

RSD-100-B Series

100W Railway Single Output DC-DC Converter



Features

- Compliance to EN50155 railway standard
- 2:1 wide input range
- Protections: Short circuit / Overload / Over Voltage / Input reverse polarity
- 4000VDC I/O isolation
- Cooling by free air convection
- Half encapsulated
- Built-in constant current limiting circuit
- 1U low profile 36mm
- All using 105°C long life electrolytic capacitors
- LED indicator for power on
- 100% full load burn-in test
- 3 years warranty



Specification

INPUT	Voltage Range	16.8 ~ 31.2VDC (Continuous)		
		14.4 ~ 33.6VDC (1 second)		
	Efficiency	88%	88%	89%
	DC Current	4.8A /24V	4.8A /24V	4.8A /24V
	Inrush Current (Typ.)	30A/24VDC		
OUTPUT	MODEL No.	RSD-100B-5	RSD-100B-12	RSD-100B-24
	Voltage	5V	12V	24V
	Rated Current	20A	8.4A	4.2A
	Current Range	0 ~ 20A	0 ~ 8.4A	0 ~ 4.2A
	Rated Power	100W	100.8W	100.8W
	Ripple Noise MAX.	100mVp-p	120mVp-p	150mVp-p
	Voltage Tolerance	± 2.0%	± 2.0%	± 2.0%
	Line Regulation	± 0.5%	± 0.2%	± 0.2%
	Load Regulation	± 1.0%	± 1.0%	± 1.0%
	Setup Rise Time	80ms, 50ms at full load		
	Hold Up Time	Complies with S2 level at full load		
PROTECTION	Overload	105 ~ 135% rated output power Protection Type: Constant current limiting, recovers automatically after fault is removed		
	Over Voltage	5.75~7V	13.8~16.2V	27.6~32.4V
		Protection Type: Shut down o/p voltage, re-power on to recover		
ENVIRONMENT	Working Temp.	-40 ~ +55°C (no derating); +70°C @ 60% load by free air convection; +70°C no derating with external base plate, TX class compliance		
	Working Humidity	5 ~ 95% RH non-condensing		
	Storage Temp., Humidity	-40 ~ +85°C, 5 ~ 95% RH		
	Temp. Co-efficient	±0.03%/°C (0 ~ 50°C)		
	Vibration	10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes; Mounting: compliance to IEC61373		
SAFETY & EMC	Safety Standards	Meet IEC60950-1 (LVD)		
	Withstand Voltage	I/P-O/P:4KVDC	I/P-FG:2.5KVDC	O/P-FG:2.5KVAC
	Isolation Resistance	I/P-OP, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25°C /70%RH		
	EMC Emission	Compliance to EN55022 (CISPR22) Conduction Emission: Class A, Radiation Emission: Class B		
	EMC Immunity	Compliance to EN61000-4-2,3,4,5,6,8, light industry level, criteria A		
	Railway Standard	Meet EN50155 / IEC60571 including IEC61373 for shock & vibration, EN50121-3-2 for EMC		
OTHERS	M.T.B.F.	254.1K hrs min. MIL-HDBK217F (25°C)		
	Packaging	0.6Kg; 24pcs/15.4Kg/0.98CUFTCUFT		

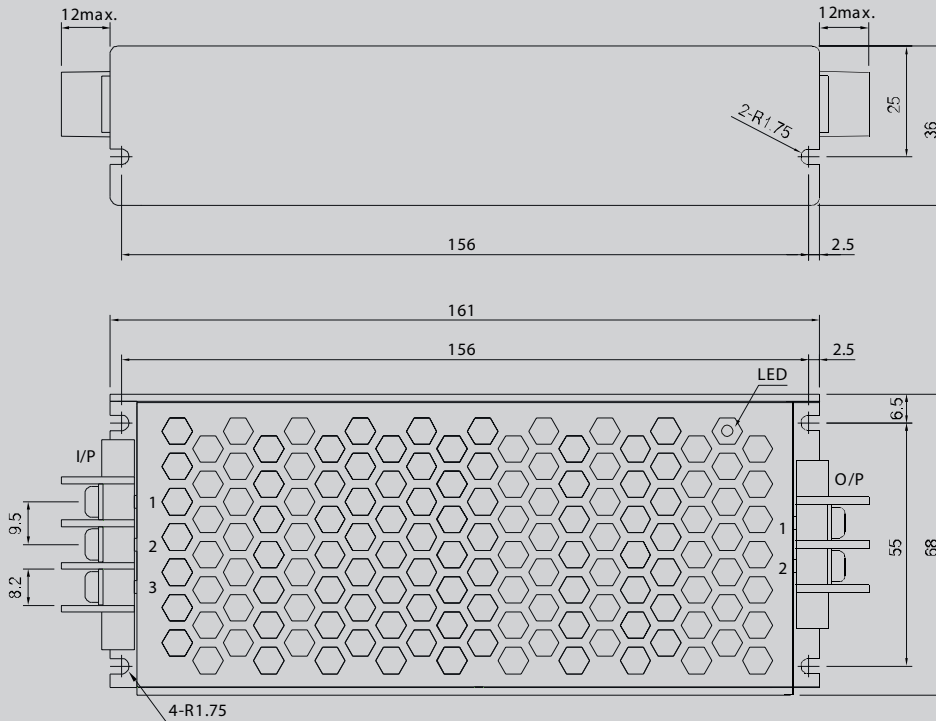
1. All parameters not specially mentioned are measured at 24, 48, 110VDC input, rated load and 25°C of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uF & 47uF parallel capacitor.
3. Tolerance: Includes set up tolerance, line regulation and load regulation.
4. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives.

