

PMF Panel Mount Power Supply

5V 275W 1 Phase / PMF-5V320WC□□



PMF

Highlights & Features

- Universal AC input voltage range
- Built-in active PFC and automatic fan speed control
- Full corrosion resistant aluminium casing
- Conforms to harmonic current IEC/EN 61000-3-2, Class A and Class D
- Cold start -20°C at 100% load (275W)
- Remote ON/OFF is available as an option



Safety Standards



CB Certified for worldwide use

Model Number: PMF-5V320WC□□
Unit Weight: 0.86 kg (1.90 lb)
Dimensions (L x W x D): 215 x 115 x 50 mm
 (8.46 x 4.53 x 1.97 inch)

General Description

The PMF panel mount power supply series currently offers nominal output voltages of 5V. These power supply units come with universal AC input from 85Vac to 264Vac and wide operating temperature of -10°C to +70°C. The built-in active PFC provides high power factor and conforms to harmonic current IEC/EN 61000-3-2, Class A and Class D. This versatile series has two different connector options (Front Face and Terminal Block) to satisfy different application needs. Remote ON/OFF function is also available for the PMF series. All PMF power supplies conform to major international safety standards including IEC/EN/UL 60950-1 standards and are fully compliant with RoHS Directive 2011/65/EU for environmental protection.

Model Information

PMF Panel Mount Power Supply

| Model Number | Input Voltage Range | Rated Output Voltage | Rated Output Current |
|---------------|---------------------|----------------------|----------------------|
| PMF-5V320WC□□ | 85-264Vac | 5Vdc | 55.0A |

Model Numbering

| | | | | | | CC Code |
|-------------|----------------------------------|----------------|-------------------------------------|------------------------------|---|---|
| PM | F – | 5V | 320W | C | □ | □ |
| Panel Mount | Product Series F – PFC Series | Output Voltage | Output Power (320W series model) | Package Type C – Enclosed | Connector Type G – Front Face A – Terminal Block* | Variable B – No Remote ON/OFF R – With Remote ON/OFF* |

*Options

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Specifications

Input Ratings / Characteristics

| | | |
|---------------------------------|--|---|
| Nominal Input Voltage | 100-240Vac | |
| Input Voltage Range | 85-264Vac | |
| Nominal Input Frequency | 50-60Hz | |
| Input Frequency Range | 47-63Hz | |
| Input Current | < 5.00A @ 115Vac, < 2.50A @ 230Vac | |
| Efficiency at 100% Load | 78.5% typ. @ 230Vac | |
| Max Power Dissipation | 0% load | 2.6W typ. @ 115Vac & 2.52W typ. @ 230Vac |
| | 100% load | 83.24W typ. @ 115Vac & 72.66W typ. @ 230Vac |
| Max Inrush Current (Cold Start) | < 30A @ 115Vac, < 50A @ 230Vac | |
| Power Factor at 100% load | 0.98 typ. @ 115Vac, 0.95 typ. @ 230Vac | |
| Leakage Current | < 1mA @ 240Vac | |

Output Ratings / Characteristics*

| | |
|---|--|
| Nominal Output Voltage | 5Vdc |
| Factory Set Point Tolerance | 5Vdc \pm 1% |
| Output Voltage Adjustment Range | 4.50-5.50Vdc |
| Output Current | 0-55.0A (275W max.) |
| Output Power | 275W |
| Line Regulation | \pm 0.5% typ. (@ 115Vac & 230Vac) |
| Load Regulation | \pm 2.0% typ. (@ 115Vac & 230Vac) |
| PARD** (20MHz) | < 150mVpp @ 25°C < 300mVpp @ -10°C |
| Rise Time | 50ms typ. @ 115Vac & 230Vac (100% load) |
| Start-up Time | 2500ms typ. @ 115Vac, 1000ms typ. @ 230Vac (100% load) |
| Hold-up Time | 16ms typ. @ 115Vac & 230Vac (100% load) |
| Dynamic Response (Overshoot & Undershoot O/P Voltage) | \pm 5% (0.5V pk-pk) @ 115Vac & 230Vac, 0-50% load and 50-100% load (Slew Rate: 0.1A/ μ S, 50% duty cycle @ 5Hz) |
| Start-up with Capacitive Loads | 8,000 μ F Max |
| Remote ON/OFF Function (Option) | CN102 Output ON: 5-12.5V Output OFF: 0-0.5V (For more information, please refer to the details in the Functional Manual section on Page 11) |

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

**PARD is measured with an AC coupling mode, 5cm wires, and in parallel with 0.1 μ F ceramic capacitor & 47 μ F electrolytic capacitor.

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Mechanical

| | | |
|-----------------------------------|---|--------------------------------|
| Case Cover / Chassis | Aluminium | |
| Dimensions (L x W x D) | 215 x 115 x 50 mm (8.46 x 4.53 x 1.97 inch) | |
| Unit Weight | 0.86 kg (1.90 lb) | |
| Indicator | Green LED (DC OK) | |
| Cooling System | Forced Cooling | |
| Terminal | PMF-5V320WCG <input type="checkbox"/> | M3.5 x 9 Pins (Rated 300V/20A) |
| | PMF-5V320WCA <input type="checkbox"/> | M3.5 x 9 Pins (Rated 300V/15A) |
| Wire | AWG 14-12* | |
| Noise (1 Meter from power supply) | Sound Pressure Level (SPL) <60dBA | |

*Only use wire that can withstand operating temperature of more than 125°C.

