

PMU Panel Mount Power Supply with Integrated DC-UPS

PMU-155 W Series / PMU-□V155W□□A

PMU



Highlights & Features

- AC input voltage range selectable by switch
- LED indicators for DC OK (Green) and Battery Reverse Polarity Connection (Red)
- Zero switch-over time from loss of AC, to battery operation
- Conforms to harmonic current IEC/EN 61000-3-2, Class A
- High MTBF > 700,000 hrs. per Telcordia SR-332
- Monitoring Signals for AC OK, DC OK and Battery Low indication
- Overvoltage / Overcurrent / Over temperature / Short circuit protections
- Certified according to IEC/EN/UL 62368-1

Safety Standards



CB Certified for worldwide use

| | |
|--------------------------------|---|
| Model Number: | PMU-□V155W□□A |
| Unit Weight: | 0.60 kg (1.32 lb) (Enclosed) 0.54 kg (1.19 lb) (L Frame) |
| Dimensions (L x W x H): | 178 x 97 x 38 mm (Enclosed) (7.01 x 3.82 x 1.50 inch) 178 x 96.5 x 37.5 mm (L Frame) (7.01 x 3.80 x 1.48 inch) |

General Description

This PMU panel mount power supply, with integrated DC UPS function, prevents end-product downtime for the customer in the event of failure/disruption or unexpected loss of input AC power. The power supply will switch to battery operation (batteries not included) without interruption to increase the operational reliability of the critical mission. The TTL compatible monitoring signals for AC OK, DC OK and Battery Low will alert the user in the event of a failure. This convection-cooled single phase power supply has a wide operating temperature range from -20°C to + 70°C and is suitable for security system, access control, automatic doors, alarm system, and other similar products. In addition to having overvoltage, overload, over temperature, deep battery discharge, and reverse battery polarity protections on the main output, there are also short circuit and overload protections when operating in the buffering (battery discharging) mode. The PMU design meets worldwide safety approvals, certified to Class B radiated and conducted emission requirements, and is also available in an L Frame platform for different application needs.

Model Information

PMU Panel Mount Power Supply

| Model Number | Input Voltage Range | Rated Output Voltage | Rated Output Current |
|----------------|---|----------------------|----------------------|
| PMU-13V155WC□A | 90-132 Vac, 180-264 Vac (Selectable by Switch) | 13.8 Vdc | V1: 9.5 A, B+: 1.5 A |
| PMU-13V155WL□A | | | |
| PMU-27V155WC□A | | 27.6 Vdc | V1: 4.0 A, B+: 1.5 A |
| PMU-27V155WL□A | | | |

Model Numbering

| PM | U – | □ V | 155 W | □ | □ | A |
|-------------|-----------------------------|----------------|----------------|-----------------------------|---------------------------------------|--------------------|
| Panel Mount | Product Series | Output Voltage | Output Power | Package Type | Signal | Connector Type |
| | U – With DC UPS function | 13 V 27 V | (155 W series) | C – Enclosed L – L Frame | B – Without Signal C – With Signal | A – Terminal Block |

PMU Panel Mount Power Supply with Integrated DC-UPS

PMU-155 W Series / PMU-□V155W□□A

Specifications

| Model Number | PMU-13V155W□□A | | PMU-27V155W□□A | |
|--------------|----------------|----|----------------|----|
| | V1 | B+ | V1 | B+ |

Input Ratings / Characteristics

| | | | |
|---------------------------------|---|--|--|
| Nominal Input Voltage | 100-120 Vac, 200-240 Vac (Selectable by Switch) | | |
| Input Voltage Range | 90-132 Vac, 180-264 Vac (Selectable by Switch) For power de-rating at 90-132 Vac, see power de-rating on page 5. | | |
| Nominal Input Frequency | 50-60 Hz | | |
| Input Frequency Range | 47-63 Hz | | |
| Input Current | < 2.5 A @ 115 Vac, < 1.5 A @ 230 Vac | | |
| Efficiency at 100% Load | > 85.0% @ 115 Vac > 86.0% @ 230 Vac | | > 88.0% @ 115 Vac > 89.0% @ 230 Vac |
| Max Power Dissipation | No Load | < 0.4 W @ 115 Vac < 0.5 W @ 230 Vac | < 0.6W @ 115 Vac < 0.7W @ 230 Vac |
| | 100% Load | < 23 W @ 115 Vac & 230 Vac | < 19W @ 115 Vac & 230 Vac |
| Max Inrush Current (Cold Start) | < 25 A @ 115 Vac & 230 Vac | | |
| Leakage Current | < 0.5 mA @ 264 Vac | | |

Output Ratings / Characteristics¹⁾

| | | | | | | |
|--|----------------|---|------------------------|----------------------------|------------------------|-------------------|
| Nominal Output Voltage | 13.8 Vdc | | 13.3 Vdc ²⁾ | 27.6 Vdc | 27.1 Vdc ²⁾ | |
| Factory Set Point Tolerance | ± 2% | | | | | |
| Output Voltage Adjustment Range | 12-14 Vdc | | - | 24-28 Vdc | - | |
| Output Current ³⁾ | Enclosed | Normal Mode | 9.5 A (0-11 A) | 1.5 A (0.5-1.5 A) | 4.0 A (0-5.5 A) | 1.5 A (0.5-1.5 A) |
| | | Buffering Mode | - | 11 A | - | 5.5 A |
| | L Frame | Normal Mode | 9.5 A (0-11 A) | 1.5 A (0.5-1.5 A) | 4.3 A (0-5.5 A) | 1.2 A (0.5-1.2 A) |
| | | Buffering Mode | - | 11 A | - | 5.5 A |
| Output Power | 151 W (max) | | | | | |
| Line Regulation | V1 | < 0.5% (90-132 Vac @ 90% load, 180-264 Vac @ 100% load) | | | | |
| Load Regulation | V1 | < 1.0% (90-132 Vac @ 0-90% load, 180-264 Vac @ 0-100% load) | | | | |
| PARD ⁴⁾ (20MHz) | V1 | < 150 mVpp @ 0°C to -20°C < 100 mVpp @ > 0°C to 70°C | | | | |
| Rise Time | V1 | < 50 ms (100 Vac @ 90% load, 200 Vac @ 100% load) | | | | |
| Start-up Time | V1 | < 1,000 ms (115 Vac @ 90% load, 230 Vac @ 100% load) | | | | |
| Hold-up Time | V1 | > 20 ms (115 Vac @ 90% load, 230 Vac @ 100% load) | | | | |
| Dynamic Response (Overshoot & Undershoot O/P Voltage) | V1 | ± 5%, 0-50% & 50-100% & 10-100% load (Slew Rate: 0.1 A/μS, 50% duty cycle @ 5 Hz to 1 KHz) | | | | |
| Start-up with Capacitive Loads | V1 | 3,600 μF at 13.8 Vdc/11 A | | 3,600 μF at 27.6 Vdc/5.5 A | | |
| Voltage Drop Between V1 and B+ | Normal Mode | 0.5 Vdc typ. | | | | |
| | Buffering Mode | 0.2 Vdc typ. | | | | |
| Series Operation | No | | | | | |
| Parallel Operation | No | | | | | |

1) For power de-rating from < 0°C to -20°C, and 50°C to 70°C, and power de-rating at input voltage, see power de-rating on page 11.

2) If a battery is not connected to B+ and B-, 2 Vdc typ. can be found at these terminals when PMU is turned on.

3) The maximum combined output power from V1 and B+ is 151 W at 180-264 Vac input but the output power is reduced to 136 W at 90-132 Vac input

For example;

151 W; V1: 27.6 V/4 A (110.4 W), B+: 27.1 V/1.5 A (40.6) or V1: 27.6 V/5.5 A (151 W), B+: 27.1 V/0 A (0 W).

136 W; V1: 27.6 V/3.45 A (95.2 W), B+: 27.1 V/1.5 A (40.6) or V1: 27.6 V/4.9 A (136 W), B+: 27.1 V/0 A (0 W).

Battery charging current at B+ output can be adjusted according to output current range in parentheses by battery charging current adjustment potentiometer.

Load range in parentheses and rated current outside parentheses.

