

# 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

<b>Model Number:</b>	PMU-□V155W□□A
<b>Unit Weight:</b>	0.60 kg (1.32 lb) (Enclosed) 0.54 kg (1.19 lb) (L Frame)
<b>Dimensions (L x W x H):</b>	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 PMU-13V155WL□A	90-132 Vac, 180-264 Vac (Selectable by Switch)	13.8 Vdc	V1: 9.5 A, B+: 1.5 A
PMU-27V155WC□A PMU-27V155WL□A		27.6 Vdc	V1: 4.0 A, B+: 1.5 A V1: 4.3 A, B+: 1.2 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 / Characteristics<sup>1)</sup>

Nominal Output Voltage	13.8 Vdc		13.3 Vdc <sup>2)</sup>	27.6 Vdc	27.1 Vdc <sup>2)</sup>	
Factory Set Point Tolerance	± 2%					
Output Voltage Adjustment Range	12-14 Vdc		-	24-28 Vdc	-	
Output Current <sup>3)</sup>	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 <sup>4)</sup> (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.

# PMU Panel Mount Power Supply with Integrated DC-UPS

## PMU-155 W Series / PMU-□V155W□□A

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 <sup>1)</sup>	11.5 Vdc typ.	22.5 Vdc typ.
	Minimum Voltage <sup>2)</sup>	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 <sup>3)</sup>		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.

# PMU Panel Mount Power Supply with Integrated DC-UPS

## PMU-155 W Series / PMU-□V155W□□A

### Buffering Times VS Output Load and Battery Capacity

#### PMU-13V155W□□A

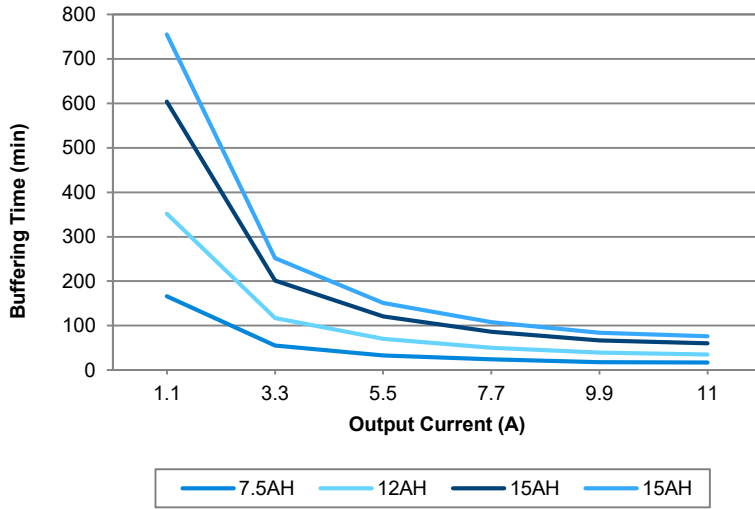


Fig. 1 Buffering Time VS Output Current (PMU-13V155W□□A)

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

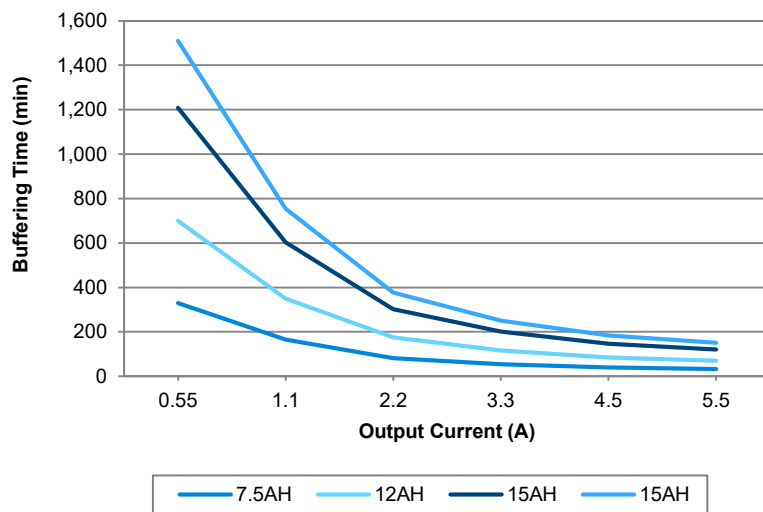


Fig. 2 Buffering Time VS Output Current (PMU-27V155W□□A)

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

# PMU Panel Mount Power Supply with Integrated DC-UPS

## PMU-155 W Series / PMU-□V155W□□A

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 <sup>2</sup> ) 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 <sup>2</sup> (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 <sup>2</sup> ) 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) <sup>1)</sup>
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 <sup>2)</sup>	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 <sup>3)</sup> 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

## PMU-155 W Series / PMU-□V155W□□A

Model Number	PMU-13V155W□□A		PMU-27V155W□□A	
	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