Environment

| | | |
|-----------------------------|---|---|
| Surrounding Air Temperature | Operating | -10°C to +70°C (Cold start at -20°C) |
| | Storage | -25°C to +85°C |
| Power De-rating | > 50°C de-rate power by 2.5% / °C < 90Vac de-rate power by 5% / 1V | |
| Operating Humidity | 5 to 95% RH (Non-Condensing) | |
| Operating Altitude | 0 to 5,000 Meters (16,400 ft) | |
| Shock Test | Non-Operating | IEC 60068-2-27, Half Sine: 50G for a duration of 11ms, 3 shocks for each 3 directions |
| Vibration | Non-Operating | IEC 60068-2-6, Random: 5Hz to 500Hz (2.09Grms); 20 min per axis for all X, Y, Z direction |
| Over Voltage Category | II | |
| Pollution Degree | 2 | |

Protections

| | |
|--------------------------|---|
| Overvoltage | 5.75-7.30V, Latch Mode |
| Overload / Overcurrent | 105-135%, Hiccup Mode, Non-Latching (Auto-Recovery) |
| Over Temperature | Hiccup Mode, Non-Latching (Auto-Recovery) |
| Short Circuit | Hiccup Mode, Non-Latching (Auto-Recovery) |
| Internal Fuse at L pin | F8AH |
| Protection Against Shock | Class I with PE* connection |

*PE: Primary Earth

Reliability Data

| | |
|------------------------|---|
| MTBF | > 700,000 hrs. as per Telcordia SR-332 I/P: 100Vac, O/P: 100% load, Ta: 35°C |
| Expected Cap Life Time | 10 years (115Vac & 230Vac, 50% load @ 40°C) |

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Safety Standards / Directives

| | | |
|--------------------------|-------------------|---|
| Safety Entry Low Voltage | | SELV (EN 60950-1) |
| Electrical Safety | TUV Bauart | EN 60950-1 |
| | UL/cUL recognized | UL 60950-1 and CSA C22.2 No. 60950-1 (File No. E131881) |
| | CB scheme | IEC 60950-1 |
| | CCC | GB4943 |
| CE | | In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU |
| Material and Parts | | RoHS Directive 2011/65/EU Compliant |
| Galvanic Isolation | Input to Output | 3.0KVac |
| | Input to Ground | 2.0KVac |
| | Output to Ground | 0.5KVac |

EMC

| | | |
|-----------------------------------|----------------|--|
| Emissions (CE & RE) | | CISPR 32, EN 55032, FCC Title 47: Class B |
| Immunity | | EN 55024 |
| Electrostatic Discharge | IEC 61000-4-2 | Criteria A ¹⁾ Level 3 Air Discharge: 8kV Level 2 Contact Discharge: 4kV |
| Radiated Field | IEC 61000-4-3 | Level 2 Criteria A ¹⁾ 80MHz-1GHz, 10V/M with 1kHz tone / 80% modulation |
| Electrical Fast Transient / Burst | IEC 61000-4-4 | Level 3 Criteria A ¹⁾ 1kV |
| Surge | IEC 61000-4-5 | Level 3 Criteria A ¹⁾ Common Mode ²⁾ : 2kV Differential Mode ³⁾ : 1kV |
| Conducted | IEC 61000-4-6 | Level 2 Criteria A ¹⁾ 150kHz-80MHz, 3Vrms |
| Power Frequency Magnetic Fields | IEC 61000-4-8 | Criteria A ¹⁾ 1A/Meter |
| Voltage Dips and Interruptions | IEC 61000-4-11 | 100% dip; 1 cycle (20ms); Self Recoverable |
| Low Energy Pulse Test (Ring Wave) | IEC 61000-4-12 | Level 3 Criteria A ¹⁾ Common Mode ²⁾ : 2kV Differential Mode ³⁾ : 1kV |
| Harmonic Current Emission | | IEC/EN 61000-3-2, Class A and Class D |
| Voltage Fluctuation and Flicker | | IEC/EN 61000-3-3 |

1) Criteria A: Normal performance within the specification limits

2) Asymmetrical: Common mode (Line to earth)

