Martek Power converters and inverters for railway applications

DC/DC converters

Input Voltages: 24, 36, 52, 72, 110V dc
Applicable Norms: EN 50155, EN 50121-3-2, EN 45545

	Power	Series	Output Voltage (s)	Outputs	Construction	Dimensions (LxWxH)	EN50155 S2 (10ms)	RIA12	Notes
	10W	D10R	5 to 48Vdc	1	Encapsulated IP65 or open frame	70x50x30mm	✓	✓	Connections via pins for PCB mounting or flying leads
	15W	MBR	5 to 48Vdc	1,2 or 3	Encapsulated IP65	84x72x32mm	✓	✓	Connections via pins for PCB mounting or flying leads
	25W	MBRH	5 to 48Vdc	1	Encapsulated IP65	84x72x32mm	✓	✓	Connections via pins for PCB mounting or flying leads
	35W	JL	5 to 110Vdc	1	Open frame or enclosed	220x73x30mm (PCB)	✓	Option	specify JLR series for RIA12 compliance

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DC/DC converters (continued)

	Power	Series	Output voltage (s)	Outputs	Construction	Dimensions (LxWxH)	EN50155 S2 (10ms)	RIA12	Notes
	35W	JLM	5 to 48Vdc	1	Open frame or enclosed	110x80x22mm (PCB)	✓	✗	
	50W	JLH	5 to 48Vdc	1	Open frame or enclosed	220 x 73 x 30mm (PCB)	✓	Option	specify JLHR series for RIA12 compliance
	50W	JLHM	5 to 48Vdc	1	Open frame or enclosed	110 x 80 x 22mm (PCB)	✓	✗	Conduction cooled version also available
	50W	SQ	3.3 to 24Vdc	1	Open frame (conduction cooled)	256 x 80 x 25mm	✓	✓	
	50W	CCR	5 to 24Vdc	1	Open frame (conduction cooled). Optional cover.	105 x 100 x 35.5mm	✓	✗	Single wide input range (16.8 to 137.5V continuous)
	55W	DR	5 to 48Vdc	1, 2 or 3	3U Euro Cassette	169mm x 8TE x 3U	✓	✓	
	100W	VER	12 to 48Vdc	1	Open Frame (conduction cooled). Optional cover.	110x70x40mm (standard)	with enhanced version	✗	Enhanced version adds S2 holdup, active inrush & output monitor signal
	100W	CPCIR	3V3, 5V1 & 12V	3	3U Compact PCI with parallel plate. Full cover optional.	180 x 70 x 40mm (enhanced)	✓	✗	Model BF covers 24/36V inputs Model AD covers 72/110V inputs
	120W	SRE	5 to 48Vdc	1 or 2	3U Euro Cassette	169mm x 4TE x 3U	✗	✗	Additional HM120 holdup module supports S2 (10ms)
	140W	EBR	12 to 48Vdc	1	Enclosed	300 x 180 x 60mm with base plate	✓	✓	
	150W	ER	5 to 48Vdc	1 or 2	3U Euro Cassette	169 x 44 x 112	✓	✓	
	150W	ERL	12 to 48Vdc	1	3U Euro Cassette	169 x 44 x 112	✓	✓	
	200W	XER	12 to 48Vdc	1	Open Frame (conduction cooled). Optional cover.	200x80x50mm	✓	✗	Model BF covers 24/36V inputs Model AD covers 72/110V inputs
	200W	NSL	12 to 48Vdc	1	Enclosed	260 x 160 x 75mm	✓	✓	

DC/DC converters (continued)

	Power	Series	Output voltage (s)	Outputs	Construction	Dimensions (LxWxH)	EN50155 S2 (10ms)	RIA12	Notes
	300W	ATG	12 to 110Vdc	1	Enclosed (conduction cooled)	238 x 130 x 60mm	see data sheet	Option	
	400W	NSH	12 to 48Vdc	1	Enclosed	260 x 160 x 75mm	✓	✓	
	500W	PMR	12 to 60Vdc	1	Enclosed (conduction cooled)	250 x 158 x 70mm	✓	Filter PCB available	Convection cooled version with heatsink also available

DC/AC inverters

Input Voltages: 24, 36, 52, 72, 110V dc
Applicable Norms: EN 50155, EN 50121-3-2, EN 45545

	Power	Series	Output voltage (s)	Outputs	Construction	Dimensions (LxWxH)	EN50155 S2 (10ms)	RIA12	Notes
	250W	ACR	230Vac	1	Chassis mount IP65	280x180x100mm	✓	✓	Dimensions exclude mounting plate
	750W	ACR	230Vac	1	Chassis mount IP65	395x250x145mm	✓	✓	
	750W	ASP	230Vac	1	Chassis mount IP65	500x240x125mm	✓	✓	Lockable access door to MCB / RCD

AC/DC converters

Input Voltages: 230Vac (110Vac also available for some models)
Applicable Norms: EN 50155, EN 50121-3-2, EN 45545

	Power	Series	Output voltage (s)	Outputs	Construction	Dimensions (LxWxH)	EN50155 S2 (10ms)	RIA12	Notes
	15W	MBR suffix Z	5 to 48Vdc	1	Encapsulated IP65	84x72x32mm	✓	n/a	
	55W	ABR	5 to 24Vdc	1	3U Euro Cassette	169mm x 8TE x 3U	✓	n/a	230Vac or 110/230Vac models available
	300W	ATG suffix Z	12 to 48Vdc	1	Enclosed (conduction cooled)	238x130x60mm	✓	n/a	
	500W	PMR suffix Z	12 to 60Vdc	1	Enclosed (conduction cooled)	250x158x70mm	✓	n/a	

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Martek Power
10W D10R Series
Datasheet

DC/DC converter for railway applications

Encapsulated version

Open frame PCB version

Description

The 10W D10R series is a range of low power converters, which incorporate full surge and transient protection to RIA 12 and EN50155. They are single output units with nominal inputs from 24Vdc up to 110Vdc. The D10R is available in encapsulated and open frame versions and can be supplied with pins for PCB mounting or input / output cables for bulkhead mounting.

Special features include:

- Fully protected to rail norms EN50155 and BRB RIA
- Choice of construction - encapsulated or open frame PCB
- Choice of connections - PCB pins or cables

Input specifications

The following input voltages versions are available as standard:

110V (66.0 - 137.5V) dc (Suffix A)
72V (43.2 - 90.0V) dc (Suffix D)
52V (31.2 - 65.0V) dc (Suffix C)
36V (21.0 - 50.4V) dc (Suffix F)
24V (16.8 - 33.6V) dc (Suffix B)

Parameter	Detail
Input Ripple	To RIA 13 and EN50155
Input Protection	Reverse polarity protection. Surges and transients to RIA 12 & EN50155
Inrush Current	Limited to typically 5 x nominal current (after 0.1ms)
Efficiency	85% typical
Hold-up time	10ms to EN50155 Class S2

Output specifications

Parameter	Detail
Maximum Output Power	Up to 10W
Output Versions	Single output only
Output Voltage	Can be specified from 5V to 48V
Setting Tolerance	±1.0% at 50% load, 15°C to 25°C
Minimum Load	Zero

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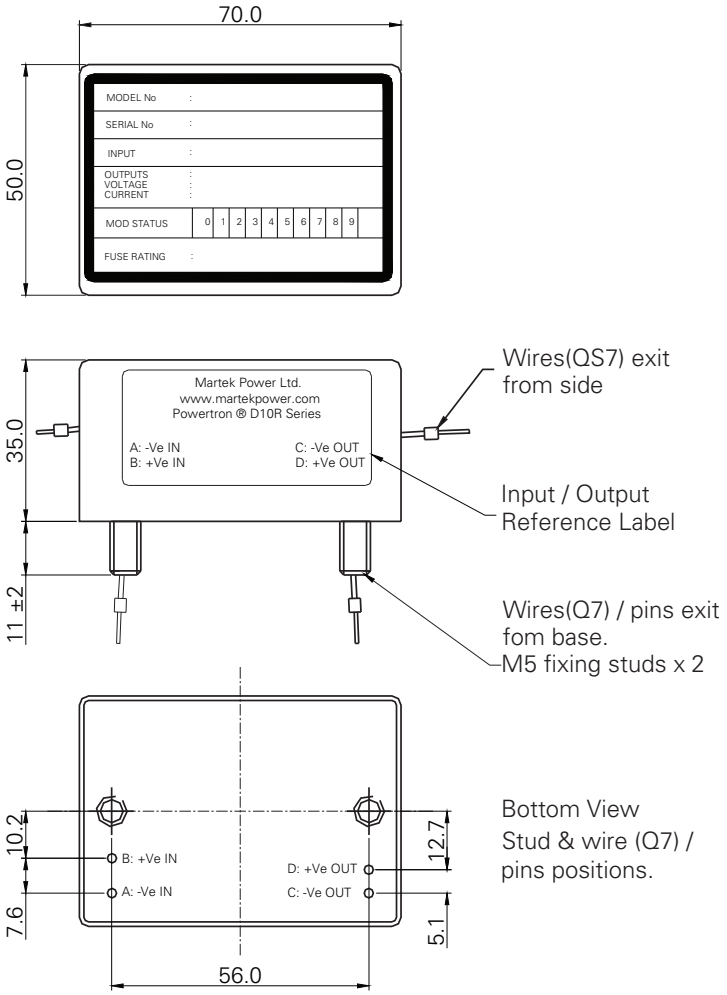
Output specifications (Continued)

Parameter	Detail
Line Regulation	±0.2%
Load Regulation	±0.5%
Temperature Coefficient	<0.02% / °C
Output Ripple	<1% Pk-Pk of Output Voltage
Output Noise	<50mV Pk-Pk superimposed (up to 20MHz)
Response Time	1.0ms to within 2% (for a 20% - 90% load change)
Output Protection	Protected against indirect transients to RIA 12
Current Limit	Operates at approximately 120% of rated output current
Isolation (tested at dc equivalent voltage)	Input to Output 2.0kV ac

Environmental details

Parameter	Detail
Operating Temperature	Encapsulated versions -25°C to +65°C (no derating) Open frame versions -40°C to +70°C (no derating)
De rating	Open frame versions can be derated at 2.25%\°C to 95°C
Storage Temperature	-40°C to +85°C
Cooling	Convection
Relative Humidity	99% max. (encapsulated version)
Shock & Vibration	EN 50155 (EN 61373), RIA 20
Environmental Protection	IP65 (encapsulated version)

Technical drawing



Applicable norms

Parameter	Detail
EMC	EN50155 (2007), EN50121-3-2 (2006) RIA 12, 18.
Other	EN50155 (2007), RIA 13, 18, 20.