## PMU-155 W Series / PMU-□V155W□□A

Model Number	PMU-13V155W□□A		PMU-27V155W□□A	
	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 <sup>1)</sup> Air Discharge: 8 kV Contact Discharge: 6 kV		
Radiated Field	IEC 61000-4-3	Level 3 Criteria A <sup>1)</sup> 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 <sup>1)</sup> 2 kV (Input power ports)		
Surge	IEC 61000-4-5	Level 3 Criteria A <sup>1)</sup> Common Mode <sup>2)</sup> : 2 kV Differential Mode <sup>3)</sup> : 1 kV		
Conducted	IEC 61000-4-6	Level 3 Criteria A <sup>1)</sup> 150 kHz-80 MHz, 10 Vrms		
Power Frequency Magnetic Fields	IEC 61000-4-8	Criteria A <sup>1)</sup> 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 <sup>1)</sup> Criteria A <sup>1)</sup> Criteria B <sup>2)</sup> Criteria A <sup>1)</sup> Criteria A <sup>1)</sup>	
Low Energy Pulse Test (Ring Wave)	IEC 61000-4-12	Level 3 Criteria A <sup>1)</sup> Common Mode <sup>2)</sup> : 2 kV Differential Mode <sup>3)</sup> : 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

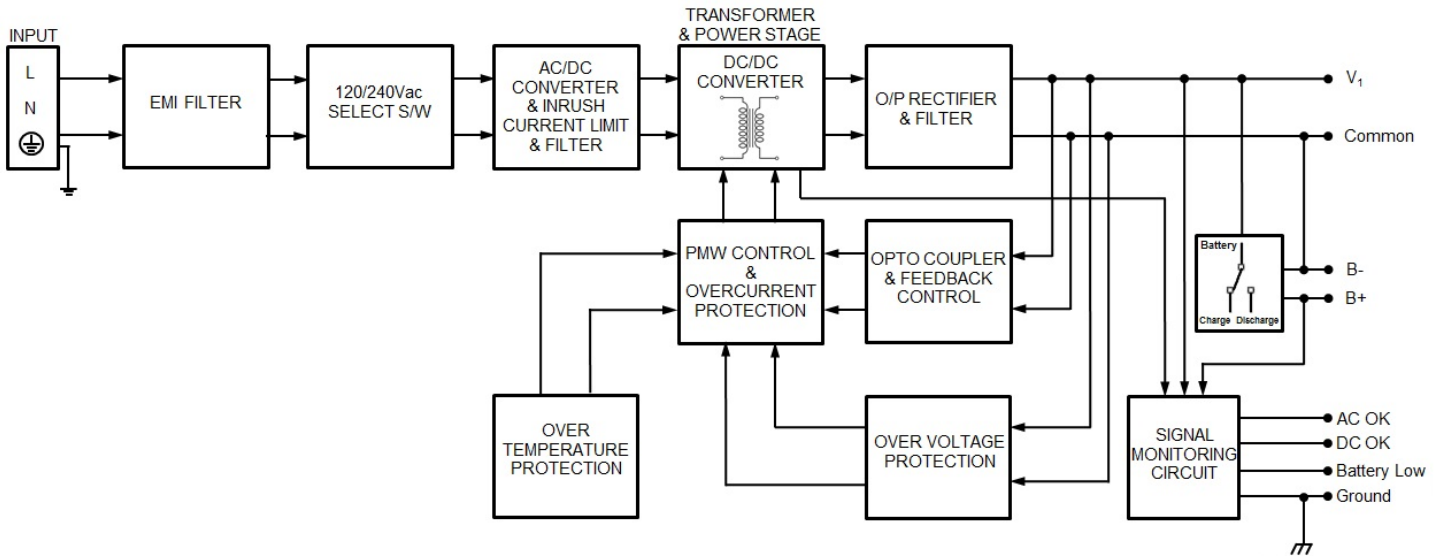
2) Asymmetrical: Common mode (Line to earth)

3) Symmetrical: Differential mode (Line to line)

