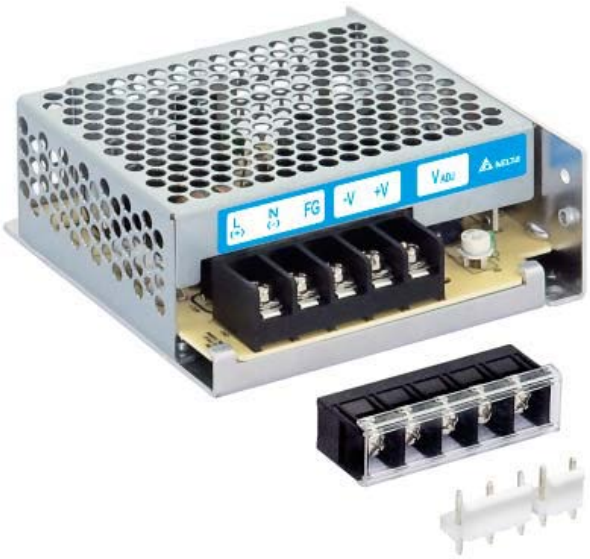
TECHNICAL DATASHEET

# PMT Panel Mount Power Supply

## 24V 35W 1 Phase / PMT-24V35W1AX



# PMT

### Highlights & Features

- Universal AC input range
- Allows input voltage from 90Vac to 264Vac without power de-rating
- Versatile connector options (Terminal Block, Front Face, Harness)
- MTBF > 200,000 hrs.
- Overvoltage / Overcurrent / Over Temperature Protections
- Reliable economical solution with high temperature range E-Cap

### Safety Standards

CB Certified for worldwide use

**Model Number:** PMT-24V35W1AX
**Unit Weight:** 0.22 kg
**Dimensions (L x W x D):** 98 x 98 x 37.5 mm

### General Description

The new PMT series of panel mount power supplies is the latest offering from one of the world's largest power supply manufacturers and solution providers - Delta. The first range of PMT products will offer a nominal output voltage of 24V with a wide operating temperature range from -10°C to +70°C and can withstand shock and vibration requirements (in accordance to IEC60068-2-27 and IEC60068-2-6 respectively). In addition to features like overvoltage and overload protections, Delta's PMT series of panel mount power supplies is unlike many other brands in the same price level. The PMT series is designed for cost competitive markets without compromising the quality of the components and product specifications. The series of products has an expected life time of 10 years and will have no output power de-rating from 90Vac to 264Vac. This versatile series has three different connector options (Terminal Block, Front Face and Harness) and can also be converted into L Frame (PML) or Open Frame (PMB) type of power supplies to satisfy different application needs.

### Model Information

PMT Panel Mount Power Supply

| Model Number | Input Voltage Range | Output Voltage | Output Current |
|---|---|---|---|
| PMT-24V35W1AX | 85-264Vac | 24Vdc | 1.46A |

### Model Numbering

| PM | X – | 24V | 35W | 1 | A | X |
|---|---|---|---|---|---|---|
| Panel Mount | Product Type<br>T – Enclosed<br>L – L Frame*<br>B – Open Frame* | Output Voltage | Output Power | Single Phase | No PFC Series | Connector Type<br>A – Terminal Block<br>G – Front Face*<br>H – Harness* |

***Options**



All parameters are specified at 25°C ambient unless otherwise noted.
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# PMT Panel Mount Power Supply
## 24V 35W 1 Phase / PMT-24V35W1AX

### 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 | < 0.75A @ 115Vac, < 0.50A @ 230Vac |
| Efficiency at 100% Load | > 85.0% @ 115Vac & 230Vac |
| Max Inrush Current | < 30A @ 115Vac, < 60A @ 230Vac |
| Power Factor | Conform to EN61000-3-2 |
| Leakage Current | < 1mA @ 240Vac |