Mechanical characteristics

Parameter	Detail
Construction	Encapsulated Module or conformal coated PCB
Dimensions, (L,W,H)	Encapsulated 70x50x35 mm Open frame 66x46x25 mm
Weight	250g
Connections	PCB pins as standard or option for cables
Fixings	Two ø 5mm fixing studs (encapsulated version)

Options for Encapsulated & Open frame series

Code	Detail
Q7	Connections cables from underside Drawing 867-901
QS7	Connections cables from side Drawing 867-901
U	Non encapsulated, open frame PCB Drawing 867-901

Notes:

All dimensions in mm.
Case: Moulded in ABS
Flame retardant to UL94 V-0
Pins fitted as standard
Option U denotes Open-frame
Option Q7 denotes wire version
(wires exit from base; for open-frame wires fitted to component side)
Option QS7 denotes wire version (exit from sides)

Wires are zero halogen type:

Martek Power 361072 (0.6sq. mm 20AWG)
Wire Length - 370mm
Wire termination - None

Cable marker code (as per label):

A: -Ve IN C: -Ve OUT
B: +Ve IN D: +Ve OUT

867-901 iss 02

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Martek Power
25W MBRH Series
Datasheet

DC/DC converter for railway applications

Description

The 25W MBRH is an enhanced version of the well established Martek Power 15W MBR series. The MBRH offers all the same electrical features as the MBR, and in the same enclosure, but at an increased output power rating of 25 Watts. One of the main benefits of both the MBR and MBRH over similar products is that they incorporate all of the components necessary for full EMC compliance and EN50155 class S2 interruptions (10ms hold-up time). It is not necessary for any additional filtering or capacitors to be added by the end user. Intended for rail applications, these encapsulated modules are fully compliant with both the latest European norms and the older BRB RIA standards.

Special features include:

- Single and dual output versions
- Rugged encapsulated construction
- Requires no external filter components or capacitors for hold-up
- Equally suitable for PCB or bulkhead mounting (choice of cables connections or PCB pins)

Input specifications

The following input voltages versions are available as standard:

110V	(66.0	-	137.5V)	dc	(Suffix A)
72V	(43.2	-	90.0V)	dc	(Suffix D)
52V	(31.2	-	65.0V)	dc	(Suffix C)
36V	(21.0	-	50.4V)	dc	(Suffix F)
24V	(16.8	-	33.6V)	dc	(Suffix B)
230V	(185.0	-	265V)	ac	(Suffix Z)

Parameter	Detail
Input Ripple	To RIA 13 and EN50155
Input Protection	Reverse polarity protection. Surges and transients to RIA 12 & EN50155
Inrush Current	Limited to typically 5 x nominal current (after 0.1ms)
Efficiency	80% typical
Hold-up time	10ms to EN50155 Class S2

Output specifications

Parameter	Detail
Maximum Output Power	25W (20W for 5Vdc output version)
Output Versions	Single and Dual
Output Voltage	Can be specified from 5V to 48V
Setting Tolerance	±1.0% at 50% load, 15°C to 25°C

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Output specifications (Continued)

Parameter	Detail	
Minimum Load	Typically zero for all outputs, although in some cases a minimum load of up to 5% on U1 for full performance.	
Line Regulation	±0.2%	
Load Regulation	±0.5%	
Temperature Coefficient	<0.02% / °C	
Output Ripple	<1% Pk-Pk of Output Voltage	
Output Noise	<50mV Pk-Pk superimposed (up to 20MHz)	
Response Time	1.0ms to within 2% (for a 20% - 90% load change)	
Output Protection	Outputs protected against indirect transients to RIA 12	
Current Limit	Operates at approximately 120% of full power. Auto recovery.	
Isolation (tested at dc equivalent voltage)	Input to Output	1.0kV ac
	Output to Output	500V ac

Environmental details

Parameter	Detail
Operating Temperature	-25°C to +65°C (no derating)
Storage Temperature	-40°C to +85°C
Cooling	Convection
Relative Humidity	99% max.
Shock & Vibration	EN 50155 (EN 61373), RIA 20
Environmental Protection	IP65

Applicable norms

Parameter	Detail
EMC	RIA 12, 18; EN50155 (2007), EN50121-3-2 (2006)
Other	RIA 13, 18, 20; EN50155 (2007)

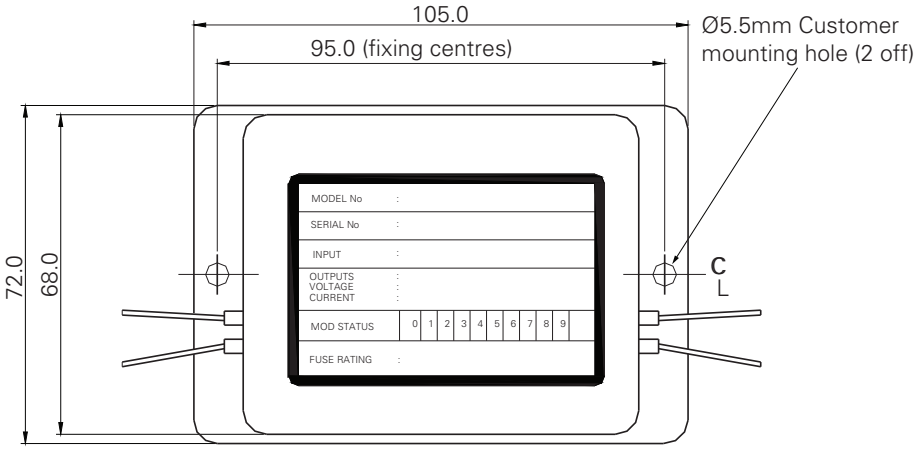
Mechanical characteristics

Parameter	Detail
Construction	Encapsulated Module
Dimensions	Length = 84 mm (mounting flange increases length to 105 mm) Width = 72 mm Height = 32 mm
Weight	300g
Connections	Solder pins for PCB mounting as standard Option for input / output cables (halogen free cable)
Fixings	Two ø 5mm clear holes mounting flange

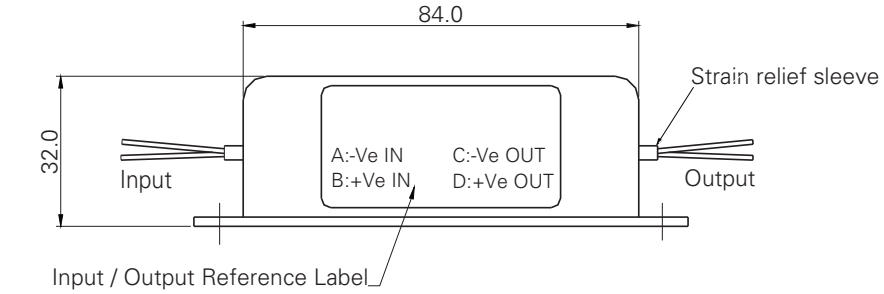
Options for MBRH series

Option	Detail	Code
Connections	Input / output cables 350mm	Q7
Connections	Input / output cables 600mm	Q8
Connections	Input cables 1000mm Output cables 300mm	Q12
DIN rail mounting plate	Drawing 900-931	D

Technical drawing



Notes:
All dimensions in mm.
Case: Moulded in flame retardant ABS to UL94 V-0.
All leadouts are 0.6mm² (19/0.2mm) halogen free cable
Length from outside of the potted box is 350mm ±10mm unterminated.
Cable marker code (as per label):
A: -Ve IN
B: +Ve IN
C: -Ve OUT
D: +Ve OUT



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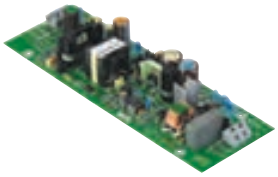
Martek Power
35W & 50W JL Series
Datasheet

DC/DC converter for railway applications

JL & JLH open frame version



Description

Originally designed for on-board passenger information systems, the JL series is now available in a wide variety of input and output configurations. Capable of providing 35W or 50W of continuous power at ambient temperatures of up to 75°C, the low component count makes the JL series a highly reliable yet cost-effective solution. For applications where the converter will be housed within an enclosure, the open frame version offers a further cost saving. The JL and JLH series have recently expanded to include alternative size footprints, connectors and functional features.

Special features include:

- Wide operating temperature range
- Low component count, high reliability
- Simple construction - open frame or enclosed versions available
- Low cost

*New versions: JLR & JLHR series with functional options and to RIA norms

*New versions: JLM & JLHM M1 Conduction cooled versions

JL series family-overview

35Watts	JL versions rectangular PCB with enclosure option
	JLR versions include RIA and other functional options
	JLM versions mini PCB footprint with enclosure option
	JLM M1 versions mini PCB footprint with conduction cooled package
50Watts	All versions as above; JLH, JLHR, JLHM

Options for JLR and JLHR versions

Code	Detail
L	Output OK Relay (NO and NC)
R	RIA filtering (RIA 12 & 13)
V	Enable. Connect to + input to enable

Input specifications

The following input voltages versions are available as standard:

110V (66.0 - 137.5V) dc (Suffix A)
72V (50.0 - 90.0V) dc (Suffix D)
52V (36.0 - 65.0V) dc (Suffix C)
36V (25.0 - 50.4V) dc (Suffix F)
24V (16.8 - 33.6V) dc (Suffix B)

Parameter	Detail
Input Ripple	EN50155
Input Protection	Reverse polarity protection. Surges and transients to EN50155 (Direct and Indirect)
Inrush Current	Limited to typically 5 x nominal current (after 0.1ms)
Efficiency	85% typical
Hold up time	10ms to EN50155 S2 (except JLH 72Vdc input version)
Supply change over (dips)	0 - 6Un 100mS to EN50155 Class C1

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Output specifications

Parameter	Detail	
Maximum Output Power	35Watts 50W	JL, JLR, JLM, versions JLH, JLHR, JLHM versions
Output Versions	Single and Dual	
Output Voltage	Fixed output can be specified from 5V to 110Vdc (5Vdc output versions limited to 35Watts)	
Setting Tolerance	±2%	
Line / Load Regulation	±2%	
Temperature Coefficient	<0.02% / °C	
Output Ripple	<1% Pk-Pk of Output Voltage	
Output Noise	<75mV Pk-Pk superimposed (up to 20MHz)	
Response Time	1.0ms to within 2% (for a 20% - 90% load change)	
Current Limit	Operates at approximately 115% of rated current	
Isolation (tested at dc equivalent voltage)	Input to Output Output/Input to Case	2.0kV ac 1.0kV ac (enclosed version)

Environmental details

Parameter	Detail
Operating Temperature	-25°C to +75°C (no derating)
Storage Temperature	-40°C to +80°C
Cooling	By convection (M1 versions have conduction cooled package)
Relative Humidity	95% max.
Shock & Vibration	EN50155 (EN61373)

Applicable norms

Parameter	Detail
EMC	EN50155 (2007), EN50121-3-2 (2006)
Other	EN50155 (2007) RIA 12, 13 version specific

JL & JLH enclosed version

JLM & JLHM open frame version

Mechanical characteristics

Parameter	Detail		
Construction	Open frame PCB with Enclosure options		
Dimensions (Length x Width x Height)	**Version**	**PCB Footprint**	**Enclosed version**
	JL & JLH	220x73x30mm	250x78x35mm
	JLR & JLHR	220x73x30mm	250x78x35mm
	JLM & JLHM	115x85x22mm	145x91x35mm
	JLM M1 Conduction cooled	135x85x30mm with base plate	
Finish	PCB, Conformal coating. Enclosure, plated mild steel.		
Weight	<0.5kg		
Connections	**Version**	**Input Connector**	**Output Connector**
	JL & JLH	Wago 236-501	Wago 236-501
	JLR & JLHR	Wago 236-501 or Wago 721-434	Wago 236-501 or Wago 721-435
	JLM & JLHM	(standard) Wago 236-501 (Q4 option) Wago 721-433/001-000 (Q6 option) Wago 236-501 (Q1 option) 3W3 male power D-type	Wago 721-434/001-000 Wago 721-433/001-000 Wago 236-501 3W3C coded female power d-type

Options for all series

Code	Detail
T	Extended temperature range; -40°C operating
S	Enclosure with DIN Rail mounting clips
S2	Enclosure no clips

Options for JLM & JLHM series only

Code	Detail
M1	Conduction cooled package
Q1	Power d-type connectors
Q4	Alternative Wago input connector

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Martek Power
55W DR Series
Datasheet

DC/DC converter for railway applications

Part number	Output 1		Output 2		Output 3	
	V_{dc}	A	V_{dc}	A	V_{dc}	A
DR0500	5	8.0				
DR1100	11	5.2				
DR1200	12	4.5				
DR1400	14	4.0				
DR1500	15	3.5				
DR1800	18	3.3				
DR2400	24	2.2				
DR2800	28	1.8				
DR3000	30	1.8				
DR4800	48	1.25				
DR0512	5	5.0	12	2.0		
DR1212	12	2.2	12	2.2		
DR1248	12	3.0	48	0.3		
DR1515	15	1.8	15	1.8		
DR2424	24	1.1	24	1.1		
DR3030	30	0.9	30	0.9		
DR5555	55	0.5	55	0.5		
DR051212	5	5.0	12	1.0	12	1.0
DR051515	5	5.0	15	0.8	15	0.75
DR051224	5	4.0	12	0.8	24	0.4
DR241515	24	1.0	15	0.8	15	0.75

Description

The 55W DR series is a well-established product range designed specifically for use on railway rolling stock. Units are available in single, dual and triple output versions with input ranges to cover all of those typically found in rail applications. Housed in a rugged 3U Euro cassette, the DR series is a suitable for both rack and bulkhead mounting. The range is fully compliant with the current national and international railway standards and norms.

