

PJT Open Frame Power Supply

PJT-100WBB Series / PJT-□□V100WBB□

PJT

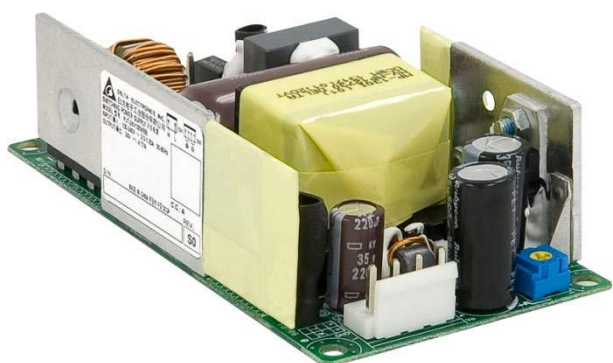
Highlights & Features

- Universal AC input voltage
- Standard industrial foot print of 2" x 4"
- Low leakage current < 0.1 mA
- High MTBF > 700,000 hrs as per Telcordia SR-332
- Multiple connector source options

Safety Standards



CB Certified for worldwide use



Model Number: PJT-□□V100WBB□
Unit Weight: 0.15 kg (0.33 lb)
Dimensions (L x W x H): 101.6 x 50.8 x 31.8 mm [2" x 4"]

General Description

The PJT open frame power supply series offers choices of 12 V, 15 V, 18 V and 24 V nominal output voltages. The single output products are designed with small standard industrial foot prints at 2" x 4". The highly efficient convection cooling designs enable optimum thermal management for high power efficiency. The PJT series of products can operate from -10°C to +70°C across the entire input voltage range of 90 to 264 Vac and are certified for safety standard according to IEC/EN/UL 62368-1 and for EMI standard according to EN/BS EN 55032, Class B.

Model Information

PJT Open Frame Power Supply

| Model Number | Input Voltage Range | Rated Output Voltage | Rated Output Current |
|----------------|---------------------|----------------------|--|
| PJT-12V100WBB□ | 90-264 Vac | 12 Vdc | 6.67 A (Convection) 8.33 A (Forced Cooling) |
| PJT-15V100WBB□ | | 15 Vdc | 5.33 A (Convection) 6.67 A (Forced Cooling) |
| PJT-18V100WBB□ | | 18 Vdc | 4.44 A (Convection) 5.55 A (Forced Cooling) |
| PJT-24V100WBB□ | | 24 Vdc | 3.33 A (Convection) 4.17 A (Forced Cooling) |

Model Numbering

| PJ | T – | XXV | 100W | B | B | □ |
|------------|--|--|--------------|--------------------------------|------------------|--|
| Open Frame | Product Type T – ITE Application Series | Output Voltage 12 V 15 V 18 V 24 V | Output Power | Package Type B – Open Frame | Family Code B | Harness Connector A – JST connector B – Molex connector* C – JWT connector* |

*Options

PJT Open Frame Power Supply

PJT-100WBB Series / PJT-□□V100WBB□

Specifications

| Model Number | PJT-12V100WBB□ | PJT-15V100WBB□ | PJT-18V100WBB□ | PJT-24V100WBB□ |
|--------------|----------------|----------------|----------------|----------------|
|--------------|----------------|----------------|----------------|----------------|

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 | | | | |
| Input Current | < 2.50 A typ. @ 115 Vac | | | | |
| Efficiency at 100% Load | 115 Vac | 86.0% typ. | 87.0% typ. | 87.0% typ. | 88.0% typ. |
| | 230 Vac | 88.0% typ. | 89.0% typ. | 89.0% typ. | 89.0% typ. |
| Max Inrush Current | 30 A typ. @ 115 Vac, 60 A typ. @ 230 Vac | | | | |
| Leakage Current | 0.1 mA @ 240 Vac | | | | |

