



CE

Features

- Compliance to EN50155 and EN45545-2 railway standard
- Ultra compact and 1U low profile(25mm)
- 4:1 wide input range
- No minimum load required
- Protections: Short circuit / Overload / Over voltage / Input reverse polarity
- 4000VDC I/O isolation (reinforced isolation)
- Half encapsulated, cooling by free air convection
- -40~+70°C wide working temperature
- · Built-in constant current limiting circuit
- · LED indicator for power on
- 3 years warranty









Applications

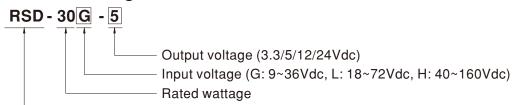
- · Bus,tram,metro or railway system
- Wireless network
- Telecom or datacom system
- Highly vibrating, highly dusty, extremely low or high temperature harsh environment

Description

RSD-30 is a 30W enclosed type DC-DC reliable railway converter. This series is compliant with EN50155/ IEC60571 railway standard, constituting three types of models with 4:1 wide but different input ranges 9~36V/18~72V/40~160V, suitable for railway and all kinds of transportation systems exploiting the frequently used standard input voltages such as 12V, 24V, 36V, 48V, 72V, 96V and 110V. Various output voltages, 3.3V, 5V, 12V and 24V are available for selection.

This series has the capability of working under -40 $^{\circ}$ C, low ripple and noise, supreme EMC characteristics, 4KVDC I/P-OP, low enclosure profile 25mm and an interior with semi-potted silicone. It does not only well fits the in-car systems or the facilities by rails for railway, trams and buses but also can be used in the harsh environment with high vibration, high dust, extremely low or high temperature, etc.

