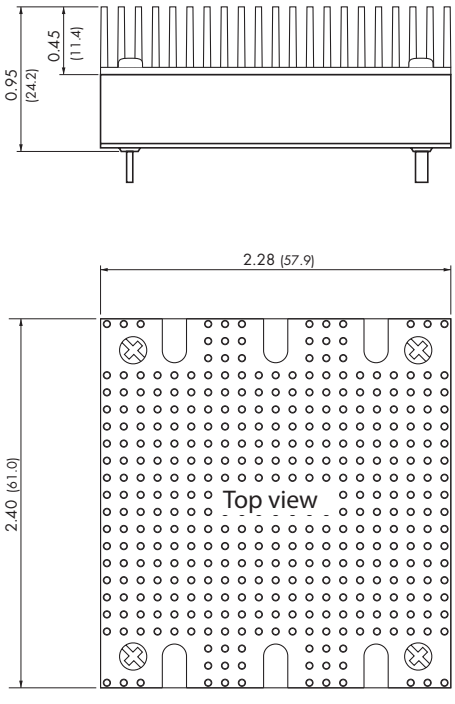
Pin diameter pin 5 & 9: 0.08 (2.0)
Pin diameter other pins: 0.04 (1.0)

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.

Option Heatsink





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

Weight: 135g (4.76 oz)
(Heatsink + Converter)

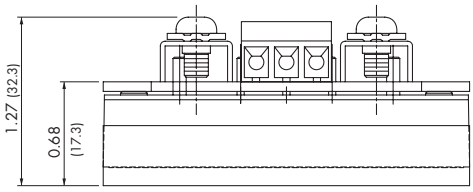
Dimensions in Inch, () = mm
Tolerances ±0.02 (±0.5)
Pin pich tolerances ±0.01 (±0.25)
Mounting hole pich tolerances ±0.01 (±0.25)

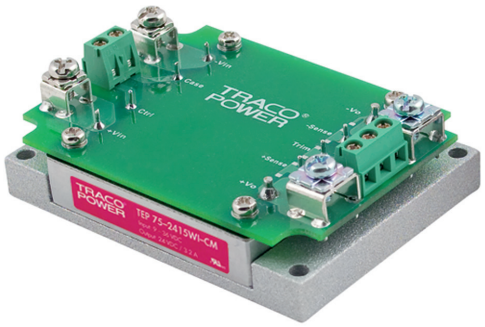
Option Chassis Mount

TEP 75 module with chassis mount adabtor (suffix –CM or –CMF)

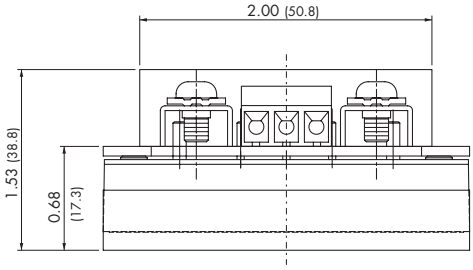
For easy chassis mounting the converter modules can be supplied with an adaptor option consisting of a screw terminal connection board (soldered to converter pins) and a chassis mount adaptor.
In addition this Chassis mount option is available with an EMI-filter (see EMI specification)

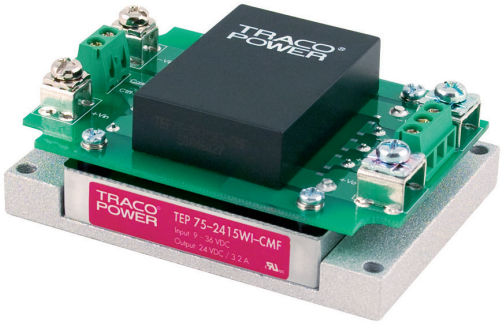
Suffix **–CM**: Chassis mount adaptor

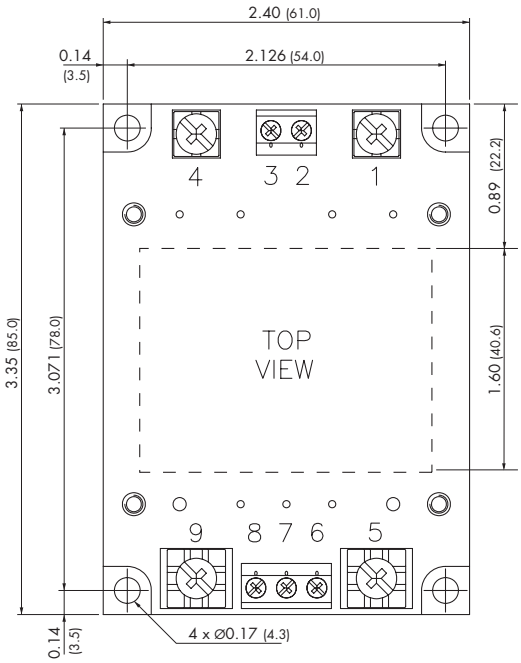




Suffix **–CMF**: Chassis mount adaptor with EMI filter







Please note that adaptors cannot be ordered as seperate items but are factory assembled.

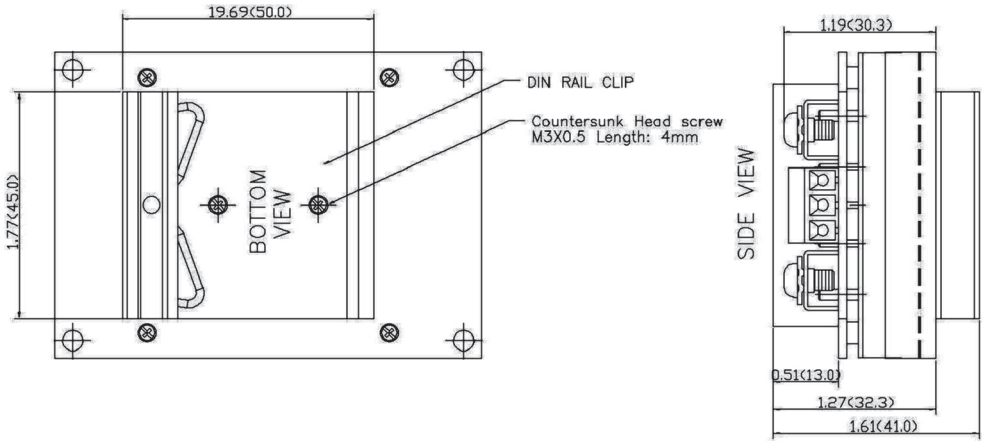
Connection	
Pin	
1	– Vin
2	Case
3	Remote On/Off
4	+ Vin
5	– Vout
6	– Sense*
7	Trim
8	+ Sense*
9	+ Vout

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

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

Weight: –CM 196 g (6.91 oz)
Weight: –CMF 238 g (8.39 oz)

Option DIN-Rail Clip



Order code: **TEP-MK1**
Includes DIN-rail clip and mounting screws.
To order modules with mounted DIN-rail clip ask factory.