Output Ratings / Characteristics

| | | | | | |
|--|---|-------------------------|--------------|--------------|--------|
| Nominal Output Voltage | 12 Vdc | 15 Vdc | 18 Vdc | 24 Vdc | |
| Output set point range through potentiometer | ± 1.5% (initial set point tolerance from factory) | | | | |
| Output Current* | Convection | 6.67 A | 5.33 A | 4.44 A | 3.33 A |
| | Forced Cooling | 8.33 A | 6.67 A | 5.55 A | 4.17 A |
| Output Power | Convection | 80 W | | | |
| | Forced Cooling | 100 W | | | |
| Line Regulation | ± 0.5% @ 115 Vac & 230 Vac | | | | |
| Load Regulation | ± 1.0% @ 115 Vac & 230 Vac | | | | |
| PARD** (20 MHz) | < 120 mVpp | < 150 mVpp | < 180 mVpp | < 240 mVpp | |
| Start-up Time | 115 Vac | 500 ms typ. (100% load) | | | |
| | 230 Vac | | | | |
| Hold-up Time | 115 Vac | 10 ms typ. (100% load) | | | |
| | 230 Vac | | | | |
| Dynamic Response (Overshoot & Undershoot O/P Voltage) | ± 5% @ 50-100% load (Slew Rate: 0.1 A/μS) | | | | |
| Start-up with Capacitive Loads | 4,000 uF Max | 3,500 uF Max | 3,000 uF Max | 2,000 uF Max | |

*Convection: 80% load, Forced Cooling: 100% load

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

Mechanical

| | | | | |
|----------------|----------------------------------|--|--|--|
| Dimensions | 101.6 x 50.8 x 31.8 mm [2" x 4"] | | | |
| Unit Weight | 0.15 kg (0.33 lb) | | | |
| Cooling System | Convection / Forced Cooling | | | |
| Terminal | PJT-□□V100WBB <u>A</u> | Input: JST B2P3-VH(LF)(SN) Output: JST B4P-VH(LF)(SN) | | |
| | PJT-□□V100WBB <u>B</u> | Input: Molex 26-62-4030 Output: Molex 26-60-4040 | | |
| | PJT-□□V100WBB <u>C</u> | Input: JWT A3963WV2-3P-D Output: JWT A3963WV2-4P | | |
| Wire | AWG 20-18 | | | |

PJT Open Frame Power Supply

PJT-100WBB Series / PJT-□□V100WBB□

Environment

| | | |
|-----------------------------|----------------|--|
| Surrounding Air Temperature | Operating | -10°C to +70°C (Cold start at -10°C, 80% load) |
| | Storage | -40°C to +85°C |
| Power De-rating | Convection | > 50°C de-rate power by 2% / °C |
| | Forced Cooling | > 50°C de-rate power by 2.5% / °C |
| Operating Humidity | | 10 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 Wave: 50 G for a duration of 11 ms, 3 shocks for each 3 directions |
| Vibration | Operating | IEC 60068-2-6, Sine Wave: 10 Hz to 150 Hz @ 25 m/S ² (2.5 G); 10 min per cycle, 90 min per axis for all X, Y, Z direction |
| Over Voltage Category | | II |
| Pollution Degree | | 2 |

Protections

| | | | | |
|--------------------------|---|----------------------|----------------------|----------------------|
| Overvoltage | < 18.0 V, Latch Mode | < 22.5 V, Latch Mode | < 27.0 V, Latch Mode | < 36.0 V, Latch Mode |
| Overload / Overcurrent | < 170% of rated load current, Hiccup Mode, Non-Latching (Auto-Recovery) | | | |
| Over Temperature | Non-Latching (Auto-Recovery) | | | |
| Short Circuit | Hiccup Mode, Non-Latching (Auto-Recovery when the fault is removed) | | | |
| Internal Fuse at L pin | T5A | | | |
| Protection Against Shock | Class I with PE* connection | | | |