#### Output Ratings / Characteristics

| | |
|---|---|
| Nominal Output Voltage | 24Vdc |
| Output Voltage Tolerance | ± 2% (initial set point tolerance from factory) |
| Output Voltage Adjustment Range | 22-28Vdc |
| Output Current | 1.46A |
| Output Power | 35W |
| Line Regulation | < 0.5% typ. (@ 85-264Vac input, 100% input) |
| Load Regulation | < 1% typ. (@ 85-264Vac input, 0-100% input) |
| PARD (20MHz) | < 100mVpp @ 0°C to 50°C,<br>< 150mVpp @ -10°C to 0°C |
| Rise Time | < 30ms @ nominal input (100% load) |
| Start-up Time | < 2500ms @ nominal input (100% load) |
| Hold-up Time | > 16.7ms @ 115Vac |
| Dynamic Response (Overshoot & Undershoot O/P Voltage) | ± 5% @ 0-100% load (Slew Rate: 0.1A/μS) |
| Start-up with Capacitive Loads | 8,000μF Max |

#### Mechanical

| | |
|---|---|
| Case Chassis | Aluminium |
| Case Cover | SGCC |
| Dimensions (L x W x D) | 98 x 98 x 37.5 mm |
| Unit Weight | 0.22 kg |
| Indicator | Green LED (DC OK) |
| Cooling System | Convection |
| Terminal | Refer to the Table on Page 7 |
| Wire | Refer to the Table on Page 7 |

# PMT Panel Mount Power Supply

## 24V 35W 1 Phase / PMT-24V35W1AX

### Environment

| | | |
|---|---|---|
| Surrounding Air Temperature | Operating | -10°C to +70°C |
| | Storage | -25°C to +85°C |
| Power De-rating | | > 50°C de-rate power by 2.5% / °C |
| Operating Humidity | | < 95% RH (Non-Condensing) |
| Operating Altitude | | 5,000 Meters |
| Shock Test (Non-Operating) | | IEC60068-2-27, 50G for a duration of 11ms, 3 times per direction, 18 times in total |
| Vibration (Non-Operating) | | IEC60068-2-6, 10Hz to 55Hz @ 50m/S² (5G peak); 90 min per axis for all X, Y, Z direction |
| Pollution Degree | | 2 |

### Protections

| | |
|---|---|
| Overvoltage | < 32V, ±10%, SELV Output, Hicc-up Mode, Non-Latching (Auto-Recovery) |
| Overload / Overcurrent | > 120% of rated load current, Hicc-up Mode, Non-Latching (Auto-Recovery) |
| Over Temperature | Non-Latching (Auto-Recovery) |
| Short Circuit | Hicc-up Mode, Non-Latching (Auto-Recovery when the fault is removed) |
| Protection Against Shock | Class I with PE* connection |

*PE: Primary Earth

### Reliability Data

| | |
|---|---|
| MTBF | > 200,000 hrs. |
| Expected Cap Life Time | 10 years (115Vac & 230Vac, 50% load @ 40°C) |

### Safety Standards / Directives

| | | |
|---|---|---|
| Electrical Safety | | TUV Bauart to EN60950-1, UL/cUL recognized to UL60950-1 and CSA C22.2 No. 60950-1, CB scheme to IEC60950-1, CCC to GB4943 |
| ITE | | IEC/EN/UL 60950-1 |
| CE | | In conformance with EMC Directive 2004/108/EC and Low Voltage Directive 2006/95/EC |
| Material and Parts | | RoHS Directive 2011/65/EU Compliant |
| Galvanic Isolation | Input to Output | 3.0KVac |
| | Input to Ground | 1.5KVac |
| | Output to Ground | 0.5KVac |