■ Model Encoding



Series name



SPECIFICATION

a.5% Joutput power Constant curre a.75 ~ 7V Shut down o/p lerating); +70 condensing 95% RH non 50°C) Omin./1cycle,	r ent limiting, reco 13.8 ~ 16.2V o voltage, re-pow	vers automaticall 27.6 ~ 32.4V er on to recover by free air conver	18 ~ 72VDC 84% 0.52A/48V 20A/48VDC ly after fault cond 3.8 ~ 4.5V	86% 0.8A/48V 10.8A/48V 10.8A/48V 10.8A/48V 10.8A/48V	12V 2.5A 0 ~ 2.5A 30W 60mVp-p ±2.0% ±0.3% ±0.3% 90% 13.8 ~ 16.2V xternal base plate	91% 27.6 ~ 32.4V								
- 6A - 6A - 6W	0 ~ 2.5A 30W 60mVp-p ±2.0% ±0.3% ±0.3% ms) @full load,\$ 86.5% 86.5%	0 ~ 1.25A 30W 50mVp-p ±2.0% ±0.2% ±0.2% (32 level(10ms) € 89% 89%	0 ~ 6A 19.8W 70mVp-p ±2.0% ±0.5% ±0.5% 280% load; L typ 18 ~ 72VDC 84% 0.52A/48V 20A/48VDC by after fault cond 3.8 ~ 4.5V	0 ~ 6A 30W 70mVp-p ±2.0% ±0.5% ±0.5% = comply with \$ 86% 0.8A/48V	0 ~ 2.5A 30W 60mVp-p ±2.0% ±0.3% ±0.3% \$\frac{1}{2}\$\$\$\$ 90%	0 ~ 1.25A 30W 50mVp-p ±2.0% ±0.2% ±0.2% 2full load 91%								
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95% RH non 50°C) 0min./1cycle,	•	ng Y V 7 avas ·												
50°C) 0min./1cycle,)	•	ing Y V 7 aves :				5 ~ 95% RH non-condensing								
Omin./1cycle,	, 60min. each alo	ing Y V 7 avec :	-40 ~ +85°C, 10 ~ 95% RH non-condensing											
)	, ournin. each aid		±0.03%/°C (0 ~ 50°C)											
<u>′</u>		ing X, 1, 2 axes,	10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes; Mounting: compliance to IEC61373											
	IEC60950-1 (LVD)													
)/P-FG:100M		/ 25°C / 70% RH		Tookloo	/ Nata									
					vei / Note									
				Class A										
•			Task Lavel / Notes											
Radiated Field EN61000-4-3		61000-4-3												
EFT / Burst		EN61000-4-4												
				Level 4,	, ,									
				Level 3,1KV Line-Line, Level 3, 2KV Line-E										
Compliance to EN45545-2 for fire protection; EN50155 / IEC60571 including IEC61373 for shock & vibration, EN50121-3-2 for EMC														
396.9K hrs min. MIL-HDBK-217F (25°C)														
	_													
Kg/0.83CUF1	Т													
4 * il 1	5545-2 for fir MIL-HDBK- W*H) (g/0.83CUF) neasured at ndwidth by tall ulation and I which will be ckness. The I testing of c	t EN: t EN: EN: Sta EN: Sta EN: EN: EN: EN: EN: EN: EN: EN	EN6100-3-3 Standard EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6 5545-2 for fire protection; EN50155 / IEC60571 MIL-HDBK-217F (25°C) W*H) Kg/0.83CUFT measured at 24,48VDC input, rated load and nodwidth by using a 12" twisted pair-wire termulation and load regulation. which will be installed into a final equipment ckness. The final equipment must be re-confi	EN55032 t EN6100-3-2 EN6100-3-3 Standard EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6 5545-2 for fire protection; EN50155 / IEC60571 including IEC613 MIL-HDBK-217F (25°C) W*H) Kg/0.83CUFT neasured at 24,48VDC input, rated load and 25°C of ambier ndwidth by using a 12" twisted pair-wire terminated with a 0: ulation and load regulation. which will be installed into a final equipment. All the EMC teckness. The final equipment must be re-confirmed that it still I testing of component power supplies." (as available on http	EN55032 Class A EN55032 Class B t	EN55032 Class B t EN6100-3-2 Class B t EN6100-3-2 Class A EN6100-3-3 Standard Test Level / Note EN61000-4-2 Level 3, ±8KV air; Level EN61000-4-3 Level X EN61000-4-4 Level 3, 2KV at power Level 4, 2KV at signal EN61000-4-5 Level 3 EN61000-4-6 Level 3 5545-2 for fire protection; EN50155 / IEC60571 including IEC61373 for shock & vibration, EN50121 MIL-HDBK-217F (25°C) W*H) Kg/0.83CUFT measured at 24,48VDC input, rated load and 25°C of ambient temperature. ndwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor. ulation and load regulation. which will be installed into a final equipment. All the EMC tests are been executed by moun ckness. The final equipment must be re-confirmed that it still meets EMC directives. For guicl testing of component power supplies." (as available on http://www.meanwell.com)								