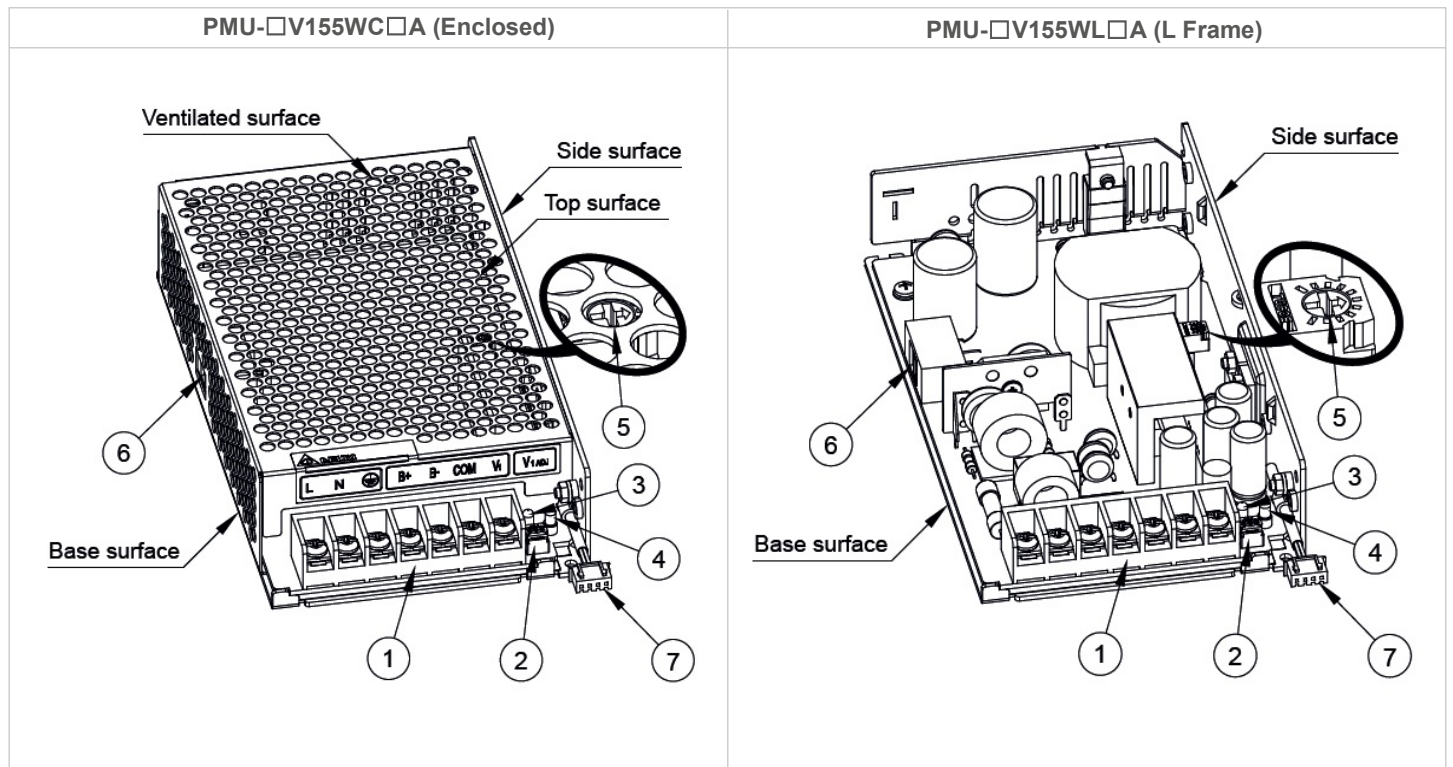
# PMU Panel Mount Power Supply with Integrated DC-UPS

## PMU-155 W Series / 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.	Line	Neutral	FG	Battery +	Battery -	Common (-)	V1 (+)

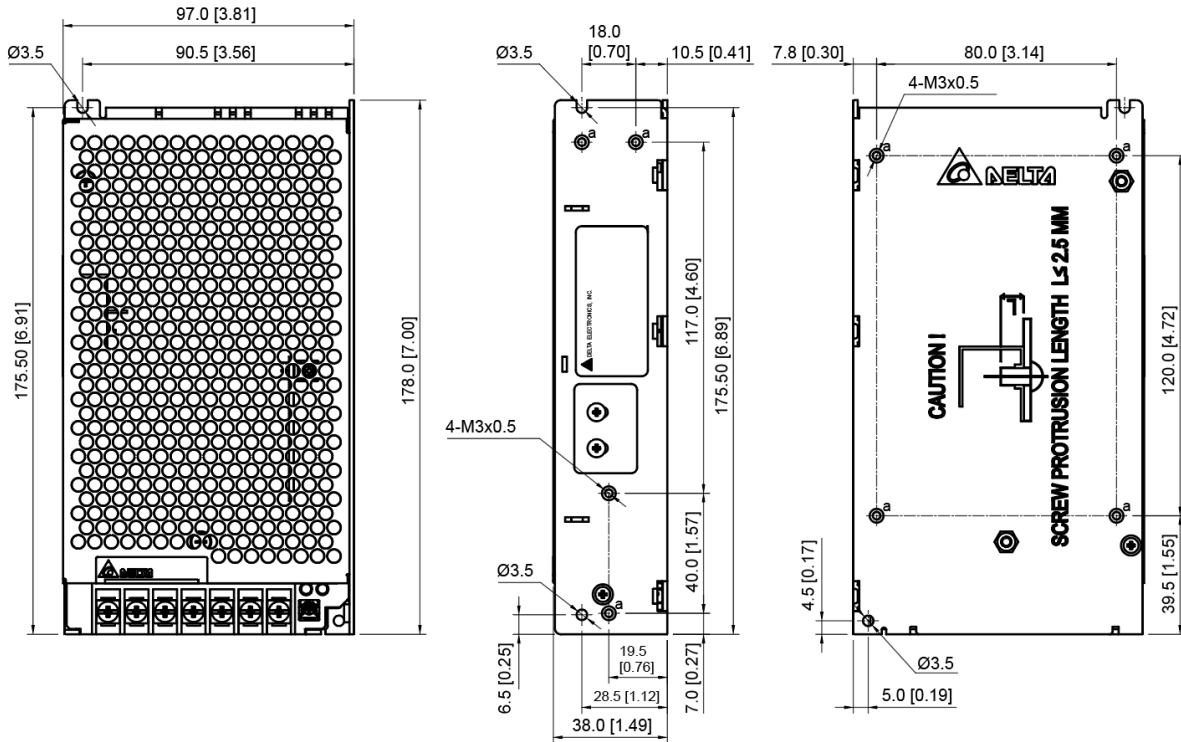
# PMU Panel Mount Power Supply with Integrated DC-UPS