# PMT Panel Mount Power Supply

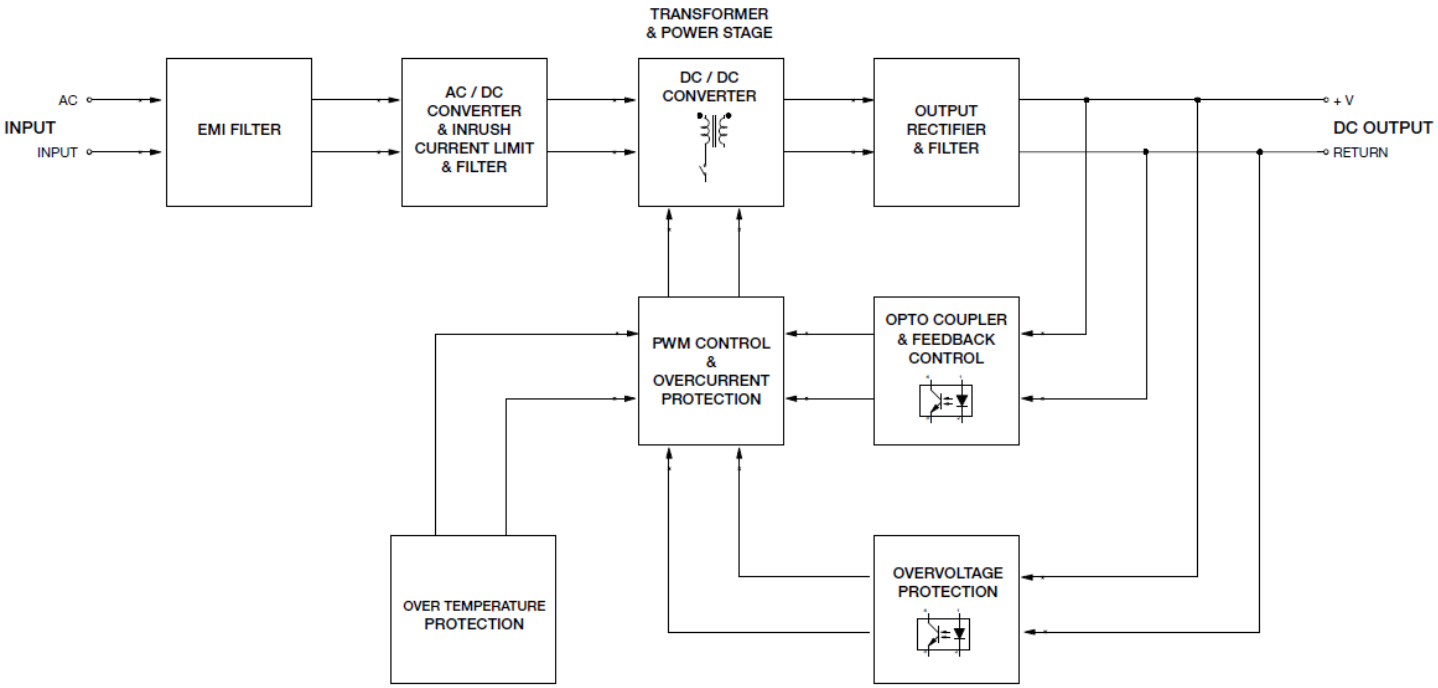
## 24V 35W 1 Phase / PMT-24V35W1AX

### EMC

| | | |
|---|---|---|
| EMC / Emissions | | CISPR22, EN55022, FCC Title 47: Class B |
| Immunity to | | |
| Electrostatic Discharge | IEC61000-4-2 | Level 4 Criteria A[1)]<br>Air Discharge: 15kV<br>Contact Discharge: 8kV |
| Radiated Field | IEC61000-4-3 | Level 3 Criteria A[1)]<br>80MHz-1GHz, 10V/M with 1kHz tone / 80% modulation |
| Electrical Fast Transient / Burst | IEC61000-4-4 | Level 3 Criteria A[1)]<br>2kV |
| Surge | IEC61000-4-5 | Level 3 Criteria A[1)]<br>Common Mode[2)]: 2kV<br>Differential Mode[3)]: 1kV |
| Conducted | IEC61000-4-6 | Level 3 Criteria A[1)]<br>150kHz-80MHz, 10Vrms |
| Power Frequency Magnetic Fields | IEC61000-4-8 | Criteria A[1)]<br>10A/Meter |
| Voltage Dips | IEC61000-4-11 | 100% dip; 1 cycle (20ms); Self Recoverable |
| Low Energy Pulse Test (Ring Wave) | IEC61000-4-12 | Level 3 Criteria A[1)]<br>Common Mode[2)]: 2kV<br>Differential Mode[3)]: 1kV |

1) Criteria A: Normal performance within the specification limits
2) Asymmetrical: Common mode (Line to earth)
3) Symmetrical: Differential mode (Line to line)