Special features include:

- 3U Euro cassette
- Single, Dual and Triple outputs
- Wide range of optional features

Input specifications

The following input voltages versions are available as standard:

110V (66.0 - 137.5V) dc (Suffix A)
72V (43.2 - 90.0V) dc (Suffix D)
52V (31.2 - 65.0V) dc (Suffix C)
36V (21.0 - 50.4V) dc (Suffix F)
24V (16.8 - 33.6V) dc (Suffix B)

Parameter	Detail
Input Ripple	To RIA 13 and EN50155
Input Protection	Reverse polarity protection. Surges and transients to RIA 12, EN50155
Inrush Current	Limited to typically 5 x nominal current (after 0.1ms)
Efficiency	75% to 85% dependent on voltage combinations
Hold-up time	10ms to EN50155 Class S2
Input fuse	20mm cartridge style mounted on rear panel. See table overleaf for fuse options

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Output specifications

Parameter	Detail
Maximum Output Power	55W (45W for triple output) 60W for single 48Vdc output version
Output Voltage	Can be specified from 5V to 48Vdc
Minimum Load	Zero for all outputs
Setting Tolerance	±0.5% at 50% load, 15°C to 25°C
Line Regulation	±0.2%
Load Regulation	±0.5%
Temperature Coefficient	<0.02% / °C
Output Ripple	<1% Pk-Pk of Output Voltage
Output Noise	<1% Pk-Pk superimposed (up to 20MHz)
Response Time	0.5ms to within 2% (for a 20% - 90% load change)
Indicators	Green "Output good" LED for each output
Output Protection	Output and signal lines protected against indirect transients to RIA 12, EN50155
Current limit	Operates at approximately 110% of full power. Auto recovery
Thermal Protection	Shuts down PSU if safe internal temperature is exceeded. Auto recovery.
Isolation (tested at dc equivalent voltage)	Input to Output 2.0kV ac Input to Case 1.0kV ac Output to Case 1.0kV ac Output to Output 350V ac

Electrical options for DR series

Option	Detail	Code
Input Fuse	Fitted on PCB	B
Input Fuse	Not fitted	Z
Input Fail	Operates when input falls below minimum. (Active high or Active low)	I or J
Output Fail	Operates when U1 output falls below 96% of nominal value. (Active high or Active low)	K or L
Over-voltage	Limits voltages of U1 to safe level under fault conditions	P
Inhibit	TTL high to inhibit	V
Enable	Link to U1 return to enable	W

Environmental details

Parameter	Detail
Operating Temperature	-25°C to +70°C (+85°C for 10 minutes)
Storage Temperature	-40°C to +85°C
Cooling	Convection
Relative Humidity	95% max.
Shock & Vibration	EN 50155 (EN 61373), RIA 20
Environmental Protection	IP54

Applicable norms

Parameter	Detail
EMC	RIA 12, 18; EN50155 (2007), EN50121-3-2 (2006)
Other	RIA 13, 18, 20; EN50155 (2007)

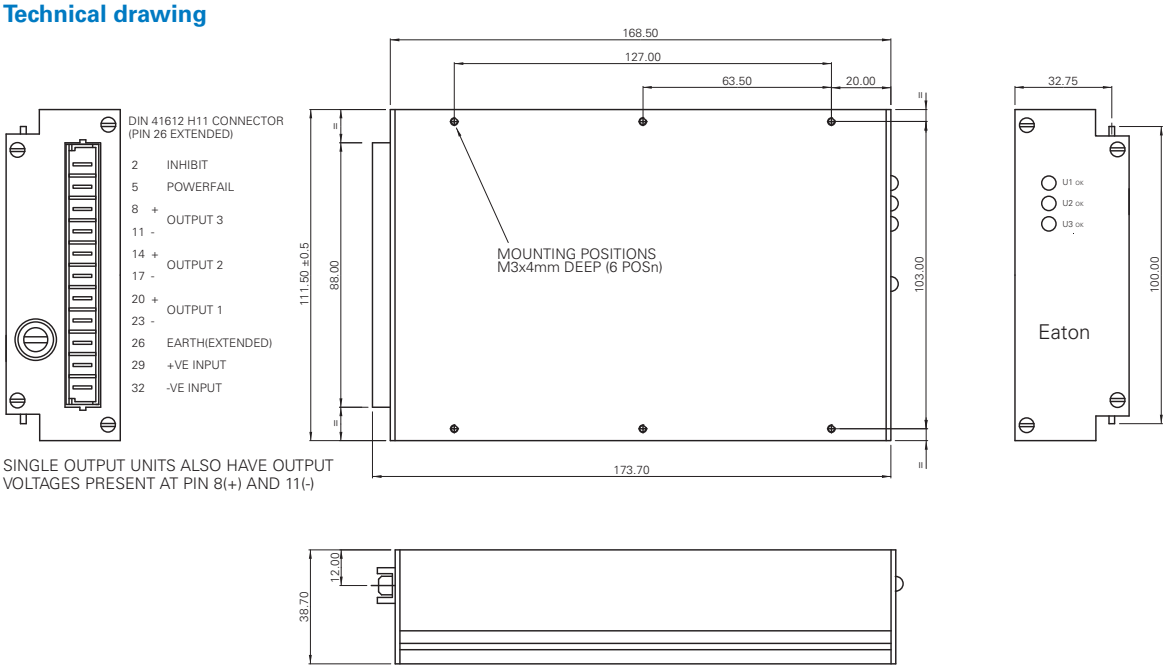
Mechanical characteristics

Parameter	Detail
Construction	Euro cassette - suitable for either rack or bulkhead mounting
Dimensions	Length = 168.5mm Width = 8TE Height = 3U
Weight	0.7kg
Connections	Connector DIN 41612 H11 Class 1 - Option for connection retaining clips - Option for cable connections
Fixings	Six M3 tapped holes in cassette side panel Option for rack mounting or bulkhead mounting plate

Environmental & mechanical options for DR series

Option	Detail	Code
Extended temperature range	- 40°C operating	T
Connector fixing	Retaining clips	H
Mounting plate	Bulkhead fixing Drawing 900-911	M
Rack mounting Front Panel	8HP Front Panel Drawing 900-910	Q4
Connections	Flying leads (Halogen free cable)	Q6

Technical drawing



SINGLE OUTPUT UNITS ALSO HAVE OUTPUT VOLTAGES PRESENT AT PIN 8(+) AND 11(-)

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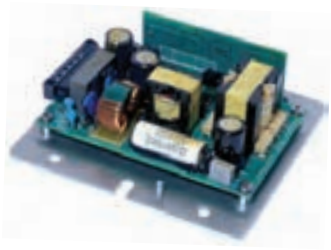
Martek Power
100W VER Series
Datasheet

DC/DC converter for railway applications

VER standard version



VER enhanced version

Description

The VER series is a range of cost effective, medium power, single output converters. Featuring a very small footprint, the standard version complies fully with the latest rail specifications and norms for protection and EMC. For applications requiring compliance with class S2 supply interruptions (10ms hold-up time), an enhanced version is available which also adds active inrush current limiting and output health indication.

Special features include:

- Very compact, lightweight and cost effective
- High efficiency
- Each model covers two nominal vehicle battery voltages
- Standard and Enhanced versions available
- Fully compliant with rail standards, including EN50155 & EN50121.3.2

Input specifications

The following input voltages versions are available as standard:

72 / 110V (50.4 - 137.5V) dc (Suffix AD)
24 / 36V (16.8 - 50.4V) dc (Suffix BF)

Options

Code	Detail
E	Enhanced version. Adds 10ms hold-up time, active inrush limiting and output good signal.

Part number	Output V_o [Vdc]	Output I_o [A]
VER 1200	12	8.3
VER 1500	15	6.7
VER 2400	24	4.2
VER 3600	36	2.8
VER 4800	48	2.1

Parameter	Detail		
Under-voltage switch-off (Customer configurable) (approximate value)		Suffix AD	Suffix BF
	Standard (factory set) configuration	41V	13V
	Alternate configuration	63V	20V
Input Ripple	To EN50155		
Input Protection	Reverse polarity protection by shunt diode (external fuse or circuit breaker required). Surges and transients to EN50155 (direct and indirect)		
Inrush Current	Standard version: limited by source impedance but duration <0.1ms Enhanced version: limited to typically 5 x nominal current (after 0.1ms)		
Efficiency	90% typical		
Hold up time	Standard version: EN50155 Class S1 (no interruptions) Enhanced version: EN50155 Class S2 (10ms interruptions)		
Input Fuse	Not fitted. External fuse or circuit breaker required.		