## PMU-155 W Series / PMU-□V155W□□A

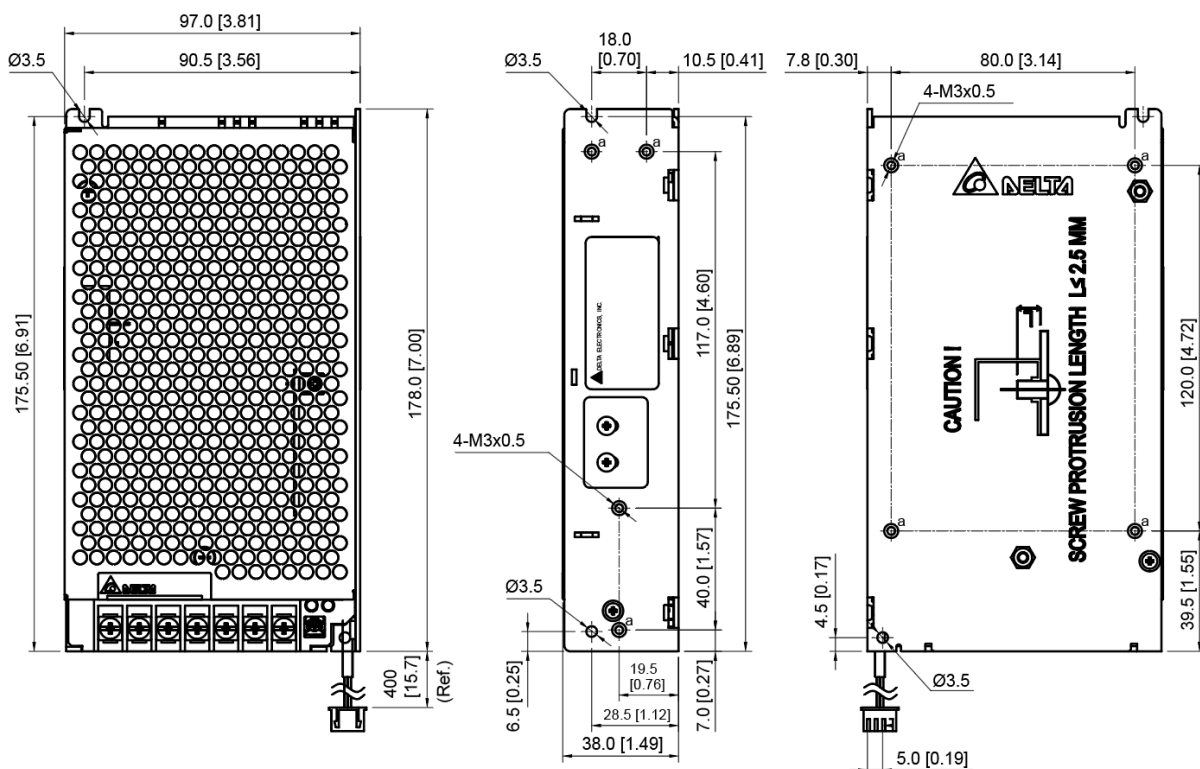
### Dimensions

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

#### PMU-□V155WCBA



#### PMU-□V155WCCA



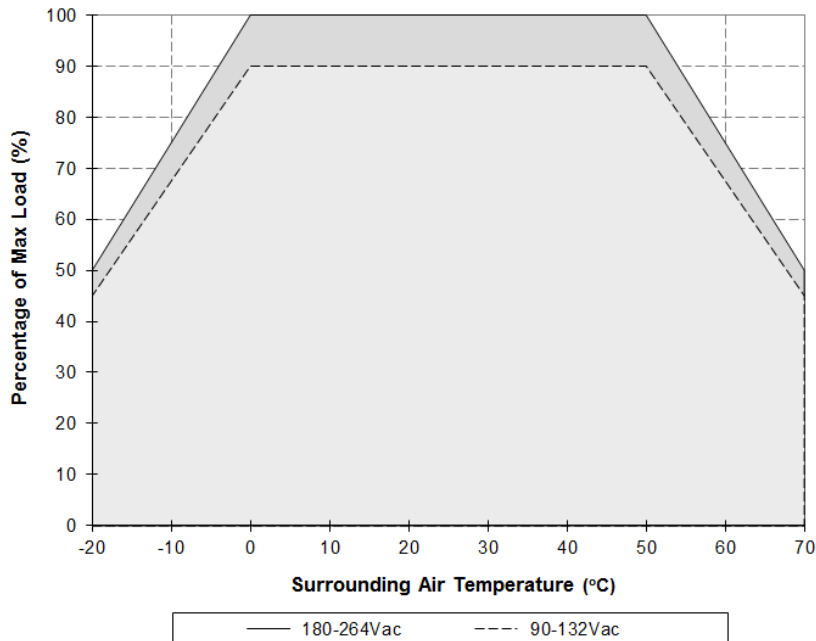


# PMU Panel Mount Power Supply with Integrated DC-UPS

## PMU-155 W Series / PMU-□V155W□□A

### Engineering Data

#### Output Load De-rating VS Surrounding Air Temperature



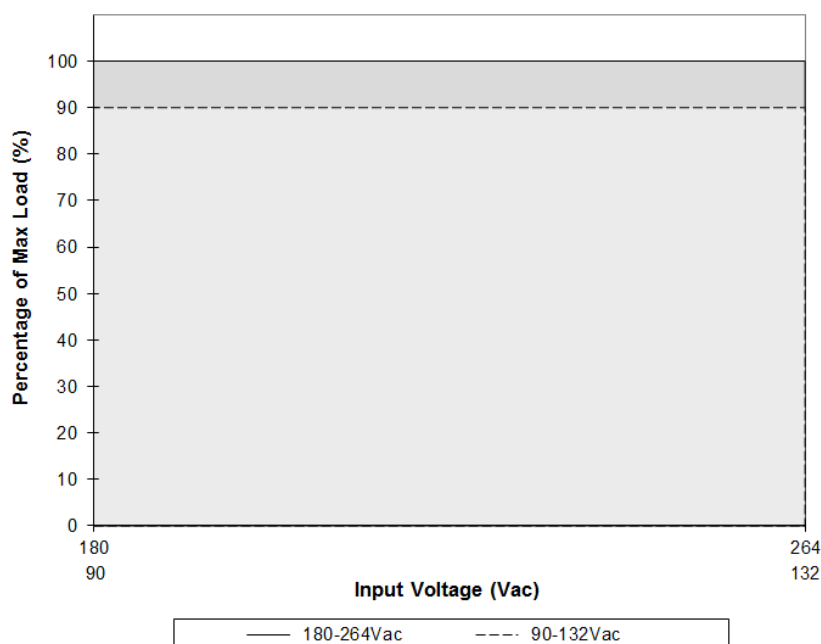