### Block Diagram





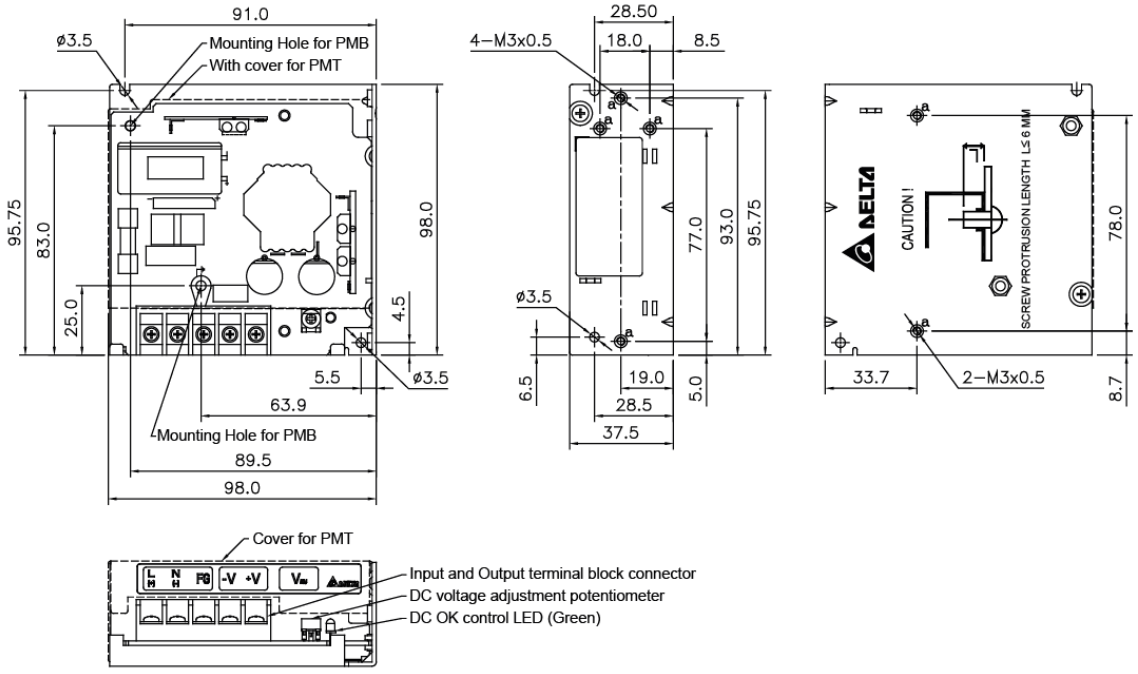

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# PMT Panel Mount Power Supply

