

PMR Panel Mount Power Supply

PMR 150 W series / PMR-□V150W1AT

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
- No load power consumption < 0.5 W
- Low profile design: 30 mm height
- Household appliance approvals according to IEC/EN 60335-1, IEC/EN 61558-1 and IEC/EN 61558-2-16
- Wide operating temp -30°C ~70°C (Support -40°C cold start)



Safety Standards



CB Certified for worldwide use

| | |
|--------------------------------|---|
| Model Number: | PMR-□V150W1AT |
| Unit Weight: | 0.35 kg (0.77 lb) |
| Dimensions (L x W x H): | 129 x 97 x 30 mm (5.08 x 3.82 x 1.18 inch) |

General Description

PMR 150W series power supplies offers nominal output voltage of 12V/24V/36V/48V with a wide operating temperature range from -30°C to +70°C and can withstand shock and vibration according to IEC 60068-2. The product is designed in a low 30 mm profile and comes with universal AC input voltage range at 90 Vac to 264 Vac. The PMR series is made for installation in narrow space while its built-in active PFC circuit provides high power factor values and conforms to harmonic current emission according to 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-12V150W1AT | 90-264 Vac (127-375 Vdc) | 12 Vdc | 12.5 A |
| PMR-24V150W1AT | | 24 Vdc | 6.5 A |
| PMR-36V150W1AT | | 36 Vdc | 4.3 A |
| PMR-48V150W1AT | | 48 Vdc | 3.3 A |

Model Numbering

| PM | R – | □V | 150W | 1 | A | T |
|-------------|--|--|--------------|--------------|----------------|--------------------------------------|
| Panel Mount | Product Type R – Standard Rack Type Series (1U) | Output Voltage 12 – 12 V 24 – 24 V 36 – 36 V 48 – 48 V | Output Power | Single Phase | Family Code: A | Connector Type T – Terminal Block |

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Specifications

| Model Number | PMR-12V150W1AT | PMR-24V150W1AT | PMR-36V150W1AT | PMR-48V150W1AT |
|--------------|----------------|----------------|----------------|----------------|
|--------------|----------------|----------------|----------------|----------------|

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 | 1.5 A typ. @ 115 Vac, 0.8 A typ. @ 230 Vac | | | |
| Efficiency at 100% Load @ 230Vac | 93% typ. | 92.5% typ. | 93.0% typ. | 94% typ. |
| No Load Power Consumption | 0.3 W max. @ 230 Vac | 0.3 W max. @ 230 Vac | 0.5 W max. @ 230 Vac | 0.5 W max. @ 230 Vac |
| Max Inrush Current (Cold Start) | 45 A typ. @ 230 Vac | | | |
| Power Factor at 100% Load | > 0.96 @ 115 Vac & > 0.93 @ 230 Vac | | | |
| Leakage Current | < 0.5 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 | 12 Vdc | 24 Vdc | 36 Vdc | 48 Vdc |
| Factory Set Point Tolerance | 12 Vdc ± 1% | 24 Vdc ± 1% | 36 Vdc ± 1% | 48 Vdc ± 1% |
| Output Voltage Adjustment Range | 10.8-13.2 Vdc | 21.6-26.4 Vdc | 32.4-39.6 Vdc | 43.2-52.8 Vdc |
| Output Current | 0-12.5 A | 0-6.5 A | 0-4.3 A | 0-3.3 A |
| Output Power | 150.0 W Max. | 156.0 W Max. | 154.8 W Max. | 158.4 W Max. |
| Line Regulation | ± 0.5% typ. @ 115 Vac & 230 Vac | | | |
| Load Regulation | ±0.5% typ. | | | |
| PARD* ³ (20MHz) | < 120 mVpp @ 0°C to 70°C 360 mVpp typ. @ -30°C to 0°C | | < 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 | 30 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 | 8,000 μF Max | 6,000 μF Max | 5,000 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°C