*PE: Primary Earth

Reliability Data

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

Safety Standards / Directives

| | | |
|--------------------|---------------------------------|--|
| Electrical Safety | TUV Bauart UL/cUL recognized | EN 60950-1, EN 62368-1 UL 60950-1 and CSA C22.2 No. 60950-1 (File No. E131881) UL 62368-1 and CSA C22.2 No. 62368-1 (File No. E131881) |
| | CB scheme | IEC 60950-1, IEC 62368-1 |
| 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 | 3.0 KVac |
| | Input to Ground | 1.5 KVac |
| | Output to Ground | 0.5 KVac |

PJT Open Frame Power Supply

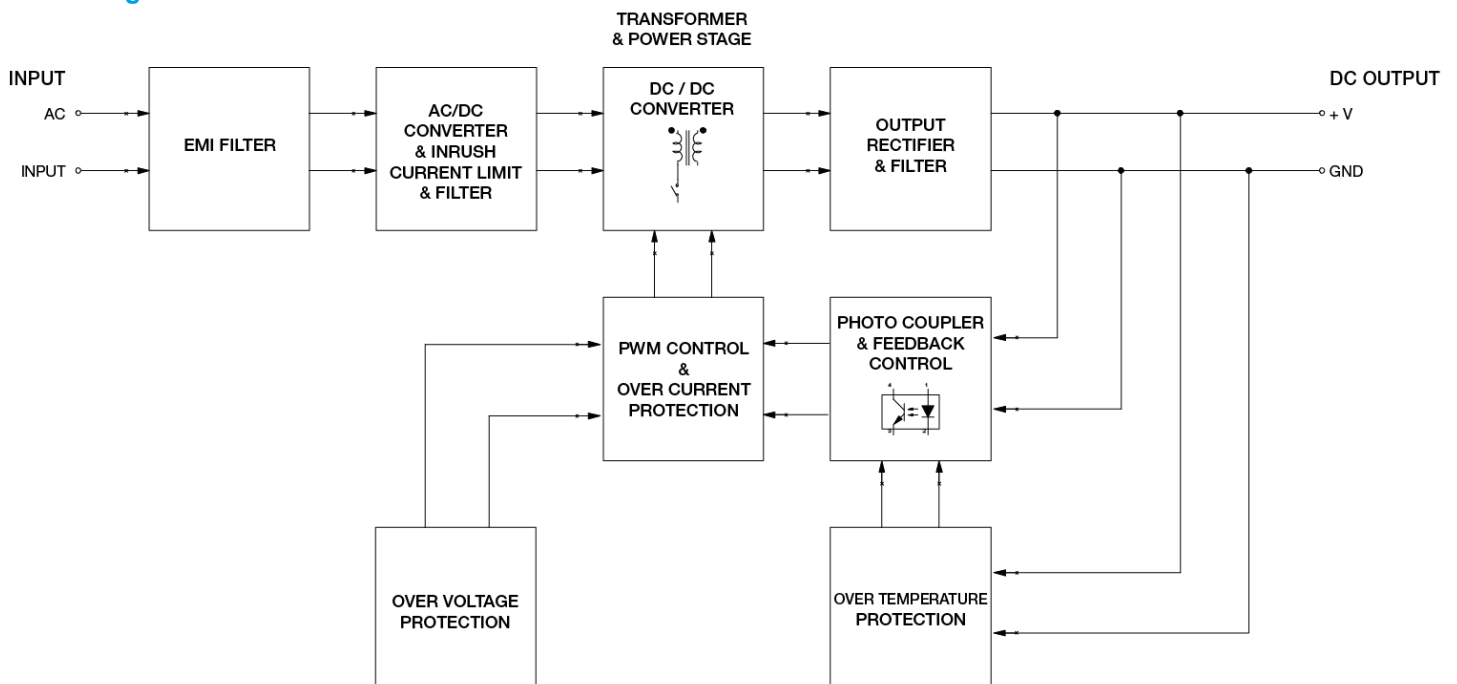
PJT-100WBB Series / PJT-□□V100WBB□

EMC

| | | |
|-----------------------------------|---|--|
| Emissions (CE & RE) | CISPR 32, EN/BS EN 55032, FCC Title 47: Class B | |
| Immunity | EN/BS EN 55024 | |
| Electrostatic Discharge | IEC 61000-4-2 | Criteria A ¹⁾ Level 3 Air Discharge: 8 kV Level 3 Contact Discharge: 6 kV |
| Radiated Field | IEC 61000-4-3 | Level 2 Criteria A ¹⁾ 80 MHz-1 GHz, 3 V/M with 1 kHz tone / 80% modulation |