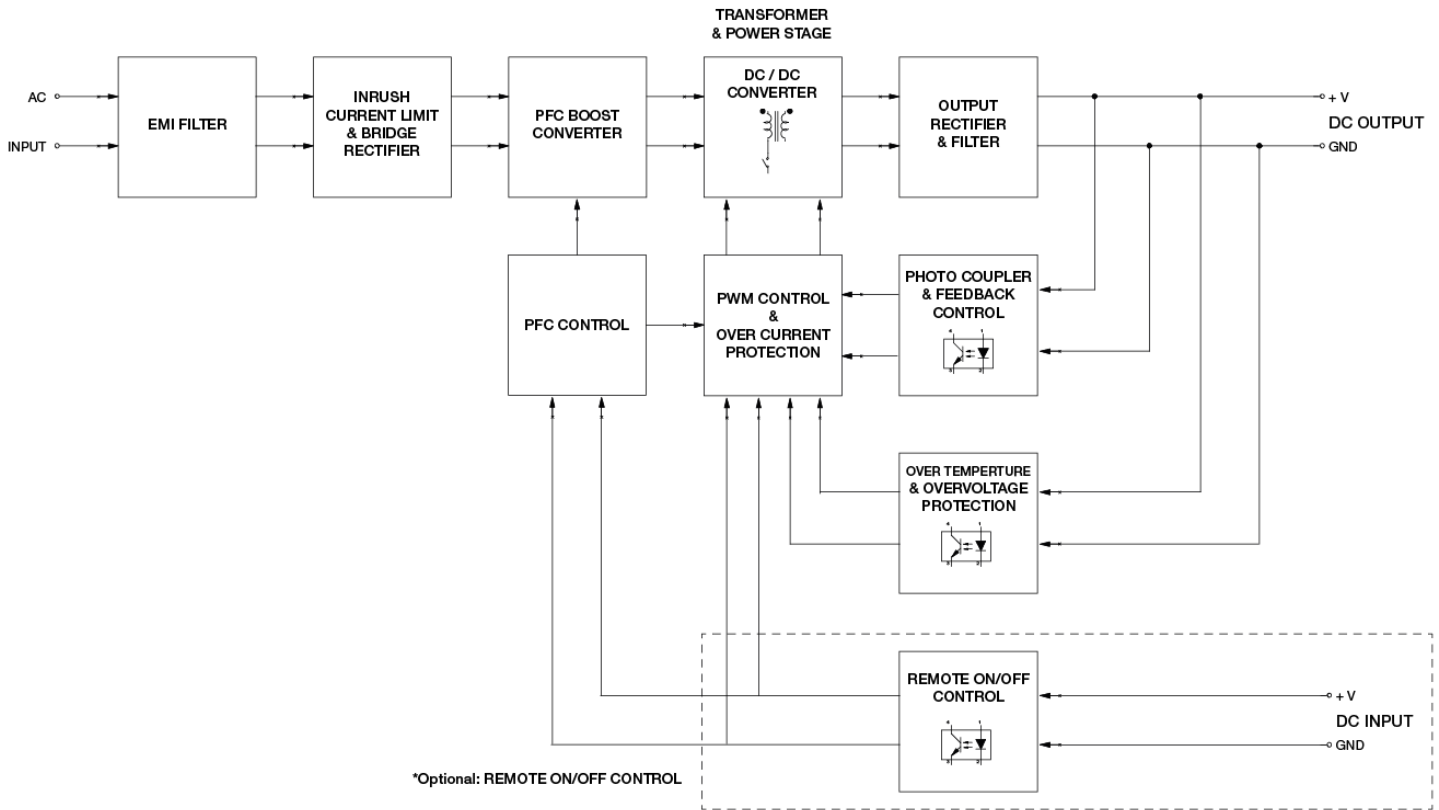
3) Symmetrical: Differential mode (Line to line)

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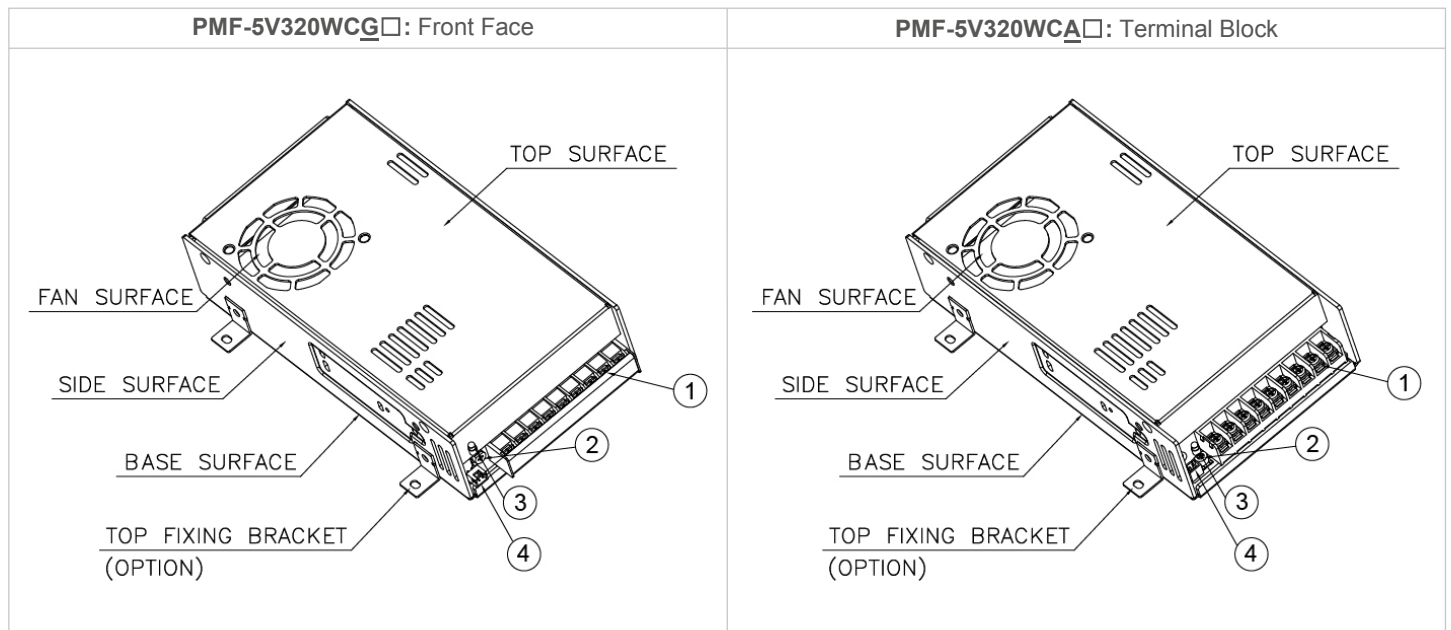
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Block Diagram



Device Descriptions



- 1) Input & Output terminal block connector
- 2) DC voltage adjustment potentiometer
- 3) DC OK control LED (Green)
- 4) Remote ON/OFF function connector (Option)