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Mechanical

| | |
|------------------------|--|
| Case Chassis | Aluminum |
| Case Cover | SGCC |
| Dimensions (L x W x H) | 129 x 97 x 30 mm (5.08 x 3.82 x 1.18 inch) |
| Unit Weight | 0.35 kg (0.77 lb) |
| Indicator | Green LED (DC OK) |
| Cooling System | Convection |
| Terminal | M3.5 x 7 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 | -30°C to +70°C (-40°C Cold Start) |
| | 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: 50 G for duration of 11 ms; 3 times per direction |
| Vibration | Operating | IEC 60068-2-6, Sine Wave: 10 Hz to 500 Hz @ 2G;10Min per cycle,60min for X,Y,Z direction |
| Over Voltage Category | II (Compliance to EN 62477-1 OVC III with 2000 meters altitude) | |
| Pollution Degree | 3 | |

Protections

| | | | | |
|--------------------------|---|---|---|---|
| Overvoltage | 13.2 V - 16.8 V SELV Output, Latch Mode | 26.4 V - 33.6 V SELV Output, Latch Mode | 39.6 V - 48.6 V SELV Output, Latch Mode | 52.8 V - 64.8 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: 230 Vac, O/P: 100% Load, Ta: 25°C) |
| Expected Cap Life Time | 10 years (230 Vac, 50% load @ 40°C) |

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Safety Standards / Directives

| | | |
|--------------------------|---|---|
| Safety Entry Low Voltage | | SELV |
| Electrical Safety | TUV Bauart UL/cUL CB scheme EAC BSMI CCC | EN 62368-1, EN 60335-1 UL 62368-1, and CAN/CSA C22.2 No. 62368-1 IEC 62368-1, IEC 60335-1, IEC/EN 61558-1/-2-16 TP TC 004/2011 CNS 15598-1 GB 4943.1 |
| 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, KS C 9832, AS/NZS CISPR32 & Compliance to FCC Title 47, EN/BS EN 55014-1, EN/BS 61000-6-3, EN/BS EN 61000-6-4 : Class B | | |
| Immunity | | EN/BS EN 55035, KS C 9835, & Compliance to EN/ BS EN 55014-2, EN/BS EN 61000-6-1, EN/BS EN 61000-6-2 | | |
| 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 – 6 GHz, 3 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, 10 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)

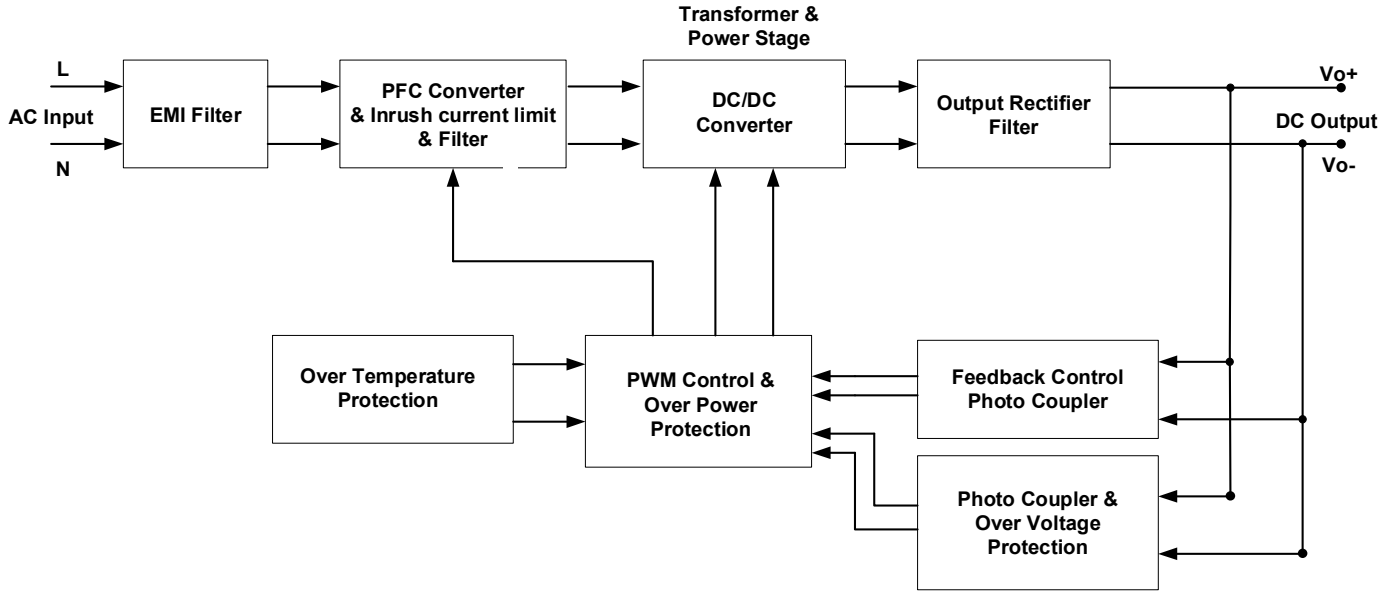
5) Symmetrical: Differential mode (Line to line)

