TECHNICAL DATASHEET

PMR Panel Mount Power Supply

PMR 240 W series / PMR-24V240W1AJ



PMR

Highlights & Features

- Universal AC input voltage
- Built-in active PFC and conforms to harmonic current IEC/EN 61000-3-2, Class A and Class D
- Lower no load power consumption
- Compact 1U low-profile design
- Terminal block cover and conformal coating available
- Certified for industrial and household applications (IEC/EN 62368-1, 60335-1, 61558-1, 61558-2-16)
- Compliant with IEC 61000-4-6 20V/m & semiconductor requirements
- Over voltage category III (OVC III)
- Wide operating temperature -40°C ~70°C

Safety Standards

CB Certified for worldwide use

Model Number: PMR-24V240W1AJ
Unit Weight: 0.45 kg (0.992 lb)
Dimensions (L x W x H): 159 x 97 x 30 mm (6.26 x 3.82 x 1.18 inch)

General Description

PMR series 240 W power supply offers nominal output voltages of 24 V across a wide operating temperature range from -40°C to +70°C and obtains shock and vibration certification IEC 60068-2. The product is designed in a low 30 mm profile and comes with a universal AC input voltage ranging from 90 Vac to 264 Vac. The PMR series is made for installation in limited spaces. Its built-in active PFC circuit provides high power factor values and conforms to harmonic current emission standards IEC/EN 61000-3-2, Class A and Class D.

Model Information

PMR Panel Mount Power Supply

Model Number	Input Voltage Range	Rated Output Voltage	Rated Output Current
PMR-24V240W1AJ	90-264 Vac (127-375 Vdc)	24 Vdc	10.0 A

Model Numbering

PM	R –	24V	240W	1	A	☐
Panel Mount	Product Type R – Standard Rack Type Series (1U)	Output Voltage 24 – 24 V	Output Power	Single Phase	Family Code: A	Connector Type J – Harness T – Terminal Block*

*Option



J

All parameters are specified at 25°C ambient and nominal AC input unless otherwise indicated.
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PMR 240 W series / PMR-24V240W1AJ

Specifications

Model Number	PMR-24V240W1AJ

Input Ratings / Characteristics

Nominal Input Voltage	100-240 Vac
Input Voltage Range	90-264 Vac
Nominal Input Frequency	50-60 Hz
Input Frequency Range	47-63 Hz
DC Input Voltage Range*1	127-375 Vdc
Input Current	2.5 A typ. @ 115 Vac, 1.3 A typ. @ 230 Vac
Efficiency at 100% Load @ 230 Vac	93.0% typ.
No Load Power Consumption	0.5 W typ. @ 230 Vac
Max Inrush Current (Cold Start)	50 A typ. @ 230 Vac
Power Factor at 100% Load	> 0.96 @ 115 Vac & > 0.93 @ 230 Vac
Leakage Current	< 1.2 mA @ 240 Vac

*1 Power Supply can operate at DC Input voltage, please connect +pole to L, -pole to N and PE terminal to an earth wire or to the machine ground.

Output Ratings / Characteristics*2

Nominal Output Voltage	24 Vdc
Factory Set Point Tolerance	24 Vdc ± 1%
Output Voltage Adjustment Range	21.6-26.4 Vdc
Output Current	0-10.0 A
Output Power	240.0 W Max.
Line Regulation	± 0.5% typ. @ 115 Vac & 230 Vac
Load Regulation	± 0.5% typ.
PARD*3 (20MHz)	< 150 mVpp @ 0°C to 70°C 450 mVpp typ. @ -30°C to 0°C
Rise Time	30 ms typ. @ 115 Vac & 230 Vac
Start-up Time	500 ms typ. @ 115 Vac & 230 Vac
Hold-up Time	16 ms typ. @ 115 Vac & 230 Vac
Dynamic Response (Overshoot & Undershoot O/P Voltage)	± 10% @ 115 & 230 Vac input, 10-100% load (Slew Rate: 2.5 A/μS, 50% duty cycle @ 5 Hz & 10 KHz)
Start-up with Capacitive Loads	8,000 μF Max

*2 For power de-rating from > 50°C to 70°C, see power de-rating on page 3.

