

PMH Panel Mount Power Supply

PMH-24V100W Series / PMH-24V100WC□□

PMH

Highlights & Features

- Household appliance approvals for pollution degree 3 to IEC/EN 60335-1, IEC/EN 61558-1 and IEC/EN 61558-2-16
- Universal AC input voltage
- Withstand line input voltage surge 300Vac up to 7 seconds
- Full power from -25°C to +50°C operation @ 5000m or 16400 ft. altitude
- Full corrosion resistant aluminium casing
- No load power consumption < 0.3W
- Low earth leakage current < 0.75mA
- NEC Class 2 certified (PMH-24V100WCM□)
- Versatile connector options available: IP20, Front Face and Harness connectors

Safety Standards



CB Certified for worldwide use

Model Number: PMH-24V100WC□□
Unit Weight: 0.31 kg (0.68 lb)
Dimensions (L x W x D): 129 x 97 x 30 mm
 (5.08 x 3.82 x 1.18 inch)

General Description

The PMH-24V100WC□□ offers universal input from 85Vac to 264Vac with nominal output voltage of 24V. The highly efficient convection cooling construction can operate from -30°C to 70°C. The single output is specifically designed with compact and competitively priced for household electrical appliances safety approvals to pollution degree 3 as well as including IEC/EN 60335-1, IEC/EN 61558-2-16, IEC/EN/UL 60950-1 (with NEC Class 2). In addition, the product meets the EMC approvals to EN 55014-1 / EN 55014-2 for household appliances and EN 61000-6-2 / EN 61000-6-3 for industrial and residential environment without extra EMI filter required and comes with several connector options consisting of Terminal Block, IP20, Front Face and Harness connectors.

Model Information

PMH Panel Mount Power Supply

| Model Number | Input Voltage Range | Rated Output Voltage | Rated Output Current |
|----------------|------------------------|----------------------|----------------------|
| PMH-24V100WCL□ | 85-264Vac (120-375Vdc) | 24Vdc | 4.5A |
| PMH-24V100WCM□ | | | 3.8A |

Model Numbering

| PM | H – | 24V | 100W | C | □ | □ |
|-------------|--------------------------------------|----------------|-------------|------------------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------------|
| Panel Mount | Product Type H – Household Series | Output Voltage | 100W series | Package Type C – Enclosed | L – Low Profile M – Low Profile with NEC Class 2 | Connector Type S – Terminal Block U – IP20 Connector* V – Front Face* T – Harness* |

*Options



1 | All parameters are specified at 25°C ambient and AC input unless otherwise indicated.
www.DeltaPSU.com (December 2018, Rev. 03)



PMH Panel Mount Power Supply

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Specifications

| Model Number | PMH-24V100WCL□ | PMH-24V100WCM□ |
|--------------|----------------|----------------|
|--------------|----------------|----------------|

Input Ratings / Characteristics

| | |
|---------------------------------|----------------------------------------------|
| Nominal Input Voltage | 100-240Vac |
| Input Voltage Range* | 85-264Vac |
| Nominal Input Frequency | 50-60Hz |
| Input Frequency Range | 47-63Hz |
| DC Input Voltage Range** | 120-375Vdc |
| Input Current | < 1.90A @ 115Vac, < 1.20A @ 230Vac |
| Efficiency at 100% Load | > 86% @ 115Vac, > 88% @ 230Vac |
| Max Power Dissipation | No Load < 0.3W @ 115Vac, < 0.5W @ 230Vac |
| | 100% Load < 17.0W @ 115Vac, < 15.0W @ 230Vac |
| Max Inrush Current (Cold Start) | < 25A @ 115Vac, < 50A @ 230Vac |
| Leakage Current | < 0.75mA @ 240Vac |

*For power de-rating at 85-100Vac, see power de-rating on page 3.