*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.

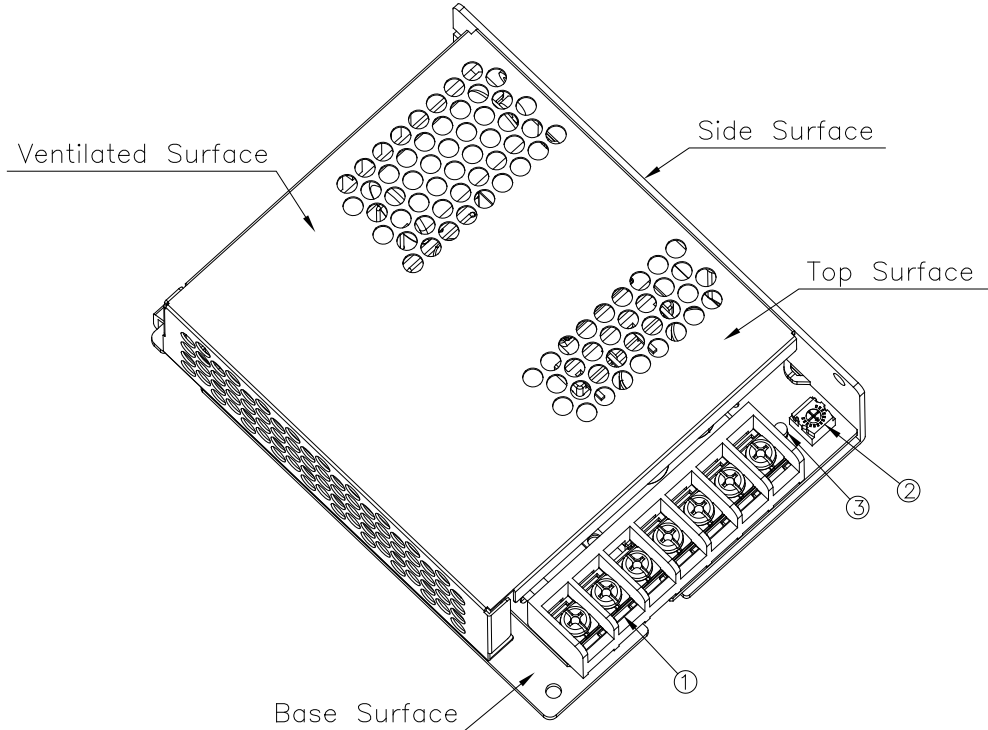
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Block Diagram