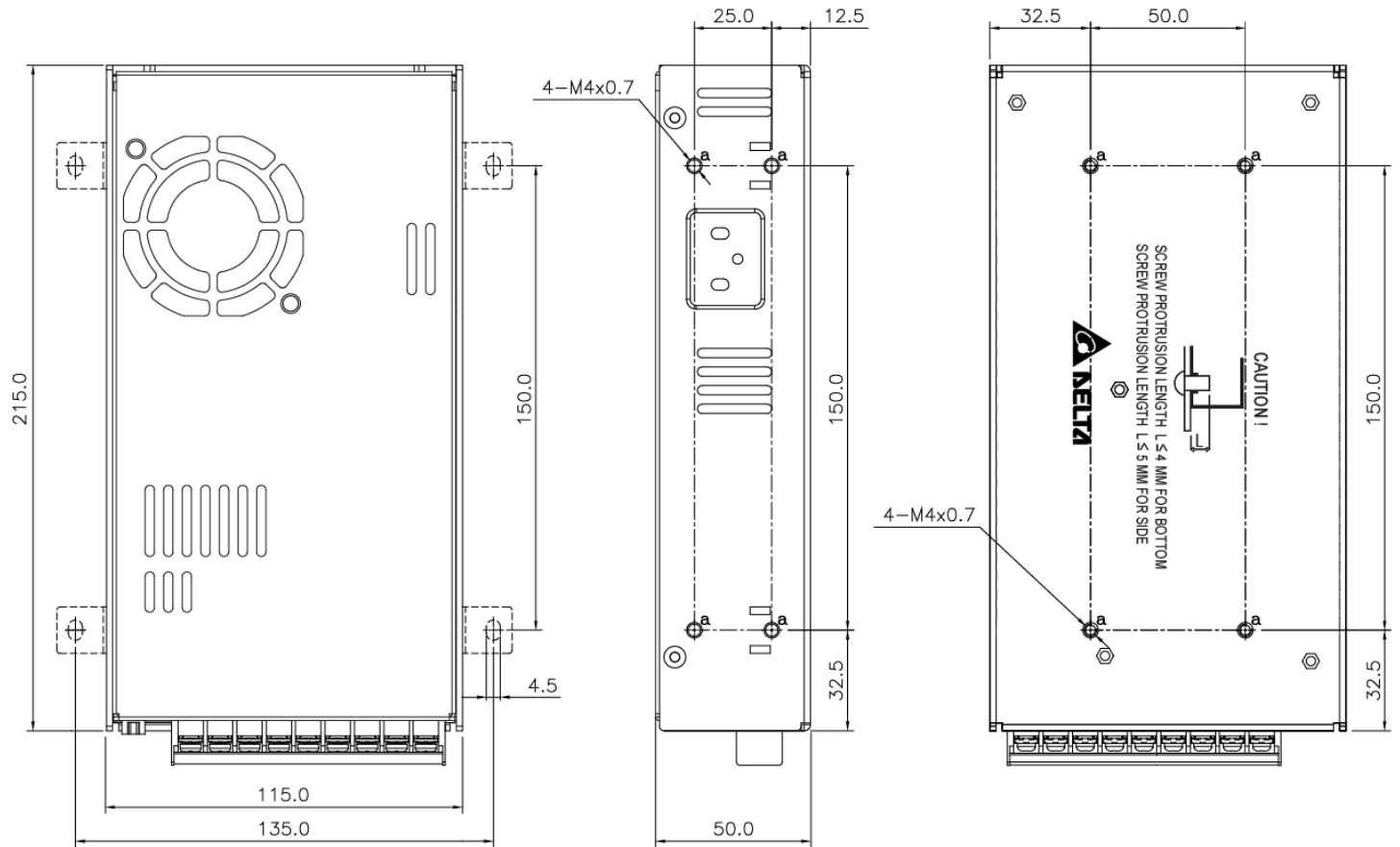
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Dimensions

PMF-5V320WCG: Front Face

L x W x D: 215 x 115 x 50 mm (8.46 x 4.53 x 1.97 inch)



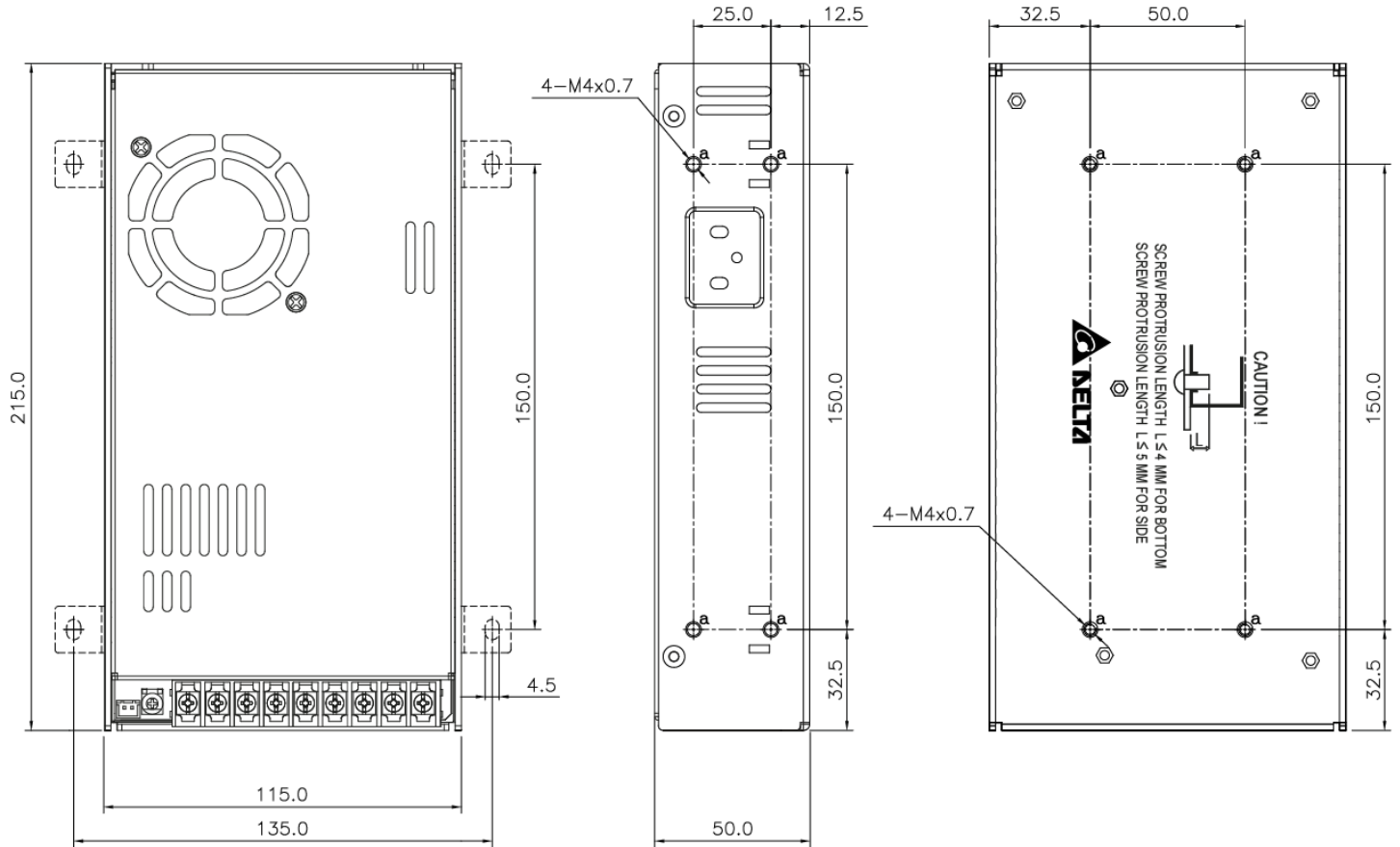
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PMF-5V320WCA: Terminal Block

