

- High power block with excellent thermal convection
- Operating temperature -40°C to +93°C
- Ultra wide 4:1 input voltage range
- EN 50155 approval for railway applications
- Excellent efficiency up to 88%
- Input filter meet EN 55032 class B
- I/O isolation up to 1591 VAC
- Under voltage lock-out circuit
- Protection against overvoltage, overtemperature and short circuit
- Output LED indicator



The TEQ 20WIR 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 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 heatsink construction allows an operating temperature up to +83°C with natural convection cooling without power derating and up to +93°C with power derating. Further features include under voltage lockout, over temperature protection and short circuit protection.

Models						
Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
TEQ 20-2411WIR	9 - 36 VDC (24 VDC nom.)	5 VDC	4'000 mA			87 %
TEQ 20-2412WIR		12 VDC	1'670 mA			88 %
TEQ 20-2413WIR		15 VDC	1'330 mA			87 %
TEQ 20-2415WIR		24 VDC	833 mA			87 %
TEQ 20-2422WIR		+12 VDC	833 mA	-12 VDC	833 mA	87 %
TEQ 20-2423WIR		+15 VDC	667 mA	-15 VDC	667 mA	88 %
TEQ 20-4811WIR	18 - 75 VDC (48 VDC nom.)	5 VDC	4'000 mA			87 %
TEQ 20-4812WIR		12 VDC	1'670 mA			88 %
TEQ 20-4813WIR		15 VDC	1'330 mA			88 %
TEQ 20-4815WIR		24 VDC	833 mA			87 %
TEQ 20-4822WIR		+12 VDC	833 mA	-12 VDC	833 mA	87 %
TEQ 20-4823WIR		+15 VDC	667 mA	-15 VDC	667 mA	88 %
TEQ 20-7211WIR	43 - 160 VDC (110 VDC nom.)	5 VDC	4'000 mA			86 %
TEQ 20-7212WIR		12 VDC	1'670 mA			87 %
TEQ 20-7213WIR		15 VDC	1'330 mA			87 %
TEQ 20-7215WIR		24 VDC	833 mA			87 %
TEQ 20-7222WIR		+12 VDC	833 mA	-12 VDC	833 mA	87 %
TEQ 20-7223WIR		+15 VDC	667 mA	-15 VDC	667 mA	88 %

## Input Specifications

Input Current	- At no load	24 Vin models: <b>10 mA typ.</b> 48 Vin models: <b>8 mA typ.</b> 110 Vin models: <b>6 mA typ.</b>
Surge Voltage		24 Vin models: <b>50 VDC max.</b> (1 s max.) 48 Vin models: <b>100 VDC max.</b> (1 s max.) 110 Vin models: <b>170 VDC max.</b> (1 s max.)
Input Inrush Current		<b>15 A typ.</b>
Under Voltage Lockout		24 Vin models: <b>7 VDC min. / 8 VDC typ. / 8.8 VDC max.</b> 48 Vin models: <b>15 VDC min. / 16 VDC typ. / 17.5 VDC max.</b> 110 Vin models: <b>37 VDC min. / 40 VDC typ. / 42 VDC max.</b>
Recommended Input Fuse		24 Vin models: <b>4'000 mA</b> (slow blow) 48 Vin models: <b>2'000 mA</b> (slow blow) 110 Vin models: <b>1'000 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)
Reverse Voltage Protection		Parallel diode

## Output Specifications

Voltage Set Accuracy		<b>±1% max.</b> (Single Output) <b>+1% / -1.2%</b> (Dual Output)
Regulation	- Input Variation (Vmin - Vmax)  - Load Variation (0 - 100%)  - Cross Regulation (25% / 100% asym. load)	single output models: <b>0.5% max.</b> dual output models: <b>0.5% max.</b> single output models: <b>1.5% max.</b> (5 VDC models) <b>1% max.</b> (other models) dual output models: <b>1% max.</b> (Output 1) <b>1% max.</b> (Output 2) dual output models: <b>5% max.</b>
Ripple and Noise (20 MHz Bandwidth)	- single output  - dual output	5 Vout models: <b>75 mVp-p max.</b> 12 Vout models: <b>100 mVp-p max.</b> 15 Vout models: <b>100 mVp-p max.</b> 24 Vout models: <b>150 mVp-p max.</b> 12 / -12 Vout models: <b>100 / 100 mVp-p max.</b> 15 / -15 Vout models: <b>100 / 100 mVp-p max.</b>
Capacitive Load	- single output  - dual output	5 Vout models: <b>5'000 µF max.</b> 12 Vout models: <b>850 µF max.</b> 15 Vout models: <b>700 µF max.</b> 24 Vout models: <b>250 µF max.</b> 12 / -12 Vout models: <b>500 / 500 µF max.</b> 15 / -15 Vout models: <b>350 / 350 µF max.</b>
Minimum Load		Not required
Temperature Coefficient		<b>±0.02 %/K max.</b>
Hold-up Time		<b>10 ms min.</b> (acc. EN50155 class S2, without external components)
Start-up Time		<b>100 ms typ.</b>
Short Circuit Protection		Continuous, Automatic recovery
Output Current Limitation		<b>150% typ.</b> of Iout max.
Overvoltage Protection		<b>125% typ.</b> of Vout nom.
Transient Response	- Response Time	<b>250 µs typ.</b> (25% Load Step)