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Mechanical Specification



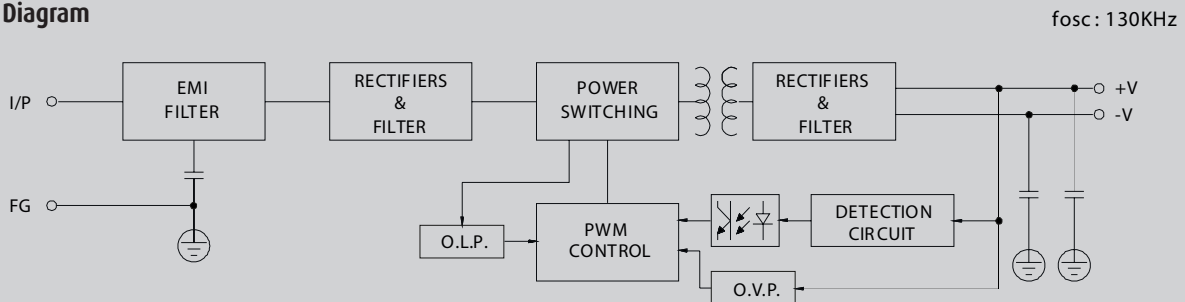
Input Terminal Pin No. Assignment:

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

Output Terminal Pin No. Assignment:

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

Block Diagram



Input Fuse

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

Type	Fuse Type	Reference and Rating
D	Time-Lag	Conquer UDA-A, 3.15A, 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.

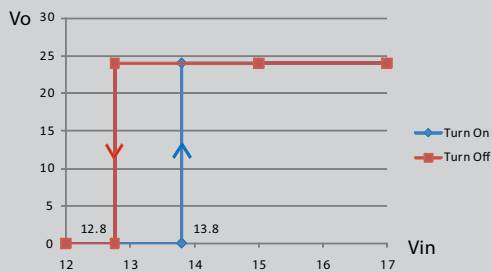
Input Range and Transient Ability

The series has a wide range input capability. Within $\pm 3.0\%$ of rated input voltage, it can be executed at full-load operation and operate properly; with $\pm 40\%$ of rated input voltage, it can withstand that for 1 second.

Input Under-Voltage Protection

If input voltage drops below V_{imin} , the internal control IC shuts down and there is no output voltage. It recovers automatically when input voltage reaches above V_{imin} , please refer to the curve below.

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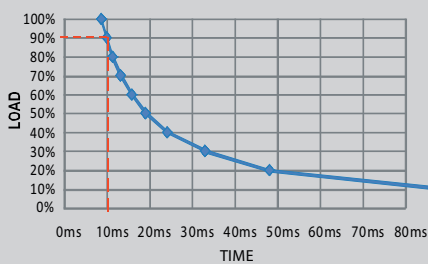
Inrush Current

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.

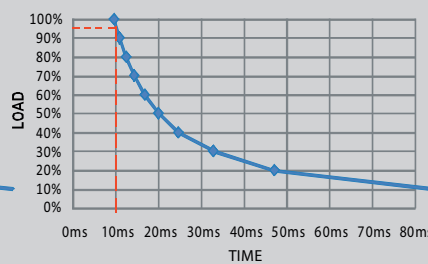
Hold Up time

In compliance with S1 level at full load output condition. To fulfil the requirements of S2 level, requires de-rating their output load to 70%, please refer to these diagrams.