**Fulfills test conditions for DC input. Safety approval for DC input can be obtained upon request.

Output Ratings / Characteristics***

| | | |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------|
| Nominal Output Voltage | 24Vdc | |
| Factory Set Point Tolerance | 24Vdc ± 2% | |
| Output Voltage Adjustment Range | 24-28Vdc | 22-24Vdc |
| Output Current | 0-4.5A (108W max.) | 0-3.8A (91.2W max.) |
| Output Power | 108W | 91.2W |
| Line Regulation | < 0.5% (@ 100-264Vac input, 100% load) | |
| Load Regulation | < 1.0% (@ 100-264Vac input, 0-100% load) | |
| PARD**** (20MHz) | < 150mVpp | |
| Rise Time | < 100ms @ nominal input (100% load) | |
| Start-up Time | < 2500ms @ 115Vac (100% load), < 1500ms @ 230Vac (100% load) | |
| Hold-up Time | > 10ms @ 115Vac, > 50ms @ 230Vac (100% load) | |
| Dynamic Response (Overshoot & Undershoot O/P Voltage) | ± 5% @ 100-264Vac input, 0-50%, 0-100%, 50-100% load (Slew Rate: 0.1A/μS, 50% duty cycle @ 5Hz to 1kHz) | |
| Start-up with Capacitive Loads | 3,000μF Max | |

***For power de-rating from < -25°C to -30°C, and 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 0.1μF ceramic capacitor & 47μF electrolytic capacitor.

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Mechanical

| | | |
|-----------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------|
| Case Chassis / Cover | Aluminium | |
| Dimensions (L x W x D) | 129 x 97 x 30 mm (5.08 x 3.82 x 1.18 inch) | |
| Unit Weight | 0.31 kg (0.68 lb) | |
| Indicator | Green LED (DC OK) | |
| Cooling System | Convection | |
| Terminal | PMH-24V100WC□S | M3.5 x 7 Pins (Rated 300V/15A) |
| | PMH-24V100WC□U | M3.5 x 7 Pins (Rated 300V/20A) |
| | PMH-24V100WC□V | M3.5 x 7 Pins (Rated 300V/20A) |
| | PMH-24V100WC□I | Power Supply Header Input: B3P(6-2.3.5)-VH(LF)(SN) Output: B4P7-VH(LF)(SN) |
| Wire | PMH-24V100WC□S | AWG 20-14 |
| | PMH-24V100WC□U | AWG 20-12 |
| | PMH-24V100WC□V | AWG 20-12 |
| | PMH-24V100WC□I | AWG 22-18 |
| Noise (1 Meter from power supply) | Sound Pressure Level (SPL) < 25dBA | |

Environment

| | | |
|-----------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Surrounding Air Temperature | Operating | -30°C to +70°C |
| | Storage | -40°C to +85°C |
| Power De-rating | Temperature | 120Vac < -25°C de-rate power by 5.0% / °C 120Vac and 240Vac > 50°C de-rate power by 2.0% / °C |
| | Input Voltage | < 100Vac de-rate power by 1.33%/°C |
| 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, 30G (300m/S ²) for a duration of 18ms, 3 times per direction, 9 times in total |
| Vibration | Non-Operating | IEC 60068-2-6, 10Hz to 150Hz @ 50m/S ² (5G peak); displacement of 0.35mm; 20 min per axis for all X, Y, Z direction |
| Bump | Operating | IEC 60068-2-29, 10G (100m/S ²) for a duration of 11ms, 1000 times per direction, 6000 times in total |
| Over Voltage Category | II | |
| Pollution Degree | 3 | |

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Protections

| | |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Overvoltage | < 35V, SELV Output, Latch mode |
| Overload / Overcurrent | PMH-24V100WCL□ 120~180% of rated load current, Hiccup mode, Non-Latching (Auto recovery) PMH-24V100WCM□ 105~130% of rated load current, Hiccup mode, Non-Latching (Auto recovery) |
| Over Temperature | < 75°C Surrounding Air Temperature @ 100% load, Latch mode |
| Short Circuit | Hiccup Mode, Non-Latching (Auto-recovery when the fault is removed) |
| Internal Fuse at L pin | T 3.15AH |
| Degree of Protection | IP20 (PMH-24V100WC□□ <u>U</u>) |
| Protection Against Shock | Class I with PE* connection |