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Output specifications

Parameter	Detail
Maximum Output Power	100W
Output Versions	Single output only
Output Voltage	Can be specified from 12V to 48V
Setting Tolerance	±1.0% at 50% load, 15°C to 25°C
Minimum Load	Zero
Line & Load Regulation	±1.0% combined
Temperature Coefficient	<0.02% / °C
Output Ripple	<1% Pk-Pk of Output Voltage
Output Noise	<75mV Pk-Pk superimposed (up to 20MHz)
Response Time	0.5ms to within 1% (for a 10% - 100% load change)
Current limit	Operates at 105 - 130% of rated output current
Thermal Protection	Shuts down PSU if safe internal temperature is exceeded. Auto recovery.
Remote ON/OFF	Connect inhibit pin to negative input to turn off converter.
Output Good signal	Indication by volt free relay contacts [closed=output good] (Enhanced version only)
Isolation	Input to Output 2.0kV ac (tested at 3.0kV dc) Input to Case 1.0kV ac (tested at 1.5kV dc) Output to Case 1.0kV ac (tested at 1.5kV dc)

VER standard version with cover

VER enhanced version with cover

Option

Code	Detail
S	Ventilated steel cover

Environmental details

Parameter	Detail
Operating Temperature	EN50155 class TX: -40°C to +70°C (no de-rating). (85°C for 10 minutes.) Base plate is intended for cold wall mounting and must not exceed 85°C for full power operation (90°C during 10 minute over temperature).
Output power de-rating	Above 70°C: 3.0% / °C; 100°C absolute maximum
Storage Temperature	-40°C to +85°C
Cooling	Convection / Conduction. Mounting surface should be thermally rated at 1.5°C/W. A thermal mass equivalent to 450g of aluminium is required for 10 minutes operation at 85°C.
Relative Humidity	95% max.
Shock & Vibration	EN50155 (EN61373) for mounting in any orientation
Environmental Protection	IP20 with optional ventilated steel cover

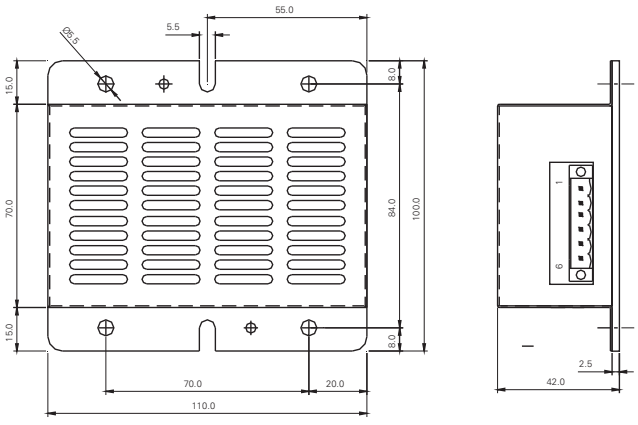
Applicable norms

Parameter	Detail
EMC	EN50155 (2007), EN50121-3-2 (2006)
Other	EN50155 (2007)

Mechanical characteristics

Parameter	Detail	
Construction	Conformal coated PCB with aluminium base plate. Optional ventilated steel cover.	
Dimensions (L x W x H) Note: width is 100mm with flanges	Standard Version 110x70x40mm (42mm with cover)	Enhanced Version 180x70x40mm (42mm with cover)
Weight	250g (330g with cover)	350g (500g with cover)
Connections	6 way PCB mounted connector with screw locks, part number: Weidmüller SL-SMT 5.08/6/90LF	8 way PCB mounted connector with screw locks, part number: Weidmüller SL-SMT 5.08/8/90LF
Fixings	Four ø 5.5mm fixing holes & two 5.5mm slots on base plate	Four ø 5.5mm fixing holes

Outline drawing (standard and enhanced versions with option 'S' cover fitted)



CONNECTOR:

WEIDMULLER
SL - SMT 5.08/06/90L

PIN OUTS:

1 = +VE IN
2 = -VE IN
3 = INHIBIT
4 = N/C
5 = -VE OUT
6 = +VE OUT

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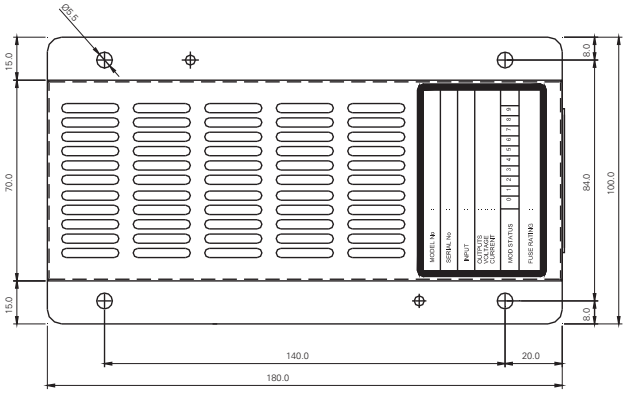

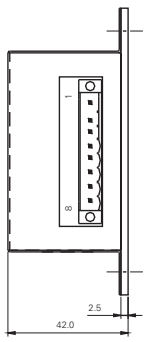

CONNECTOR:

WEIDMULLER
SL - SMT 5.08/08/90L

PIN OUTS:

1 = +VE IN
2 = -VE IN
3 = INHIBIT
4 = N/C
5 = RELAY
6 = RELAY
7 = -VE OUT
8 = +VE OUT

RELAY PINS ARE CLOSED
WHEN PSU OK

A01-901 Issue A

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Martek Power
120W SRE Series
Datasheet

DC/DC converter for railway applications

Description

The SRE series is a very low profile converter designed specifically for use on railway rolling stock. Rated at 120W, units are available in single or dual output configurations with input ranges to cover all those typically found in rail applications. The unit is suitable for either rack or bulkhead mounting. The range is fully compliant with the current national and international railway standards and norms.

Special features include:

- Very low profile
- Very high efficiency
- Fully enclosed 3U euro cassette
- Active current sharing as standard

Input specifications

The following input voltages versions are available as standard:

110V (77.0 - 137.5V) dc (Suffix A)
72V (50.0 - 90.0V) dc (Suffix D)
52V (36.0 - 65.0V) dc (Suffix C)
36V (25.0[1] - 45.0V) dc (Suffix F)
24V (16.8 - 33.0V) dc (Suffix B)

Part number	Output 1		Output 2	
	V_{dc}	A	V_{dc}	A
SRE 0500	5	16.0[2]		
SRE 1200	12	10.0		
SRE 1500	15	8.0		
SRE 2400	24	5.0		
SRE 3600	36	3.3		
SRE 4800	48	2.5		
SRE1212	12	5.0	12	5.0
SRE1515	15	4.0	15	4.0
SRE2424	24	2.5	24	2.5

Note:
1. Operation at 23.0V input is possible at maximum ambient (70°C) and 100W output load continuously, or at maximum ambient and 120W load for 10 minutes.
2. 20A peak, 5 minutes maximum continuous in a 1:10 duty cycle.

Parameter	Detail
Input Ripple	To EN50155
Input Protection	Reverse polarity protection. Surges and transients EN50155
Inrush Current	Limited to typically 5 x nominal current (after 0.1ms)
Efficiency	Typically 90%
Hold-up time	Consult factory for optional hold up module to EN50155 Class S2
Input fuse	Board-mounted.

Output specifications

Parameter	Detail
Maximum Output Power	120W (for most output versions)
Output Versions	Single and dual output
Output Voltage	Can be specified from 5V to 48V
Setting Tolerance	±0.6% at 50% load, 15°C to 25°C
Line Regulation	±0.2%
Load Regulation	±0.5% (U1 only)

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Output specifications (Continued)

Parameter	Detail
Cross Regulation (dual output versions)	U1= ±0.5%, U2= ±3.5% (for 10 - 100% loading)
Temperature Coefficient	<0.02% / °C
Output Ripple	<1% Pk-Pk of Output Voltage
Output Noise	<1% Pk-Pk superimposed (up to 20MHz)
Response Time	0.5ms to within 2% (for a 20% - 90% load change)
Indicators	Output OK LED
Signal	Output good signal given by an isolated open collector transistor.
Current sharing	Active current sharing fitted to U1 on both single & dual versions
Output Protection	Protected against indirect transients to EN50155
Overvoltage Protection	Operates at approximately 120% of nominal output Standard for all single output versions. Dual output versions either U1 or U2 - consult Sales team
Current limit	Operates at approximately 115% of nominal or peak load. Auto recovery.
Thermal Protection	Shuts down PSU if safe internal temperature is exceeded. Auto recovery.
Isolation (tested at dc equivalent voltage)	Input to Output 2.0kV ac Input to Case 1.0kV ac Output to Case 1.0kV ac Output to Output 0.3kV ac

Environmental details

Parameter	Detail
Operating Temperature	-40°C to +71°C (no derating). {90°C max case temperature} Note: 5Vdc output versions are -25°C to +71°C.
Storage Temperature	-40°C to +85°C
Cooling	Convection / Conduction
Relative Humidity	95% max.
Shock & Vibration	EN 50155 (EN 61373)
Environmental Protection	IP54

Applicable norms

Parameter	Detail
EMC	EN50155 (2007), EN50121-3-2 (2006)
Other	EN50155 (2007)

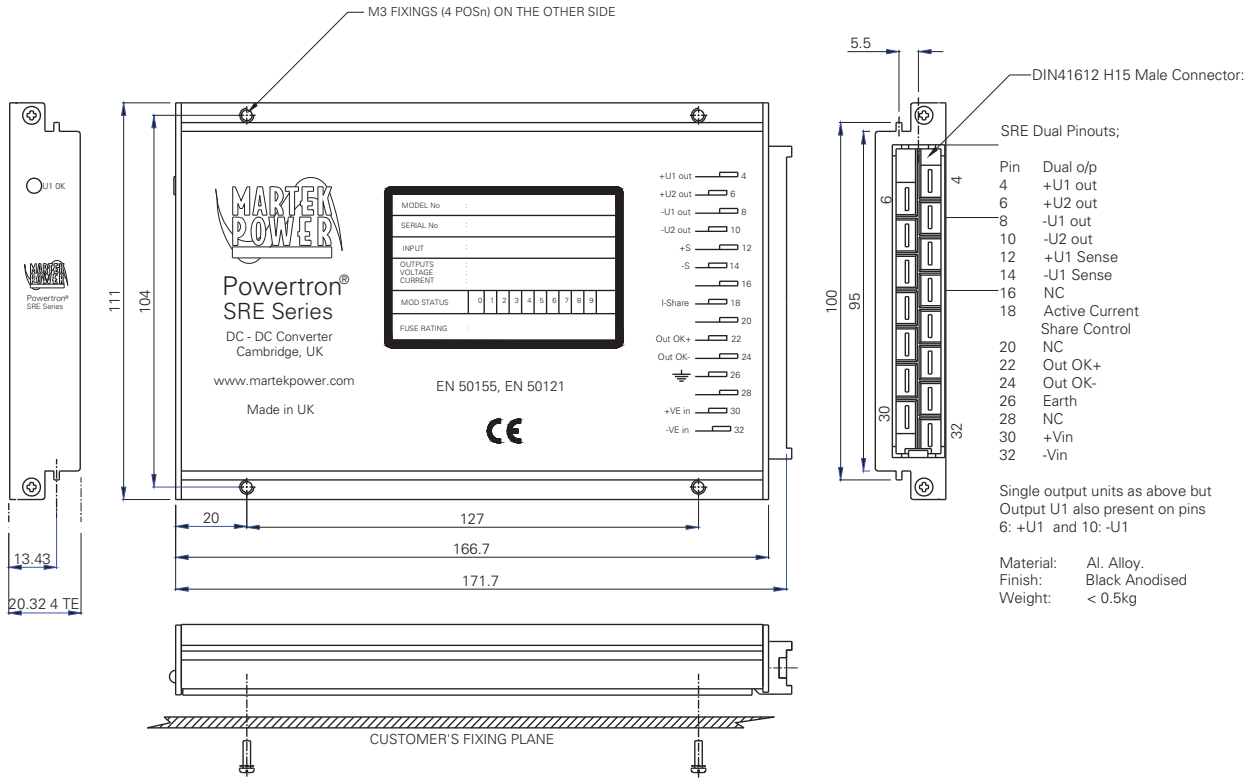
Mechanical characteristics

Parameter	Detail
Construction	Euro cassette
Dimensions	Length = 166.7 mm Width = 4TE (20.32mm) Height = 3U (111 mm)
Weight	< 0.5kg
Connections	DIN 41612 H15 Class 1
Fixings	Four ø 3mm tapped holes in cassette Four ø 5mm clear holes in mounting plate option

Options for SRE series

Option	Detail	Code
Mounting plate	Chassis mounting	M
Heatsink	Additional 2TE (10mm) heatsink	Q1
Front panel	5TE silver front panel + handle	Q4

Technical drawing



SRE Dual Pinouts;

Pin	Dual o/p
4	+U1 out
6	+U2 out
8	-U1 out
10	-U2 out
12	+U1 Sense
14	-U1 Sense
16	NC
18	Active Current Share Control
20	NC
22	Out OK+
24	Out OK-
26	Earth
28	NC
30	+Vin
32	-Vin

Single output units as above but Output U1 also present on pins 6: +U1 and 10: -U1

Material: Al. Alloy.
Finish: Black Anodised
Weight: < 0.5kg

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Martek Power
150W ER Series
Datasheet

DC/DC converter for railway applications

Description

The 150W ER series is a well-established product range designed specifically for use on railway rolling stock. Units are available in single and dual output versions with input ranges to cover all those typically found in rail applications. Housed in a rugged 3U Eurocassette, the ER series is suitable for both rack and bulkhead mounting and is available with either a heatsink or cold wall mounting plate. The range is fully compliant with the current national and international railway standards and norms.