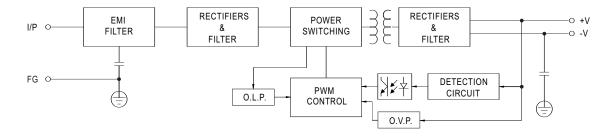
SPECIFICATION

MODEL		RSD-30H-3.3	RSD-30H-5	RSD-30H-12		RSD-30H-24		
	DC VOLTAGE	3.3V	5V	12V		24V		
ОИТРИТ	RATED CURRENT	6A	6A	2.5A		1.25A		
	CURRENT RANGE	0 ~ 6A	0 ~ 6A	0 ~ 2.5A		0 ~ 1.25A		
	RATED POWER	19.8W	30W	30W		30W		
	RIPPLE & NOISE (max.) Note.2	70mVp-p	70mVp-p	60mVp-p		50mVp-p		
	VOLTAGE TOLERANCE Note.3		±2.0%	±2.0%		±2.0%		
	LINE REGULATION	±0.5%	±0.5%	±0.3%		±0.2%		
	LOAD REGULATION	±0.5%	±0.5%	±0.3%		±0.2%		
	SETUP, RISE TIME	120ms, 85ms at full load						
	HOLD UP TIME (Typ.)	H-type comply with S2 level(10n	ns) @ full load					
	VOLTAGE RANGE CONTINUOUS	, ,	-, 0					
	EFFICIENCY (Typ.)	87%	89%	89%		89%		
INPUT	DC CURRENT (Typ.)	0.23A/110V	0.35A/110V	3070		0070		
	INRUSH CURRENT (Typ.)	20A/110VDC	0.00747104					
	introdit outreet (13p.)	105 ~ 135% rated output power						
	OVERLOAD	Protection type : Constant curre	nt limiting, recovers automatics	Illy after fault condition	is removed			
PROTECTION		3.8 ~ 4.5V	5.75 ~ 7V	13.8 ~ 16.2V	is removed	27.6 ~ 32.4V		
	OVER VOLTAGE		1 1			27.0 ~ 32.4 V		
	WORKING TEMP	Protection type: Shut down o/p voltage, re-power on to recover -40 ~ +55°C (no derating); +70°C @ 60% load by free air convection; +70°C (no derating with external base plate)						
	WORKING TEMP.	5 ~ 95% RH non-condensing						
FNVIDONMENT	WORKING HUMIDITY	· · · · · · · · · · · · · · · · · · ·						
ENVIRONMENT	STORAGE TEMP., HUMIDITY TEMP. COEFFICIENT	-40 ~ +85°C, 10 ~ 95% RH non-condensing						
		±0.03%/°C (0 ~ 50°C)						
	VIBRATION	10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes; Mounting: compliance to IEC61373 IEC60950-1 (LVD)						
	SAFETY STANDARDS	I/P-O/P:4KVDC I/P-FG:2.5KVDC O/P-FG:2.5KVDC						
	WITHSTAND VOLTAGE							
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25°C / 70% RH Parameter Standard Test Level / Note						
			Standard EN55032		Class A	ei / Note		
	EMC EMISSION	Conductor						
			EN55032					
		Harmonic Current Voltage Flicker	EN6100-3-2 EN6100-3-3		Class A			
SAFETY &		•				1/11-4-		
EMC	EMC IMMUNITY	Parameter	Standard		Test Level / Note			
(Note 4)		ESD Radiated Field	EN61000-4-2		Level 3, ±8KV air ; Level 3, ±6K			
		Radiated Field	EN01000-4-3	EN61000-4-3		Level X Level 3, 2KV at power		
		EFT / Burst	EN61000-4-4	EN61000-4-4		·		
		Curao	ENG1000 4 5		Level 4, 2KV at signal Level 3,1KV Line-Line, Level 3, 2KV Line-E			
		Surge Conducted	EN61000-4-5		-	V Lille-Lille, Level 3, 2KV Lille-Eartil		
	DAII WAY STANDADD			EN61000-4-6 Level 3 n; EN50155 / IEC60571 including IEC61373 for shock & v		rotion ENEO121 2 2 for EMC		
	RAILWAY STANDARD		0	I including IEC61373 lo	SHOCK & VIDI	ration, ENSU121-3-2 for EMC		
OTHERO	MTBF	396.9K hrs min. MIL-HDBK-217F (25°C)						
OTHERS	DIMENSION	113*60*25mm (L*W*H)						
NOTE	Ripple & noise are measure Tolerance : includes set up The power supply is consid a 360mm*360mm metal pla perform these EMC tests, p	ally mentioned are measured at 110VDC input, rated load and 25°C of ambient temperature. The detailed at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor. To tolerance, line regulation and load regulation. The dered a component which will be installed into a final equipment. All the EMC tests are been executed by mounting the unit on ate with 1mm of thickness. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to please refer to "EMI testing of component power supplies." (as available on http://www.meanwell.com) at external output capacitance should not exceed 5000uF.						