Device Descriptions



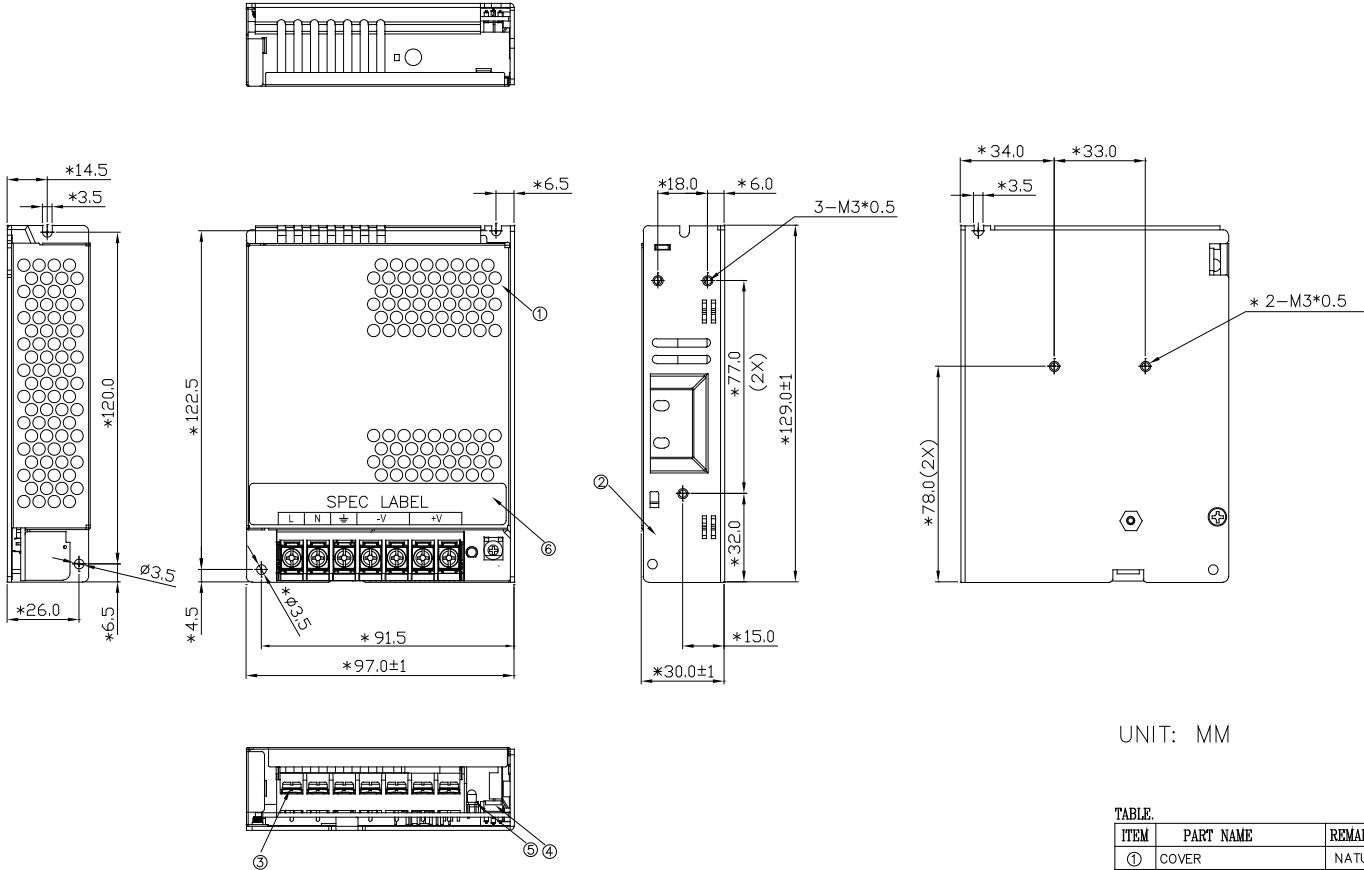
- 1) Input & Output terminal block connector
- 2) DC voltage adjustment potentiometer
- 3) DC OK control LED (Green)

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Dimensions

L x W x H: 129 x 97 x 30mm (5.08 x 3.82 x 1.18 inch)



UNIT: MM

TABLE.

| ITEM | PART NAME | REMARKS |
|------|----------------------|---------|
| ① | COVER | NATURE |
| ② | CHASSIS | NATURE |
| ③ | TERMINAL BLOCK 7 PIN | BLACK |
| ④ | VR | -- |
| ⑤ | LED | GREEN |
| ⑥ | SPEC LABEL | -- |

UNLESS OTHERWISE SPECIFIED TOLERANCE OF DIMENSION ARE ±0.5.