## 24V 35W 1 Phase / PMT-24V35W1AX

### Dimensions

**L x W x D:** 98 x 98 x 37.5 mm




### Engineering Data

#### De-rating

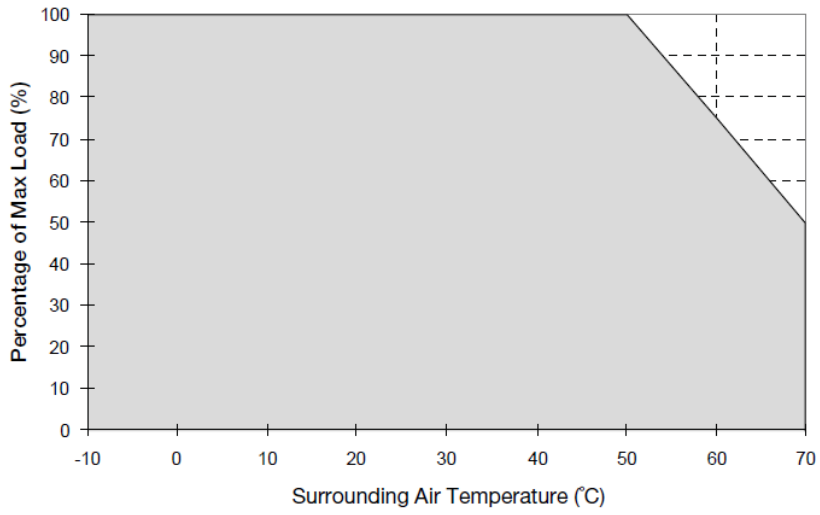



**Fig. 1 De-rating for Vertical and Horizontal Mounting Orientation**
> 50°C de-rate power by 2.5% / °C

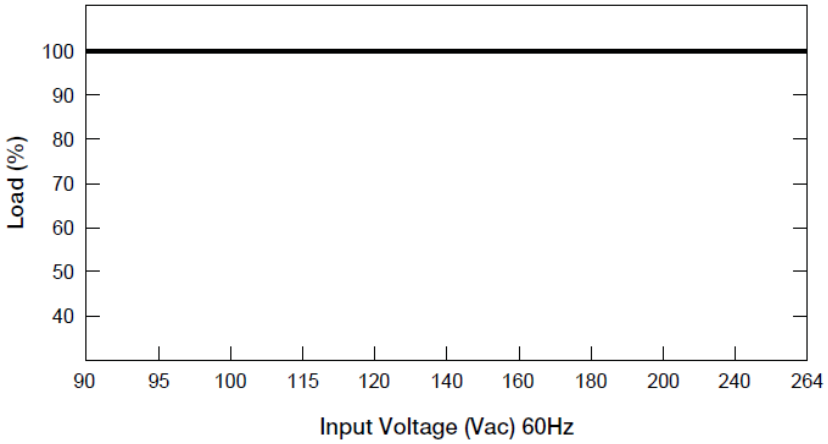
**Note**

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 >50°C, 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 of 20mm with adjacent units 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 do not hesitate to contact **info@deltapsu.com** for more details.

# PMT Panel Mount Power Supply

## 24V 35W 1 Phase / PMT-24V35W1AX

### Output De-rating VS. Input Voltage




- No output power de-rating for the input voltage from 90Vac 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 5 mm length.
Ⓑ This surface belongs to customer's end system or panel where the power supply is mounted.
Ⓒ Connector

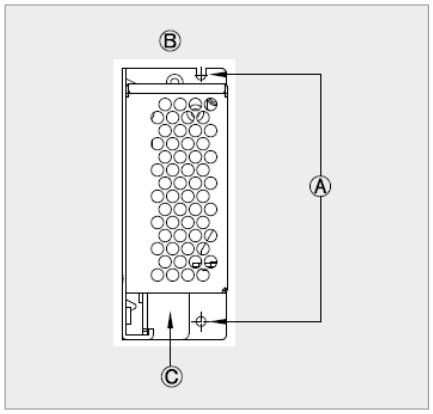



Fig. 2.1 Side Mounting (Vertical)

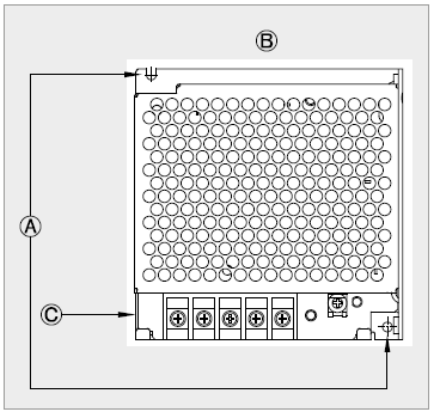



Fig. 2.2 Base Mounting (Vertical)

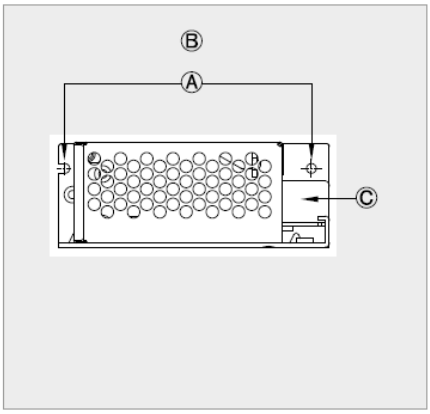
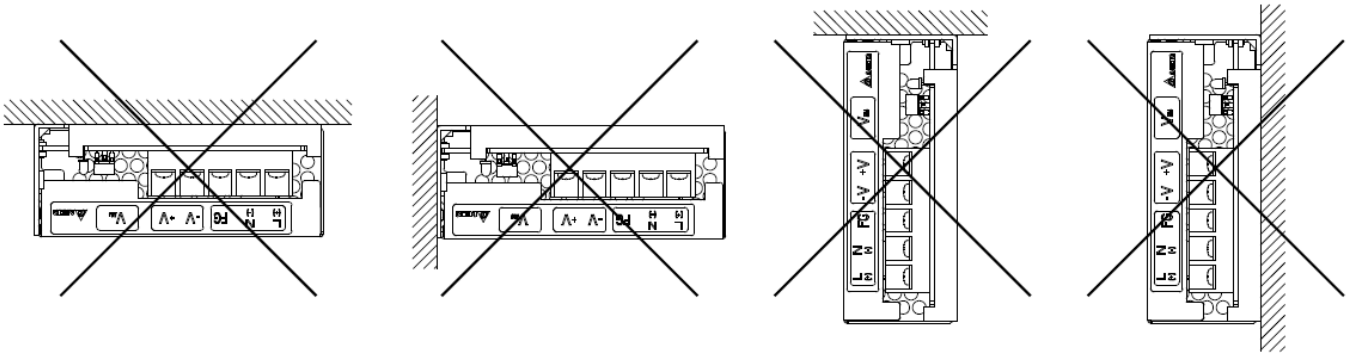