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

## Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1
	- Industrial Control Equipment	Designed for UL 508 (no certification) (single output models only)
	- Railway Applications	EN 50155
	- Certification Documents	<a href="http://www.tracopower.com/overview/teq20wir">www.tracopower.com/overview/teq20wir</a>
Pollution Degree		PD 2

## EMC Specifications

EMI Emissions	- Conducted Emissions	EN 50121-3-2 (EMC for Rolling Stock) EN 55032 class B (internal filter)
	- Radiated Emissions	EN 55032 class B (internal filter)
EMS Immunity		EN 50155 (Railway Applications) EN 50121-3-2 (EMC for Rolling Stock) EN 55024 (IT Equipment) EN 55035 (Multimedia)
	- Electrostatic Discharge	Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A Contact: EN 61000-4-2, $\pm 6$ kV, perf. criteria A
	- RF Electromagnetic Field	EN 61000-4-3, 20 V/m, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 1$ kV, perf. criteria A
	- Conducted RF Disturbances	EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous: 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 +93°C
	- Storage Temperature	-40°C to +105°C
Power Derating	- High Temperature	Depending on model See application note: <a href="http://www.tracopower.com/overview/teq20wir">www.tracopower.com/overview/teq20wir</a>
Cooling System		Natural convection (20 LFM)
Altitude During Operation		2'000 m max.
Switching Frequency		297 - 363 kHz (PWM)
		330 kHz typ. (PWM)
Insulation System		Functional Insulation
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 $\Omega$ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	6'000 pF typ.
Reliability	- Calculated MTBF	1'600'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration	MIL-STD-810F EN 61373
	- Mechanical Shock	MIL-STD-810F EN 61373
	- Thermal Shock	MIL-STD-810F EN 50155
Housing Material		Aluminum
Housing Type		Metal Case
Mounting Type		Chassis Mount

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

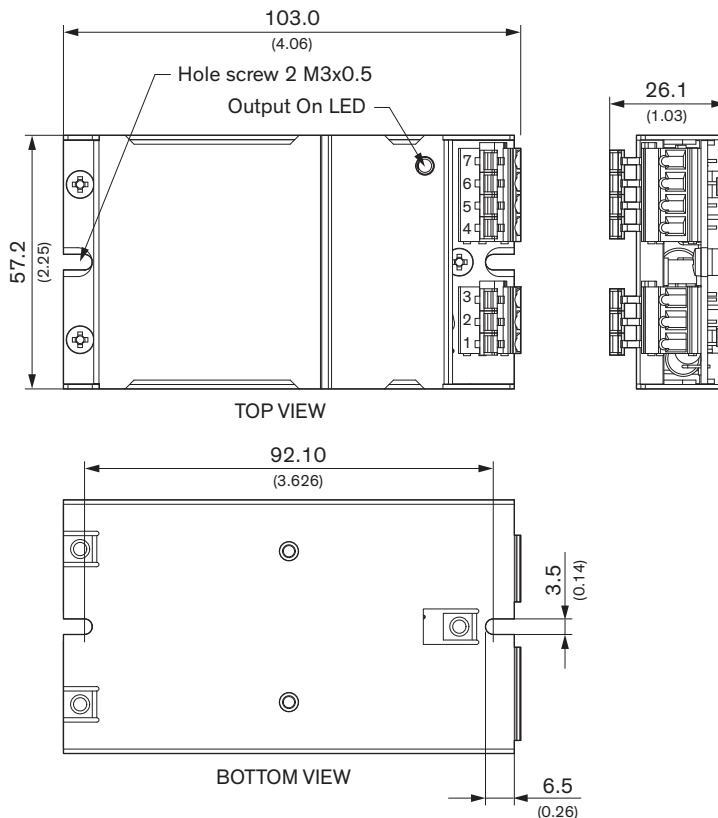
Connection Type	Spring Clamps
Weight	122 g
Status Indicator	Indicated by green LED
Environmental Compliance	<a href="http://www.tracopower.com/info/reach-declaration.pdf">- REACH Declaration</a> <a href="http://www.tracopower.com/info/rohs-declaration.pdf">- RoHS Declaration</a>  <a href="#">- SCIP Reference Number</a> <a href="#">- Flammability (EN 45545-2)</a>
	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> <b>Exemptions: 7a, 7c-I</b> (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).) <b>3ad2da4c-14d8-4a79-a38b-1b0447f15324</b> <a href="http://www.tracopower.com/info/en45545-declaration.pdf">www.tracopower.com/info/en45545-declaration.pdf</a>

### Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/teq20wir](http://www.tracopower.com/overview/teq20wir)

### Outline Dimensions



Terminal connection		
Pin	Single Output	Dual Output
1	+Vin	+Vin
2	-Vin (GND)	-Vin (GND)
3	NC	NC
4	NC	-Vout
5	-Vout	Common
6	+Vout	Common
7	NC	+Vout

NC: Not connected

Dimensions in mm, ( ) = inch  
Tolerances: x.x ±0.5 (±0.02)  
x.xx ±0.25 (±0.01)  
Screw max. torque: 5.0 kgf - cm (0.49 Nm)  
Spring terminals: 12 - 18 AWG