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 | | |

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Engineering Data

Output Load De-rating VS Surrounding Air Temperature

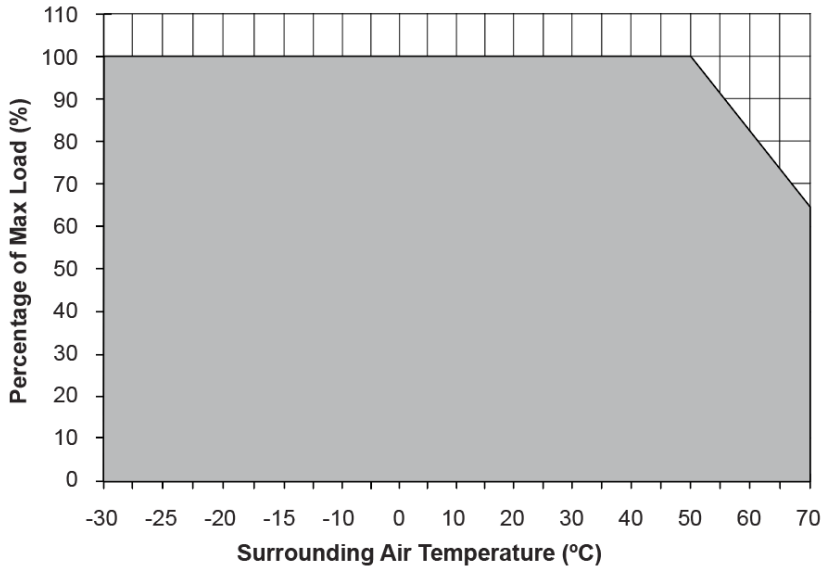
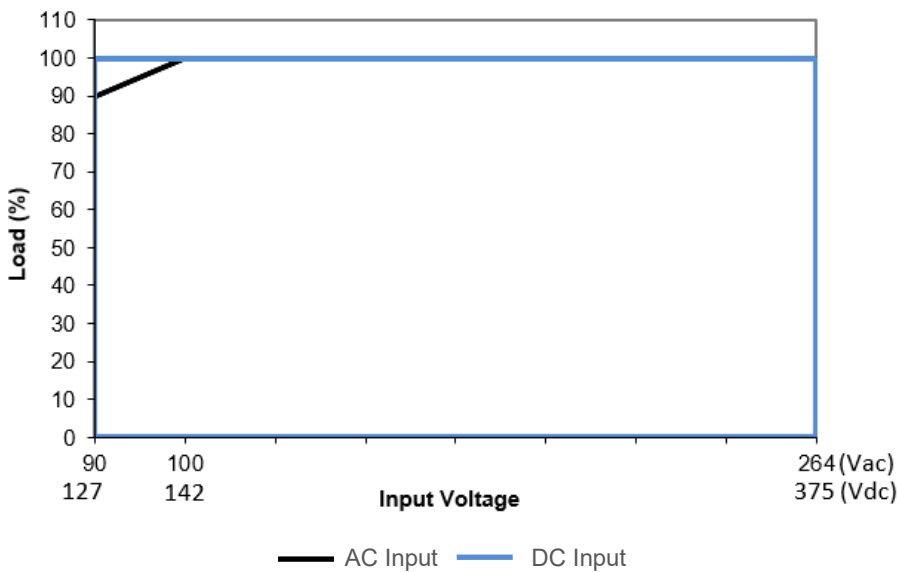


Fig. 1 De-rating for Horizontal Mounting Orientation
 > 50°C de-rate power by 2.0% / °C

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 PSU will be bouncing and start up time will not exceed 5s when ambient temperature at -30 °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