Fig. 2.3 Side Mounting (Horizontal)

### Improper Installations

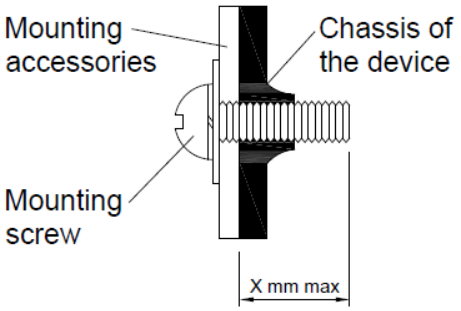




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# PMT Panel Mount Power Supply

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- Only use M3 screw ≤ X mm through the base mounting holes (Refer to the Screw Protrusion Length in the table below). This is to keep a safe distance between the screw and internal components.

### Connection & Screw Protrusion Data

| Product Group | Item | Connector Options | | |
|---|---|---|---|---|
| PMT | | A – Terminal Block | G – Front Face* | H – Harness* |
| | AWG | 22-12 | 22-12 | 22-18 |
| | Torque | 13Kgf.cm | 13Kgf.cm | – |
| | Input Connector | – | – | B3P5-VH(LF)(SN) |
| | Output Connector | – | – | B2P3-VH(LF)(SN) |
| | Input Mating Connector | – | – | VHR-5N |
| | Output Mating | – | – | VHR-3N |
| | Input & Output Terminal | – | – | SVH-21T-P1.1 |
| | Screw Protrusion Length | 5mm (6mm Max) | 5mm (6mm Max) | 5mm (6mm Max) |
| PML* | AWG | 22-12 | 22-12 | 22-18 |
| | Torque | 13Kgf.cm | 13Kgf.cm | – |
| | Input Connector | – | – | B3P5-VH(LF)(SN) |
| | Output Connector | – | – | B2P3-VH(LF)(SN) |
| | Input Mating Connector | – | – | VHR-5N |
| | Output Mating | – | – | VHR-3N |
| | Input & Output Terminal | – | – | SVH-21T-P1.1 |
| | Screw Protrusion Length | 5mm (6mm Max) | 5mm (6mm Max) | 5mm (6mm Max) |
| PMB* | AWG | 22-12 | 22-12 | 22-18 |
| | Torque | 13Kgf.cm | 13Kgf.cm | – |
| | Input Connector | – | – | B3P5-VH(LF)(SN) |
| | Output Connector | – | – | B2P3-VH(LF)(SN) |
| | Input Mating Connector | – | – | VHR-5N |
| | Output Mating | – | – | VHR-3N |
| | Input & Output Terminal | – | – | SVH-21T-P1.1 |
| | Screw Protrusion Length | 5mm | 5mm | 5mm |

*Options

– To ensure sufficient convection cooling, always maintain a safety distance of 20mm from all ventilated surfaces while the device is in operation.
– The device is not recommended to be placed on low thermal conductive surfaces, for example, plastics.
– Prevent any foreign metal, particles or conductors to enter the device through the openings during installation. It can cause: - Electric shock; Safety Hazard; Fire; Product failure.