| Electrical Fast Transient / Burst | IEC 61000-4-4 | Level 3 Criteria A ¹⁾ 2 kV |
| Surge | IEC 61000-4-5 | Level 3 Criteria A ¹⁾ Common Mode ²⁾ : 2 kV Differential Mode ³⁾ : 1 kV |
| Conducted | IEC 61000-4-6 | Level 2 Criteria A ¹⁾ 3 V with 80% AM |
| Power Frequency Magnetic Fields | IEC 61000-4-8 | Criteria A ¹⁾ Magnetic field strength 3 A/Meter |
| Voltage Dips | IEC 61000-4-11 | 30% dip; 10 ms Criterion A (I/P: 115 Vac) 30% dip; 10 ms Criterion B (I/P: 100 Vac) 60% dip; 100 ms Criterion B 100% dip; 5000 ms Criterion B |
| Low Energy Pulse Test (Ring Wave) | IEC 61000-4-12 | Level 3 Criteria A ¹⁾ Common Mode ²⁾ : 2 kV Differential Mode ³⁾ : 1 kV |
| Harmonic Current Emission | IEC/EN/BS EN 61000-3-2, Class A | |
| Voltage Fluctuation and Flicker | IEC/EN/BS 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)

Block Diagram



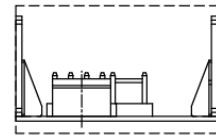
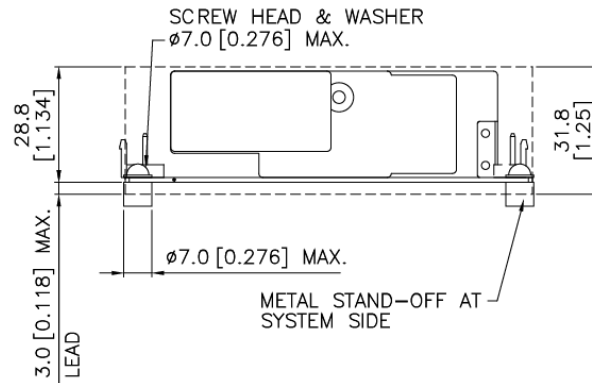
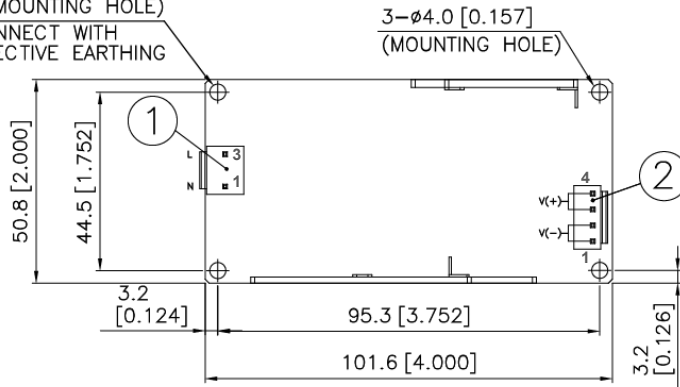
PJT Open Frame Power Supply

PJT-100WBB Series / PJT-□□V100WBB□

Dimensions

L x W x H: 101.6 x 50.8 x 31.8 mm [2" x 4"]