*3 PARD is measured with an AC coupling mode, and in parallel to end terminal with 0.1μF ceramic capacitor & 47μF electrolytic capacitor. PSU need to burn in > 5 minutes when AMB ≤ 0℃

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Mechanical

Case Chassis	Aluminum
Case Cover	SGCC
Dimensions (L x W x H)	159 x 97 x 30 mm (6.26 x 3.82 x 1.18 inch)
Unit Weight	0.45 kg (0.992 lb)
Indicator	Green LED (DC OK)
Cooling System	Convection
Terminal	M3.5 x 9 Pins (Rated 300 V / 20 A)
Wire	AWG 18-12 Current rating can refer to page 6 “Wire AWG Table”

Environment

Surrounding Air Temperature	Operating	-40°C to +70°C
	Storage	-40°C to +85°C
Power De-rating		> 50°C de-rate power by 2% / °C < 100Vac de-rate power by 1% / V (90% load @ 90 Vac)
Operating Humidity		20 to 90% (Non-Condensing)
Operating Altitude		0 to 5,000 Meters (0 to 16,400 ft)
Shock Test	Non-Operating	IEC 60068-2-27, Half Sine Wave: 50G for a duration of 11 ms, 3 shocks for each 3 directions
	Operating	IEC 60068-2-27, Half Sine Wave: 10G for a duration of 11 ms, 3 shock for each 3 directions.
Vibration	Non-Operating	IEC 60068-2-6, Random: 5 Hz to 500 Hz (2.09G); 20 min per axis for all X, Y, Z direction
	Operating	IEC 60068-2-6, Sine Wave: 10 Hz to 500 Hz @19.6 m/s2(2G); 10 min per cycle, 60 min for each axis (X,Y,Z)
Over Voltage Category		II (Compliance to EN 62477-1 OVC III with 2000 meters altitude)
Pollution Degree		3

Protections

Overvoltage	26.4 V - 33.6 V SELV Output, Latch Mode
Overload / Overcurrent	110-175% of rated load current, Hiccup Mode, Non-Latching (Auto-Recovery)
Over Temperature	Latch Mode
Short Circuit	Hiccup Mode, Non-Latching (Auto-Recovery when the fault is removed)
Protection Against Shock	Class I with PE*4 connection

*4 PE: Protection Earth

Reliability Data

MTBF	> 700,000 hrs as per Telcordia SR-332 I/P: 115 Vac & 230 Vac, O/P: 100% Load, Ta: 25°C)
Expected Cap Life Time	10 years (115 Vac & 230 Vac, 50% load @ 40°C)

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PMR 240 W series / PMR-24V240W1AJ

Safety Standards / Directives

Safety Entry Low Voltage		SELV
Electrical Safety	TUV Bauart UL/cUL CB scheme EAC	EN 62368-1, EN 60335-1, EN 61558-1/-2-16 UL 62368-1, and CAN/CSA C22.2 No. 62368-1 IEC 62368-1, IEC 60950-1, IEC 60335-1, IEC 61558-1/-2-16 TP TC 004/2011
CE		In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU
UKCA		In conformance with Electromagnetic Compatibility Regulations 2016 and Electrical Equipment (Safety) Regulations 2016
Galvanic Isolation	Input to Output	4.0 KVac
	Input to Ground	2.0 KVac
	Output to Ground	1.25 KVac

EMC*5

Emissions (CE & RE)		CISPR 32, EN/BS EN 55032, AS/NZS CISPR32, EN/BS EN 61000-6-4 Compliance to FCC Title 47, EN/BS EN 55014-1, EN/BS 61000-6-3: Class B		
Immunity		EN/BS EN 55035, EN/BS EN 61000-6-2 & Compliance to EN/ BS EN 55014-2, EN/BS EN 61000-6-1		
Electrostatic Discharge	IEC 61000-4-2	Level 4 Criteria A[1)] Air Discharge: 15 kV Contact Discharge: 8 kV		
Radiated Field	IEC 61000-4-3	Level 3 Criteria A[1)] 80 MHz – 1 GHz, 10 V/M, 80% Modulation (1 kHz) 1.4 GHz – 2 GHz, 3 V/M, 80% Modulation (1 kHz) 2 GHz – 2.7 GHz, 1 V/M, 80% Modulation (1 kHz)		
Electrical Fast Transient / Burst	IEC 61000-4-4	Level 3 Criteria A[1)] 2 kV		
Surge	IEC 61000-4-5	Level 4 Criteria A[1)] Common Mode[4)]: 4 kV Differential Mode[5)]: 2 kV		
Conducted	IEC 61000-4-6	Level 3 Criteria A[1)] 150 kHz-80 MHz, 20 Vrms		
Power Frequency Magnetic Fields	IEC 61000-4-8	Level 4 Criteria A[1)] 30 A/Meter		
Voltage Dips and Interruptions	IEC 61000-4-11	0% residual; 1 cycle, Criteria B[2)] 40% residual; 10 cycle, Criteria C[3)] 70% residual; 25 cycle, Criteria C[3)]		
Harmonic Current Emission		IEC/EN/BS EN 61000-3-2, Class A & Class D		
Voltage Fluctuation and Flicker		IEC/EN/BS EN 61000-3-3		
Voltage Sag Immunity SEMI F47 – 0706		80% of 200 Vac 70% of 200 Vac 50% of 200 Vac	160 Vac, 1000 ms 140 Vac, 500 ms 100 Vac, 200 ms	Criteria A[1)] Criteria A[1)] Criteria A[1)]