■ Block Diagram

fosc: 110KHz



■ Input Fuse

There is one fuse connected in series to the positive input line, which is used to protect against abnormal surge. Fuse specifications of each model are shown as below.

Type	Fuse Type	Reference and Rating
G	Time-Lag	CONQUE MST, 6.3A, 250V
L	Time-Lag	CONQUE MST, 3.15A, 250V
Н	Time-Lag	CONQUE MST, 2A, 250V

■ Input Reverse Polarity Protection

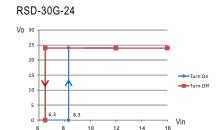
There is a MOSFET connected in series to the negative input line. If the input polarity is connected reversely, the MOSFET opens and there will be no output to protect the unit.

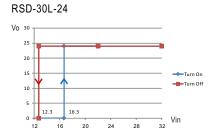
■ Input Range and Transient Ability

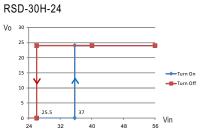
The series has a wide range input capability. With $\pm 40\%$ of rated input voltage, it can withstand that for 1 second.

■ Input Under-Voltage Protection

If input voltage drops below Vimin, the internal control IC shuts down and there is no output voltage. It recovers automatically when input voltage reaches above Vimin, please refer to the cruve below.







■ Inrush Current

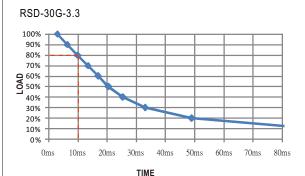
Inrush current is suppressed by a resistor during the initial start-up, and then the resistor is bypassed by a MOSFET to reduce power consumption after accomplishing the start-up.

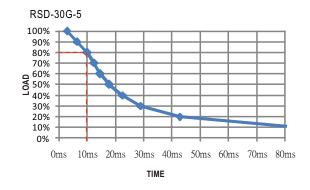


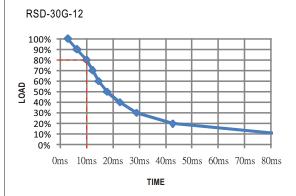
■ Hold-up Time

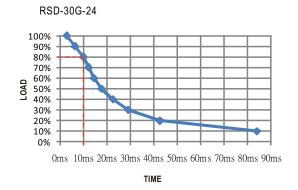
H type is in compliance with S2 level (10ms), while G and L types are in compliance with S1 level (3ms) at full load output condition.

To fulfil the requirements of S2 level (10ms), G types require de-rating their output load to 80%, please refer to the curve diagrams below.









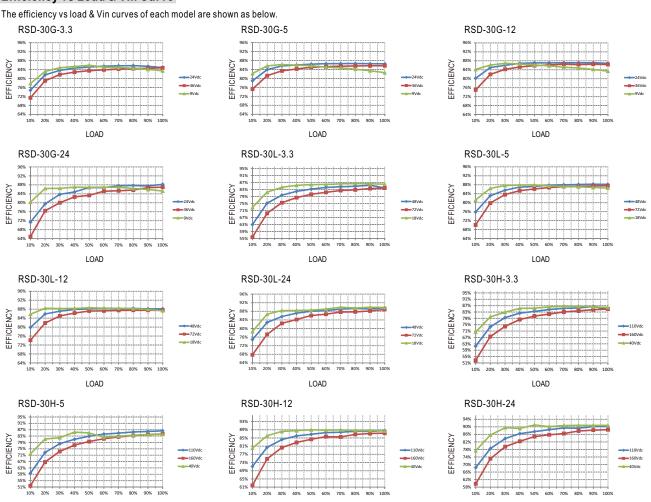
■ Output Voltage Adjustment

This function is optional, which the standard product does not have it. If you do need the function, please contact MW for details.