*PE: Primary Earth

Reliability Data

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

Safety Standards / Directives

| | | |
|---------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------|
| Safety Entry Low Voltage | SELV (EN 60950-1) | |
| Electrical Safety | SIQ Bauart | EN 60950-1, EN 60335-1, EN 61558-1, EN 61558-2-16 |
| | UL/cUL recognized | UL 60950-1 and CSA C22.2 No. 60950-1 (File No. E191395) |
| | CB scheme | IEC 60950-1, IEC 60335-1, IEC 61558-1, IEC 61558-2-16 |
| Class 2 Power Supply (PMH-24V100WCM□) | UL/cUL recognized | UL 60950-1 and CSA C22.2 No. 60950-1 (File No. E191395) |
| 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 | 4.0KVac |
| | Input to Ground | 2.0KVac |
| | Output to Ground | 1.0KVdc |

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EMC

| | | |
|----------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Emissions (CE & RE) | | EN 55011, EN 55032, CISPR 32, FCC Title 47: Class B, EN 55014-1, EN 61000-6-3 |
| Component Power Supply for General Use | | EN 61204-3 |
| Immunity | | EN 55024, EN 61000-6-2, EN 55014-2 |
| Electrostatic Discharge | IEC 61000-4-2 | Level 3 Criteria A ¹⁾ Air Discharge: 8kV Contact Discharge: 6kV |
| Radiated Field | IEC 61000-4-3 | Level 3 Criteria A ¹⁾ 80MHz-1GHz, 10V/M with 1kHz tone / 80% modulation 1.4GHz-2GHz, 3V/M with 1kHz tone / 80% modulation 2GHz-2.7GHz, 1V/M with 1kHz tone / 80% modulation |
| Electrical Fast Transient / Burst | IEC 61000-4-4 | Level 3 Criteria A ¹⁾ 2kV |
| Surge | IEC 61000-4-5 | Level 4 Criteria A ¹⁾ Common Mode ³⁾ : 4kV Differential Mode ⁴⁾ : 2kV |
| Conducted | IEC 61000-4-6 | Level 3 Criteria A ¹⁾ 150kHz-80MHz, 10Vrms |
| Power Frequency Magnetic Fields | IEC 61000-4-8 | Criteria A ¹⁾ 30A/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 ³⁾ : 2kV Differential Mode ⁴⁾ : 1kV |
| Harmonic Current Emission | | IEC/EN 61000-3-2, Class A |
| Voltage Fluctuation and Flicker | | IEC/EN 61000-3-3 |

1) Criteria A: Normal performance within the specification limits

2) Criteria B: Temporary degradation or loss of function which is self-recoverable

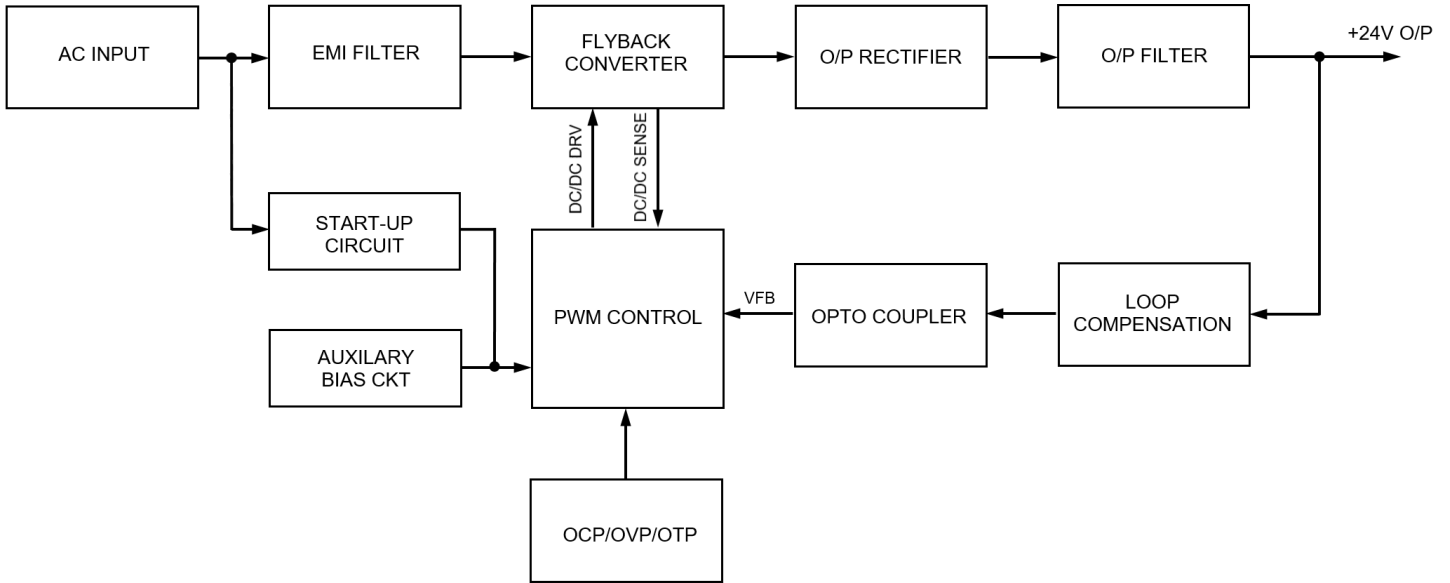
3) Asymmetrical: Common mode (Line to earth)