Input specifications

The following input voltages versions are available as standard:

110V (66.0 - 137.5V) dc (Suffix A)
72V (43.2 - 90.0V) dc (Suffix D)
52V (31.2 - 65.0V) dc (Suffix C)
36V (21.0 - 50.4V) dc (Suffix F)
24V (16.8 - 33.6V) dc (Suffix B)

Part number	Output 1		Output 2	
	V_{dc}	A	V_{dc}	A
ER 0500	5	25.0		
ER 1200	12	12.0		
ER 1500	15	10.0		
ER 2400	24	6.0		
ER 3000	30	5.0		
ER 0512	5	15.0	12	6.0
ER 1212	12	6.0	12	6.0
ER 1515	15	5.0	15	5.0
ER 2424	24	3.0	24	3.0
ER 1205	12	10.0	5	5.0
ER 2412	24	4.0	12	4.5
ER 5555	55	1.4	55	1.4

Parameter	Detail
Input Ripple	To RIA 13 and EN50155
Input Protection	Reverse polarity protection; surges and transients to RIA 12, EN50155
Inrush Current	Limited to typically 6x nominal current (after 0.1ms)
Efficiency	80% to 90% dependent on input / output voltage
Hold-up time	10ms to EN50155 Class S2
Input fuse	20mm cartridge style mounted on rear panel (except 24Vdc input version)

Output specifications

Parameter	Detail
Maximum Output Power	150W (limited to 125W for 24V input or 5V output)
Output Versions	Single and dual output
Output Voltage	Can be specified from 5V to 48V
Setting Tolerance	±0.5% at 50% load, 15°C to 25°C
Minimum Load	Zero for all outputs
Line Regulation	±0.2% all outputs
Load Regulation	±0.5% all outputs
Remote Sensing	Compensates for up to 250mV drop in each line (single output only)
Temperature Coefficient	<0.02% / °C

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Output specifications (Continued)

Parameter	Detail	
Output Ripple	<1% Pk-Pk of Output Voltage	
Output Noise	<1% Pk-Pk superimposed (up to 20MHz)	
Response Time	1.0ms to within 2% (for a 20% - 90% load change)	
Indicators	Green LED for each output	
Output Protection	Output and signal lines protected against indirect transients to RIA 12, EN50155	
Current limit	Operates at minimum 105% of nominal load. Auto recovery.	
Primary Protection	Operates at approximately 115% of rated output power for dual units.	
Thermal Protection	Shuts down PSU if safe internal temperature is exceeded. Auto recovery.	
Isolation (tested at dc equivalent voltage)	Input to Output	2.0kV ac
	Input to Earth	1.0kV ac
	Output to Earth	1.0kV ac
	Output to output	200V ac

Electrical options for ER series

Option	Detail	Code
Input Fuse	Fitted on PCB	B
Input Fuse	Not fitted	Z
Current sharing	For parallel operation of two or more supplies using one interconnection. Sharing better than 60 / 40% on main output	S
Input Fail	Operates when input falls below minimum. (Active high or Active low)	I or J
Output Fail	Operates when U1 output falls below 96% of nominal value. (Active high or Active low)	K or L
Over-voltage	Limits voltages of U1 to safe level under fault conditions	P
Inhibit	TTL high to inhibit	V
Enable	Link to U1 return to enable	W

Environmental & mechanical options for ER series

Option	Detail	Code
Extended temperature range	-40°C to +71°C	T
Connector retaining clips	2 per fitted to secure mating DIN connector	H
Cold wall plate	Drawing 289-901	M1
Cold wall plate	Drawing 289-902	M2
Front panel	Front panel and rack mounting plate Drawing 289-908	Q4 + M3
Connections	Cables (halogen free cable)	Q6

Environmental details

Parameter	Detail
Operating Temperature	-25°C to +71°C (no derating)
Storage Temperature	-40°C to +85°C
Cooling	Convection
Relative Humidity	95% max.
Shock & Vibration	EN50155 (EN61373), RIA 20
Environmental Protection	IP54

Applicable norms

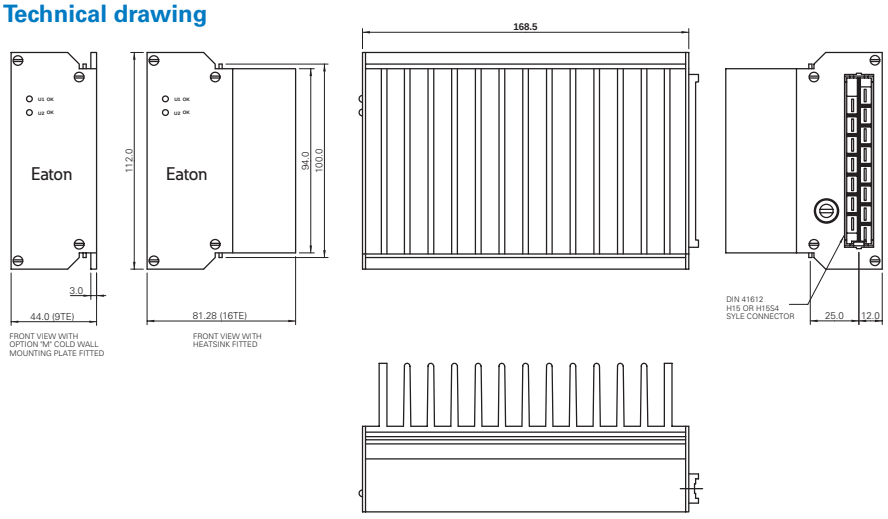
Parameter	Detail
EMC	RIA 12, 18; EN50155 (2007), EN50121-3-2 (2006)
Other	RIA 13, 18, 20; EN50155 (2007)

Mechanical characteristics

Parameter	Detail
Construction	Euro cassette - suitable for either rack or bulkhead mounting
Dimensions	Length = 168.5mm Width = 16TE - heatsink version 9TE - cold wall mount Height = 3U
Weight	1.3kg heat sink version. 0.9kg cold wall mount version.
Connections	DIN 41612 H15 Class 1. Retaining clips option. Cable connection option
Fixings	Four slotted M6 holes in heatsink. Cold wall mount options

Note: M2 cold wall mount version

Technical drawing



Pin no	Single O/P	Dual O/P
4	U1 +	U1 +
6	U1 +	U1 +
8	U1 -	U1 -
10	U1 -	U1 -
12	U1 sense +	U2 +
14	U1 sense -	U2 -
16	Not connected	Not connected
18	Inhibit	Inhibit
20	Power/Output fail	Power/Output fail
22	Current Share	Current Share
24	Earth	Earth
26	Vin +	Vin +
28	Vin +	Vin +
30	Vin -	Vin -
32	Vin -	Vin -

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Martek Power
200W & 400W NS Series
Datasheet

DC/DC converter for railway applications

Description

The NS series is a range of medium and high power single output converters that comply fully with both the traditional and latest rail specifications and norms for protection and EMC. The rugged construction and mounting arrangement ensures compliance with vibration and shock requirements.

Special features include:

- Wide choice of input and output voltages
- High output current capability
- Fully compliant with rail standards, including EN50121.3.2

Input specifications

The following input voltages versions are available as standard:

110V (66.0 - 137.5V) dc (Suffix A)
72V (43.2 - 90.0V) dc (Suffix D)
52V (31.2 - 65.0V) dc (Suffix C)
36V (21.0 - 50.4V) dc (Suffix F)
24V (16.8 - 33.6V) dc (Suffix B)

Parameter	Detail
Input Ripple	To RIA 13 and EN50155
Input Protection	Reverse polarity protection (some input versions require external fuse or circuit breaker) Surges and transients to RIA 12, EN50155 (direct and indirect)
Inrush Current	Limited to typically 6 x nominal current (after 0.1ms)
Efficiency	85% typical
Hold-up time	10ms to EN50155 Class S2

Output specifications

Parameter	Detail
Maximum Output Power	NSL series = 200W NSH series = 400W (24V input version is 300W)
Output Versions	Single output only
Output Voltage	Can be specified from 12V to 48V
Setting Tolerance	±1.0% at 50% load, 15°C to 25°C
Minimum Load	Zero

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Output specifications (Continued)

Parameter	Detail		
Line Regulation	±0.5%		
Load Regulation	±0.5%		
Temperature Coefficient	<0.02% / °C		
Output Ripple	<1% Pk-Pk of Output Voltage		
Output Noise	<75mV Pk-Pk superimposed (up to 20MHz)		
Response Time	0.5ms to within 2% (for a 10% - 100% load change)		
Current limit	Operates at approximately 110% of full power		
Thermal Protection	Shuts down PSU if safe internal temperature is exceeded. Auto recovery.		
Isolation (tested at dc equivalent voltage)	Input to Output	1.0kV ac	(tested at 1.4kVdc)
	Input to Case	1.0kV ac	(tested at 1.4kVdc)
	Output to Case	1.0kV ac	(tested at 1.4kVdc)

Environmental details

Parameter	Detail
Operating Temperature	-25°C to +55°C (no derating)
Storage Temperature	-40°C to +80°C
Cooling	By convection
Relative Humidity	95% max.
Shock & Vibration	EN 50155 (EN 61373), RIA 20
Environmental Protection	IP54