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

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| Model Number | PMU-13V155W□□A | | PMU-27V155W□□A | |
|--------------|----------------|----|----------------|----|
| | V1 | B+ | V1 | B+ |

Battery Input / Output Characteristics

| | | | |
|---|-----------------------------------|--|--|
| Nominal Battery Voltage (Batteries not included with power supply) | | 12 Vdc SLA Sealed lead acid battery | 24 Vdc SLA Sealed lead acid battery 2 x 12 Vdc SLA Sealed lead acid battery |
| Battery Voltage Range | Continuously Operating | 11.0 to 13.8 Vdc (nominal at 12 V) | 22.0 to 27.6 Vdc (nominal at 24 V) |
| | Maximum Allowed Voltage | 16 Vdc Max | 32 Vdc Max |
| | Battery Low Voltage ¹⁾ | 11.5 Vdc typ. | 22.5 Vdc typ. |
| | Minimum Voltage ²⁾ | 9.0 Vdc ± 0.5 Vdc | 18.0 Vdc ± 0.5 Vdc |
| Battery Capacity | | 3.3 AH/ 7 AH/ 12 AH/ 15 AH | |
| Charging Time ³⁾ | | 2-10 hrs @ charging current of 1.5 A | |
| Buffering Time | | Approx. 1hrs 15mins for battery 12 V/15 AH | Approx. 2hrs 30mins for battery 24 V/15 AH |
| Recommended External Fuse for Battery | | Automotive 30 A / 80 V FK3 type from Littelfuse, or similar, in the battery B+ path. The battery fuse protects the wires between the battery and the unit. | |
| Battery Charging (Normal Mode) | | CC-CV mode (constant current-constant voltage) | |
| End-of-Charge Voltage | | The unit always charges battery to a fixed voltage value | |

Mechanical

| | | |
|-----------------------------------|-----------|--|
| Case Chassis / Cover | | AL / SGCC |
| Dimensions (L x W x H) | Enclosed | 178 x 97 x 38 mm (7.01 x 3.82 x 1.50 inch) |
| | L Frame | 178 x 96.5 x 37.5 mm (7.01 x 3.80 x 1.48 inch) |
| Unit Weight | Enclosed | 0.60 kg (1.32 lb) |
| | L Frame | 0.54 kg (1.19 lb) |
| LED Indicator | Green LED | DC OK |
| | Red LED | Battery Connected in Reverse Polarity |
| Cooling System | | Convection |
| Terminal | | M3.5 x 7 Pins (Rated 300 V/15 A) |
| Signal | | JST: XHP-4 (PMU-□V155W□CA) |
| Wire | | AWG 16-14 |
| Noise (1 Meter from power supply) | | Sound Pressure Level (SPL) < 30dBA |

1) The voltage level of battery to enable "BAT Low" function, for PMU-□V155W□CA model only

2) Minimum battery voltage required for power supply to detect battery in order to begin charging. Battery must be connected to power supply, with the correct polarity, across B+ and B- terminals; and, with input and output loads disconnected.

3) Charging time depends on the state/condition of battery discharge; and will depend on the amount of buffering/discharging time, and load current that battery was discharged at.

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Buffering Times VS Output Load and Battery Capacity

PMU-13V155W□□A

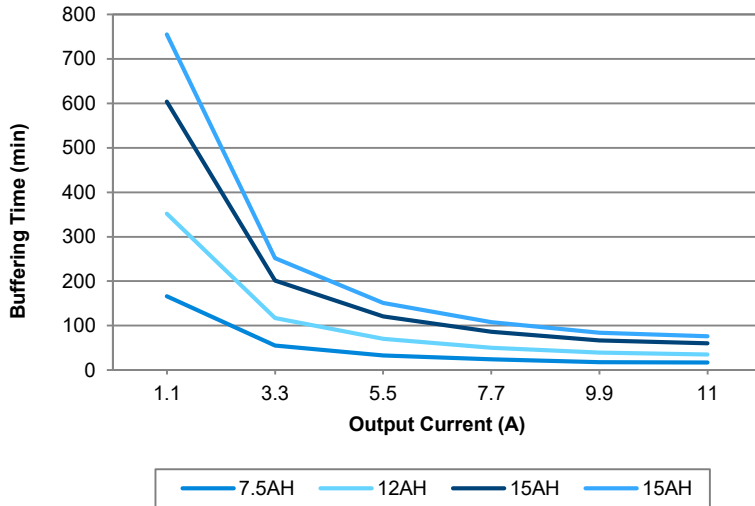


Fig. 1 Buffering Time VS Output Current (PMU-13V155W□□A)

| Output Current | Buffering Time | | | |
|----------------|----------------|-------|-------|-------|
| | 3.3 AH | 7 AH | 12 AH | 15 AH |
| 1.1 A | 166 m | 352 m | 604 m | 755 m |
| 3.3 A | 55 m | 117 m | 201 m | 252 m |
| 5.5 A | 33 m | 70 m | 121 m | 151 m |
| 7.7 A | 24 m | 50 m | 86 m | 108 m |
| 9.9 A | 18 m | 39 m | 67 m | 84 m |
| 11.0 A | 17 m | 35 m | 60 m | 76 m |

These buffering times assume the battery is fully charged to begin with

PMU-27V155W□□A

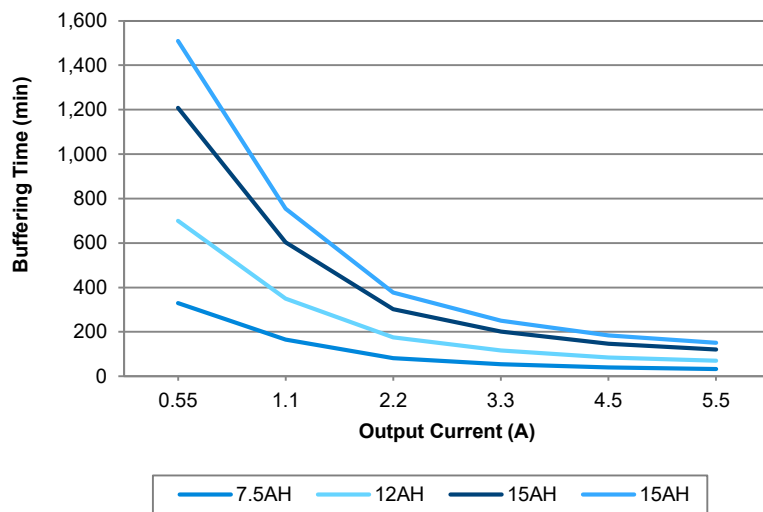


Fig. 2 Buffering Time VS Output Current (PMU-27V155W□□A)

| Output Current | Buffering Time | | | |
|----------------|----------------|-------|--------|--------|
| | 3.3 AH | 7 AH | 12 AH | 15 AH |
| 0.55 A | 330 m | 700 m | 1208 m | 1510 m |
| 1.1 A | 165 m | 350 m | 604 m | 755 m |
| 2.2 A | 82 m | 175 m | 302 m | 377 m |
| 3.3 A | 55 m | 117 m | 201 m | 251 m |
| 4.5 A | 40 m | 85 m | 147 m | 184 m |
| 5.5 A | 33 m | 70 m | 120 m | 151 m |

These buffering times assume the battery is fully charged to begin with

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| Model Number | PMU-13V155W□□A | | PMU-27V155W□□A | |
|--------------|----------------|----|----------------|----|
| | V1 | B+ | V1 | B+ |

Environment

| | | |
|-----------------------------|--------------------------------|---|
| Surrounding Air Temperature | Operating | -20°C to +70°C |
| | Storage | -40°C to +85°C |
| Power De-rating | I/P: 90-132 Vac | < 0°C to -20°C de-rate power by 2.25% / °C 50°C to 70°C de-rate power by 2.25% / °C |
| | I/P: 180-264 Vac | < 0°C to -20°C de-rate power by 2.5% / °C 50°C to 70°C de-rate power by 2.5% / °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 (300 m/S ²) for a duration of 18 ms, 3 times per direction, 9 times in total |
| Vibration | Non-Operating | IEC 60068-2-6, 10 Hz to 150 Hz @ 50 m/S ² (5 G peak); displacement of 0.35 mm; 20 min per axis for all X, Y, Z direction |
| Bump | Operating | IEC 60068-2-29, 10 G (100 m/S ²) for a duration of 11 ms, 1000 times per direction, 3000 times in total |
| Over Voltage Category | II | |
| Pollution Degree | 2 | |

Protections

| | | | |
|--|---|---|---|
| Overvoltage | V1 | <18.5 V, SELV Output, Hiccup mode, Non-latching (Auto-Recovery) | <37.0 V, SELV Output, Hiccup mode, Non-latching (Auto-Recovery) |
| | B+ | 16 Vdc Max will not cause damage to the unit | 32 Vdc Max will not cause damage to the unit |
| Overload / Overcurrent | Normal Mode | 105-150% of rated load current, Hiccup mode, Non-Latching (Auto-Recovery) | |
| | Buffering Mode | 11.5-19.0 A, Latch mode | 6.05-11.0 A, Latch mode |
| Over Temperature | Latch mode | | |
| Short Circuit | Normal Mode | Hiccup Mode, Non-Latching (Auto-Recovery when the fault is removed) | |
| | Buffering Mode | Latch mode | |
| Battery Polarity Protection | Yes (RED LED = ON) | | Yes (RED LED = ON) ¹⁾ |
| Wrong Battery Voltage Protection | Yes, 15 Vdc Max will not cause damage to the unit | | Yes, 30 Vdc Max will not cause damage to the unit |
| Deep Discharge Detection ²⁾ | 9.0 Vdc ± 0.5 Vdc | | 18.0 Vdc ± 0.5 Vdc |
| Internal fuse at L pin | T4 AH | | |
| Protection Against Shock | Class I with PE ³⁾ connection | | |

1) If the RED LED is ON, this indicates a failure in the installation of the battery. In this case, do not turn on the power supply (for 27 V only) while the battery is connected.
POWER SUPPLY WILL BE DAMAGED!