L x W x D: 215 x 115 x 50 mm (8.46 x 4.53 x 1.97 inch)



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Engineering Data

Output Load De-rating VS Surrounding Air Temperature

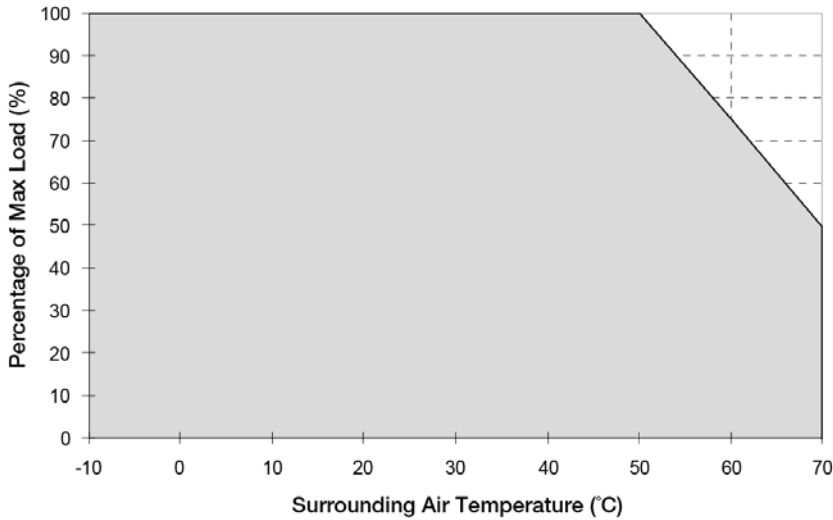
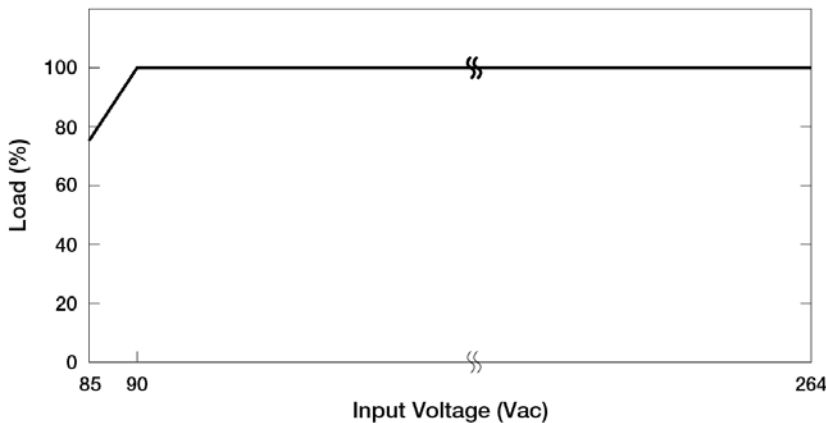


Fig. 1 De-rating for Vertical and Horizontal Mounting Orientation
 > 50°C de-rate power by 2.5% / °C

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.
2. If the output capacity is not reduced when the surrounding air temperature exceeds its specification as defined on Page 3 under "Environment", the device will run into Over Temperature Protection. When activated, the output voltage will go into bouncing mode and will recover when the surrounding air temperature is lowered or the load is reduced as far as necessary to keep the device in working condition.
3. 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.
4. Depending on the surrounding air temperature and output load delivered by the power supply, the device can be very hot!
5. If the device has to be mounted in any other orientation, please contact info@deltapsu.com for more details.