Applicable norms

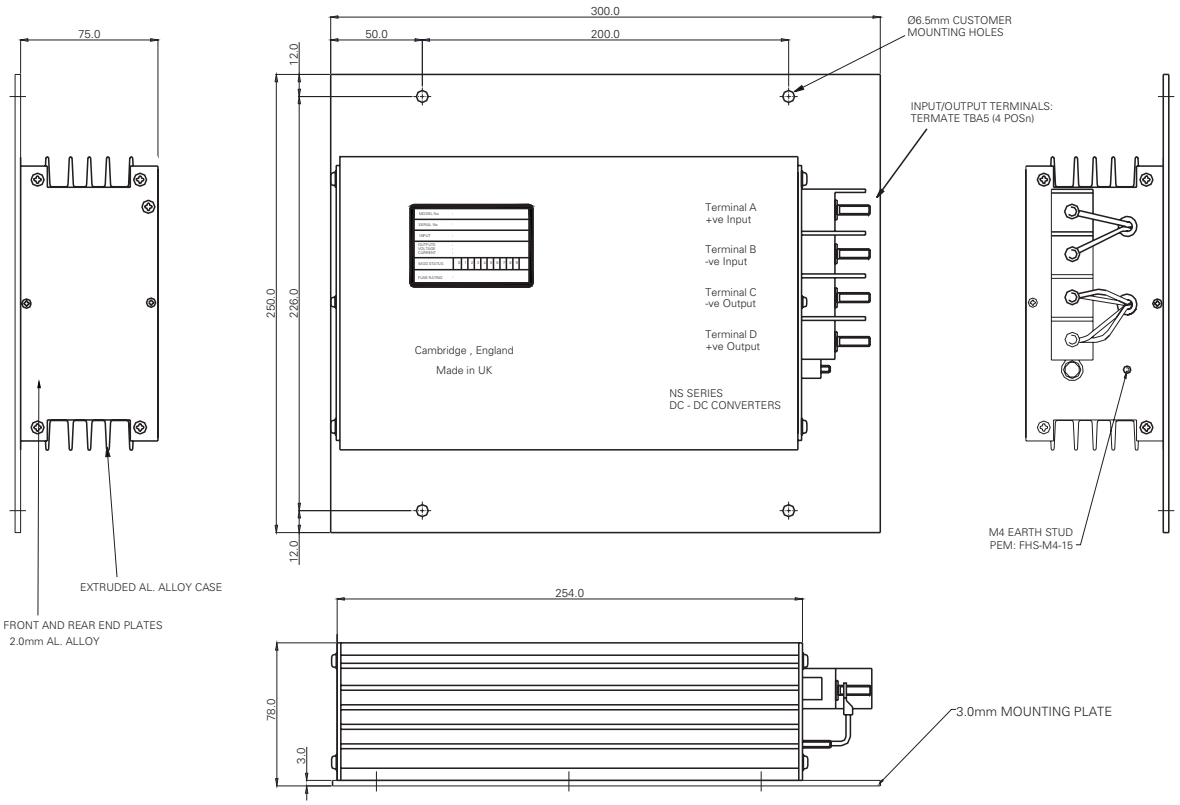
Parameter	Detail
EMC	RIA 12, 18; EN50155 (2007), EN50121-3-2 (2006)
Other	RIA 13, EN50155 (2007)

Mechanical characteristics

Parameter	Detail	
Construction	Fully enclosed in rugged splash-proof case	
Dimensions	Length = 260mm Width = 160mm Height = 75mm	(300mm with connectors) (250mm with plate) (78mm with plate)
Weight	<4.0kg	
Connections	Input / output connections are M5 studs. M4 earth stud	
Fixings	Four ø 6.5mm clear holes on mounting plate	

Option	Detail	Code
Narrow Mounting plate	330 x 160mm	M1

Technical drawing



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Martek Power
200W XER series
Datasheet

DC/DC converter for railway applications

XER open frame version

XER enclosed version

Part number	Output V_o [Vdc]	I_o [A]
XER 1200	12	12.5
XER 1500	15	10
XER 2400	24	8.3
XER 3600	36	5.6
XER 4800	48	4.2

Description

The 200W XER series is a range of very cost effective medium power, single output converters. The range is compliant with the latest European standards for railway equipment, including EMC and fire and smoke.

Special features include:

- Very compact, lightweight and cost effective
- High efficiency
- Each model covers two nominal vehicle battery voltages
- Fully compliant with rail standards, including EN50155 (2017) & EN50121.3.2 (2016)

Input specifications

The following input voltages versions are available as standard:

72V / 110V (50.4 - 137.5V)dc (Suffix AD)

24V / 36V (16.8 - 50.4V)dc (Suffix BF)

Parameter	Detail		
Under-voltage switch-off (Customer configurable) (approximate value)	Standard (factory set) configuration ('L') Alternate configuration ('H')	Suffix AD 41V 63V	Suffix BF 13V 20V
Input Ripple	To EN50155		
Input Protection	Active reverse polarity protection by series device Surges and transients to EN50155 (direct and indirect)		
Inrush Current	To EN50155		
Efficiency	90% typical		
Hold-up time	EN50155 Class S2 (10ms interruptions) with low impedance source (input short) (24V & 72V input: 9ms @ 200W load, or de-rate to 180W for 10ms)		
Input fuse	Not fitted. External fuse or circuit breaker required		

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Output specifications

Parameter	Detail				
Maximum Output Power	200W (12V & 15V models de-rated to 150W)				
Output Versions	Single output only				
Output Voltage	Can be specified from 12V to 48V				
Setting Tolerance	±1.00% at 50% load 15°C to 25°C				
Minimum Load	Zero				
Start-up delay (typical)	at 24V input: <1.5s at 36V input: <1.0s	at 72V input: <1.5s at 110V input: <1.0s			
Remote sensing	Not fitted				
Line & Load Regulation	±1.00% combined				
Temperature Coefficient	<0.02% / °C				
Output Ripple	<1% Pk-Pk of Output Voltage				
Output Noise	<75mV Pk-Pk superimposed (up to 20MHz)				
Response Time	0.5ms to within 2% (for a 20% - 90% load change)				
Current limit	Operates at 105 - 130% of rated output current				
Thermal Protection	Shuts down PSU if safe internal temperature is exceeded. Auto recovery.				
Indictors	Green 'Output OK' LED adjacent to connector				
Maximum capacitive load (output model dependant)	Output model Capacitance:	12V & 15V 10,000µF	24V 4,000µF	36V 1,500µF	48V 1,000µF
Isolation	Input to Output Input to Chassis Output to Chassis	2.0kV ac (tested at 3.0kV dc) 1.0kV ac (tested at 1.5kV dc) 1.0kV ac (tested at 1.5kV dc)			

Environmental details

Parameter	Detail
Operating Temperature	EN50155 class OT4: -40°C to +70°C (no de-rating). (85°C for 10 minutes.) Base plate is intended for cold wall mounting and must not exceed 85°C for full power operation (90°C during 10 minute over temperature)
Output power de-rating	Above 70°C: 3.0% / °C; 100°C absolute maximum
Storage Temperature	-40°C to +85°C
Cooling	Convection / Conduction. Mounting surface should be thermally rated at 1.0°C/W. A thermal mass equivalent to 300g of aluminium is required for 10 minutes operation at 85°C.
Relative Humidity	95% max.
Shock & Vibration	EN 50155 (EN 61373) for mounting in any orientation
Environmental Protection	IP20 with optional ventilated steel cover

Applicable norms

Parameter	Detail
EMC	EN50155 (2017), EN50121-3-2 (2016)
Other	EN50155 (2017), pr EN50155 (2016)
Fire & Smoke	EN 45545-2 (2013)

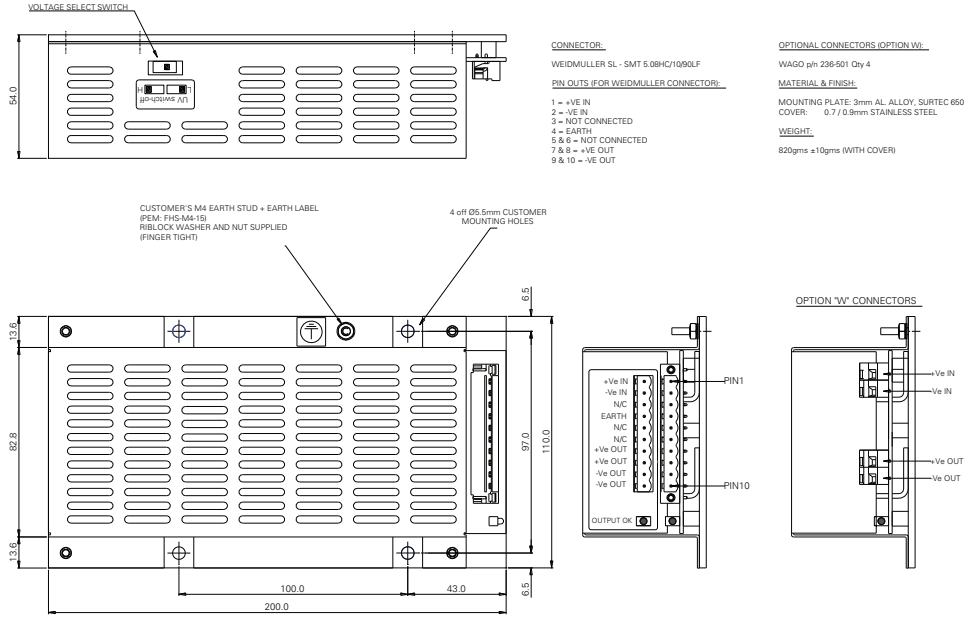
Mechanical characteristics

Parameter	Detail
Construction	Conformal coated PCB with aluminium base plate. Optional ventilated stainless steel cover.
Dimensions (L x W x H) (excluding mounting flanges)	Open frame: 200 x 80 x 50mm With cover: 200 x 83 x 54mm (mounting plate width = 110mm)
Weight	570g (820g with cover)
Connections	Standard: 10 way PCB mounted connector with screw locks part number: Weidmüller SL-SMT 5.08/10/90LF Option W: Wago cage clamp p/n 236-501 (5 pos) M4 earth stud on base plate
Fixings	Four Ø 5.5mm fixing holes.

Options for XER series

Code	Detail
S	Ventilated cover
W	Wago connectors

Technical drawing



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Martek Power
300W ATG Series
Datasheet

DC/DC converter for railway applications

Description

The 300W ATG series is a range of cost-effective, medium power single output converters that comply fully with the latest rail specifications and norms for protection and EMC. Although simple in construction, the mounting arrangement ensures compliance with the vibration and shock requirements of EN50155.

Special features include:

- Wide choice of output voltages
- High efficiency
- Fully compliant with rail standards, including EN50155 & EN50121.3.2

Option for all series

Code	Detail
Z	No fuse wire link fitted to input circuitry
L	Output status flag. Output fail relay fitted
S	Current share option. Droop current share circuit and series diode fitted
S2	Droop current share circuit fitted

Part number	Output V_o [Vdc]	Output I_o [A]
ATG 1200-*/1	12	20
ATG 1500-*/1	15	16
ATG 2400-*/1	24	12.5
ATG 3600-*/1	36.6	8.2
ATG 3600-*/2	36	8.3
ATG 4800-*/1	48	6.25
ATG 6000-*/1	60	5
ATG 7200-*/1	72	4.2
ATG 110-*/1	100	2.5

Input specifications

The following input voltages versions are available as standard:

110V (66.0 - 137.5V) dc (Suffix A)
72V (43.2 - 90.0V) dc (Suffix D)
52V (31.2 - 65.0V) dc (Suffix C)
36V (21.0 - 50.4V) dc (Suffix F)
24V (16.8 - 33.6V) dc (Suffix B)

Parameter	Detail
Input Ripple	To EN50155
Input Protection	Reverse polarity protection (some input versions require external fuse or circuit breaker). Surges and transients EN50155 (direct and indirect)
Inrush Current	Limited to typically 6 x nominal current (after 0.1ms)
Efficiency	90% typical
Hold-up time (110Vdc input version only)	10ms to EN50155 Class S2
Input Fuse	15 Amp wire link (25 SWG) is fitted for safe unit protection in the case of catastrophic failure.