# PMT Panel Mount Power Supply

## 24V 35W 1 Phase / PMT-24V35W1AX

## Functions

### Start-up Time

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

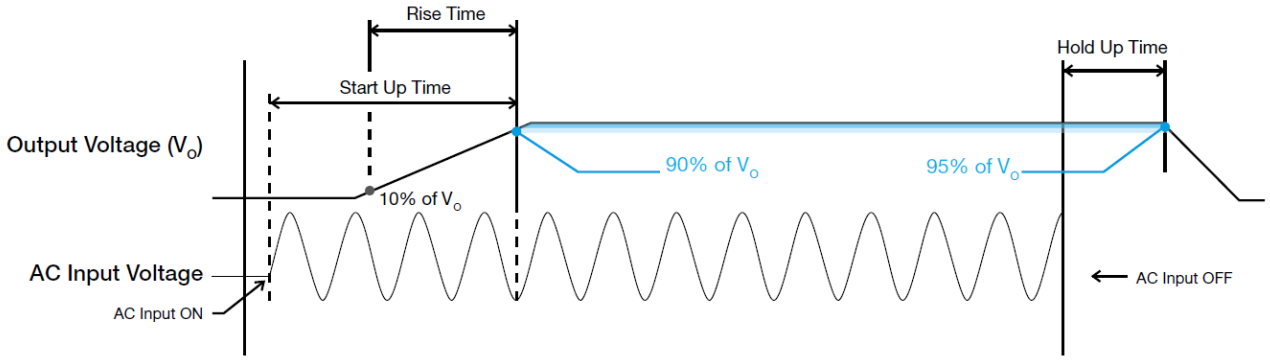
### Rise Time

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

### Hold-up Time

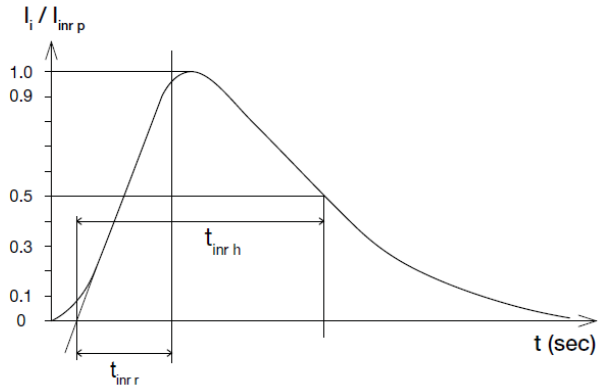
Hold up time is the time when the AC input collapses and output voltage retains regulation for a certain period of time. The time required for the output to reach 95% of its set value, after the input voltage is removed.

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



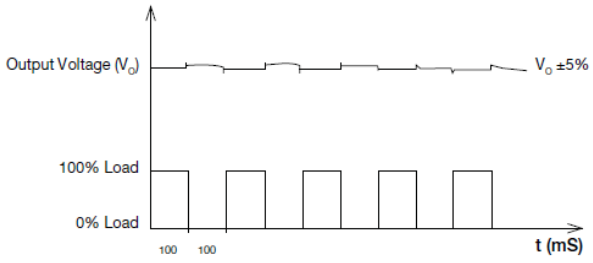

### Inrush Current

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 ±5% of its steady state value, when subjected to a dynamic load from 0 to 100% of its rated current.



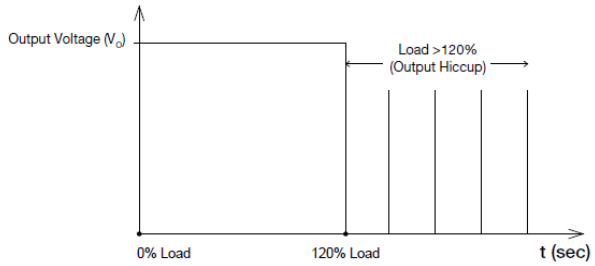



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# PMT Panel Mount Power Supply
## 24V 35W 1 Phase / PMT-24V35W1AX

### Overload & Overcurrent Protections

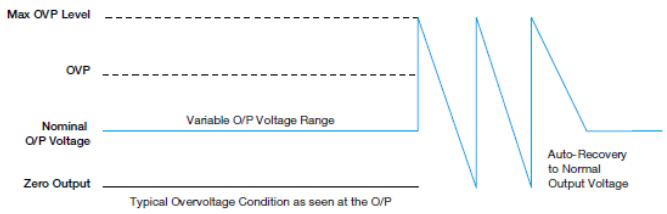
The power supply's Overload (OLP) and Overcurrent (OCP) Protections will be activated when output current exceeds 120% of $I_O$ (Max load). In such occurrence, the $V_O$ will start to droop and once the power supply has reached its maximum power limit, the protection is activated and the power supply 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.