Output Load De-rating VS Input Voltage



- No output power de-rating for the input voltage from 90Vac to 264Vac

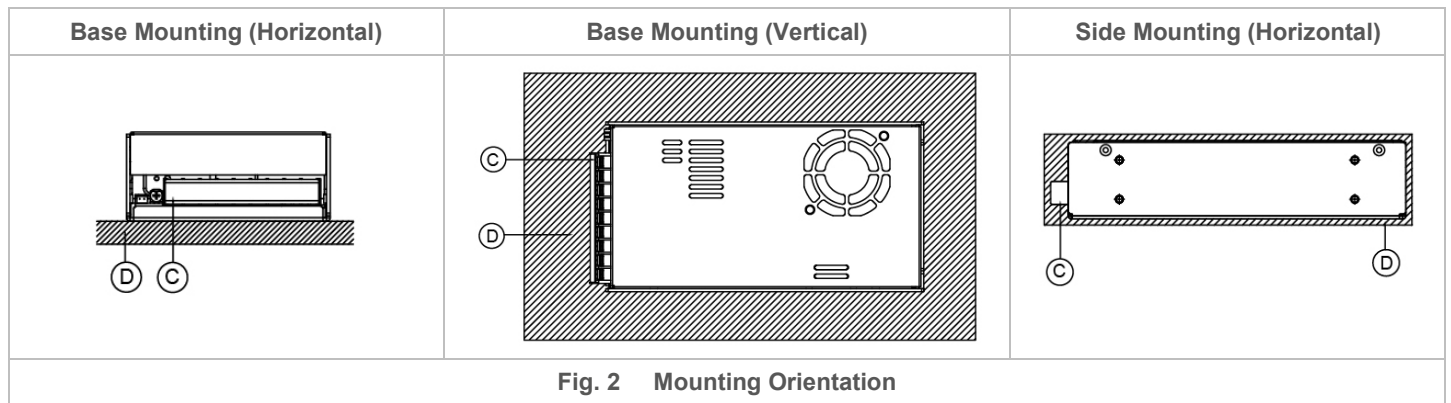
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Assembly & Installation

- Ⓐ Side Mounting: Fig. 2 and Fig. 3 show the mounting hole locations for power supply assembly onto a metal mounting surface. The power supply shall be mounted on minimum of 4 mounting holes using M4 screw of maximum 5mm (0.20 inch) length (Refer to Fig. 4). This is to maintain a safety distance between the screw and internal components.
- Ⓑ Base Mounting: Fig. 2 and Fig. 3 show the mounting hole locations for power supply assembly onto a metal mounting surface. The power supply shall be mounted on minimum of 4 mounting holes using M4 screw of maximum 4mm (0.16 inch) length (Refer to Fig. 4). This is to maintain a safety distance between the screw and internal components.
- Ⓒ Connector
- Ⓓ This surface belongs to customer's end system or panel where the power supply is mounted.



- Use flexible cable (stranded or solid) of AWG No. 14-12. The input/output connectors' allowable current is 23A max per pin. 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 13Kgf.cm. The insulation stripping length should not exceed 0.275" or 7mm.
- Recommended mounting torque of the product and its mounting accessories is 9~12Kgf.cm.

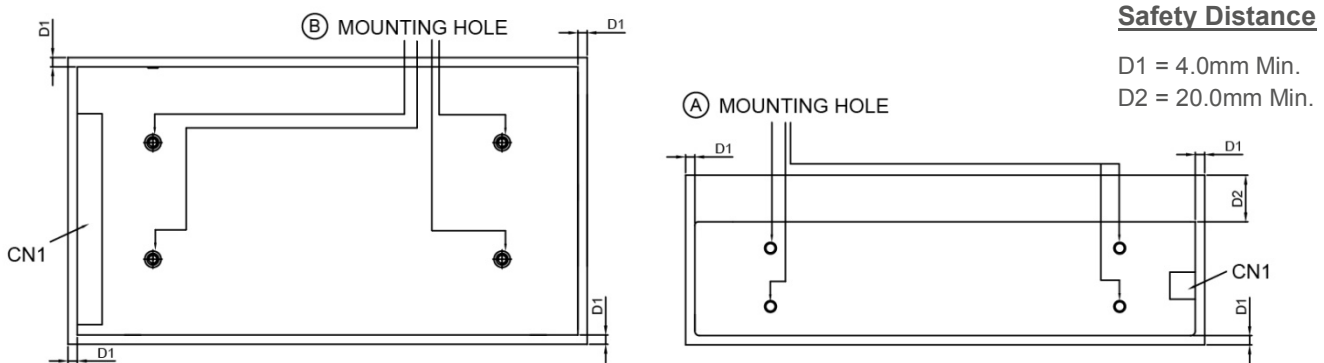
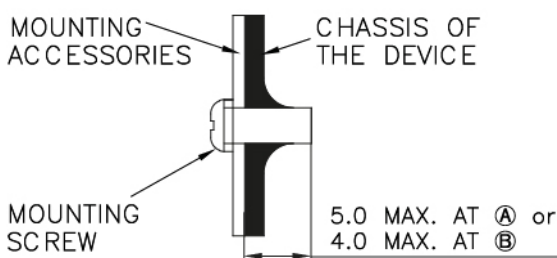


Fig. 3 Mounting Hole Locations and the Safety Distance

Ensure the mounted device is kept at $\geq 4\text{mm}$ safety distance at all sides from other components and equipment. In addition, to ensure sufficient convection cooling, always maintain a distance of $\geq 20\text{mm}$ from ventilated surfaces while the device is in operation.



- Only use M4 screw $\leq 5\text{mm}$ (0.20 inch) through the base mounting holes at Ⓐ. This is to keep a safe distance between the screw and internal components.
- Only use M4 screws $\leq 4\text{mm}$ (0.16 inch) through the base mounting holes at Ⓑ. This is to keep a safe distance between the screw and internal components.