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

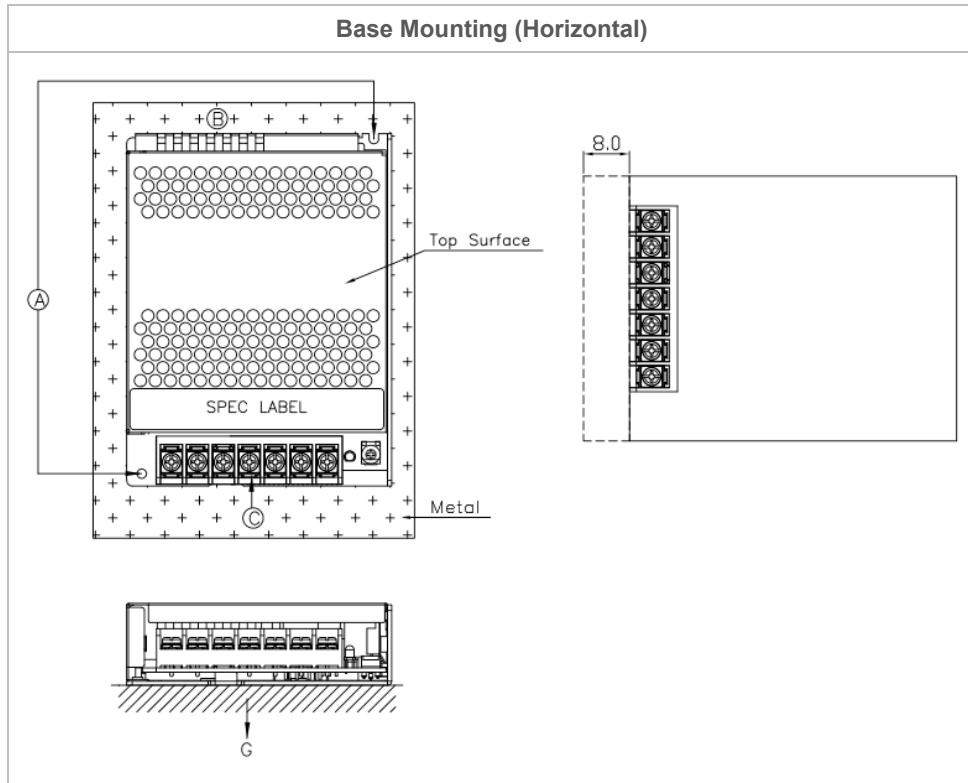
Fig. 2 De-rating for AC Input Voltage
 < 100Vac de-rate power by 1% / V (90% load @ 90 Vac)
 No de-rate power for DC Input

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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



