

## DC-DC Converters

For powering 24 V systems in  
industrial electric vehicles

**| Datasheet**



Industrial



Logistics



Utility  
Vehicles



## Features

- CE mark and UL recognised
- Ingress Protection: IP69K water / dust proof
- Compliant to salt spray standard EN 60068-2-11
- Wide input voltage range: 33.6 V<sub>DC</sub> to 96 V<sub>DC</sub>
- Output short circuit protection
- Operating temperature range: -35 °C to +70 °C

DC Input (X1)	48 V – 80 V 600 W	48 V – 80 V 400 W
Input voltage range	33.6 V – 96 V	
Extended operating range <sup>1</sup>	24 V - 33.6 V 96 V - 120 V	
Maximum input current	32 A	22 A
No load input current <sup>2</sup>	< 60 mA	< 45 mA
Inrush Pulse	< 1.5 A <sup>2</sup> s	

DC Output (X2)	48 V – 80 V 600 W	48 V – 80 V 400 W
Output Power	600 W	400 W
Nominal output voltage	24 V	
Minimum output voltage <sup>3</sup>	23 V	
Maximum output current	25 A	16.7 A
Start-up time under full load <sup>4</sup>	< 500 ms	
Noise (peak to peak)	< 0.5 V	
Typical Efficiency <sup>5</sup>	> 80%	
Line regulation <sup>6</sup>	±1%	
Line regulation (maximum) <sup>7</sup>	±3%	
Load regulation	±4%	
Load regulation response <sup>8</sup>	< 100 ms	
Step load regulation <sup>9</sup>	±8%	

1 For a maximum of 5 minutes at nominal output power

2 At nominal battery voltage

3 At nominal input voltage range. When operating in the extended lower input range the minimum voltage is 20 V

4 Measured with a resistive load

5 For 50% to 100% load

6 At nominal input voltage range

7 At extended input voltage range

8 Slew rate 1 A/μs

9 Load step: 10% → 90%, 90% → 10%

Environmental conditions		
Test	In accordance with standard	Test Details
Temperature change	EN 60068-2-14	1 cycle: -25 °C (30 mins) and 70 °C (20 mins). Transition 5 °C/min. 100 cycles. Operational.
Constant warm temperature	EN 60068-2-2	Duration: 21 days Ambient: 70 °C
Temperature shock	EN 60068-2-14	Duration: 20 cycles Operation mode: Non-operating Test temperature: Chamber 1: 75 °C; Chamber 2: -30 °C Test duration: 1 hr per chamber Transfer duration: < 10 s
Humidity/Heat cyclic	EN 60068-2-30	Max air temperature: 55 °C Number of cycles: 2 Cycles duration: 24 h
Vibrations, sinusoidal	EN 60068-2-6	Shock load: 5 g Frequency range: (10-500) Hz Length of time subject to load: 3 axes, 2 hr (10 cycles) per axis Shock form: sinusoidal Operation mode: operational
Continuous shock	EN 60068-2-29	Shock load: 10 g Duration: 16 ms Number of impacts: 1000 shocks/axis
Shocks	EN 60068-2-27	Shock load: 30 g Duration: 11 ms 3 shocks per direction, 6 directions
Salt spray	EN 60068-2-11	At 35 °C for 96 hours
Ingress Protection	IP69K	Per ISO 20653
Operating temperature <sup>1</sup>	-	-35 °C to +70 °C (-31 °F to +158 °F)
Storage temperature	-	-40 °C to +85 °C (-40 °F to +185 °F)

<sup>1</sup> When mounted to a cooling plate that must not exceed 70 °C

Protection and Reliability	48 V – 80 V 600 W	48 V – 80 V 400 W
Over current protection	29 A	21 A
Over temperature protection	Yes	
Short circuit protection	Yes	
No spark on contact <sup>1</sup>	Yes	
MTBF <sup>2</sup>	500,000 h	
Insulation voltage		
DC Input - DC Output	1.77kV <sub>AC</sub> / 2.5kV <sub>DC</sub>	
DC Input – Housing	1.77kV <sub>AC</sub> / 2.5kV <sub>DC</sub>	
DC Output - Housing	1.2kV <sub>AC</sub> / 1.7kV <sub>DC</sub>	

Mechanical Data	48 V – 80 V 600 W	48 V – 80 V 400 W
Dimensions (W x H x D)	115 x 71 x 203 mm (4.5 x 2.8 x 8 inch)	115 x 61 x 203 mm (4.5 x 2.4 x 8 inch)
Weight	2.0 kg (4.4 lbs)	1.5 kg (3.3 lbs)
Case material	Aluminium	
Cooling	Conduction via heatsinking	

Approvals and Compliance	
Safety marks	cUR <sub>US</sub> , CE, UKCA
Safety <sup>3</sup>	IEC 62368-1
EMC <sup>4</sup>	EN 12895. CISPR 25/EN 55025 EN 61000-4-2/3/4/5/6/8

Connector pin assignments				
	Connector	Input/output	Pin	Assignment
	X1	Input	1	Positive (+)
			2	0 V (GND)
	X2	Output	1	0 V (GND)
			2	Positive (+)