2) Minimum battery voltage required for power supply to detect battery in order to begin charging

3) PE: Primary Earth

PMU Panel Mount Power Supply with Integrated DC-UPS

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|--------------|----------------|----|----------------|----|
| | V1 | B+ | V1 | B+ |

Reliability Data

| | |
|------------------------|---|
| MTBF | > 700,000 hrs. as per Telcordia SR-332 I/P: 115 Vac, Ta: 25°C O/P: 13.8 V/9.9 A for 13 V model and 27.6 V/4.95 A for 27 V model |
| Expected Cap Life Time | 10 years (115 Vac & 230 Vac, 50% load @ 40°C) |

Safety Standards / Directives

| | | |
|--------------------------|-------------------|---|
| Safety Entry Low Voltage | | SELV (IEC 60950-1) |
| Electrical Safety | SIQ Bauart | EN 62368-1 |
| | UL/cUL recognized | UL 60950-1 and CSA C22.2 No. 60950-1 (File No. E191395) UL 62368-1 and CSA C22.2 No. 62368-1 (File No. E191395) |
| | CB scheme | IEC 60950-1, IEC 62368-1 |
| | BIS | IEC 60950-1 |
| | UKCA | BS EN 62368-1 |
| CCC | | GB 9254, GB 17625.1 and GB 4943.1 |
| BIS | | IS 13252 (Part 1) |
| CE | | In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU |
| UKCA | | In conformance with Electrical Equipment (Safety) Regulations 2016 No. 1011 and The Electromagnetic Compatibility Regulations 2016 No. 1091 |
| Galvanic Isolation | Input to Output | 3.0 KVac |
| | Input to Ground | 1.5 KVac |
| | Output to Ground | 0.5 KVac |

PMU Panel Mount Power Supply with Integrated DC-UPS

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|--------------|----------------|----|----------------|----|
| | V1 | B+ | V1 | B+ |

EMC

| | | | | |
|-----------------------------------|----------------|--|--|--|
| Emissions (CE & RE) | | Generic Standards: CISPR 22, CISPR 32, EN/BS EN 55022, EN/BS EN 55032, FCC Title 47: Class B | | |
| Immunity | | Generic Standards: EN/BS EN 55024 | | |
| Electrostatic Discharge | IEC 61000-4-2 | Level 3 Criteria A ¹⁾ Air Discharge: 8 kV Contact Discharge: 6 kV | | |
| Radiated Field | IEC 61000-4-3 | Level 3 Criteria A ¹⁾ 80 MHz-1 GHz, 10 V/M with 1 kHz tone / 80% modulation | | |
| Electrical Fast Transient / Burst | IEC 61000-4-4 | Level 3 Criteria A ¹⁾ 2 kV (Input power ports) | | |
| 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 3 Criteria A ¹⁾ 150 kHz-80 MHz, 10 Vrms | | |
| Power Frequency Magnetic Fields | IEC 61000-4-8 | Criteria A ¹⁾ 10 A/Meter | | |
| Voltage Dips and Interruptions | IEC 61000-4-11 | 0% of 100 Vac, 20 ms 70% of 100 Vac, 500 ms 0% of 100 Vac, 5000 ms 0% of 240 Vac, 20 ms 70% of 240 Vac, 500 ms | Criteria A ¹⁾ Criteria A ¹⁾ Criteria B ²⁾ Criteria A ¹⁾ Criteria A ¹⁾ | |
| 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, GB17625.1 | | |
| Voltage Fluctuation and Flicker | | IEC/EN/BS EN 61000-3-3 | | |

1) Criteria A: Normal performance within the specification limits

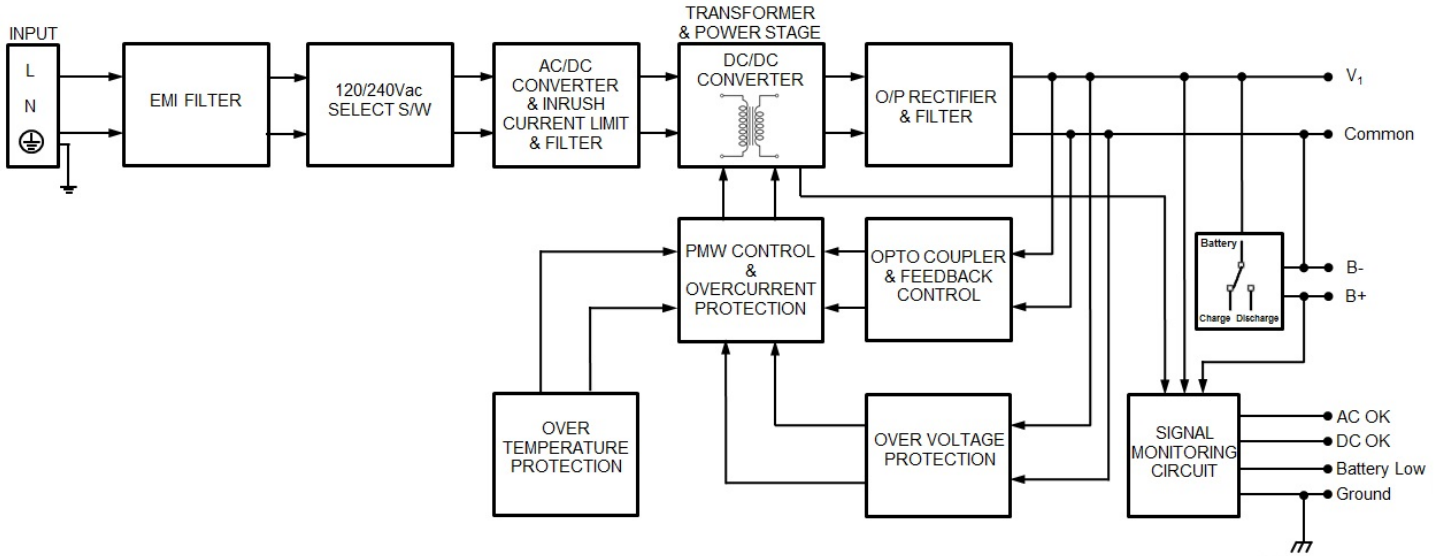
2) Asymmetrical: Common mode (Line to earth)

3) Symmetrical: Differential mode (Line to line)