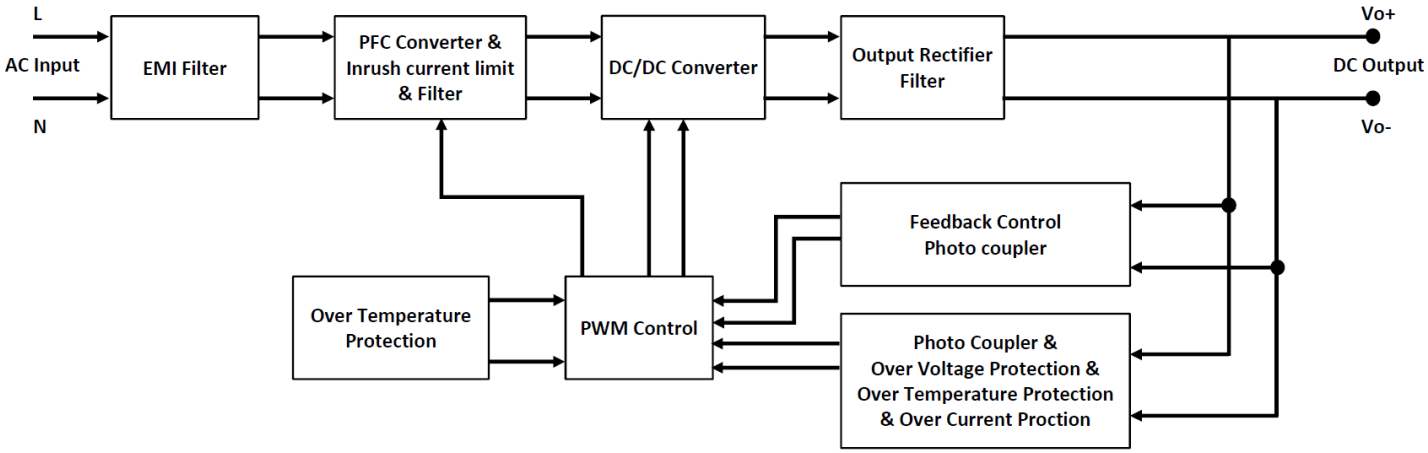
1) Criteria A: Normal performance within the specification limits
2) Criteria B: Output out of regulation, or shuts down during test. Automatically restored to normal operation after test.
3) Criteria C: Output out of regulation, shuts down during test (Need to recycle AC power cord to normal operation after test)
4) Asymmetrical: Common mode (Line to earth)
5) Symmetrical: Differential mode (Line to line)

*5 Power supply is considered a component in the end-user's system. Please contact our local sales to get more information about the power supply EMC test setup.

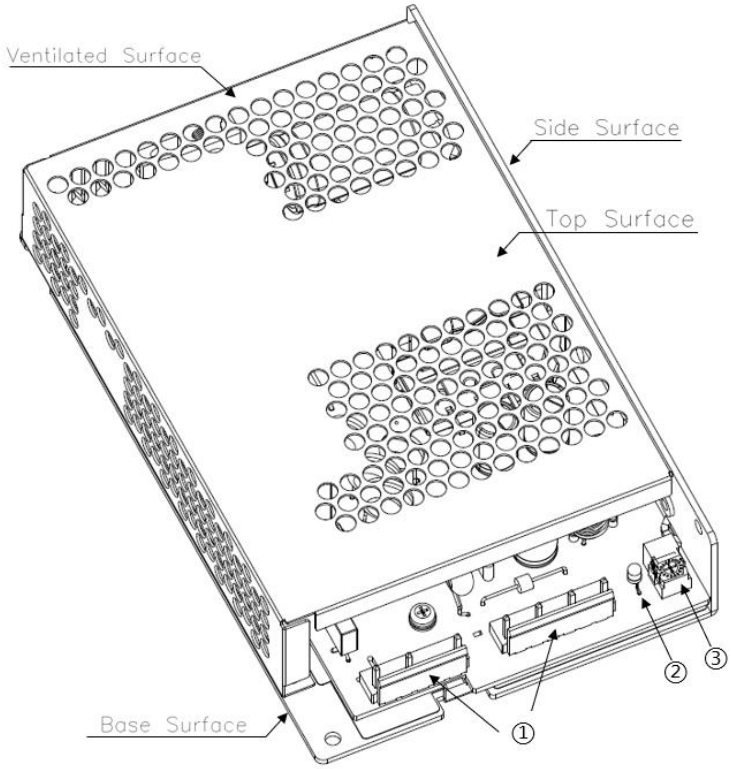
PMR Panel Mount Power Supply

PMR 240 W series / PMR-24V240W1AJ

Block Diagram



Device Descriptions



① Input & Output terminal block connector
② DC OK control LED (Green)
③ DC voltage adjustment potentiometer