ø4.0 [0.157] (MOUNTING HOLE)
PE: MUST CONNECT WITH SYSTEM PROTECTIVE EARTHING



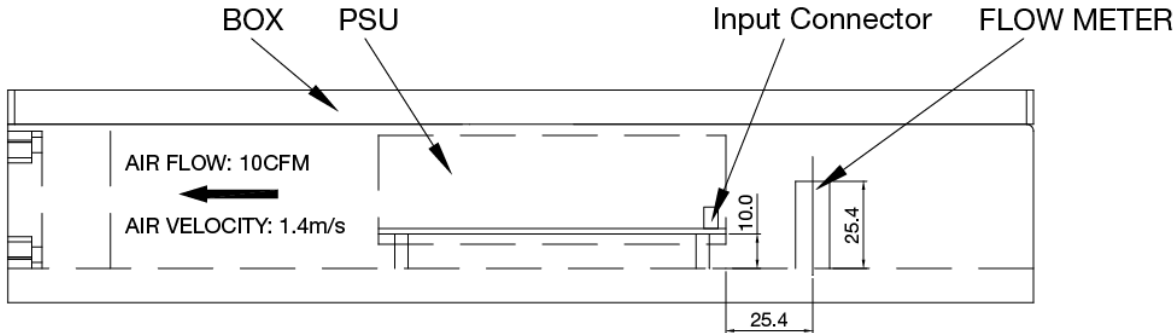
| Item | Device Description |
|------|---|
| 1 | Input Connector (CN1) Pin 1: Neutral Pin 2: NC Pin 3: Line |
| 2 | Output Connector (CN2) Pin 1 to 2 : V(-) Pin 3 to 4 : V(+) |