Additionally, if the $I_O$ is <120% but >100% for a prolong period of time (depending on the load), the Over Temperature Protection (OTP) will be activated due to high temperature on critical components. The power supply will then go into "Hiccup mode" until the fault is removed.

### Overvoltage Protection

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".




### Over Temperature Protection

As mentioned above, the power supply also has Over Temperature Protection (OTP). This is activated when the overload condition persists for an extended duration and the output current is below the overload trigger point but >100% load. In the event of a higher operating condition at 100% load, the power supply will run into OTP when the surrounding air temperature is >50°C. When activated, the output voltage will go into bouncing mode until the operating surrounding air temperature drops to 50°C or output capacity is reduced as recommended in the de-rating graph.

### Short Circuit Protection

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.

### Operating Mode

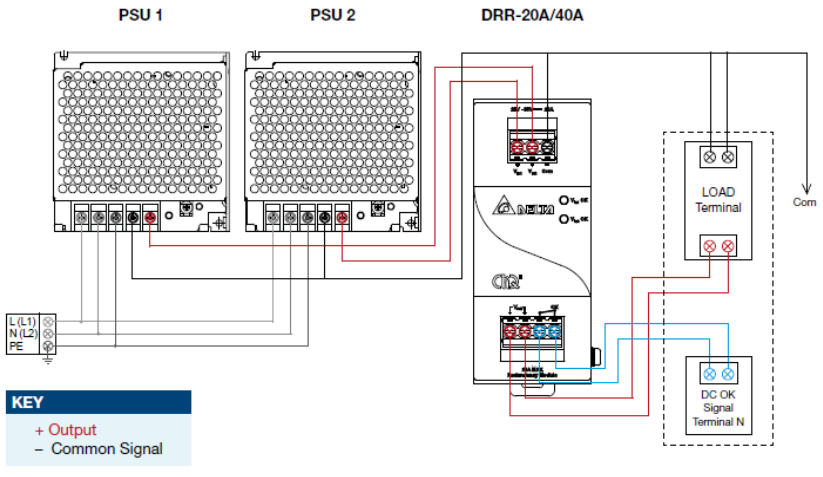



**Fig. 3 Redundancy / Parallel Operation Connection Diagram**

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

■ **Redundancy Operation**

In order to ensure proper redundancy operation for the power supply unit (PSU), ensure that the output voltage difference between the two units is kept at 0.45~0.50V for 24V supplies. Follow simple steps given below to verify:

**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, connect the power supply to 50% load and set the PSU 1 and PSU 2 output voltage.

**Step 2.**
Connect the right DRR module, 20A as per the system requirement to the power supply units PSU 1 and PSU 2 at $V_{in}$ 1 & $V_{in}$ 2 respectively.

**Step 3.**
Connect the system load from $V_{out}$. Please note that output voltage $V_{out}$ from DRR module will be = $V_O$ (output voltage of power supply) – $V_{drop}$* (in DRR module).

# PMT Panel Mount Power Supply
## 24V 35W 1 Phase / PMT-24V35W1AX

■ **Parallel Operation**

These DRR modules can also be used for Parallel function in order to increase the output power by N+1 (e.g. 2.5A + 2.5A = 5A or 2.5A + 2.5A + 2.5A = 7.5A) or current sharing, and thus increasing the power supply and system reliability. Though the DRP024V060W1AZ is not designed for current sharing, a good current sharing between two power supplies can be achieved by following simple steps as below (Refer to Fig. 3 for the Connection Diagram).

**Step 1.**
Set output load condition for both supplies at 50% and measure the output voltages.

**Step 2.**
Adjust output voltages to the same level or within ±25mV difference.

**Step 3.**
Connect PSU 1 and PSU 2 with the DRR-20A module and measure at $V_{in}$ 1 & $V_{in}$ 2 to verify the voltage difference. Ensure the voltages are within ±25mV.

**Step 4.**
Output voltage from DRR module $V_{out}$ 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.

### 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.