4) Symmetrical: Differential mode (Line to line)

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Block Diagram



Device Descriptions

| | |
|----------------------------------------------|---------------------------------------------------|
| <p>PMH-24V100WC□S: Terminal Block</p> | <p>PMH-24V100WC□U: IP20 Terminal Block</p> |
| | <p>PMH-24V100WC□V: Front Face</p> |
| | <p>PMH-24V100WC□T: Harness</p> |

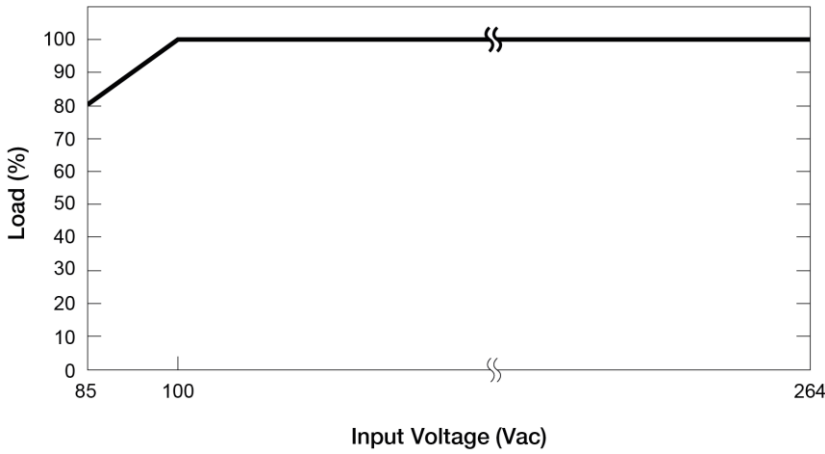
- 1) Input & Output terminal block connector
- 2) DC voltage adjustment potentiometer
- 3) DC OK control LED (Green)

| Connector Type | Output isolated to PE |
|----------------|-----------------------|
| Terminal Block | S |
| IP20 Connector | U |
| Front Face | V |
| Harness | T |

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Output Load De-rating VS Input Voltage



■ No output power de-rating for the input voltage from 100Vac to 264Vac

Assembly & Installation

- Ⓐ Mounting holes for power supply assembly onto the mounting surface. The power supply shall be mounted on minimum 2 mounting holes using M3 screw minimum 5mm (0.20 inch) length.
- Ⓑ This surface belongs to customer's end system or panel where the power supply is mounted.
- Ⓒ Connector