**Fig. 3 De-rating for Vertical and Horizontal Mounting Orientation**

**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](mailto:info@deltapsu.com) for more details.

#### Output Load De-rating VS Input Voltage



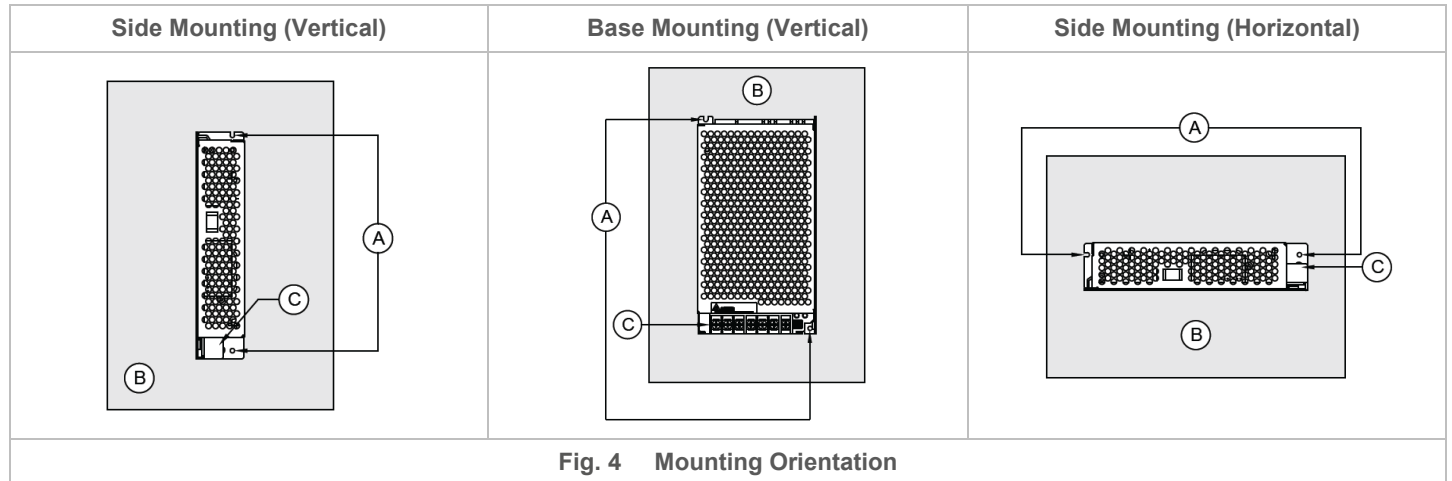
- No output power de-rating across the entire input voltage range

# 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



- 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□CA.