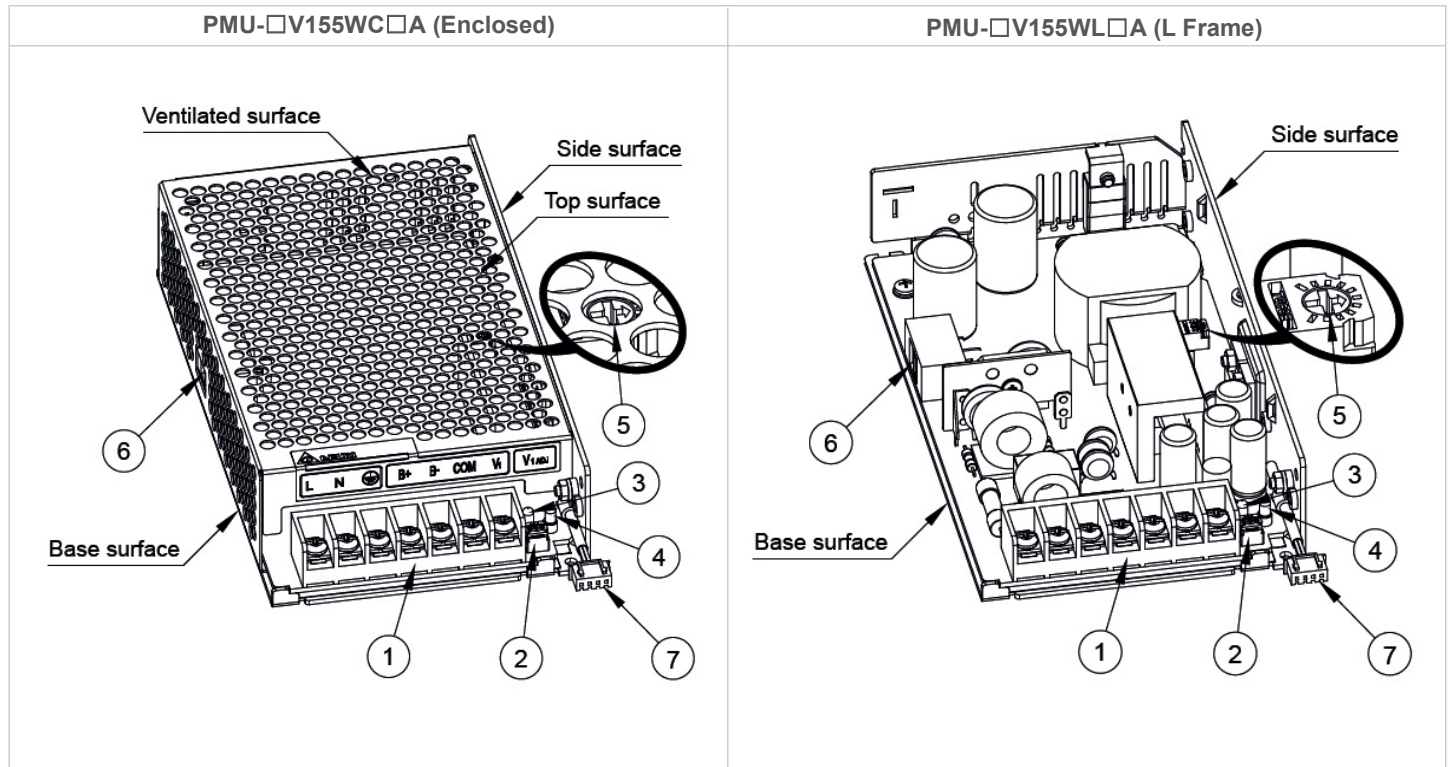
PMU Panel Mount Power Supply with Integrated DC-UPS

PMU-□V155W□□A

Block Diagram



Device Descriptions



- 1) Input & Output terminal block connector
- 2) DC voltage adjustment potentiometer (12 V – 14 V, 24 V – 28 V)
- 3) DC OK LED (Green)
- 4) Battery reverse polarity LED (Red)
- 5) Battery charging current adjustment potentiometer
- 6) AC line voltage selector switch
- 7) Signal connector (for PMU-□V155W□CA)



Pin No. 1 2 3 4 5 6 7

| Pin No. | Device Description | Pin No. | Device Description |
|---------|--------------------|---------|--------------------|
| 1 | Line | 4 | Battery + |
| 2 | Neutral | 5 | Battery - |
| 3 | FG | 6 | Common (-) |
| | | 7 | V1 (+) |

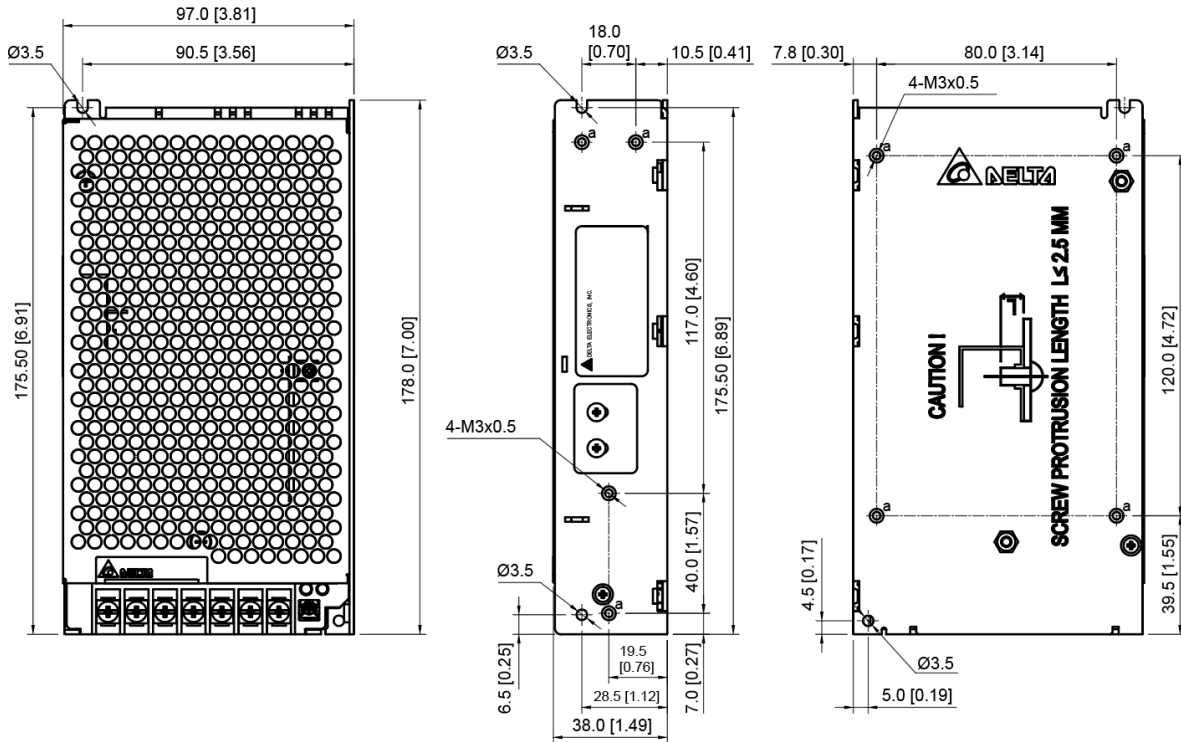
PMU Panel Mount Power Supply with Integrated DC-UPS

PMU-155 W Series / PMU-□V155W□□A

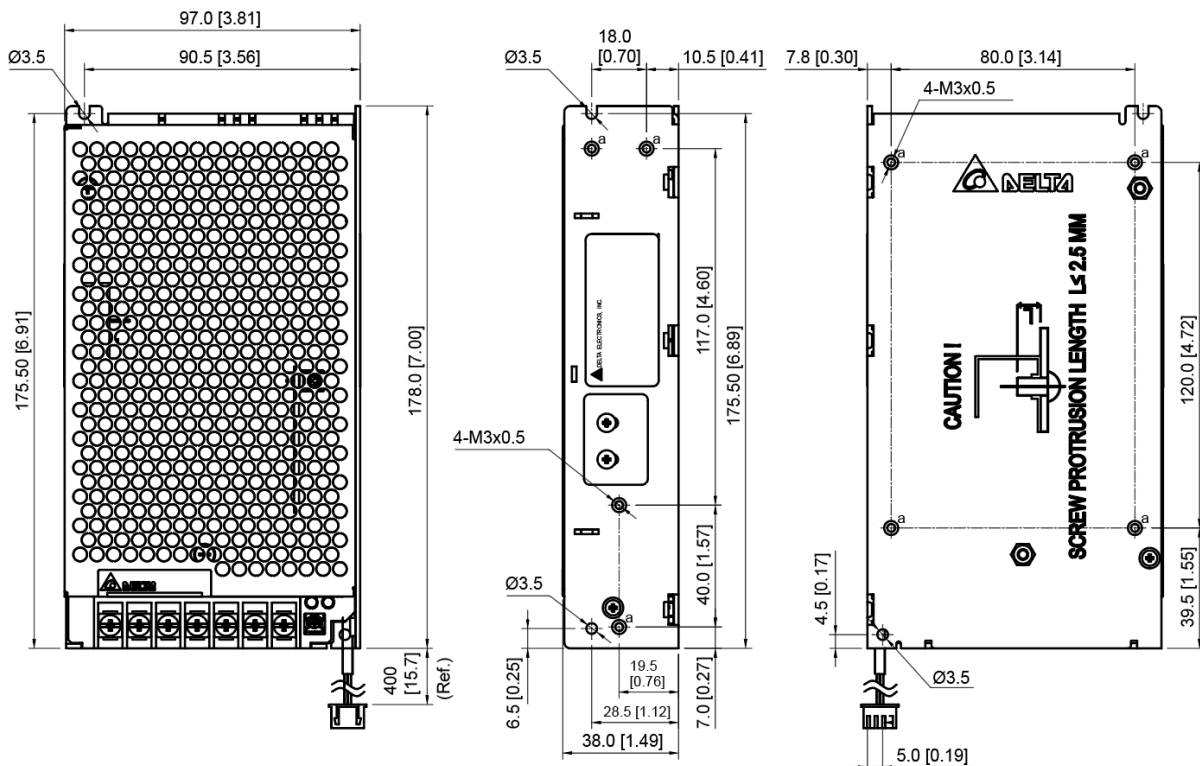
Dimensions

L x W x H: 178 x 97 x 38 mm (7.01 x 3.82 x 1.50 inch)