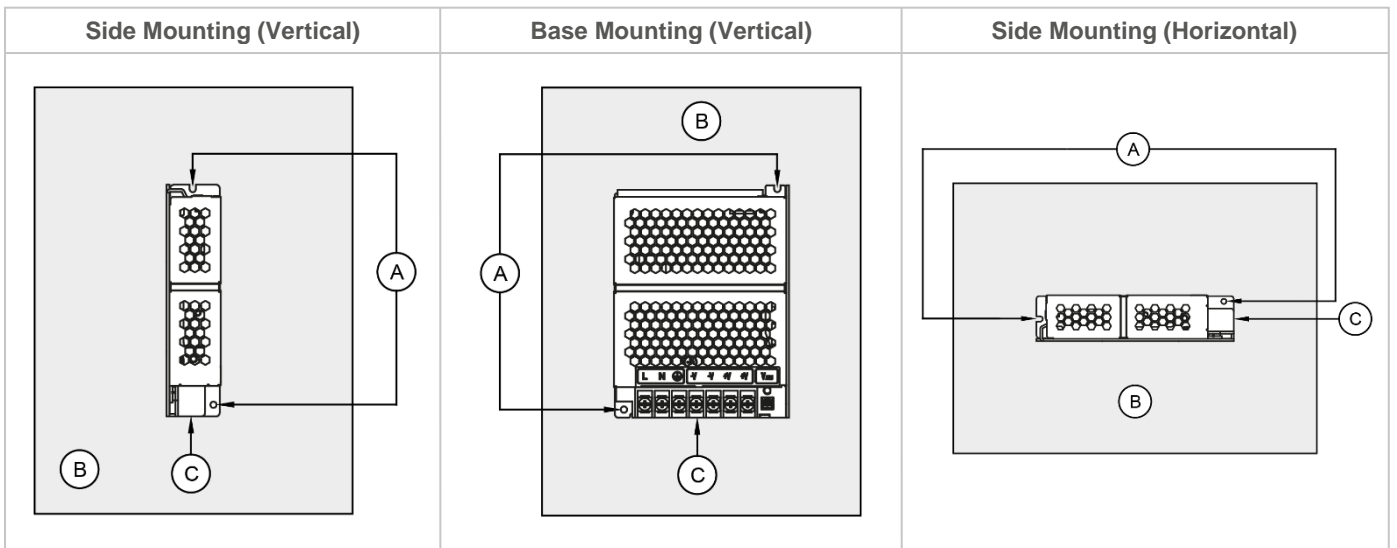


Fig. 2 Mounting Orientation

- Use flexible cable (stranded or solid) with the following sizes:

| PMH-24V100WC□ <u>S</u> | PMH-24V100WC□ <u>U</u> | PMH-24V100WC□ <u>V</u> | PMH-24V100WC□ <u>I</u> |
|------------------------|------------------------|------------------------|------------------------|
| AWG 20-14 | AWG 20-12 | AWG 20-12 | AWG 22-18 |

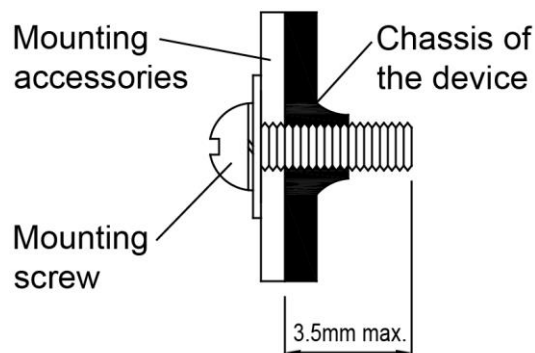
- The torque at the Connector shall not exceed 13Kgf.cm (11.23 lbf.in). The insulation stripping length should not exceed 0.275" or 7mm.
- Please refer the table below for the recommended mating connector, terminal and AWG wire size of **PMH-24V100WC□I**

| | Power Supply Header | Mating Connector | Terminal | AWG |
|---------------------|-------------------------|------------------|--------------|-------|
| Input (JST) | B3P(6-2.3.5)-VH(LF)(SN) | VHR-6N | SVH-21T-P1.1 | 22-18 |
| Output (JST) | B4P7-VH(LF)(SN) | VHR-7N | SVH-21T-P1.1 | 22-18 |

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Installation of Mounting Accessories



- Only use M3 screw $\leq 3.5\text{mm}$ (0.14 inch) through the base mounting holes. This is to keep a safety distance between the screw and internal components.
- Recommended mounting tightening torque: 4~8Kgf.cm (3.47~6.94 lbf.in).