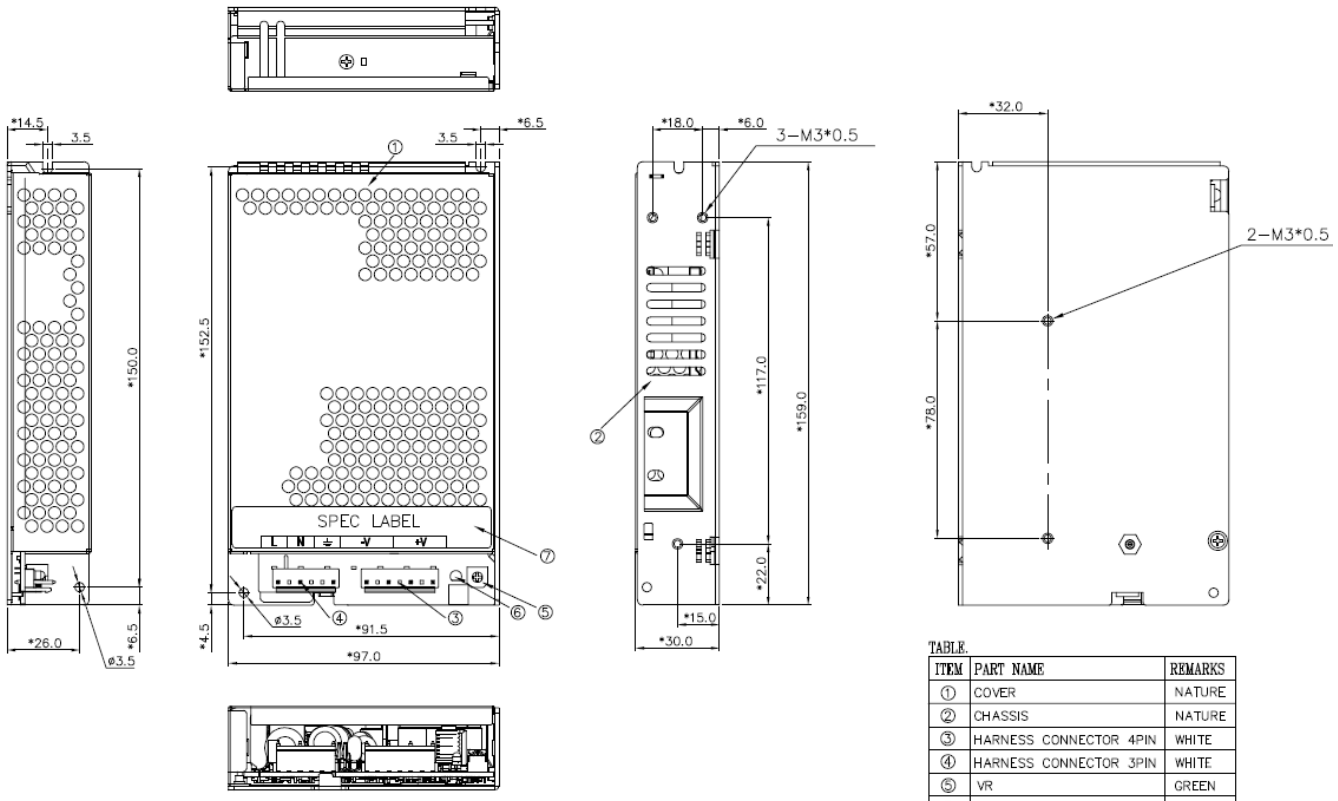
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PMR 240 W series / PMR-24V240W1AJ

Dimensions

L x W x H: 159 x 97 x 30 mm (6.26 x 3.82 x 1.18 inch)



UNLESS OTHERWISE SPECIFIED TOLERANCE OF DIMENSION ARE ±1.0

TABLE.