PJT Open Frame Power Supply

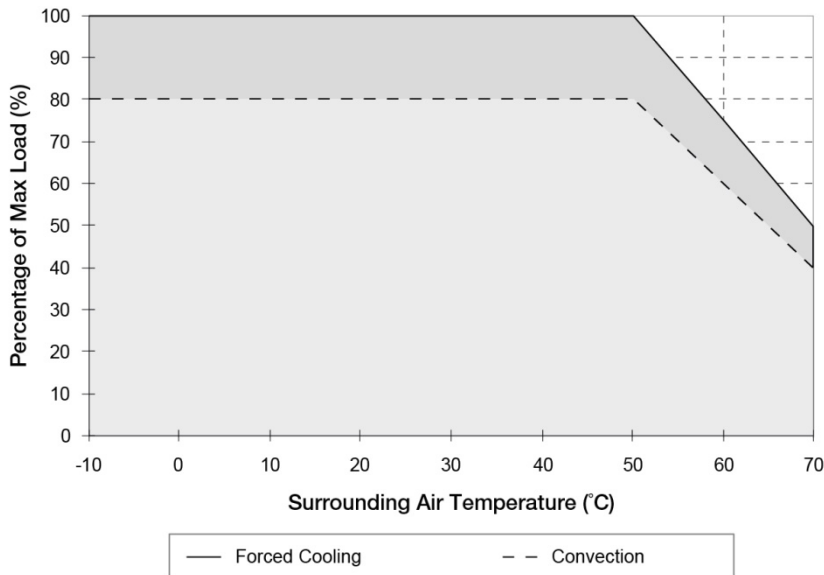
PJT-100WBB Series / PJT-□□V100WBB□

Engineering Data

Forced Cooling Air Flow Direction



Output Load De-rating VS Surrounding Air Temperature



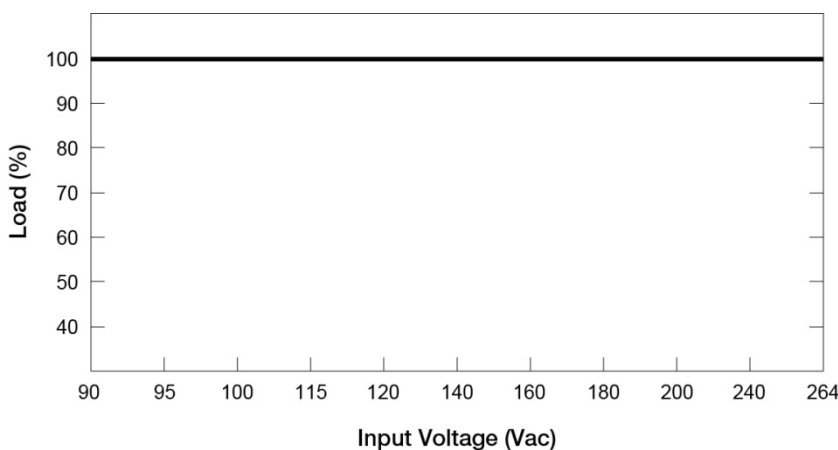
Note

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. Depending on the surrounding air temperature and output load delivered by the power supply, the device can be very hot!
4. If the device has to be mounted in any other orientation, please contact info@deltapsu.com for more details.

Fig. 1 De-rating for Horizontal Mounting Orientation

- **Convection:** > 50°C de-rate power by 2% / °C
- **Forced Cooling:** > 50°C de-rate power by 2.5% / °C

Output De-rating VS. Input Voltage



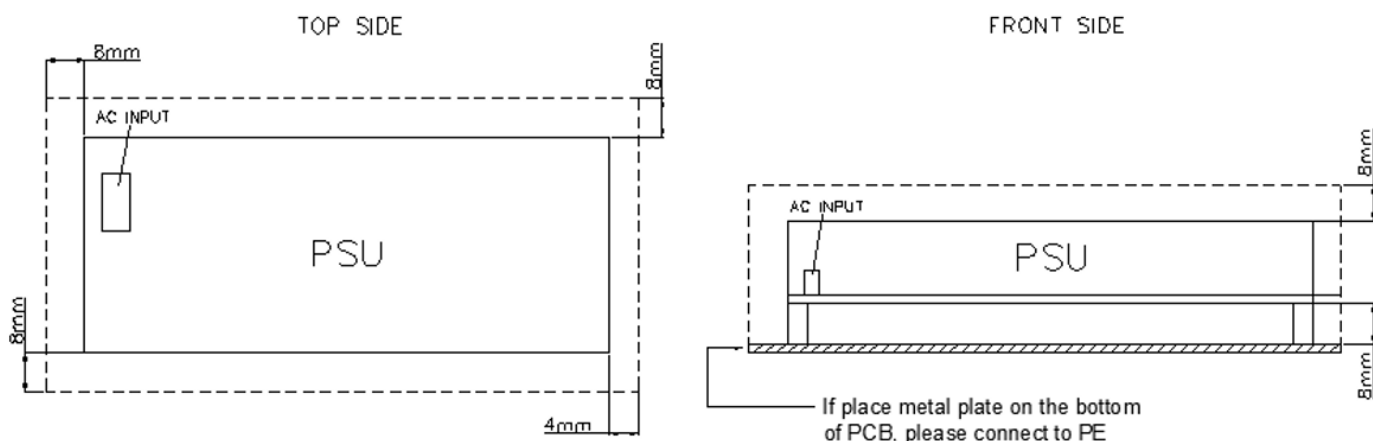
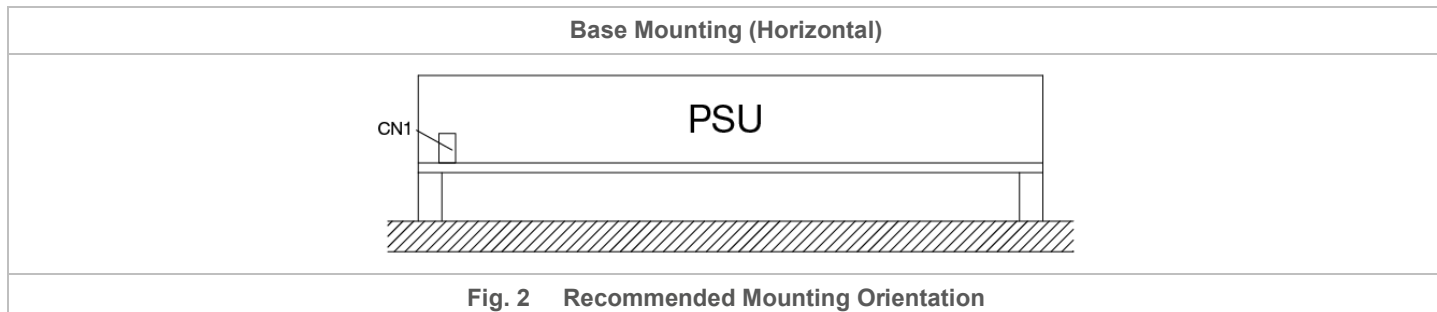
- No output power de-rating for the input voltage from 90 Vac to 264 Vac