* 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

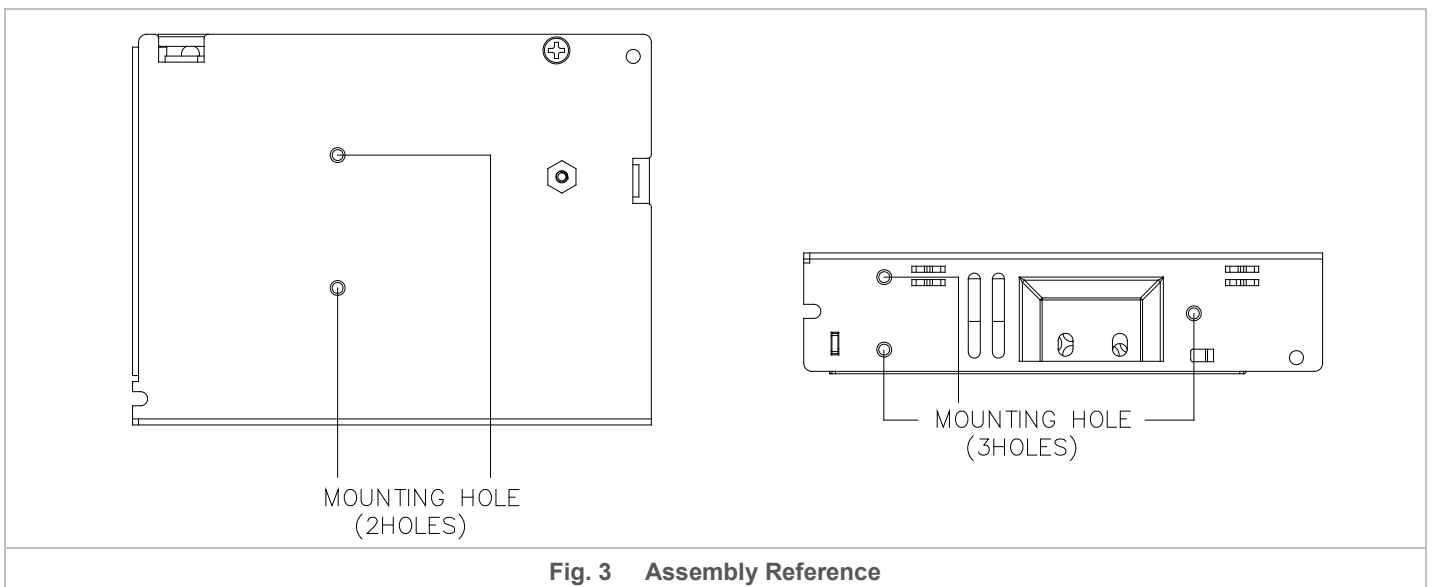
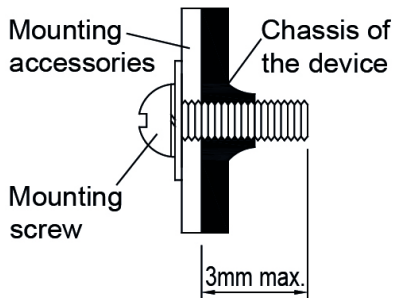


Fig. 3 Assembly Reference

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- Only use M3 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: 4~7 Kgf.cm (3.47~6.08 lbf.in).

Fig. 4 Mounting Screw

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.