ITEM	PART NAME	REMARKS
①	COVER	NATURE
②	CHASSIS	NATURE
③	HARNESS CONNECTOR 4PIN	WHITE
④	HARNESS CONNECTOR 3PIN	WHITE
⑤	VR	GREEN
⑥	LED	--
⑦	SPEC LABEL	--

Wire AWG Table

Current rating for PVC Wire AWG			
6 AWG	52.5 A	20 AWG	6.5 A
8 AWG	37.5 A	22 AWG	5.0 A
10 AWG	29.0 A	24 AWG	3.5 A
12 AWG	22.5 A	26 AWG	2.5 A
14 AWG	16.5 A	28 AWG	2.0 A
16 AWG	12.0 A	30 AWG	1.5 A
18 AWG	9.0 A		

PMR Panel Mount Power Supply

PMR 240 W series / PMR-24V240W1AJ

Engineering Data

Output Load De-rating VS Surrounding Air Temperature

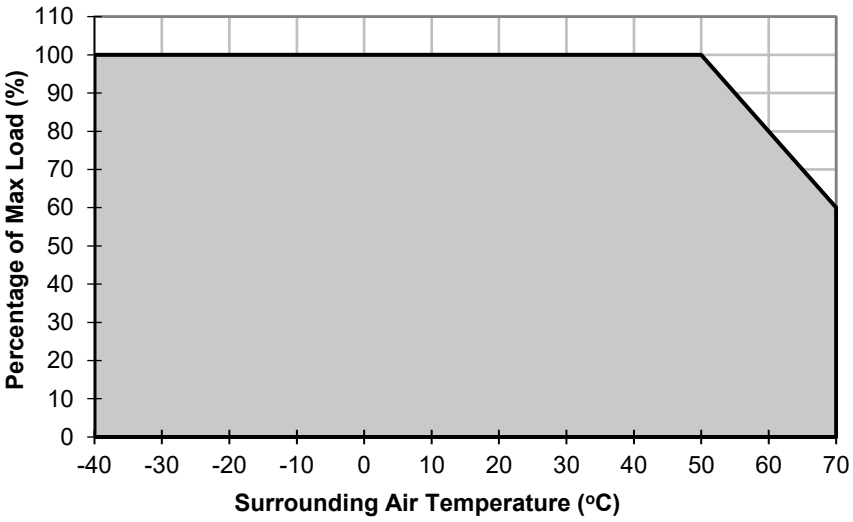


Fig. 1 De-rating for Horizontal Mounting Orientation
> 50°C de-rate power by 2.0% / °C

Note

1. Power supply components may degrade, or be damaged, when the power supply is continuously used outside the shaded region, refer to the graph shown in Fig. 1 & Fig. 2.
2. The power supply will have long rise time when the ambient temperature range is -30°C to -40°C.
3. If the output capacity is not reduced when the surrounding air temperature >50°C, the device will run into Over Temperature Protection. When activated, power supply will latch off, until the surrounding air temperature is lowered or the load is reduced as far as necessary to keep the device in working condition, and require removal/re-application of input AC voltage in order to restart.
4. In order for the device to function in the manner intended, it is also necessary to keep a safety distance as recommended in the safety instructions while the device is in operation.
5. Depending on the surrounding air temperature and output load delivered by the power supply, the device can be very hot!

Output Load De-rating VS Input Voltage

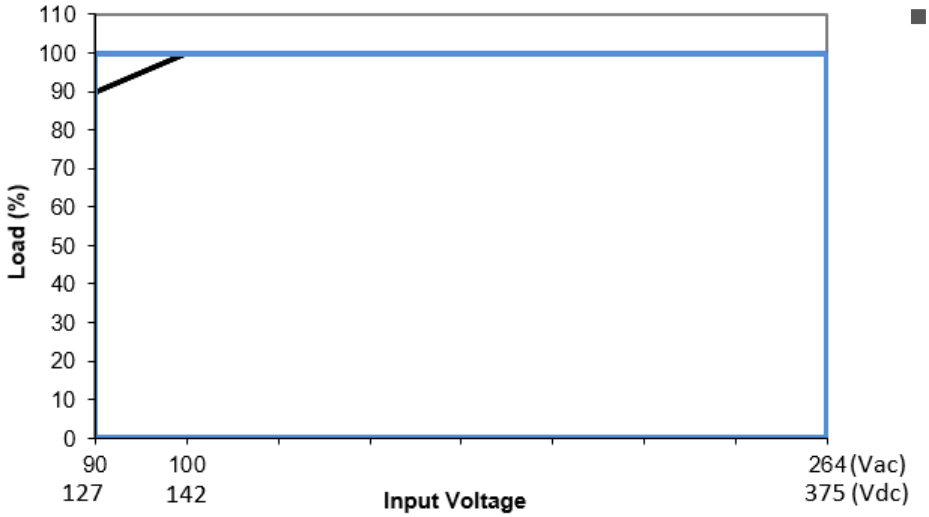


Fig. 2 De-rating for AC Input Voltage
< 100Vac de-rate power by 1% / V (90% load @ 90 Vac)
No de-rate power for DC Input

- No output power de-rating for the input voltage from 100 Vac to 264 Vac & 127 Vdc to 375 Vdc