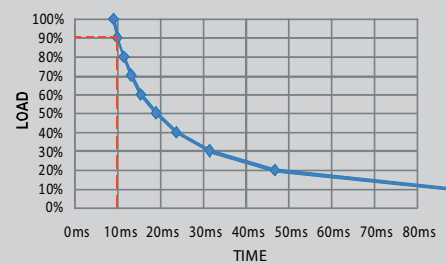
RSD-100B-5



RSD-100B-12



RSD-100B-24

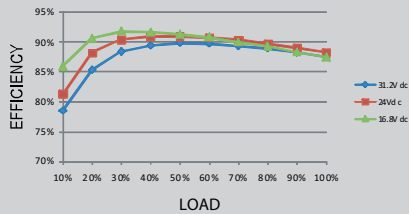


Output Voltage Adjustment

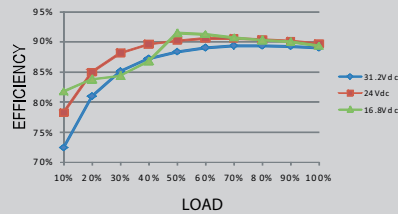
This function is an optional feature and does not have as standard. If you need this function, please ask for further details.

Efficiency vs Load & Vin Curve

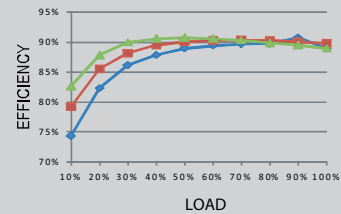
RSD-100B-5



RSD-100B-12



RSD-100B-24

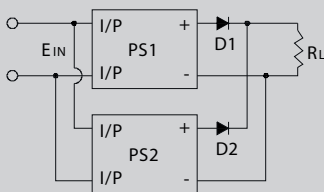


Parallel and Series Connection

A. Operation in Parallel

Since RSD-100 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.

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.

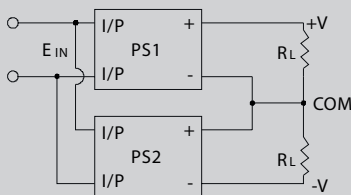


2. When using S.P.S. in parallel connection, the leakage current will increase at the same time. This could pose as a shock hazard for the user. So please contact the supplier if you have this kind of application.

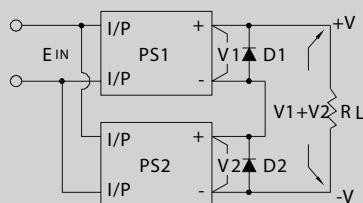
B. Operation in Series

RSD-100 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.

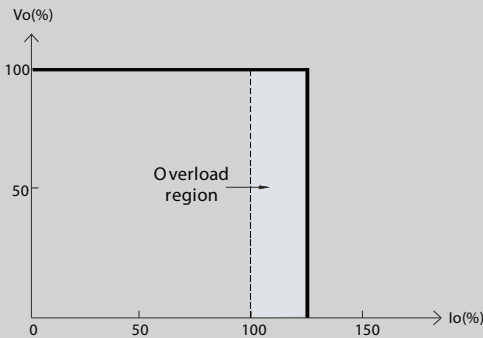


2. Increase the output voltage (current does not change). Because RSD-100 series have no reverse blocking diode in the unit, you should add an external blocking diode to prevent the damage of every unit while starting up. The voltage rating of the external diode should be larger than $V_1 + V_2$ (as 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

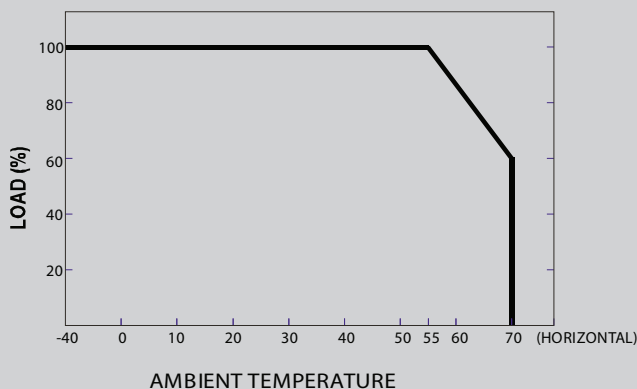
Equipped with a built-in LED indicator, the converter provides an easy way to for users to check its condition through the LED indicator.