Fig. 4 Assembly Reference



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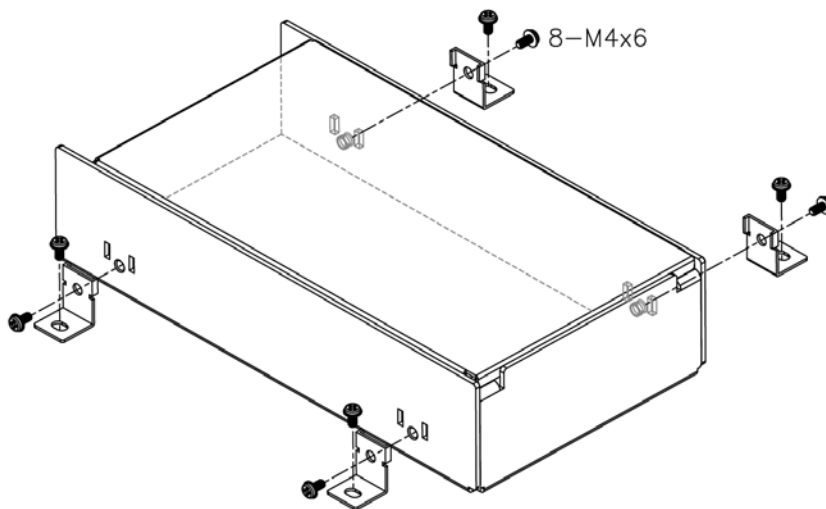
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Safety Instructions

- If user's mounting orientation is not according to the recommended mounting orientations, please consult Delta for further information.
- 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 and/or product failure.
- Warning: When connecting the device, secure Earth connection before connecting L and N. When disconnecting the device, remove L and N connections before removing the Earth connection. 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 metal surface.

Accessories



LM-01: Top Fixing Bracket

This bracket is used to fix the power supply onto a flat surface from the top.

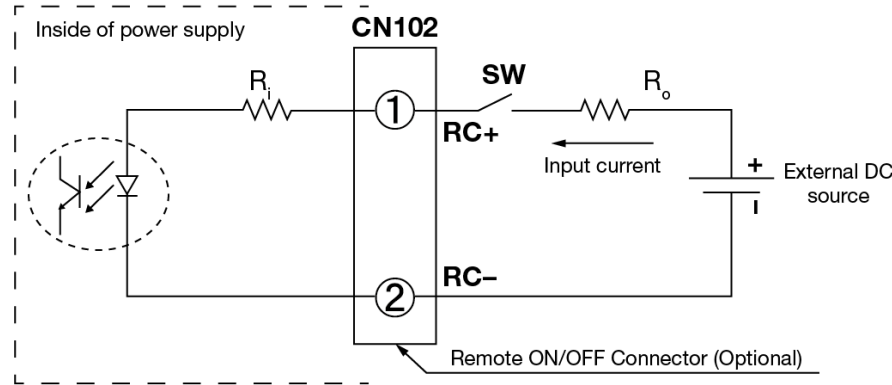
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Functional Manual

Remote ON/OFF Function



You can remotely control the power supply unit to turn ON/OFF by using an external DC source. Follow the DC power source voltage and current limiting defined in the table below.

| Built-in Resistor R_i (ohm) | Voltage Between RC+ and RC- (V) | | Input Current (mA) |
|-------------------------------|---------------------------------|------------|--------------------|
| | Output ON | Output OFF | |
| 820 | 5-12.5 | 0-0.5 | 20 Max |

Notes

1. Remote ON/OFF circuits are isolated from input, output and PE.
2. Please check if the polarity of the wire connector is the same as the external DC source. If not, the power would not turn on and the internal components may be damaged.
3. You do not need an external resistance R_o for current limit while the output voltage of external DC source is within the range of 5-12.5V. If the output voltage exceeds 12.5V, please use the following equation for the value of current limit resistance R_o .

$$R_o = \frac{V_{cc} - (3.5 + 0.006R_i)}{0.006}$$

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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.