Output specifications

Parameter	Detail
Maximum Output Power	300W (except 12V & 15V output versions which are rated at 240W continuous, 300W for 5 seconds)
Output Versions	Single output only
Output Voltage	Can be specified from 12V to 110V
Setting Tolerance	±1.0% at 50% load, 15°C to 25°C
Minimum Load	Zero

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Output specifications (Continued)

Parameter	Detail		
Line Regulation	±0.5%		
Load Regulation	±0.5%		
Temperature Coefficient	<0.02% / °C		
Output Ripple	<1% Pk-Pk of Output Voltage		
Output Noise	<75mV Pk-Pk superimposed (up to 20MHz)		
Response Time	0.5ms to within 1% (for a 10% - 100% load change)		
Current limit	Operates at approximately 110% of rated output power		
Thermal Protection	Shuts down PSU if safe internal temperature is exceeded. Auto recovery.		
Isolation	Input to Output	1.5kV ac	(tested at 2.2kV dc)
	Input to Case	1.0kV ac	(tested at 1.4kVdc)
	Output to Case	1.0kV ac	(tested at 1.4kVdc)

Environmental details

Parameter	Detail
Operating Temperature	-25°C to +70°C (no derating). Base plate is suitable for cold wall mounting and must not exceed 85°C for full power operation.
Output power derating	Above 70°C: 2% / °C; 100°C absolute maximum
Storage Temperature	-40°C to +80°C
Cooling	Convection / Conduction
Relative Humidity	95% max.
Shock & Vibration	EN50155 (EN61373)
Environmental Protection	IP20

Applicable norms

Parameter	Detail
EMC	EN50155 (2007), EN50121-3-2 (2006)
Other	EN50155 (2007)

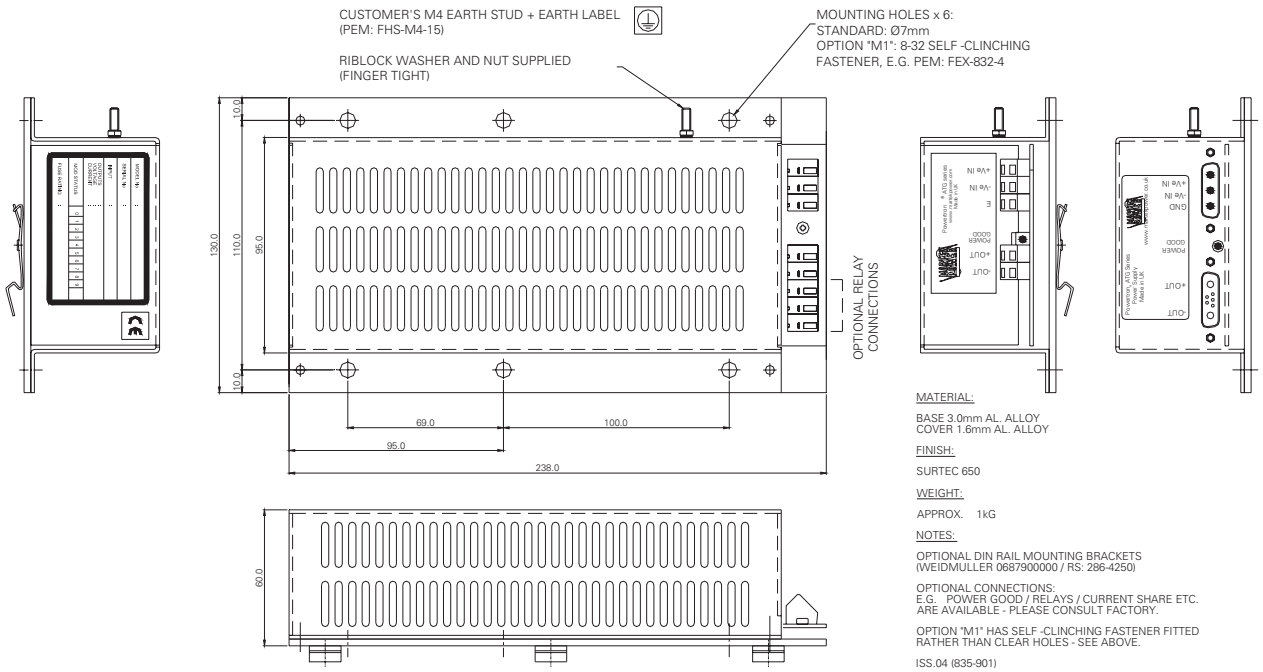
Mechanical characteristics

Parameter	Detail
Construction	Simple aluminium chassis with Suretec 650 finish
Dimensions	Length = 238mm Width = 130mm Height = 60mm
Weight	<1.0kg
Connections	Wago 236-501 terminal blocks and an M4 earth stud. Power D-type connectors also available.
Fixings	Six ø 7mm fixing holes on base plate.

Options for ATG series

Code	Detail
T	Extended temperature range to -40°C
D	DIN rail fixings fitted
Q1	Power D type connectors fitted to input and output.
SAV	RIA version, power reduced to 216 Watts Includes IP54 Enclosure and D types connectors.

Technical drawing



MATERIAL:

BASE 3.0mm AL. ALLOY
COVER 1.6mm AL. ALLOY

FINISH:

SURTEC 650

WEIGHT:

APPROX. 1kG

NOTES:

OPTIONAL DIN RAIL MOUNTING BRACKETS
(WEIDMULLER 0687900000 / RS: 286-4250)

OPTIONAL CONNECTIONS:
E.G. POWER GOOD / RELAYS / CURRENT SHARE ETC.
ARE AVAILABLE - PLEASE CONSULT FACTORY.

OPTION "M1" HAS SELF -CLINCHING FASTENER FITTED
RATHER THAN CLEAR HOLES - SEE ABOVE.

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Martek Power
500W PMR Series
Datasheet

DC/DC converter for railway applications

Description

The 500W PMR series is a range of cost-effective, medium power converters that comply fully with the latest rail specifications and norms for protection and EMC. They can be used individually or paralleled to create dual redundant or N+1 redundant systems, or simply to provide higher power capability. Although simple in construction, the mounting arrangement ensures compliance with the shock and vibration requirements of EN50155.

Special features include:

- High efficiency
- Wide choice of input and output voltages
- Output series device
- Active current share fitted as standard
- Conduction cooled or convection only cooled models available
- Fully compliant with rail standards, EN50155, EN50121.3.2

Input specifications

The following input voltages versions are available as standard:

110V	(66.0	-	137.5V)	dc	(Suffix A)
72V	(43.2	-	90.0V)	dc	(Suffix D)
52V	(31.2	-	65.0V)	dc	(Suffix C)
36V	(21.0	-	50.4V)	dc	(Suffix F)
24V	(16.8	-	33.6V)	dc	(Suffix B)

Parameter	Detail
Input Ripple	To EN50155
Input Protection	Reverse polarity protection (series device) Surges and transients EN50155 (direct and indirect)
Inrush Current	Active protection limits inrush to 6 x nominal current (after 0.1ms). (Except 24V input version)
Efficiency	88% typical
Hold-up time	10ms to EN50155 Class S2. For Suffix B & F units (24V & 36V input versions): hold-up is at a reduced load of 90%.

Output specifications

Parameter	Detail
Maximum Output Power	500W (24V input - 400W maximum)
Output Versions	Single output only
Output Voltage	Can be specified from 24V to 110V
Setting Tolerance	±1.0% at 50% load, 15°C to 25°C
Minimum Load	Zero
Line Regulation	±0.5%
Load Regulation	±0.5%

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Output specifications (Continued)

Parameter	Detail		
Remote sensing	Compensates for up to 250mV drop in each load line (for outputs between 12V & 24V).		
Temperature Coefficient	<0.02% / °C		
Output Ripple	<1% Pk-Pk of Output Voltage		
Output Noise	<75mV Pk-Pk superimposed (up to 20MHz)		
Response Time	0.5ms to within 2% (for a 10% - 100% load change)		
Current limit	Operates at approximately 110% - 130% of rated output current, stop & retry		
Thermal Protection	Shuts down PSU if safe internal temperature is exceeded. Auto recovery.		
Over-voltage Protection	Operates if output exceeds 115% (±5%) of nominal. Reset by power-down, power-up sequence		
Output Good Indication	Green LED confirms output present		
Output Good Signal	Volt-free relay contacts (changeover)		
Parallel Operation	Two or more converters may be connected in parallel for dual redundant or N+1 operation, or higher system power capability.		
Output Series Device	Prevents failure of one converter from affecting operation of others connected in parallel. Implemented using low loss device for maximum efficiency.		
Current Sharing	Active current sharing ensures that two or more supplies connected in parallel share the load current to better than 60% / 40%. One interconnection between supplies required.		
Isolation	Input to Output	1.0kV ac	(tested at 1.4kV dc)
	Input to Case	1.0kV ac	(tested at 1.4kV dc)
	Output to Case	1.0kV ac	(tested at 1.4kV dc)

Environmental details

Parameter	Detail
Operating Temperature	-40°C to +55°C (70°C for 10 min.)
Storage Temperature	-40°C to +80°C
Cooling	Alternative models for convection only cooling or conduction & convection cooling. For cold wall (conduction) cooling, base plate temperature should not exceed 85°C.
Relative Humidity	95% max.
Shock & Vibration	EN51055 (EN61373)
Environmental Protection	IP20

Applicable norms

Parameter	Detail
EMC	EN50155 (2007), EN50121-3-2 (2006)
Other	EN50155 (2007)

Mechanical characteristics

Parameter	Detail		
Construction	Simple aluminium chassis		
Dimensions		Conduction / convection cooled	Convection cooled (option H)
	L	250mm	250mm
	W	158mm	158mm
	H	70mm	112mm
	(Note: width includes mounting flanges)		
Weight		1.6kg	3.2kg
Connections	Wago 236-501 terminal blocks as standard. M5 earth stud.		
Fixings	6x12mm slot on base, four positions. M5 earth stud.		

Option	Detail	Code
Connections	Power D type connectors	Q1
Cooling	Heatsink fitted	H

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Martek Power
250W ACR Series
Datasheet

DC/AC inverter for railway applications

Description

The 250W ACR series is a range of medium power inverters that provide a 230Vac true sinewave output with very low distortion. Designed for connection directly to the train auxiliary supply, the inverters incorporate surge and transient filtering ensuring compliance with both the traditional and latest rail specifications and norms for protection and EMC. The rugged construction and various mounting options ensure compliance with vibration and shock requirements.

Special features include:

- True sinewave output
- 250W continuous output power (400W peak)
- Very low distortion
- Protected to IP65

Input specifications

The following input voltages versions are available as standard:

110V (66.0 - 137.5V) dc (Suffix A)
72V (43.2 - 90.0V) dc (Suffix D)
52V (31.2 - 65.0V) dc (Suffix C)
36V (21.0 - 50.4V) dc (Suffix F)
24V (16.8 - 33.6V) dc (Suffix B)

Parameter	Detail
Input Ripple	To EN50155
Input Protection	Reverse polarity protection. Surges and transients EN50155
Inrush Current	Limited to typically 5 x nominal current (after 0.1ms)
Efficiency	75% to 85% dependent on voltage combinations
Hold-up time	10ms to EN50155 Class S2— except 24Vdc input.