Safety Instructions

- To ensure sufficient convection cooling, always maintain a safety distance of $\geq 50\text{mm}$ (1.97 inch) from all ventilated surfaces while the device is in operation.
- The device is not recommended to be placed on surface with low thermal conductivity, such as plastics, for example.
- Note that 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 appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- 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 device is earthed and must be inaccessible.

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Functions

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



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

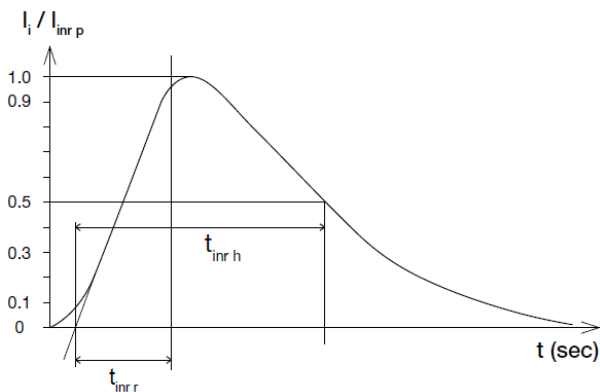
The time required for the output voltage to change from 10% to 90% of its final steady state set value.

Hold-up Time

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

Inrush Current

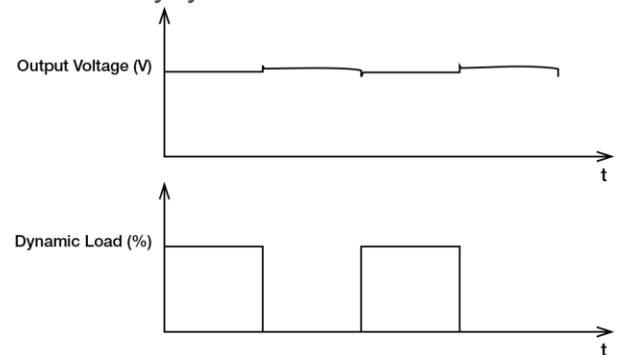
Inrush current is the peak, instantaneous, input current measured and, occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent 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%, 0% to 100% and 50% to 100% of its rated current.

- 50% duty cycle / 5Hz to 1kHz

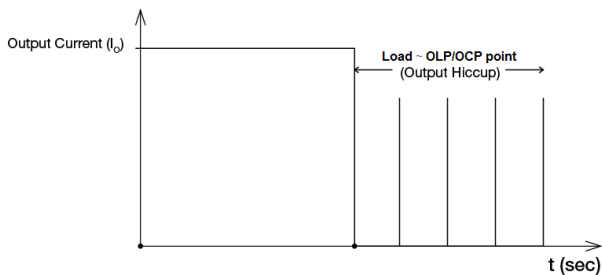


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Overload & Overcurrent Protections (Auto-Recovery)

The power supply's Overload (OLP) and Overcurrent (OCP) Protections will be activated when output current (I_o) exceeds its specification as defined on Page 4 under "Protections". In such occurrence, the output voltage (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.

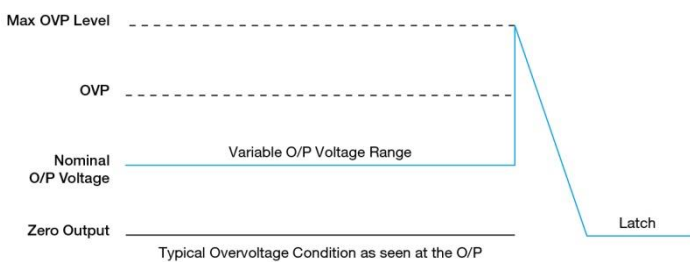


It is not recommended to prolong the duration of I_o when it is less than OLP/OCP point, but greater than 100%, since it may cause damage to the PSU.