PMU-□V155WCBA



PMU-□V155WCCA

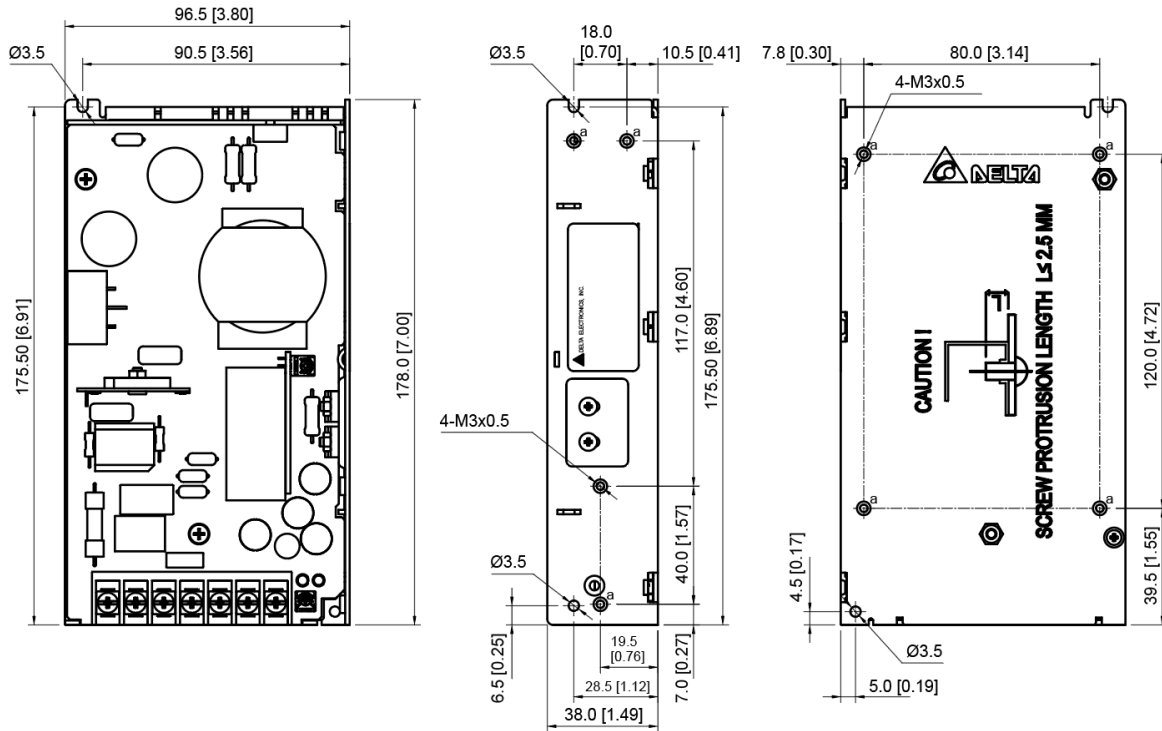


PMU Panel Mount Power Supply with Integrated DC-UPS

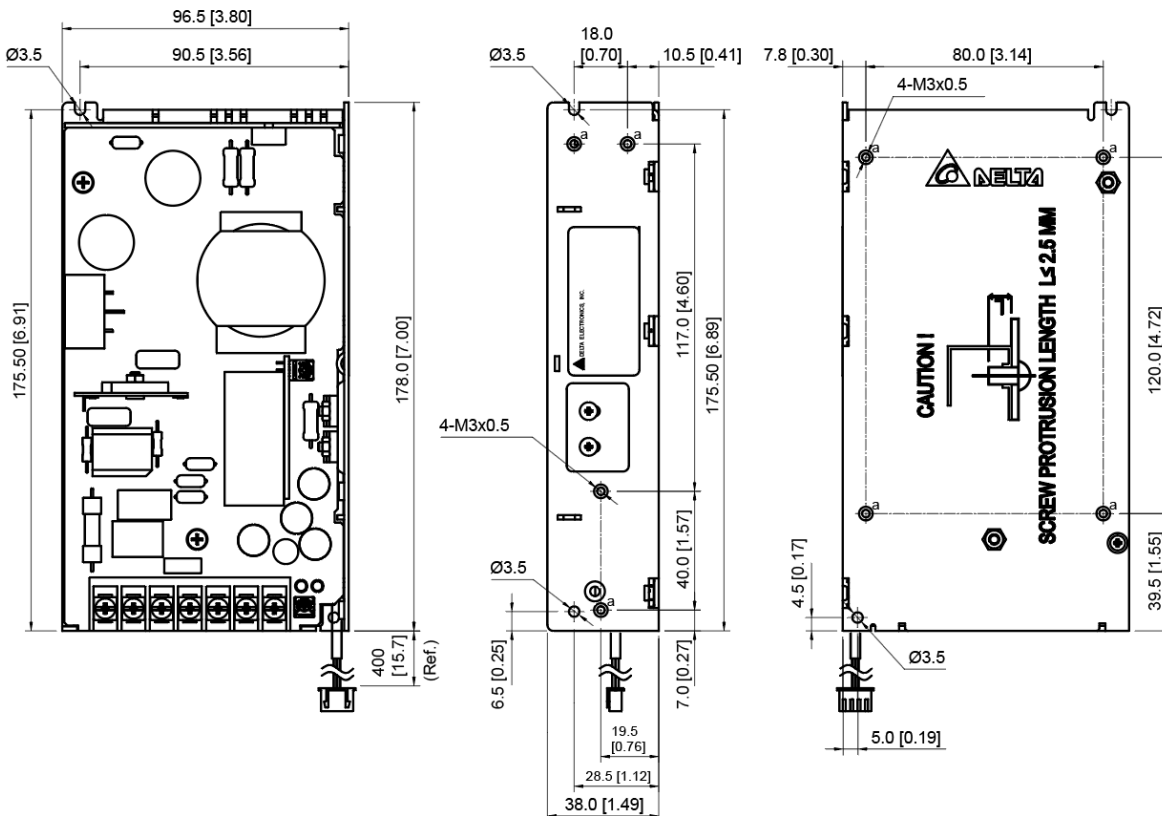
PMU-155 W Series / PMU-□V155W□□A

L x W x H: 178 x 96.5 x 37.5 mm (7.01 x 3.80 x 1.48 inch)