PJT Open Frame Power Supply

PJT-100WBB Series / PJT-□□V100WBB□

Assembly & Installation

Any excessive twisting or bending may damage the device's PCB. Please handle the device with care.



Use cable of AWG No. 20-18. Please refer to Table 1 for the recommended Mating Connector and Terminal.

| Table 1 | Input / Output | Power Supply Header | Mating Connector | Terminal |
|----------------------------|----------------|---------------------|------------------|--------------|
| A – JST connector | Input | B2P3-VH (LF)(SN) | VHR-3N | SVH-21T-P1.1 |
| | Output | B4P-VH (LF)(SN) | VHR-4N | SVH-21T-P1.1 |
| B – Molex connector | Input | 26-62-4030 | 09-50-3031 | 08-52-0071 |
| | Output | 26-60-4040 | 09-50-3041 | 08-52-0071 |
| C – JWT connector | Input | A3963WV2-3P-D | A3963H02-3P | A3963TOP-2 |
| | Output | A3963WV2-4P | A3963H02-4P | A3963TOP-2 |

Safety Instructions

- If the device has to be mounted in any other orientation, please contact info@deltapsu.com for more details.
- The device is not recommended to be placed on surface with low thermal conductivity, such as plastics, for example.
- For safety reasons, please ensure the mounted device is kept at ≥ 8 mm (0.315 inch) from primary side and ≥ 4 mm (0.16 inch) from secondary side safety distance from other components and equipments. Please insert an insulation sheet between the system and product, if the safety distance is less than 4 mm. In addition, to ensure sufficient convection cooling, always maintain a distance of ≥ 20 mm (0.79 inch) from ventilated surfaces while the device is in operation.
- Note that 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 metal surface.

PJT Open Frame Power Supply

PJT-100WBB Series / PJT-□□V100WBB□

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.