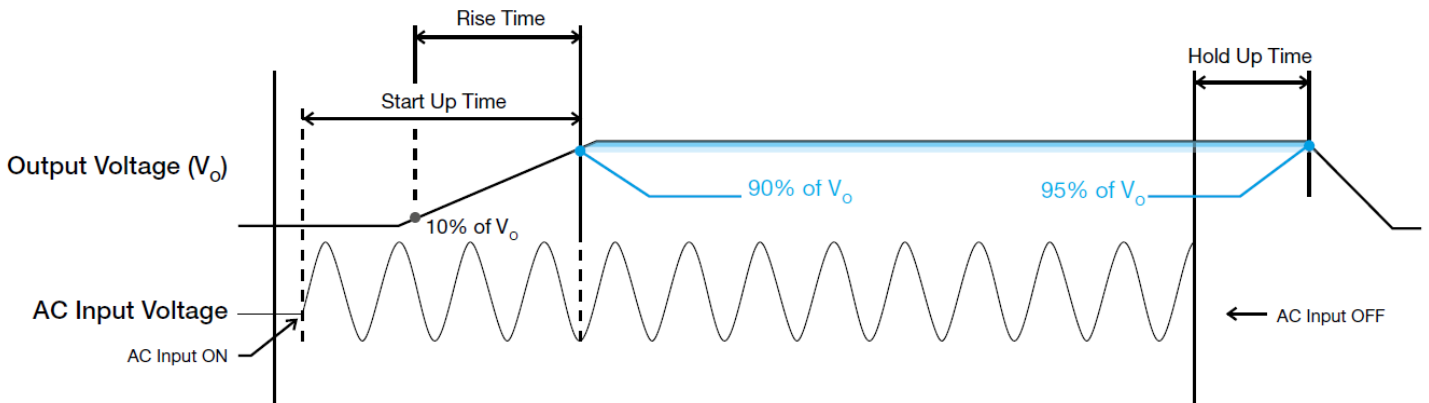
Rise Time

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

Hold-up Time

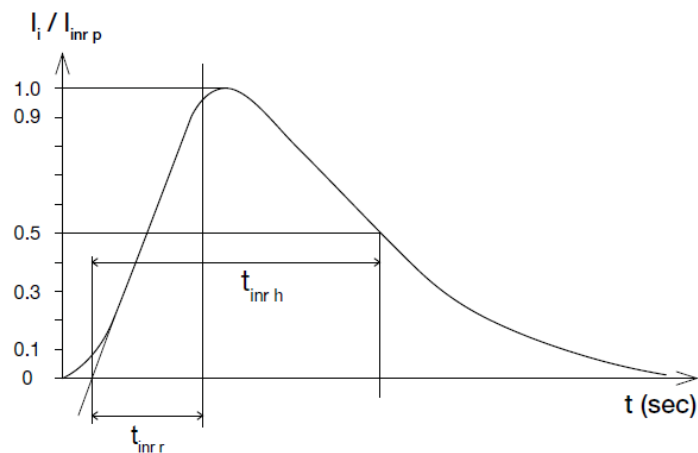
Time between the collapse of the AC input voltage, and the output falling to 95% of its steady state set value.

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



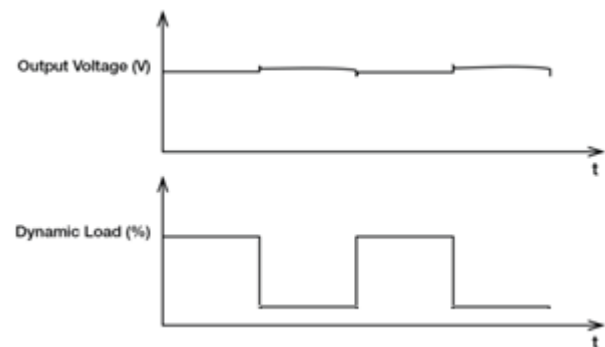
Inrush Current

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 remain within $\pm 10\%$ of its steady state value, when subjected to a dynamic load from 10% to 100%.

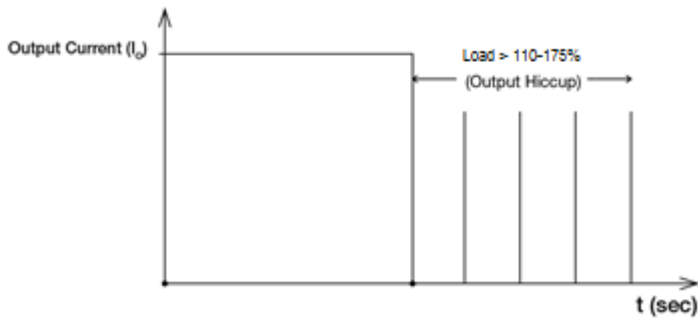


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Overload & Overcurrent Protections (Auto-Recovery)

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 I_o 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.

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 www.DeltaPSU.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.

Manufacturer and Authorized Representatives Information

Manufacturer

Thailand
Delta Electronics (Thailand) PCL.
909 Pattana 1 Rd., Muang, Samutprakarn, 10280 Thailand

Taiwan
Delta Electronics, Inc.
3 Tungyuan Road, Chungli Industrial Zone, Taoyuan County
32063, Taiwan

Authorized Representatives

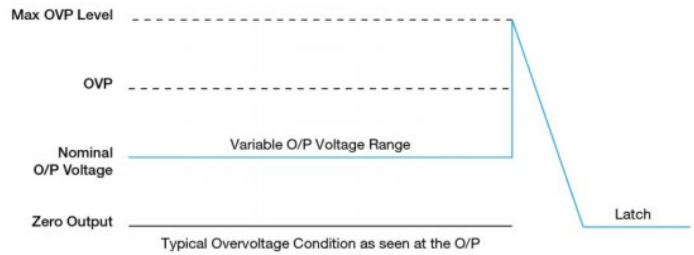
The Netherlands
Delta Greentech (Netherlands) B.V.
Zandsteen 15, 2132 MZ Hoofddorp, The Netherlands

United Kingdom
Delta Electronics Europe Limited
1 Redwood Court, Peel Park Campus,
East Kilbride, Glasgow, G74 5PF, United Kingdom

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.

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