LOAD



■ Efficiency vs Load & Vin Curve



■ Parallel and Series Connection

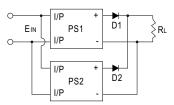
LOAD

A.Operation in Parallel

Since RSD-30 series don't have built-in parallel circuit, it can only use external circuits to achieve the redundant operation but not increase the current rating.

LOAD

1.Add a diode at the positive-output of each power supply (as shown as below), the current rating of the diode should be larger than the maximum output current rating and attached to a suitable heat sink. This is only for redundant use (increase the reliability of the system) and users have to check suitability of the circuit by themselves.

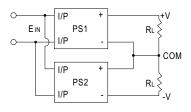


2. When using S.P.S. in parallel connection, the leakage current will increase at the same time. This could pose as a shock hazard for the user. So please contact the supplier if you have this kind of application.

B.Operation in Series

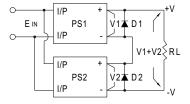
RSD-30 can be operated in series. Here are the methods of doing it:

1. Positive and negative terminals are connected as shown as below. According to the connection, you can get the positive and negative output voltages for your loads.



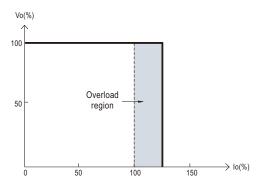


2. Increase the output voltage (current does not change). Because RSD-30 series have no reverse blocking diode in the unit, you should add an external blocking diode to prevent the damage of every unit while starting up. The voltage rating of the external diode should be larger than V1+V2 (as shown as below).



■ Overload Protection

If the output draw up to 105~135% of its output power rating, the converter will go into overload protection which is constant current mode. After the faulty condition is removed, it will recover automatically. Please refer to the diagram below for the detail operation characteristic. Please note that it's not suitable to operate within the overload region continuously, or it may cause to over temperature and reduce the life of the power supply unit or even damage it.



■ Over Voltage Protection

The converter shuts off to protect itself when the output voltage drawn exceeds 115~140% of its output rating. It must be repowered on to recover.

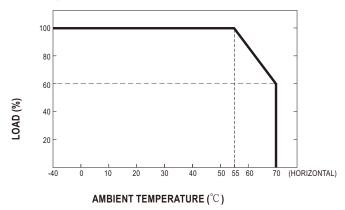
■ LED Indicator

Equipped with a built-in LED indicator, the converter provides an easy way for users to check its condition through the LED indicator. Green: normal operation; No signal: no power or failure.

■ Derating Curve

a.Single unit operation

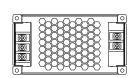
If the unit has no iron plate mounted on its bottom, the maximum ambient temperature for the unit will be 55°C as operating under full load condition. It requires de-rating output current when ambient temperature is between 55~70°C, please refer to the de-rating curve as below.

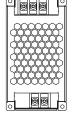


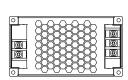


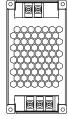
Suitable installation methods are shown as below. Since RSD-30 is a semi-potted model, its thermal performances for the following installation methods are similar and share the same derating curve.





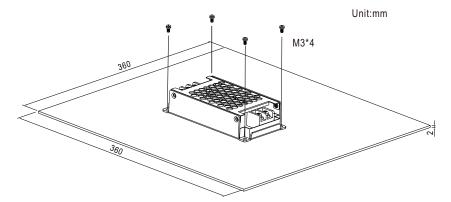




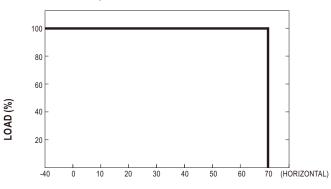


b.Operate with additional iron plate

If it is necessary to fulfil the requirements of EN50155 TX level that operate the unit fully-loaded at 70° C, RSD-30 series must be installed onto an iron plate on the bottom. The size of the suggested iron plate is shown as below. In order for optimal thermal performance, the iron plate must have an even & smooth surface and RSD-30 series must be firmly mounted at the center of the iron plate.