Green: normal operation; No Signal: no power or failure.

Derating Curve

A: Single unit operation

If the unit only 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.

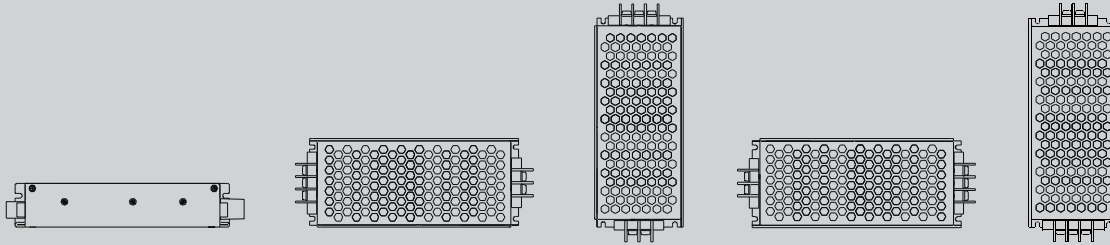


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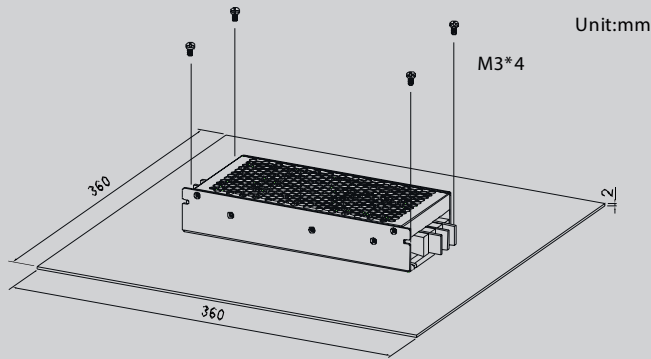


Suitable installation methods are shown as below. Since RSD-100 is a semi-potted model, its thermal performance for the following installation methods are similar and share the same derating curve.

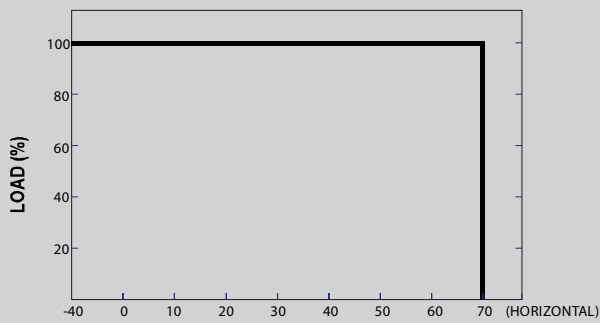


B: Operate with additional iron plate

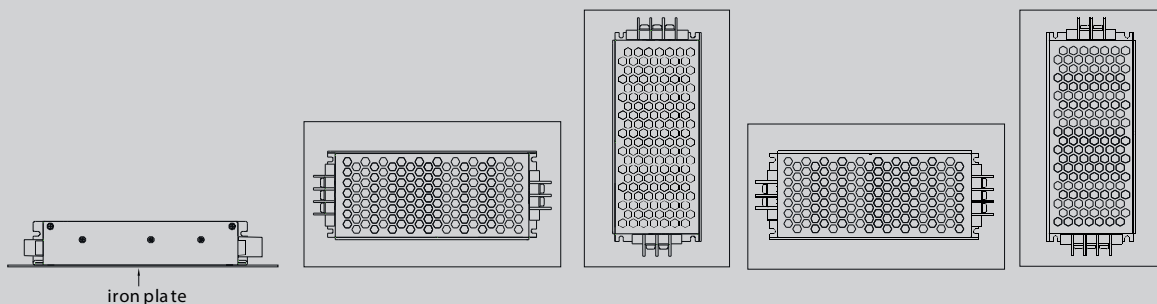
If it is necessary to fulfil the requirements of EN50155TX level that operate the unit fully-loaded at 70°C, RSD-100 series must be installed onto an iron plate on the bottom. The size of the suggested iron plate is shown below. In order for optimal thermal performance, the iron plate must have an even & smooth surface and RSD-100 series must be firmly mounted at the centre of the iron plate.



The load vs ambient temperature curve is shown as below.



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Immunity to Environmental Conditions

Test method	Standard	Test conditions	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	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	Temperature: 70°C / 85°C Duration: 6 hrs / 10min	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±3°C Humidity: 65 ± 5% Duration: 30ms*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