PMU-□V155WLBA



PMU-□V155WLCA



PMU Panel Mount Power Supply with Integrated DC-UPS

PMU-155 W Series / PMU-□V155W□□A

Engineering Data

Output Load De-rating VS Surrounding Air Temperature

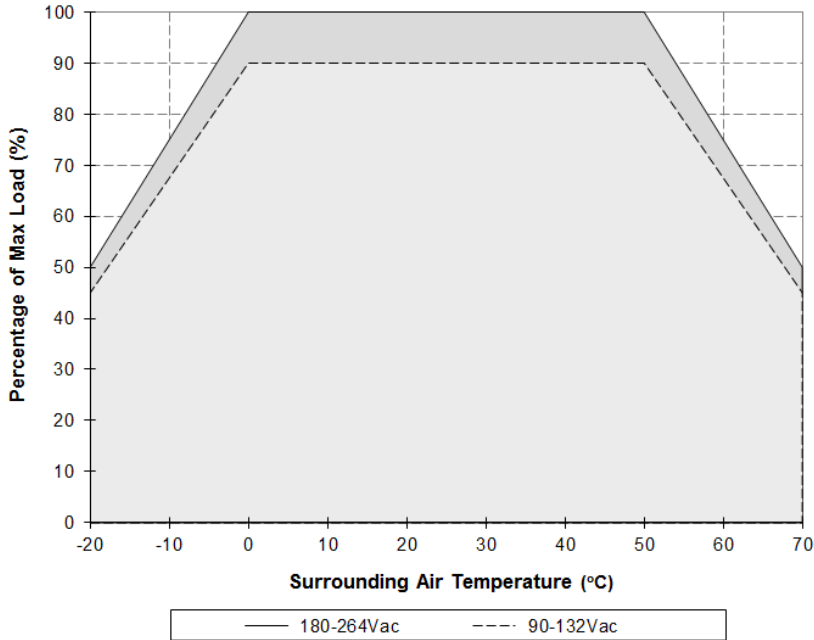


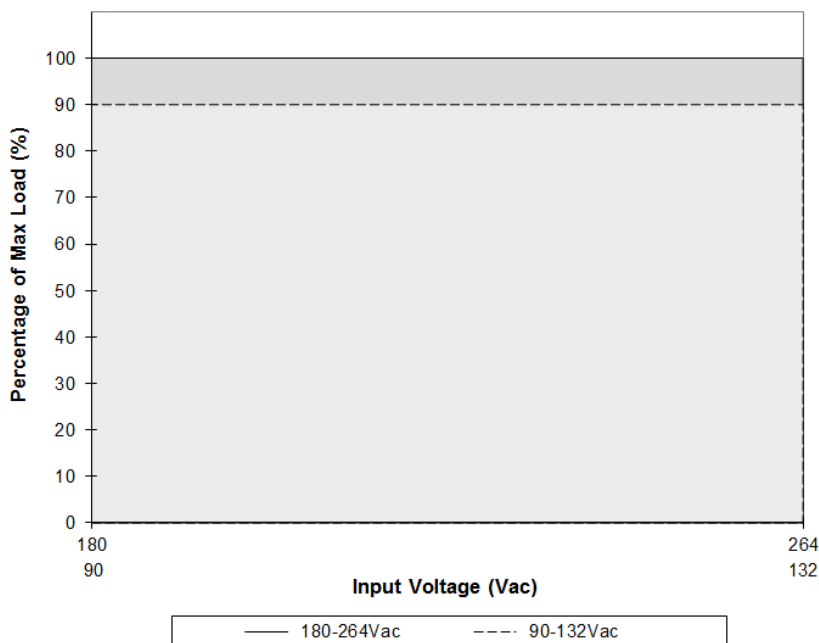
Fig. 3 De-rating for Vertical and Horizontal Mounting Orientation

90-132 Vac 0°C to -20°C de-rate power by 2.25% / °C
 > 50°C de-rate power by 2.25% / °C
180-264 Vac 0°C to -20°C de-rate power by 2.5% / °C
 > 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. 3.
2. If the output capacity is not reduced when surrounding air temperature exceeds its specification as defined on Page 5 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 across the entire input voltage range

PMU Panel Mount Power Supply with Integrated DC-UPS

PMU-155 W Series / PMU-□V155W□□A

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

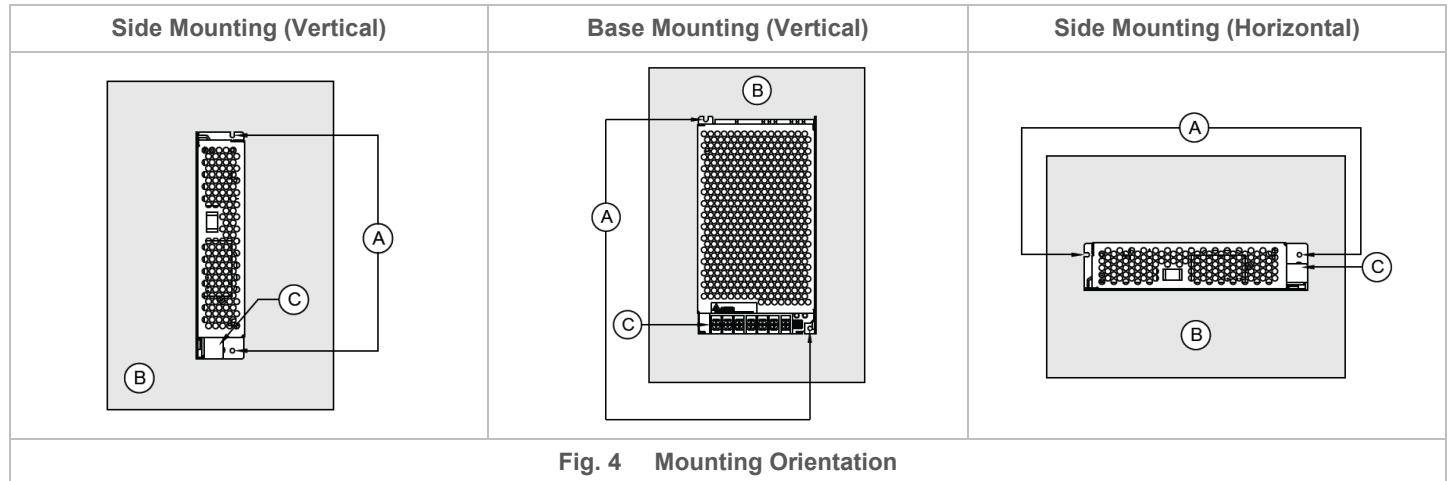


Fig. 4 Mounting Orientation

- Use flexible cable (stranded or solid), AWG No. 16-14.
- Please refer to Table 1 for the recommended Monitoring Signal Mating Connector of PMU-□V155W□□A.

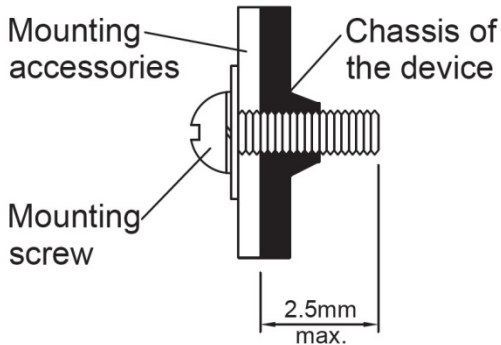
| Table 1 | Monitoring Signal | Recommended Header | Signal Connector | Terminal |
|---------------|-------------------|--------------------|------------------|---------------|
| JST connector | Monitoring Signal | XH | XHP-4 | SXH-001T-P0.6 |

- The torque at the Connector shall not exceed 13 Kgf.cm (11.23 lbf.in). The insulation stripping length should not exceed 0.275" or 7 mm.

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Installation of Mounting Accessories



- Only use M3 screw ≤ 2.5 mm (0.09 inch) through the base mounting holes. This is to keep a safety distance between the screw and internal components.
- Recommended mounting tightening torque: 4~8 Kgf.cm (3.47~6.94 lbf.in).

Safety Instructions

- Must select correct AC input voltage range through selectable switch before turning on
- To ensure sufficient convection cooling, always maintain a safety distance of ≥ 20 mm (0.79 inch) from all ventilated surfaces while the device is in operation.
- The device is not recommended to be placed on low thermal conductive surface, such as plastics, for example, plastics.
- 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
- Battery need to be protected from short circuit while installation & servicing. Danger of explosion.
- Signal cable should not interact with AC Input.
- Connecting the battery to device before connecting mains input (L, N and PE). If the Red LED is on, this indicates a failure in the installation. In this case, do not turn on power supply (for 27 V only) while the battery is connected. **POWER SUPPLY WILL BE DAMAGED!**
- 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.

PMU Panel Mount Power Supply with Integrated DC-UPS

PMU-155 W Series / PMU-□V155W□□A

Functions

Monitoring Signal Characteristics

The power supply is equipped with monitoring signal outputs for PMU-□V155W□CA to remote monitoring of the unit.



- (1) AC OK, DC OK and Battery Low monitoring signal outputs are TTL open collector. Must be connected through a pull up resistor to V1 output, or another voltage source.
- (2) The applied voltage should be in the range of 5 V to 48 V with sink current of 2 mA to 30 mA. (PMU-13V155W□CA's range is 5 V to 20 V and PMU-27V155W□CA's range is 5 V to 48 V)
- (3) The table below provides the characteristics of monitoring signal functions.

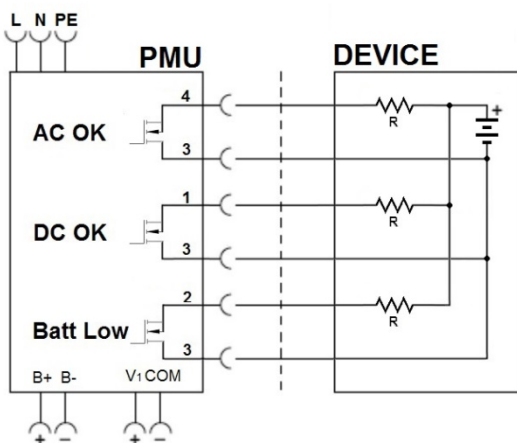
| Function | Description | Monitoring Signal status |
|---------------------------|---|--------------------------|
| AC OK | This signal is active Low when power supply is operating from AC input. | Low ¹⁾ |
| | This signal changes to active High level when AC input voltage collapses. | High ²⁾ |
| DC OK | This signal is active Low when power supply is operating within specified input operating line voltage range, or specified battery operating voltage range. | Low ¹⁾ |
| | This signal changes to active High when AC input voltage collapses and battery voltage goes low (Buffering Mode). | High ²⁾ |
| Battery Low ³⁾ | This signal turns active Low when battery voltage is lower than 11.5 Vdc typ. for 13 V model and 22.5 Vdc typ. for 27 V model, or when no battery is connected. | Low ¹⁾ |
| | This signal is active High when battery voltage is higher than 11.5 Vdc typ. for 13 V model and 22.5 Vdc typ. for 27 V model. | High ²⁾ |

1) Low: 0.5 V with max 30 mA

2) High: External applied voltage, 48 V max (PMU-13V155W□CA's range is 5 V to 20 V and PMU-27V155W□CA's range is 5 V to 48 V)

3) Battery Low status will be changed to Low in buffering mode only.