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 4 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-application of input AC voltage in order to restart.



External Input Protection Device

The unit is protected with internal fuse (not replaceable) at L pin and it has been tested and approved on 20A (UL) and 16A (IEC) branch circuits without additional protection device. An external protection device is only required if the supplying branch has an ampacity greater than above. Thus, if an external protective device is necessary, or, utilized, please refer a minimum value of 16A B- or 8A C- characteristic breaker should be used.

Short Circuit Protection (Auto-Recovery)

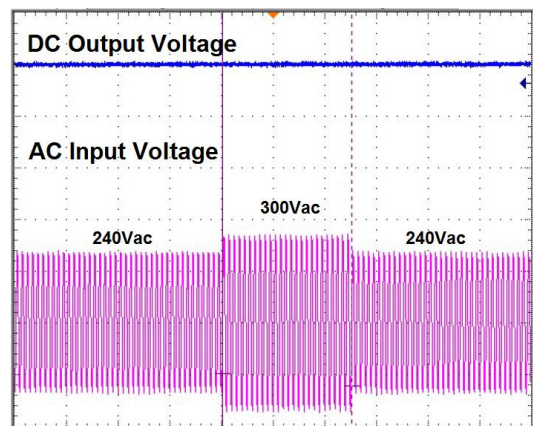
The power supply's output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate in "Hiccup mode", as shown in the illustration in the OLP/OCP section on this page. The power supply will return to normal operation after the short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

Over Temperature Protection (Latch Mode)

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 latch mode until the surrounding air temperature drops to its normal operating temperature or the load is reduced as recommended in the de-rating graph. Removal/re-application of input AC voltage will then be required in order to restart.

Line Input Voltage Surge

The power supply is operating with 100% load, the line input voltage is switched to the voltage surge from 240Vac to 300Vac (50Hz) and back to 240Vac with a 10% duty cycle. The unit shall survive repeated applications of the line voltage surges with no component damage. The power supply's output voltages shall remain within the specified range during and subsequent to these line voltage surges.



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Operating Mode

■ Redundant Operation

In order to ensure proper redundant operation for the power supply units (PSUs), the output voltage difference between the two units must be kept at 0.45~0.50V for these 24V supplies. Follow simple steps given below to set them up for the redundant operation:

Step 1.

Measure output voltage of PSU 1 and PSU 2. If PSU 1 is the master unit, then V_O of PSU 1 must be higher than PSU 2. In order to set the output voltage, individually connect each power supply to 50% of rated load at any line voltage from 100-264Vac, and set the PSU 1 and PSU 2 output voltage.

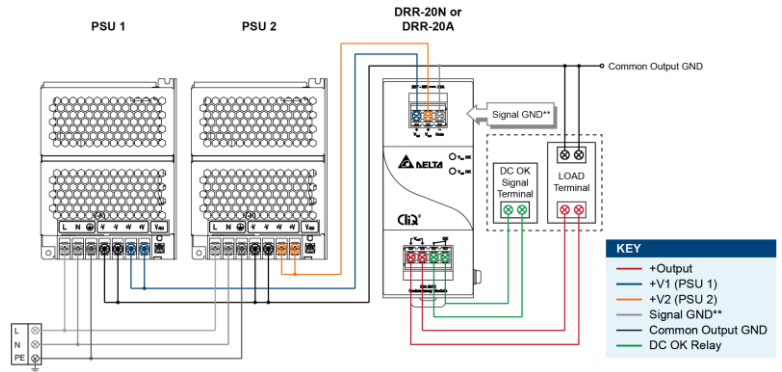
Step 2.

Connect the power supply units PSU 1 and PSU 2 to Vin 1 & Vin 2, respectively, of the DRR-20N (or 20A) module shown on the right of above diagram.

Step 3.

Connect the system load to V_{out} . Please note that output voltage V_{out} from DRR module will be = V_O (output voltage of power supply) – V_{drop}^* (in DRR module).

* V_{drop} will vary from 0.60V to 0.90V (Typical 0.65V) depending on the load current and surrounding air temperature.