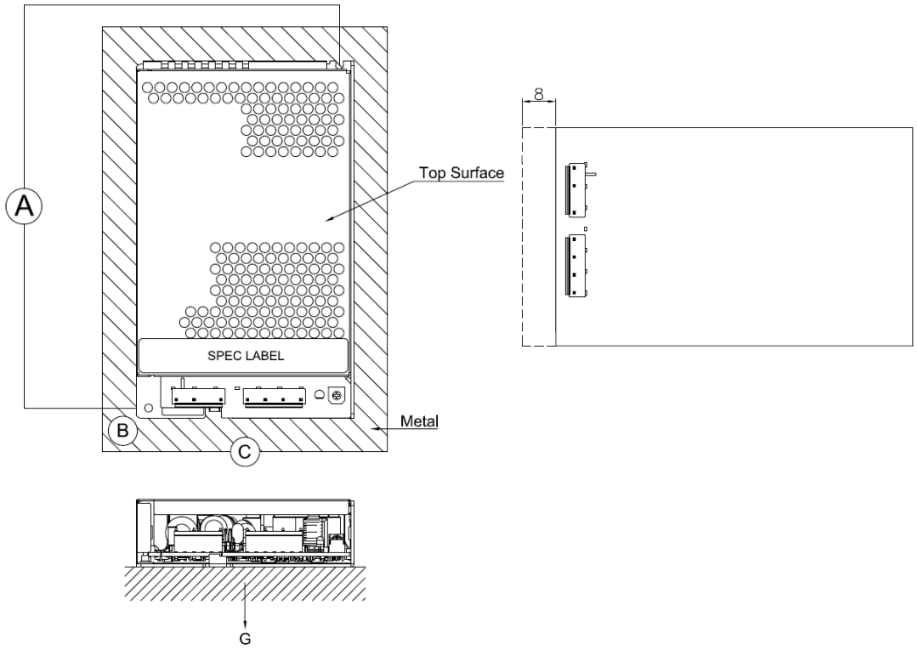
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PMR 240 W series / PMR-24V240W1AJ

Assembly & Installation

Ⓐ Base Mounting: Fig.3 shows the mounting hole locations for power supply assembly onto a metal mounting surface.
Ⓑ This surface belongs to customer's end system or panel where the power supply is mounted.
Ⓒ Connector

Base Mounting (Horizontal)



* If the device has to be mounted in any other orientation, please leave a message via the Contact Us form.

- Use flexible cable (stranded or solid) of AWG No.18-12. User should calculate and select the suitable wire specification (type/quantity/diameter) according to actual output current. The torque at the Connector shall not exceed 8 Kgf.cm. (6.94 lbf.in). The insulation stripping length should not exceed 0.275" or 7 mm. (Refer to Fig. 3).