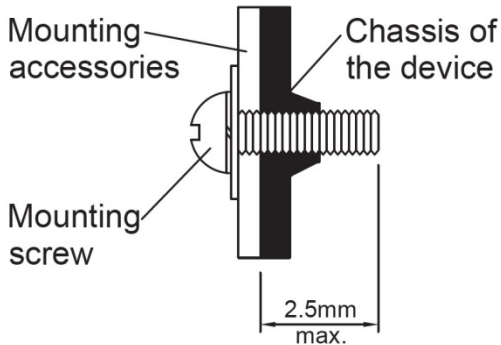
Table 1	Monitoring Signal	Recommended Header	Signal Connector	Terminal
<b>JST connector</b>	Monitoring Signal	XH	XHP-4	SXH-001T-P0.6

- 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.

# PMU Panel Mount Power Supply with Integrated DC-UPS

## PMU-155 W Series / PMU-□V155W□□A

### Installation of Mounting Accessories



- Only use M3 screw  $\leq 2.5$  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  $\geq 20$  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.

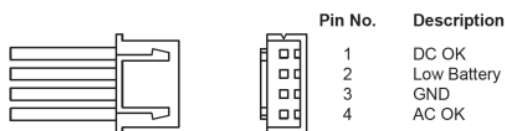
# PMU Panel Mount Power Supply with Integrated DC-UPS

## 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.

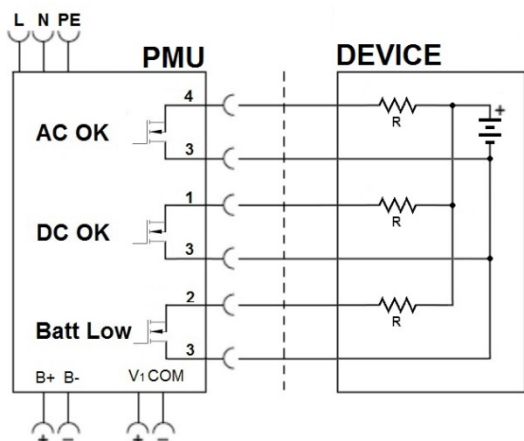
Function	Description	Monitoring Signal status
AC OK	This signal is active Low when power supply is operating from AC input.	Low <sup>1)</sup>
	This signal changes to active High level when AC input voltage collapses.	High <sup>2)</sup>
DC OK	This signal is active Low when power supply is operating within specified input operating line voltage range, or specified battery operating voltage range.	Low <sup>1)</sup>
	This signal changes to active High when AC input voltage collapses and battery voltage goes low (Buffering Mode).	High <sup>2)</sup>
Battery Low <sup>3)</sup>	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 <sup>1)</sup>
	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 <sup>2)</sup>

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 <sup>1)</sup>	High	High	Low	OFF	ON
PMU ON <sup>2)</sup> 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

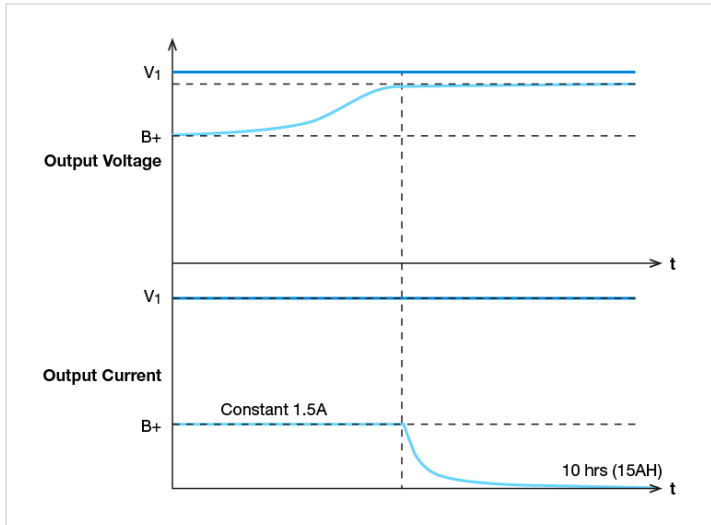
1) If the RED LED is on, this indicates a failure in the installation. In this case, do not turn on power supply (for 27 V only) while the battery is connected. **POWER SUPPLY WILL BE DAMAGED!**

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

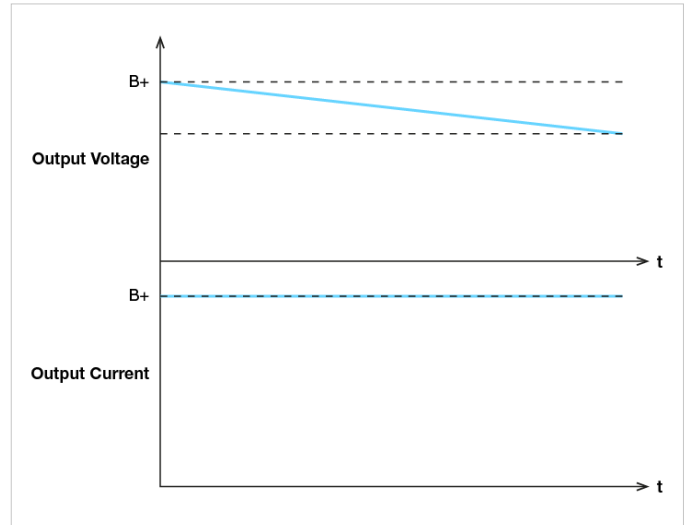
# PMU Panel Mount Power Supply with Integrated DC-UPS

## PMU-155 W Series / PMU-□V155W□□A

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.