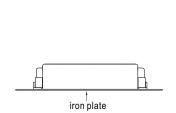


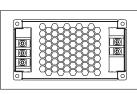
The load vs ambient temperature curve is shown as below.

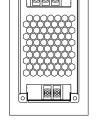


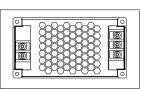
AMBIENT TEMPERATURE (°C)

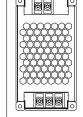
Suitable installation methods are shown as below. Since RSD-30 is a semi-potted model, its thermal performances for the following installation methods are similar and share the same derating curve.













■ Immunity to Environmental Conditions

Test method	Test method Standard		Status	
Cooling Test	EN 50155 section 12.2.3 (Column 2, Class TX) EN 60068-2-1	Temperature: -40°C Dwell Time: 2 hrs/cycle	No damage	
Dry Heat Test	ry Heat Test EN 50155 section 12.2.4 (Column 2, Class TX) EN 50155 section 12.2.4 (Column 3, Class TX & Column 4, Class TX) EN 60068-2-2		PASS	
Damp Heat Test, Cyclic	EN 50155 section 12.2.5 EN 60068-2-30	Temperature: 25°C~55°C Humidity: 90%~100% RH Duration: 48 hrs	PASS	
Vibration Test	EN 50155 section 12.2.11 EN 61373	Temperature: 19°C Humidity: 65% Duration: 10 mins	PASS	
Increased Vibration Test	EN 50155 section 12.2.11 EN 61373	Temperature: 19°C Humidity: 65% Duration: 5 hrs	PASS	
Shock Test	EN 50155 section 12.2.11 EN 61373	Temperature: $21\pm3^{\circ}\text{C}$ Humidity: $65\pm5\%$ Duration: $30\text{ms*}18$	PASS	
Low Temperature Storage Test	EN 50155 section 12.2.3 (Column 2, Class TX) EN 60068-2-1	Temperature: -40°C Dwell Time: 16 hrs	PASS	
Salt Mist Test	EN 50155 section 12.2.10 (Class ST4)	Temperature: 35°C ±2°C Duration: 96 hrs	PASS	

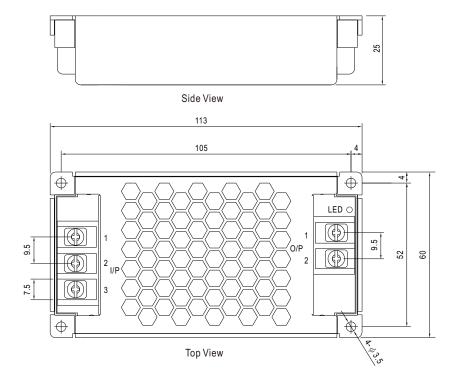
■ EN45545-2 Fire Test Conditions

Test Items Hazard Level					
Items		Standard	HL1	HL2	HL3
R24	Oxygen index test	EN 45545-2:2013+A1:2015 EN ISO 4589-2:1996	PASS	PASS	PASS
R25	Glow-wire test	EN 45545-2:2013+A1:2015 EN 60695-2-11:2000	PASS	PASS	PASS
R26	Vertical flame test	EN 45545-2:2013+A1:2015 EN 60695-11:2003	PASS	PASS	PASS



■ Mechanical Specification

Case No.253A Unit:mm



Input Terminal Pin No. Assignment:

Output Terminal Pin No. Assignment:

Pin No.	Assignment
1	DC INPUT V+
2	DC INPUT V-
3	FG ±

Pin No.	Assignment
1	DC OUTPUT -V
2	DC OUTPUT +V

■ Installation Manual

Please refer to : http://www.meanwell.com/manual.html