Installation of Mounting Accessories

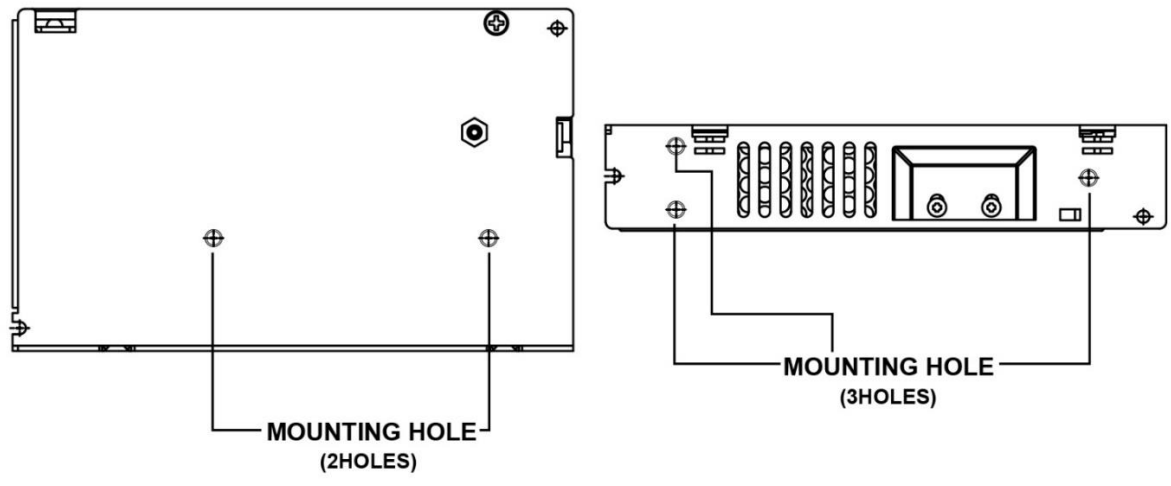


Fig. 3 Assembly Reference

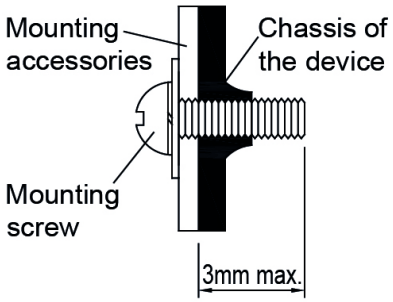


Fig. 4 Mounting Screw

- Only use M4 screw ≤ 3 mm (0.20 inch) through the base mounting holes. This is to keep a safe distance between the screw and internal components.
- Recommended mounting tightening torque: 4~5 Kgf.cm (3.47~4.33 lbf.in).

Safety Instructions

- If user's mounting orientation is not according to the recommended mounting orientations, please consult Delta for further information.
- To ensure sufficient convection cooling, always maintain a safety distance of ≥ 50 mm (1.97 inch) from all ventilated surfaces while the device is in operation.
- The device is not recommended to be placed on low thermal conductive surface. For example, plastics.
- The enclosure of the device can become very hot depending on the ambient temperature and load of the power supply. Do not touch the device while it is in operation or immediately after power is turned OFF. Risk of burning!
- Do not touch the terminals while power is being supplied. Risk of electric shock.
- Prevent any foreign metal, particles or conductors from entering the device through the openings during installation. It may cause: Electric shock; Safety Hazard; Fire; Product failure
- The power supply must be mounted by metal screws onto a grounded metal surface. It is highly recommended that the Earth terminal on the connector be connected to the grounded surface.

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Functions

Start-up Time

The time required for the output voltage to reach 90% of its final steady state set value, after the input voltage is applied.

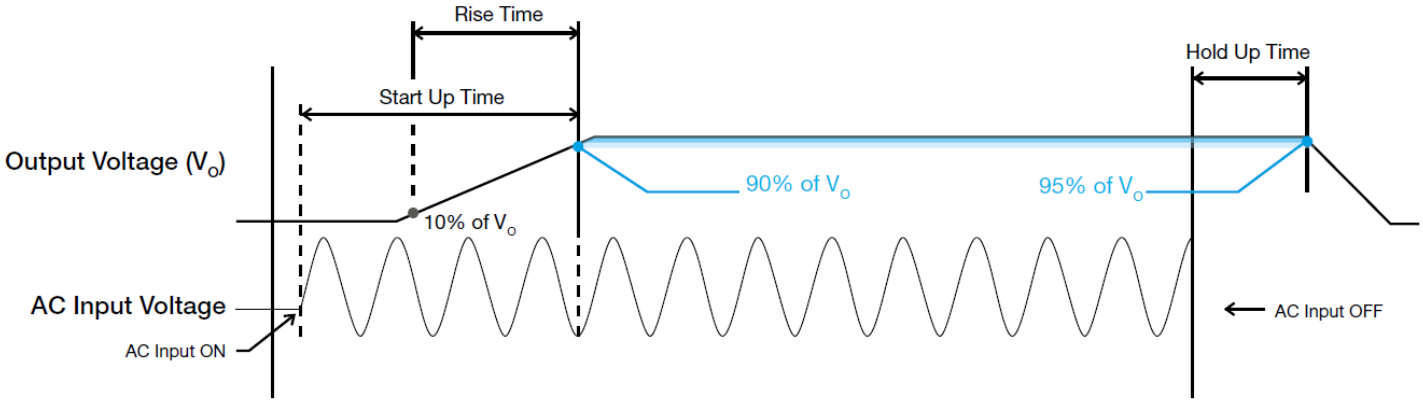
Rise Time

The time required for the output voltage to change from 10% to 90% of its final steady state set value.

Hold-up Time

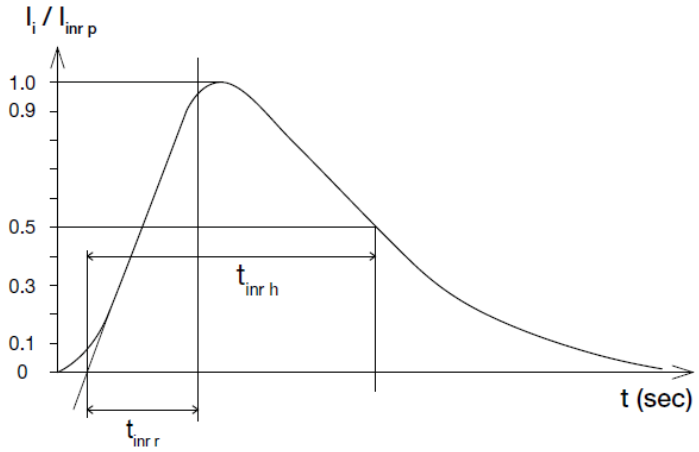
Time between the collapse of the AC input voltage, and the output falling to 95% of its steady state set value.