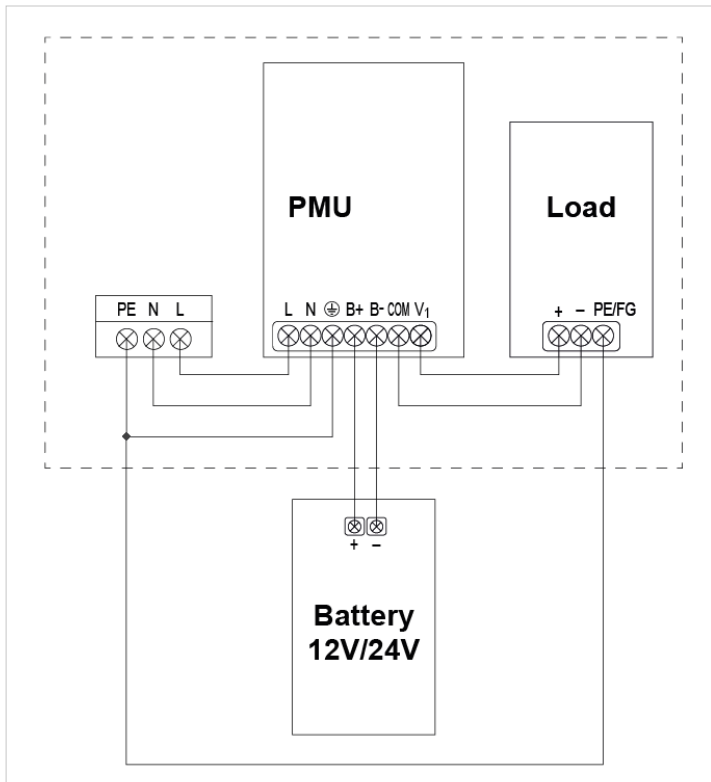
For example;

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

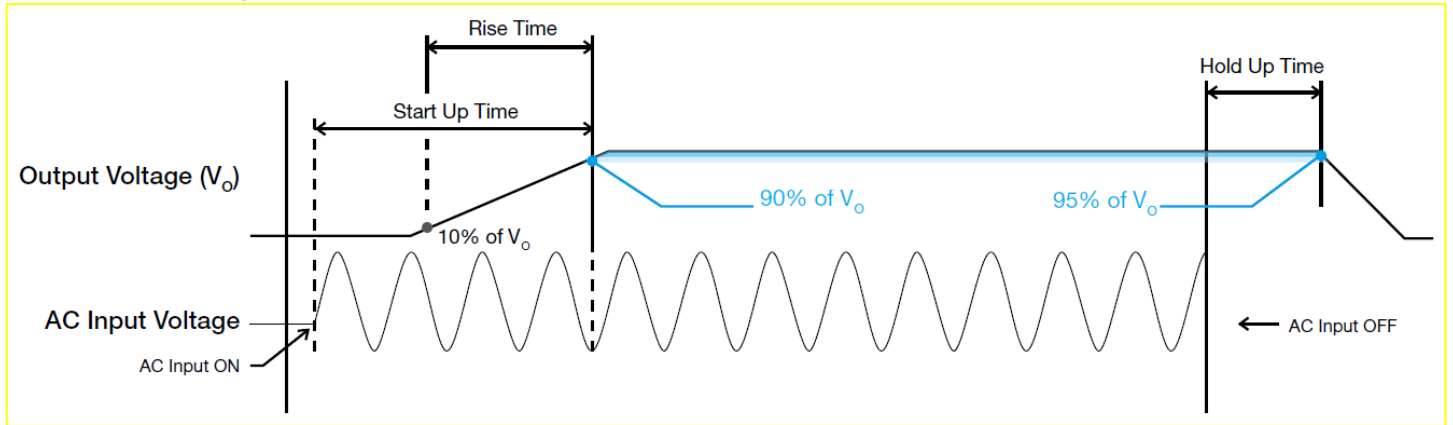


PMU can use as standalone as well and please refer output power to Normal Mode on page 2.