**The Signal GND in the DRR module is for the built-in LED and DC OK signals. The Output GND terminals from the two PSU's do not need to be connected to the Signal GND terminal.

Fig. 3 Redundant Operation Connection Diagram

■ Parallel Operation

The power supply units (PSUs) can also be used for parallel operation in order to increase the output power. The difference in output voltage between the two units must be kept to within 25mV of each other. This difference must be verified with the same output load connected independently to each unit.

Parameters such as EMI, inrush current, leakage current, PARD, start up time will be different from those on the datasheet, when two units are connected in parallel. The user will need to verify that any differences will still allow the two power supplies connected in parallel will work properly in their product/application.

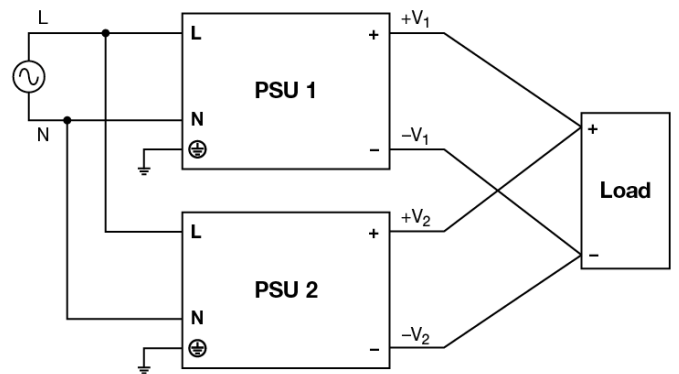


Fig. 4 Parallel Operation Connection Diagram

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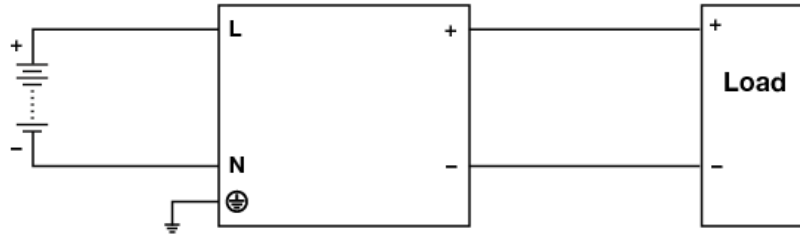


Fig. 5 DC Input Operation Connection Diagram

■ DC Input Operation

Step 1.

Use a battery or similar DC source.

Step 2.

Connect +pole to L and -pole to N.

Step 3.

Connect the PE terminal to an earth wire or to the machine ground.

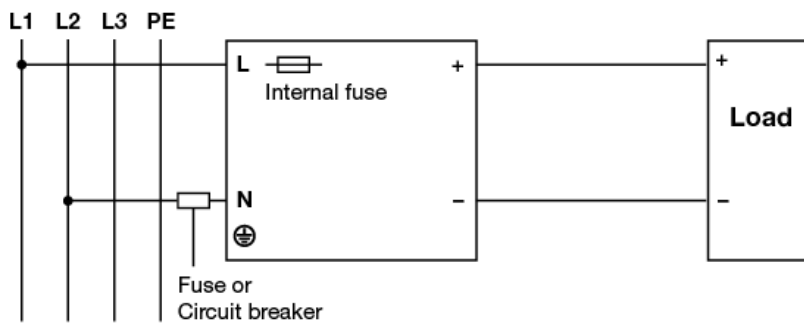


Fig. 6 2 of 3 Phase System Input Operation Connection Diagram

■ 2 of 3 Phase System Input Operation

Delta's PMH can use on 2 of 3 phase system. Please refer to the following step.

Step 1.

The input voltage applied from Line to Neutral is below the maximum rated input. The input voltage shall be below 240Vac +10%.

Step 2.

The external protector is needed on N (Neutral) input line to secure a safety. N line does not have internal fuse protection. An appropriate fuse or circuit breaker should be connected in series with N input line connection like the following.

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Others

Delta RoHS Compliant

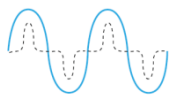


Restriction of the usage of hazardous substances

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.

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.