■ **Graph illustrating the Start-up Time, Rise Time, and Hold-up Time**



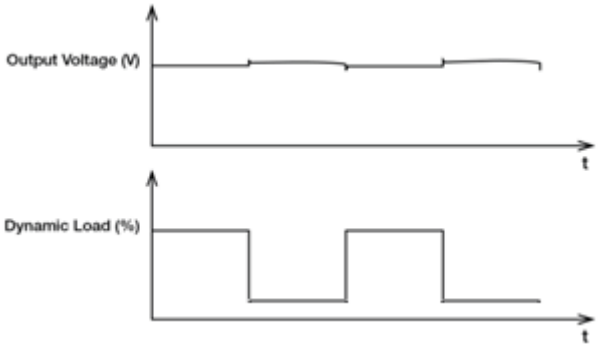
Inrush Current

Inrush current is the peak, instantaneous, input current measured and, occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent cycles of AC voltage.



Dynamic Response

The power supply output voltage will remains within ± 10% of its steady state value, when subjected to a dynamic load from 10% to 100%.



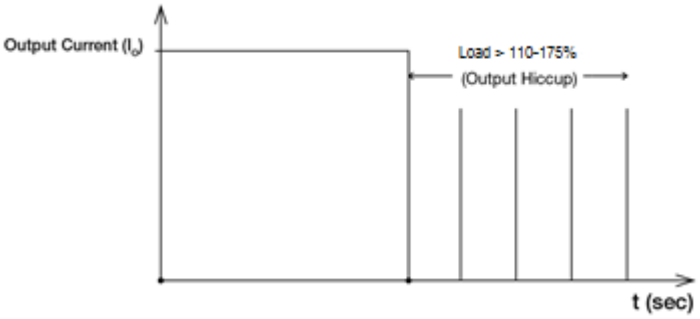
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PMR 240 W series / PMR-24V240W1AJ

Overload & Overcurrent Protections (Auto-Recovery)

The power supply's Overload (OLP) and Overcurrent (OCP) Protections will be activated when output current exceeds 110% of I_O (Max load). In such occurrence, the V_O will start to droop and once the power supply has reached its maximum power limit, the protection is activated and the power supply will go into "Hiccup mode" (Auto-Recovery). The power supply will recover once the fault condition of the OLP and OCP is removed and I_O is back within the specifications.



It is not recommended to prolong the duration of Io when it is <110% but >100%, since it may cause damage to the PSU.

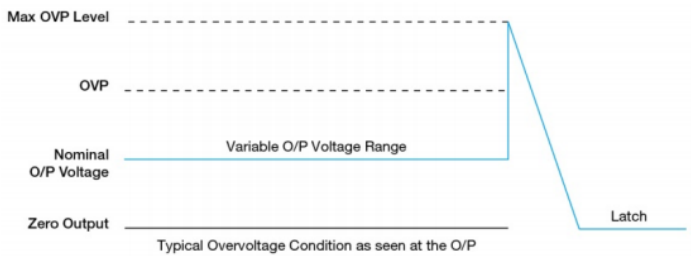
Short Circuit Protection (Auto-Recovery)

The power supply's output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate in "Hiccup mode", as shown in the illustration in the OLP/OCP section on this page. The power supply will return to normal operation after the short circuit is removed.

Overvoltage Protection (Latch Mode)

The power supply's overvoltage circuit will be activated when its internal feedback circuit fails. The output voltage shall not exceed its specifications defined on under "Protections". Power supply will latch, and require removal/re-application of input AC voltage in order to restart.

The power supply should be latch, and require removal /re-apply of input AC voltage in order to restart.



Over Temperature Protection (Latch Mode)

As described in Engineering data section, the power supply also has Over Temperature Protection (OTP). In the event of a higher operating temperature at 100% load, the power supply will run into OTP when the operating temperature is beyond what is recommended in the de-rating graph. When activated, the output voltage will go into latch mode until the temperature drops to its normal operating temperature as recommended in the de-rating graph.

Others

Attention

Delta provides all information in the datasheets on an "AS IS" basis and does not offer any kind of warranty through the information for using the product. In the event of any discrepancy between the information in the catalog and datasheets, the datasheets shall prevail (please refer to PSU.deltaww.com for the latest datasheets information). Delta shall have no liability of indemnification for any claim or action arising from any error for the provided information in the datasheets. Customer shall take its responsibility for evaluation of using the product before placing an order with Delta.

Delta reserves the right to make changes to the information described in the datasheets without notice.

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