# PMU Panel Mount Power Supply with Integrated DC-UPS

## PMU-155 W Series / PMU-□V155W□□A

■ 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

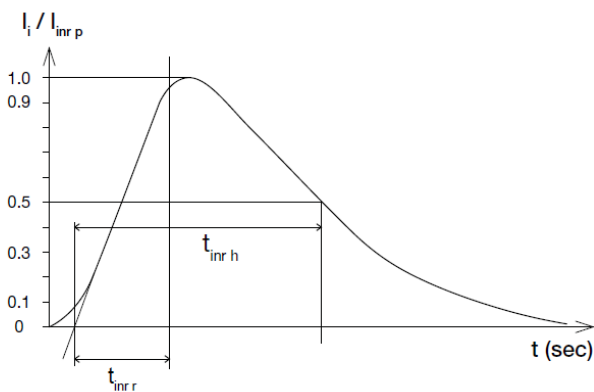
The time required for the output voltage to change from 10% to 90% of its final steady state set value.

### 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

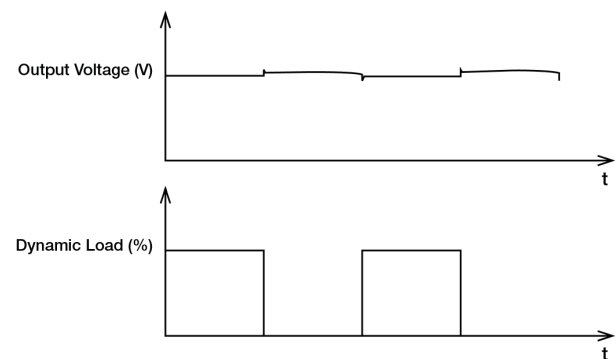
Inrush current is the peak, instantaneous, input current measured and, occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent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



# PMU Panel Mount Power Supply with Integrated DC-UPS

## PMU-155 W Series / PMU-□V155W□□A

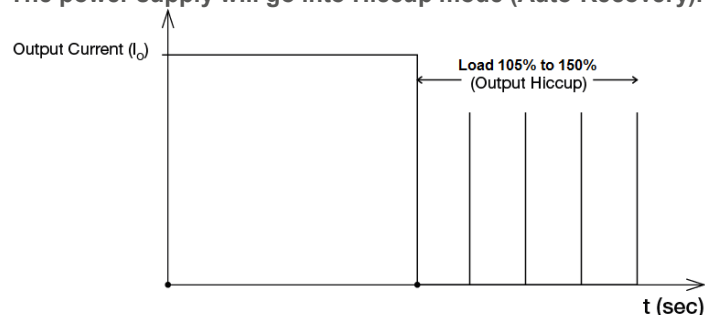
### Overload & Overcurrent Protections (Auto-Recovery and Latch Mode)

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.

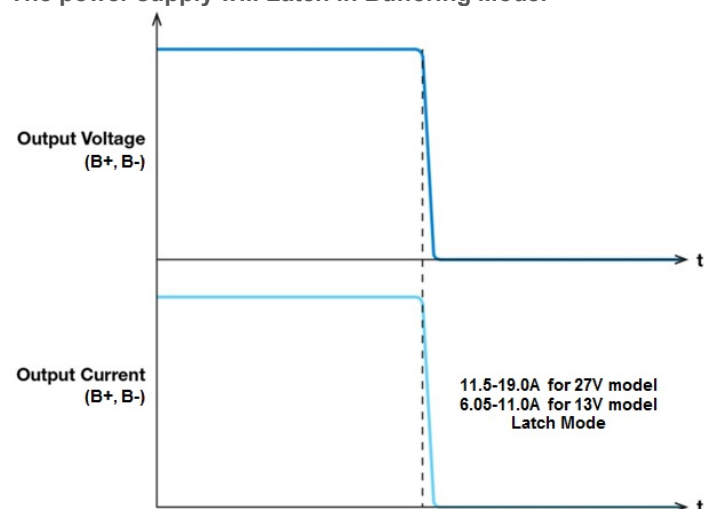
The power supply will go into Hiccup mode (Auto-Recovery).



#### 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)

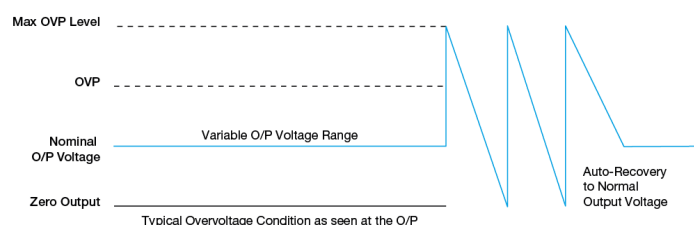
The power supply's output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate as shown in the illustration in the OLP/OCP section on this page.

**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.

# PMU Panel Mount Power Supply with Integrated DC-UPS

## PMU-155 W Series / PMU-□V155W□□A

### 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. <b>POWER SUPPLY WILL BE DAMAGED!</b>	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	<b>Normal Mode:</b> 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.
	<b>Buffering Mode:</b> 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.

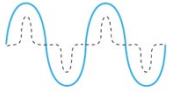
# PMU Panel Mount Power Supply with Integrated DC-UPS

## PMU-155 W Series / PMU-□V155W□□A

### 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](http://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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