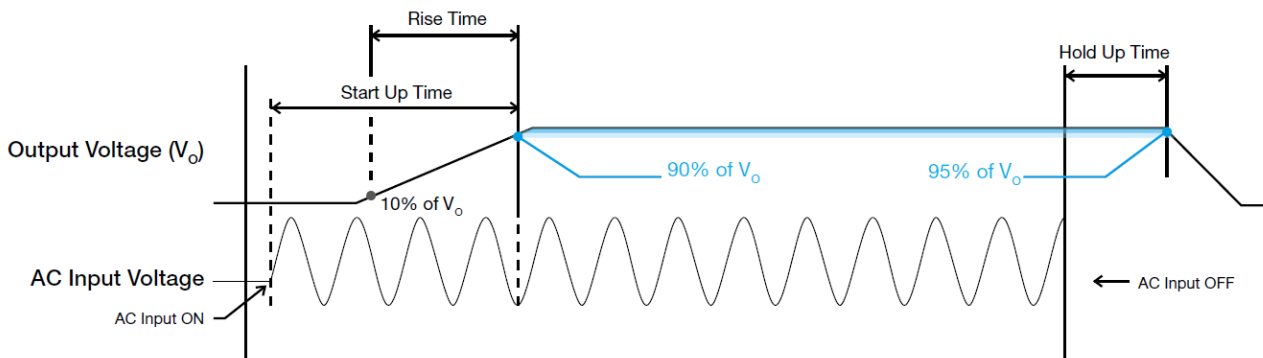
Rise Time

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

Hold-up Time

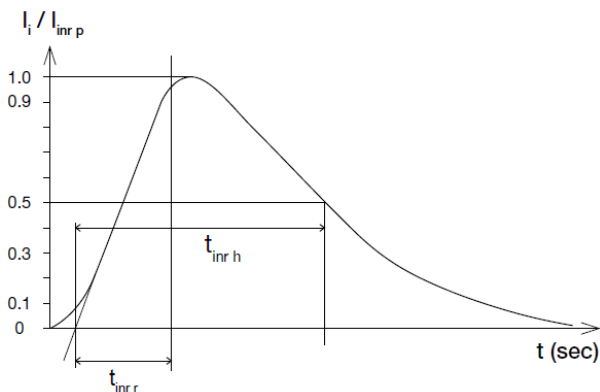
Time between the collapse of the AC input voltage, and the output falling to 95% of its steady state set value.

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



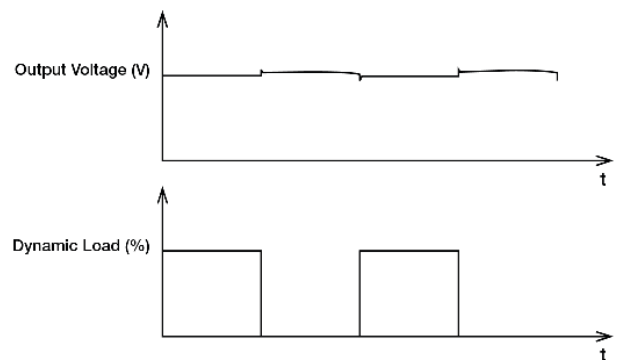
Inrush Current

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 100% of its rated current.

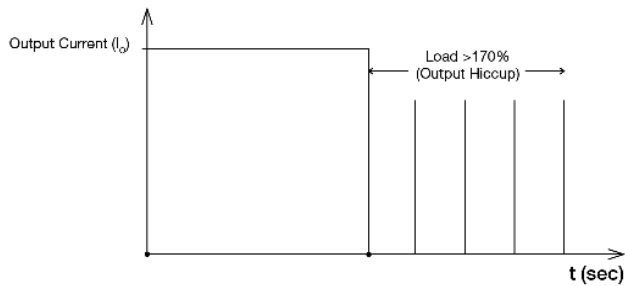


PJT Open Frame Power Supply

PJT-100WBB Series / PJT-□□V100WBB□

Overload & Overcurrent Protections (Auto-Recovery)

The power supply's Overload (OLP) and Overcurrent (OCP) Protections will be activated when output current exceeds 170% 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.

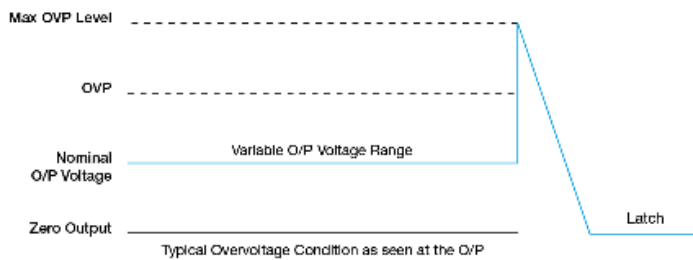


It is not recommended to prolong the duration of I_o when it is <170% but >100%, since it may cause damage to the PSU.

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 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.



Typical Overvoltage Condition as seen at the OVP

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.

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.

PJT Open Frame Power Supply

PJT-100WBB Series / PJT-□□V100WBB□

Others

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.

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