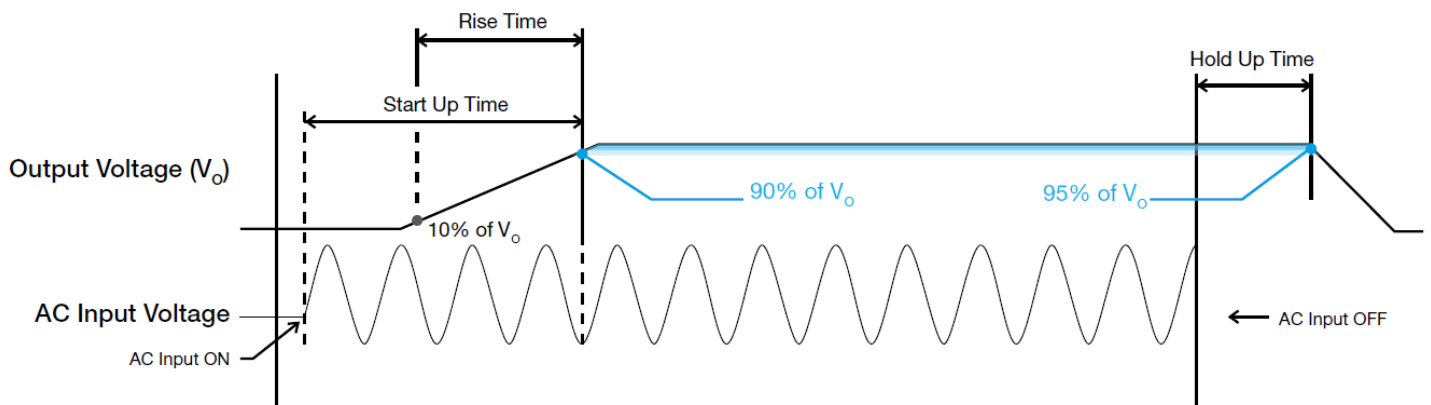
Rise Time

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

Hold-up Time

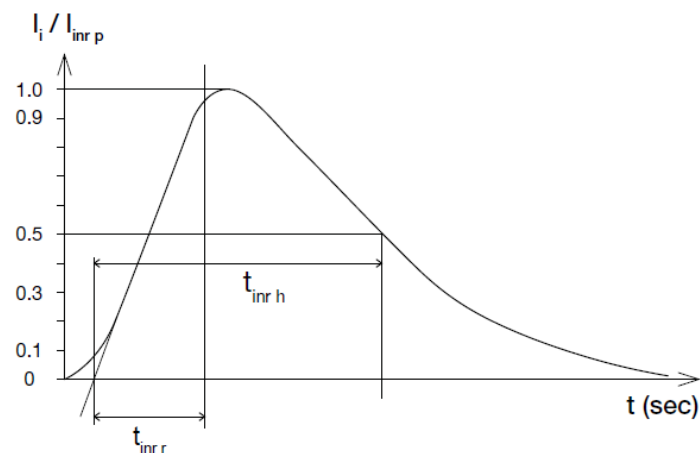
Time between the collapse of the AC input voltage, and the output falling to 95% of its steady state set value.

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



Inrush Current

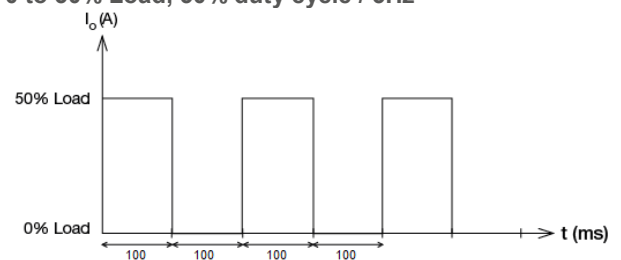
Inrush current is the peak, instantaneous, input current measured and, occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent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



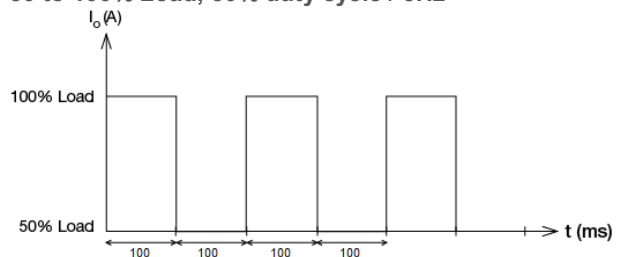
Dynamic Response

The power supply output voltage will remain within $\pm 5\%$ of its steady state value, when subjected to a dynamic load from 0 to 50% and 50% to 100% of its rated current.

■ 0 to 50% Load, 50% duty cycle / 5Hz



■ 50 to 100% Load, 50% duty cycle / 5Hz



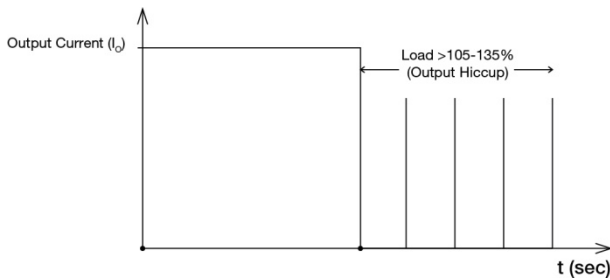
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Overload & Overcurrent Protections (Auto-Recovery)

The power supply's Overload (OLP) and Overcurrent (OCP) Protections will be activated when output current exceeds 105-135% 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 <105% 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

Delta RoHS Compliant

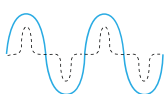


Restriction of the usage of hazardous substances

The European directive 2011/65/EU limits the maximum impurity level of homogeneous materials such as lead, mercury, cadmium, chrome, polybrominated flame retardants PBB and PBDE for the use in electrical and electronic equipment. RoHS is the abbreviation for "Restriction of the use of certain hazardous substances in electrical and electronic equipment".

This product conforms to this standard.

PFC – Norm EN 61000-3-2



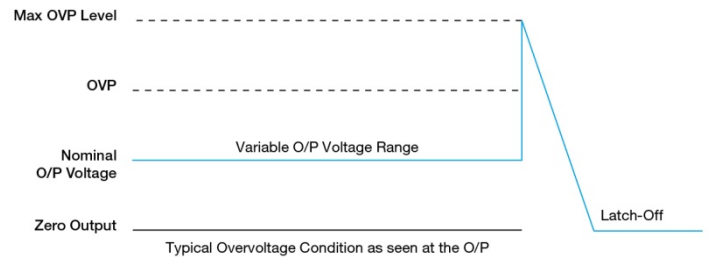
Line Current Harmonic content

Typically, the input current waveform is not sinusoidal due to the periodical peak charging of the input capacitor. In industrial environment, complying with EN 61000-3-2 is only necessary under special conditions. Complying to this standard can have some technical drawbacks, such as lower efficiency as well as some commercial aspects such as higher purchasing costs. Frequently, the user does not profit from fulfilling this standard, therefore, it is important to know whether it is mandatory to meet this standard for a specific application.

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 Page 3 under "Protections". Power supply will latch off, and require removal/re-application of input AC voltage in order to restart.

The power supply should be latch.



Over Temperature Protection (Auto-Recovery)

As described in load de-rating 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 bouncing mode until the temperature drops to its normal operating temperature as recommended in the de-rating graph.