### Mating Connectors

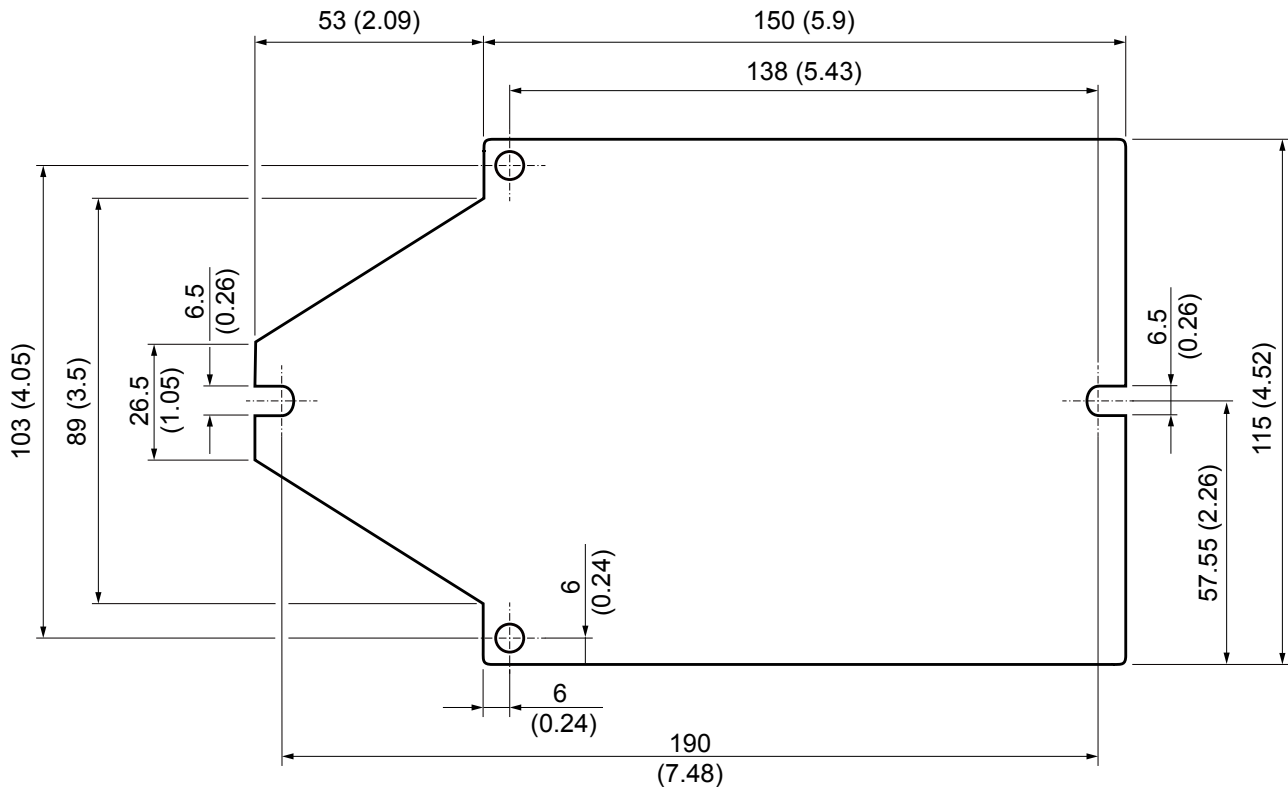
<sup>1</sup> At < 20% load

<sup>2</sup> Telcordia SR-332 at 50 °C (122 °F)

<sup>3</sup> Designed to allow industrial truck approval to UL 583 and EN 1175

<sup>4</sup> Additional external cable filtering (e.g. with ferrite cores) may be required depending on the EMC emission requirements of the end-use application. EMC suitability must be evaluated in the end-use application

## Dimensional drawing



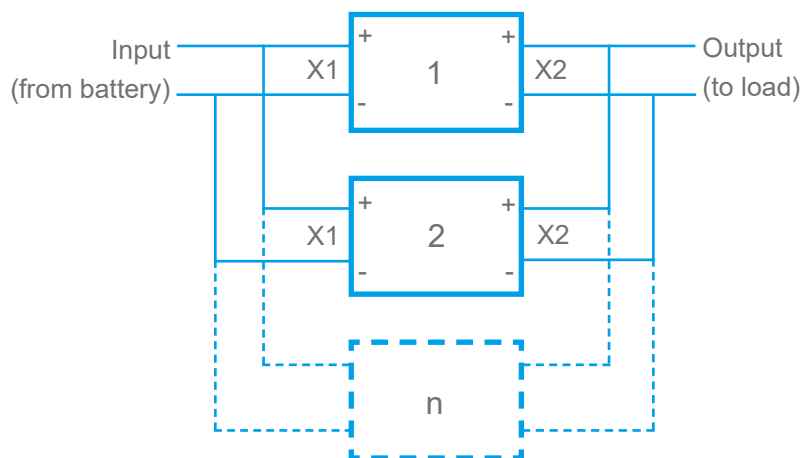
### Dimensions in mm (inch)

#### Mounting instructions

Make sure to install the DC-DC converter on a metal cooling surface, whose temperature should not exceed +70 °C (+158 °F). Use the provided gap pad between the DC-DC converter and the metal cooling surface in order to maintain good thermal contact. This avoids the over heating of DC-DC converter.

#### Parallel operation

At least two DC-C converters can be connected in parallel. It's important to ensure that output cable impedance, to a common junction point, is within 5% of each other. Current sharing suitability must be fully evaluated in the end-use application.





More information

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