Output specifications

Parameter	Detail
Maximum Output Power	250W continuous 400W peak (for 15 seconds)
Output Voltage	230Vac
Setting Tolerance	±0.6% at 50% load, 15°C to 25°C
Output frequency	50Hz
Frequency Tolerance	±2%
Waveform	True Sinewave

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Output specifications (Continued)

Parameter	Detail	
Harmonic Distortion	<1.5%	
Output Current	1.1A continuous, 1.7 for 15 seconds	
Line & Load Regulation	±5.0% combined	
Temperature Coefficient	<0.02% / °C	
Output Ripple	Typically 5% Pk-Pk of Output Voltage	
Short circuit protection	Latch operates instantaneously if output power exceeds 15A (typically). LED indication provided. Reset by power-down, power-up.	
Delayed current limit	Latch operates if output power exceeds approximately 275W for longer than 16 to 20 seconds. LED indication provided. Reset by power-down, power-up.	
Thermal Protection	Output shuts off when safe internal temperature is exceeded. Auto recovery.	
Isolation	Input to Output	1.0kV ac (tested at 1.5kV dc)
	Input to Case	1.0kV ac (tested at 1.5kV dc)
	Output to Case	1.0kV ac (tested at 1.5kV dc)
Indicators	Input OK Output OK Lock out Over-current latch	Green LED Green LED Red LED Red LED

Environmental details

Parameter	Detail
Operating Temperature	-25°C to +55°C (no derating)
Storage Temperature	-40°C to +85°C
Cooling	By convection
Relative Humidity	99% max.
Shock & Vibration	EN 50155 (EN 61373), RIA 20
Environmental Protection	IP65

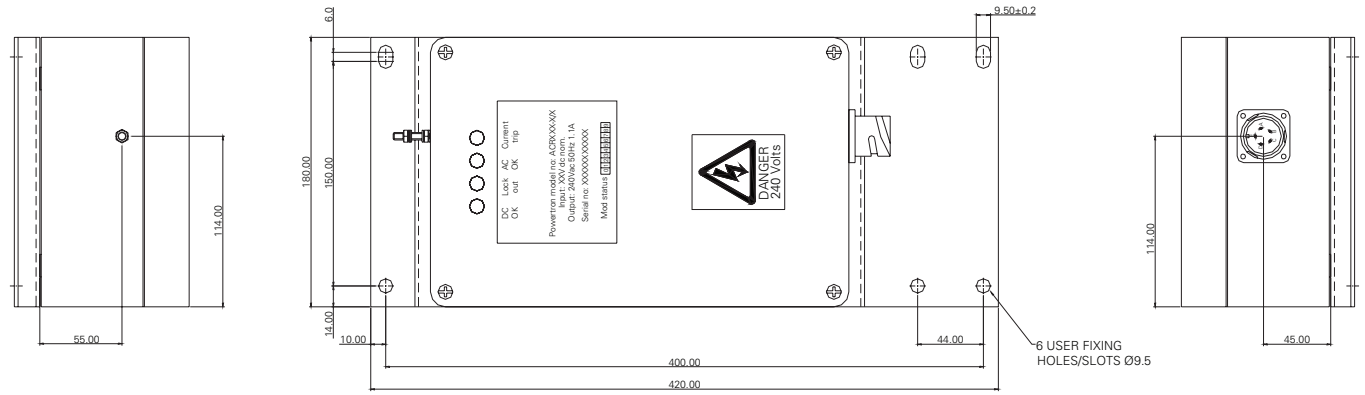
Applicable norms

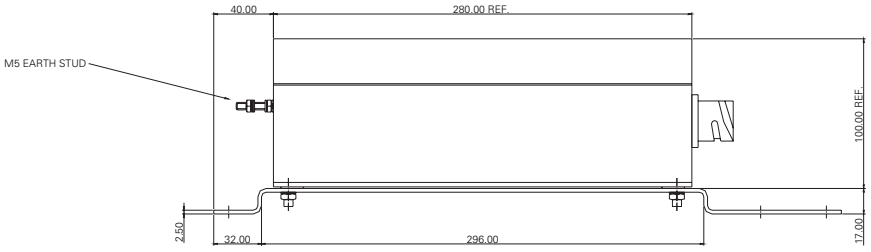
Parameter	Detail
EMC	RIA 12, 18; EN50155 (2007), EN50121-3-2 (2006)
Other	RIA 13, 18, 20 EN50155 (2007), LUL G6621

Mechanical characteristics

Parameter	Detail
Construction	Fully enclosed in sealed diecast aluminium case
Dimensions	Length = 280mm Width = 180mm Height = 100mm (Dimensions exclude base plate and connector)
Weight	<6.5kg (5kg excluding mounting plate)
Connections	Input and output via circular bayonet connector (shell size 18-11), earth via M5 stud
Fixings	Base plate allows surface mounting via six ø 9.5mm fixing holes. Other base plates available upon request.

Technical drawing





Connector part numbers:

Litton: FRCIR02R18-11PF80T12
AB: ABCIRH00A18-11PCNF80P3

Pin Configuration:

A: -Ve dc Input
B: +Ve dc Input
C: Line
D: Neutral
E: Not used

NOTES:

BASE PLATE 2.5mm MILD STEEL
PAINT FINISH: RAL 7001 SILVER GREY

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Martek Power
750W ASP Series
Datasheet

DC/AC inverter for railway applications

Description

The 750W At-Seat-Power series is a range of medium power inverters that provide a 230Vac true sinewave output with very low distortion. Designed for connection directly to the train auxiliary supply, the inverters incorporate surge and transient filtering ensuring compliance with both the traditional and latest rail specifications and norms for protection and EMC. The rugged construction and various mounting options ensure compliance with vibration and shock requirements.

Special features include:

- True sinewave output
- Very low distortion
- Ideal for mobile phone and laptop charging
- Low profile for behind seat mounting
- IP65 rated main enclosure
- RCBO output protected behind lockable access door

Input specifications

The following input voltages versions are available as standard:

110V (66.0 - 137.5V) dc (Suffix A)
72V (43.2 - 90.0V) dc (Suffix D)
52V (31.2 - 65.0V) dc (Suffix C)
36V (21.0 - 50.4V) dc (Suffix F)
24V (16.8 - 33.6V) dc (Suffix B) (24V version de-rated to 600W)

Parameter	Detail
Input Ripple	To RIA 13 and EN50155
Input Protection	Reverse polarity protection via shunt diode that will trip an external circuit breaker. Surges and transients EN50155
Inrush Current	5 x nominal current (after 0.1ms)
Efficiency	85% typically
Hold-up time	10ms to EN50155 Class S2

Output specifications

Parameter	Detail
Maximum Output Power	750W continuous (800W peak for 15 seconds) Maximum base plate temperature of 65°C for full power
Output Voltage	230Vac
Setting Tolerance	±1% at 50% load, 15°C to 25°C
Output frequency	50Hz

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Output specifications (Continued)

Parameter	Detail
Frequency Tolerance	±2%
Waveform	True Sinewave
Harmonic Distortion	<6%
Output Current	Nominal 3.3 Amps
Line & Load Regulation	±4.0% combined
Temperature Coefficient	<0.02% / °C
Output Ripple	Typically 5% Pk-Pk of Output Voltage
Short circuit protection	Operates instantaneously if output exceeds 10A (typically) Auto recovery.
Overload protection	Inverter shuts down if output power exceeds approximately 800W for longer than 16 to 20 seconds. LED indications provided. Resets automatically after approximately 10 seconds.
Earth leakage protection	MCBO (combined RCD and circuit breaker) also allows physical isolation of output
Thermal Protection	Output shuts off when safe internal temperature is exceeded. Auto recovery
Isolation	Input to Output 1.0kV ac (tested at 1.5kV dc) Input to Case 1.0kV ac (tested at 1.5kV dc) Output to Case 1.0kV ac (tested at 1.5kV dc) Relay Contacts 1.0kV ac
Indicators & signalling	Input present Green LED Output present Green LED Overload trip Red LED

Environmental details

Parameter	Detail
Operating Temperature	-25°C to +55°C (no derating)
Storage Temperature	-40°C to +80°C
Cooling	By convection Maximum base plate temperature of 65°C for full power
Relative Humidity	95% max.
Shock & Vibration	EN 50155 (EN 61373), RIA 20
Environmental Protection	IP65

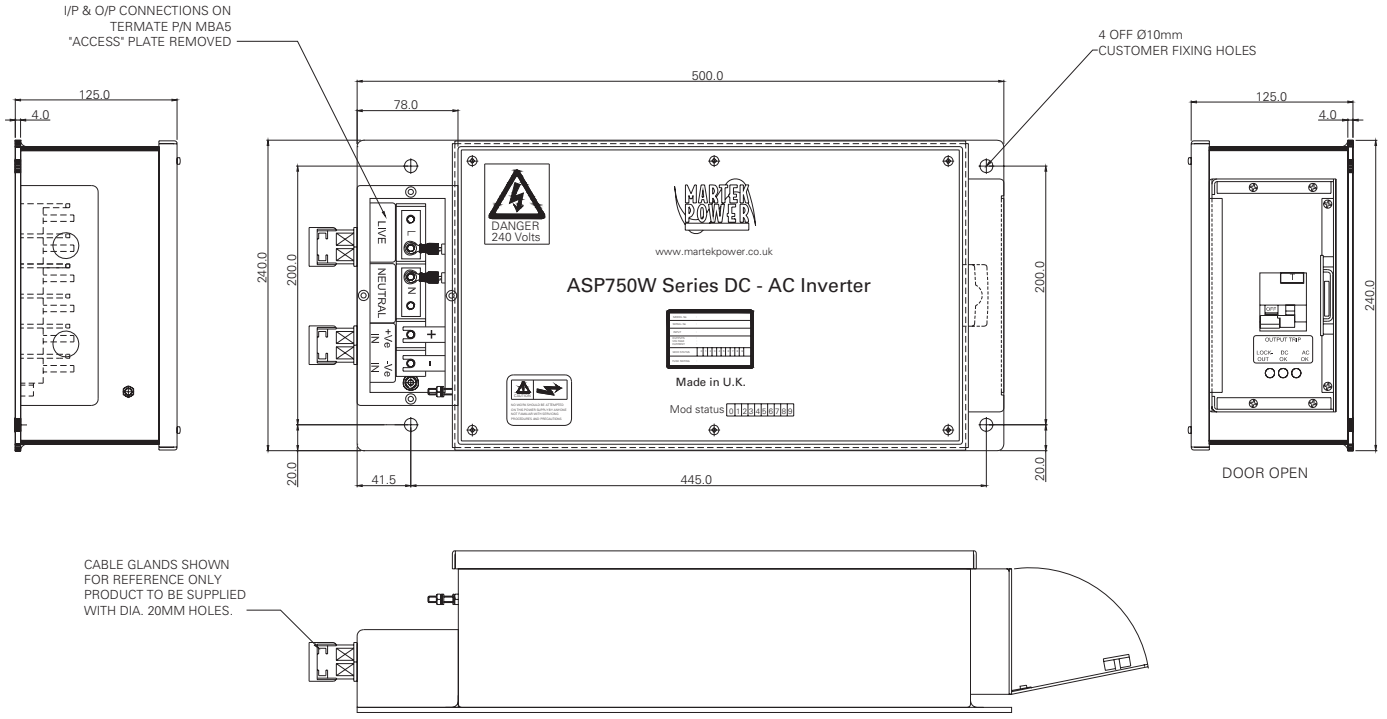
Applicable norms

Parameter	Detail
EMC	RIA 12, 18; EN50155 (2007), EN50121-3-2 (2006)
Other	RIA 13, 18, 20 EN50155 (2007)

Mechanical characteristics

Parameter	Detail
Construction	Fully enclosed in sealed aluminium case
Dimensions	Length = 500 mm (includes mounting plate) Width = 240 mm Height = 125mm
Weight	<6kg
Connections	M5 studs within the main enclosure accessible via cable glands
Fixings	See below for guidance.

Technical drawing



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