Monitoring Signals Wiring Diagram



| PMU Status | Monitoring Signal status | | | LED Indicator | |
|--|--------------------------|-------|-------------|---------------|-----|
| | AC OK | DC OK | Battery Low | Green | Red |
| PMU OFF | High | High | Low | OFF | OFF |
| Battery Reversed ¹⁾ | High | High | Low | OFF | ON |
| PMU ON ²⁾ with Battery | Low | Low | High | ON | OFF |
| Battery Charging | | | | | |
| Battery Fully Charged | High | Low | High | ON | OFF |
| Battery Discharging (Buffering Mode) | | | | | |
| Battery Discharging (Low Battery detected) | High | High | Low | OFF | OFF |
| Output Shutdown | High | High | Low | OFF | OFF |

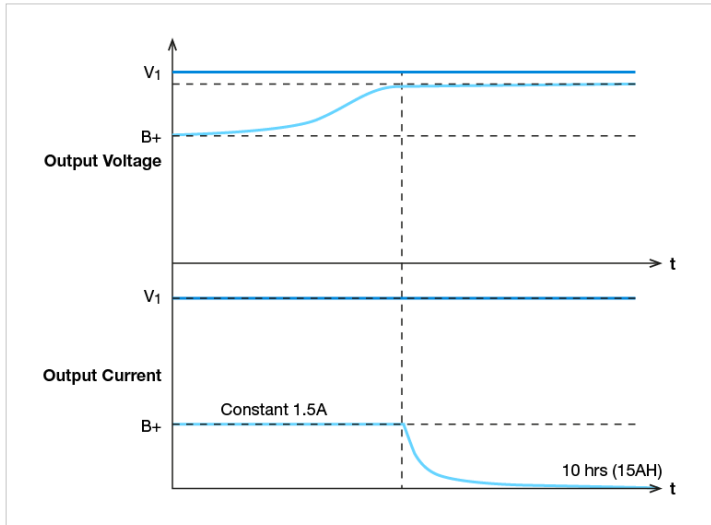
1) If the RED LED is on, this indicates a failure in the installation. In this case, do not turn on power supply (for 27 V only) while the battery is connected. **POWER SUPPLY WILL BE DAMAGED!**

2) "PMU ON" means that PMU is operating from AC input voltage

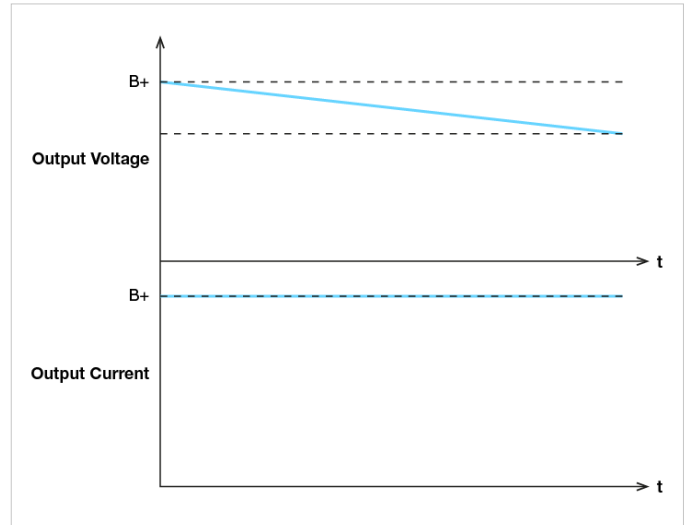
PMU Panel Mount Power Supply with Integrated DC-UPS

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Normal Mode (Power supply (V1) and Battery charging (B+))



Buffering Mode (Battery discharging (B+))



The maximum combined output power from V1 and B+ is 151 W at 180-264 Vac input but the output power is reduced to 136 W at 90-132 Vac input.

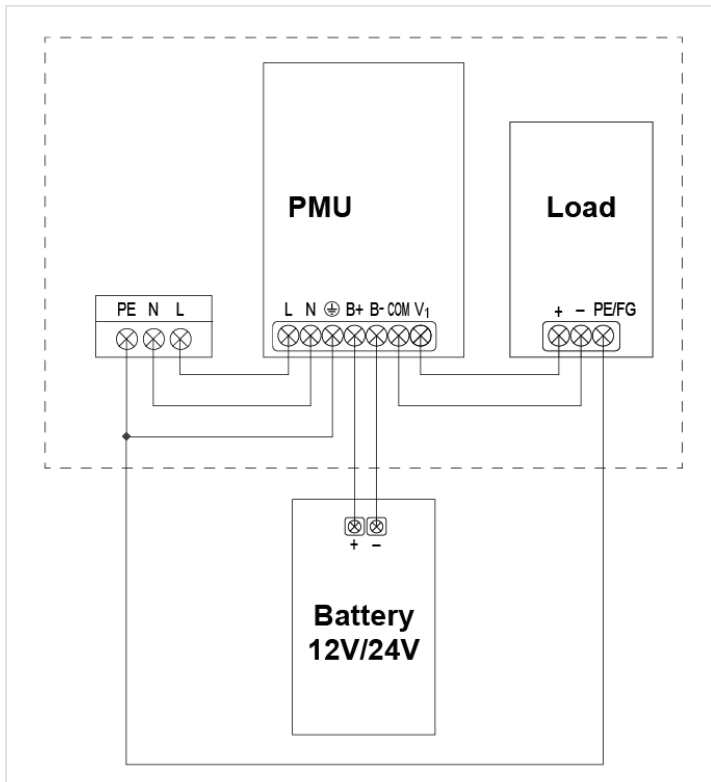
For example;

151 W; V1: 27.6 V/4 A (110.4 W), B+: 27.1 V/1.5 A (40.6) or V1: 27.6 V/5.5 A (151 W), B+: 27.1 V/0 A (0 W).

136 W; V1: 27.6 V/3.45 A (95.2 W), B+: 27.1 V/1.5 A (40.6) or V1: 27.6 V/4.9 A (136 W), B+: 27.1 V/0 A (0 W).

Typical Application Notes

Fig. 5 Provide backup power during AC source interruption or failure

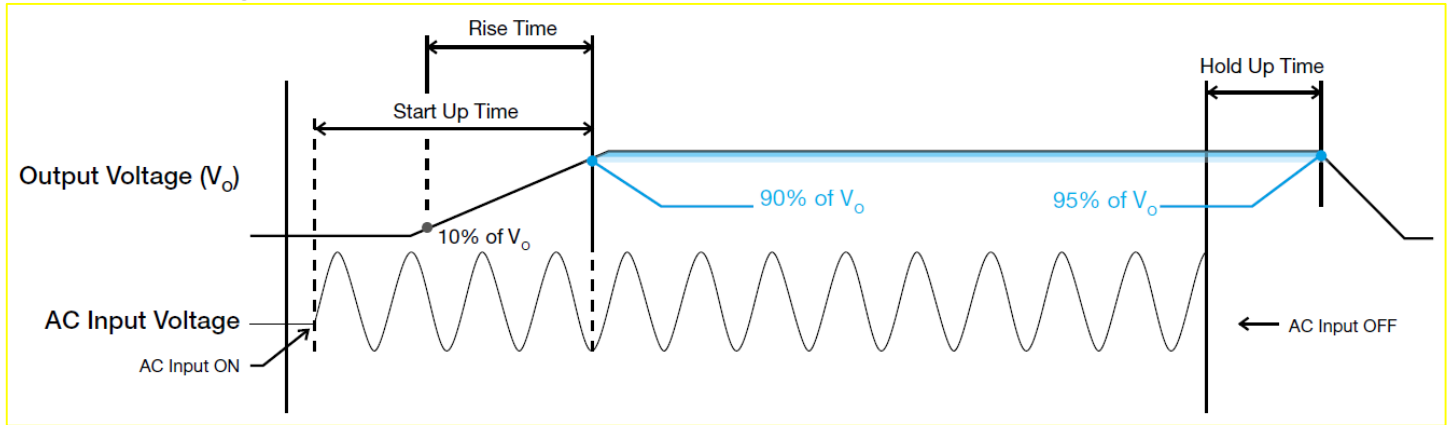


PMU can use as standalone as well and please refer output power to Normal Mode on page 2.

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■ 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

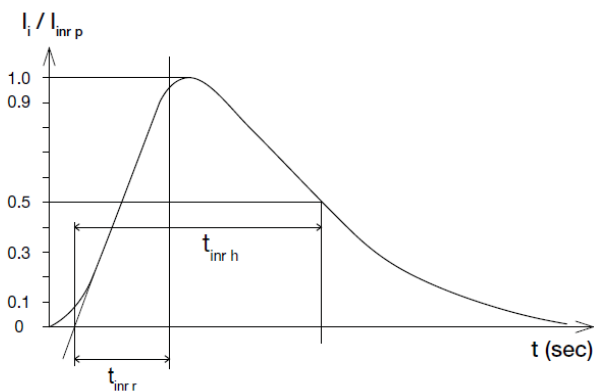
The time required for the output voltage to change from 10% to 90% of its final steady state set value.

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

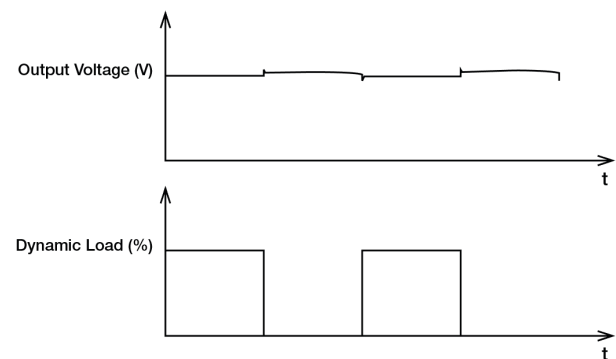
Inrush current is the peak, instantaneous, input current measured and, occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent 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 10% to 100% of its rated current.

■ 50% duty cycle / 5 Hz to 1 KHz



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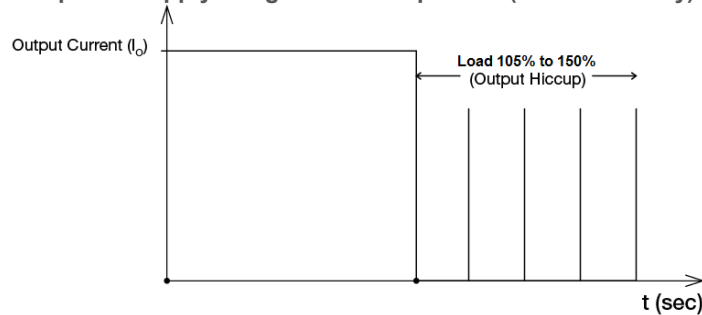
Overload & Overcurrent Protections (Auto-Recovery and Latch Mode)

The behavior of the power supply's Overload (OLP) and Overcurrent (OCP) Protections depend on whether the unit is operating in the Normal Mode, or the Buffering Mode.

Normal Mode (Operation from AC input Voltage)

In the event of an output current within 105% to 150% of I_o (Max load) the V_o will start to droop. 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 or OCP is removed and I_o is back within the specified range.

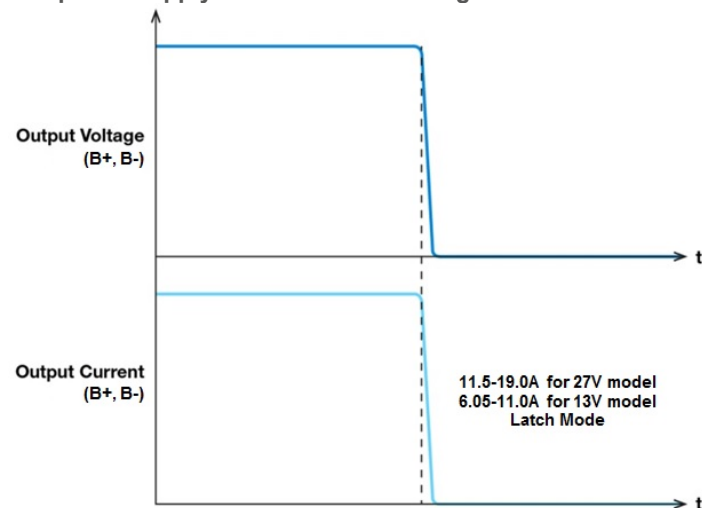
The power supply will go into Hiccup mode (Auto-Recovery).



Buffering Mode (Operation from Battery)

When the output current exceeds the maximum specified output value, the unit will latch. The power supply can then be re-started by removing the fault; and, re-application of input AC voltage.

The power supply will Latch in Buffering Mode.



Short Circuit Protection (Auto-Recovery)

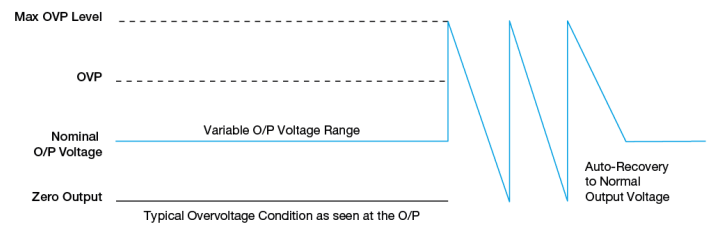
The power supply's output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate as shown in the illustration in the OLP/OCP section on this page.

Normal Mode: The power supply will go into Hiccup mode (Auto-Recovery).

Buffering Mode: The power supply will Latch.

Overvoltage Protection (Auto-Recovery)

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 5 under "Protections".



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; or, when the operating temperature is beyond what is recommended in the de-rating graph, the OTP circuit will be activated. When activated, power supply will latch off, 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.

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Troubleshooting

PMU-□V155W□BA (without Signal) and PMU-□V155W□CA (with Signal)

| Problem | Possible Cause | Suggestion |
|--|---|--|
| Red LED is ON after battery is connected | Polarity of connections from battery to the unit is incorrect. Do not turn on power supply (for 27 V only) while the battery is connected. POWER SUPPLY WILL BE DAMAGED! | Check battery polarity connection, and make corrections. |
| PMU does not operate in normal mode after AC is applied | Input wiring is open or input voltage to the supply is not available. | Check wiring and voltage of input supply. |
| | Internal fuse is opened. | Contact your local Delta sales support group. |
| PMU does not operate in Buffering mode after AC is collapsed | Battery wiring is not connected or opened. | Check battery wiring and compare with Typical Application Notes in this PMU datasheet. Make corrections as needed. |
| | Battery did not have enough time to be charged and it is still below the continuous operating voltage range. | Check battery voltage and compare with minimum required battery voltage provided in this PMU datasheet. |
| PMU does not charge and discharge battery | Battery is damaged. | Check battery and replace as needed. |

PMU-□V155W□CA (with Signal)

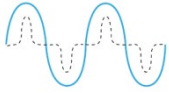
| Problem | Possible Cause | Suggestion |
|---|---|--|
| Battery Low signal status is Low (Buffering mode) | Battery is discharged and its voltage is lower than 11.5 Vdc typ. for 13 V model and 22.5 Vdc typ. for 27 V model. | Connect AC input power to the input terminals. This will charge the battery, and will cause the signal to return to a High state after sufficient charging time has elapsed. |
| | Battery is not connected. | Check connections to the battery. |
| AC OK signal status is High | Input AC voltage is not available. | Check wiring of AC input voltage to the power supply. |
| | Power supply is operating in buffering mode. | |
| DC OK signal status is High | Normal Mode: a) Input AC voltage is not available. b) PMU is damaged. | a) Check wiring of AC input voltage to the power supply. b) Contact your local sales support group. |
| | Buffering Mode: Battery is discharged and its voltage is lower than 11.5 Vdc typ. for 13 V model and 22.5 Vdc typ. for 27 V model. | Battery will be charging again after input power is available. |

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Others

PFC – Norm EN 61000-3-2



Line Current Harmonic content

Typically, the input current waveform is not sinusoidal due to the periodic peak charging of the input capacitor. In industrial environments, compliance with EN 61000-3-2 is only necessary under special conditions. Complying to this standard can have some technical drawbacks, such as lower efficiency; and, can also result in higher product cost. Frequently, the user does not profit from compliance to 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.

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