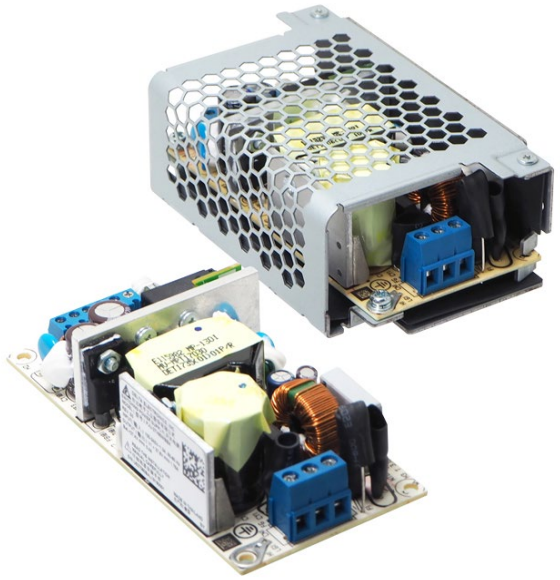
PJU Open Frame Power Supply with Integrated DC-UPS

PJU-60W Series / PJU-☐V60W☐☐☐



PJU

Highlights & Features

- Universal AC input voltage range
- Zero switch over time from loss of AC to battery operation
- Protection against reverse polarity battery connection
- Built-in diagnostic monitoring for AC OK and Battery Low status
- Overvoltage / Overcurrent / Over Temperature / Short circuit Protections
- Built-in over current and short circuit protection in Buffering (battery discharging) mode operation

Safety Standards

CB Certified for worldwide use

Model Number: PJU-☐V60W☐☐☐

Unit Weight: 0.25 kg (0.56 lb) (Enclosed)
0.23 kg (0.51 lb) (L Frame)
0.12 kg (0.26 lb) (Open Frame)

Dimensions (L x W x D):

Enclosed	103.4 x 62 x 37 mm (4.07 x 2.44 x 1.46 inch)
L Frame	103.4 x 61.45 x 37 mm (4.07 x 2.42 x 1.46 inch)
Open Frame	101.6 x 50.8 x 30.6 mm (4.00 x 2.00 x 0.12 inch)

General Description

Delta PJU series open frame power supply comes with integrated DC-UPS function. The PJU models will switch to battery operation (batteries not included) without interruption to prevent end-product downtime for the customer in the event of power disruption or unexpected loss of AC input power. Consequently, the PJU series can increase the operational reliability of a critical operation. Convection cooling is applied for the single phase design with wide operating temperature range from -20°C to +70°C. The diagnostic monitoring signals for AC OK and Battery Low status will alert the user of any failure through TTL open collector. Metal chassis with case cover is available as option for different installation preferences.

Model Information

PJU Open Frame Power Supply

Model Number	Input Voltage Range	Rated Output Voltage	Rated Output Current
PJU-13V60WC☐☐	90-264Vac	13.8Vdc	V+: 3.5A, B+: 0.8A
PJU-13V60WL☐☐			
PJU-13V60WB☐☐			V+: 3.9A, B+: 0.4A
PJU-27V60WC☐☐		27.6Vdc	V+: 1.4A, B+: 0.75A
PJU-27V60WL☐☐			
PJU-27V60WB☐☐			V+: 1.75A, B+: 0.4A

Model Numbering

PJ	U –	☐V	60W	☐	☐	☐
Open Frame	**Product Series**	**Output Voltage**	**Output Power**	**Package Type**	**Signal**	**Connector Type**
	U – With DC UPS function	13V 27V	(60W series)	C – Enclosed L – L Frame* B – Open Frame*	A – Without Signal* B – With Signal	A – Terminal Block B – JST connector* C – Molex connector*

*Options

All parameters are specified at 25°C ambient and AC input unless otherwise indicated.

PJU Open Frame Power Supply with Integrated DC-UPS

PJU-60W Series / PJU-□V60W□□□

Specifications

Model Number		PJU-13V60W□□□		PJU-27V60W□□□	
		V+	B+	V+	B+

Input Ratings / Characteristics

Nominal Input Voltage		100-240Vac		
Input Voltage Range		90-264Vac For power de-rating at 90-115Vac, see power de-rating on page 6.		
Nominal Input Frequency		50-60Hz		
Input Frequency Range		47-63Hz		
Input Current		< 1.2A @ 115Vac, < 0.8A @ 230Vac		
Efficiency at 100% Load		> 85.0% @ 115Vac > 86.0% @ 230Vac		> 88.0% @ 115Vac > 89.0% @ 230Vac
Max Power Dissipation	No Load	< 0.30W @ 115Vac < 0.45W @ 230Vac		< 0.50W @ 115Vac < 0.65W @ 230Vac
	100% Load	< 13W @ 115Vac & 230Vac		< 9W @ 115Vac & 230Vac
Max Inrush Current (Cold Start)		< 60A @ 115Vac &		
Leakage Current	IEC/EN 60950-1	< 0.5mA / 1.0mA @ 264Vac		TN/TT system / IT system
	IEC/EN 62368-1	< 1.0mA / 2.0mA @ 264Vac		TN/TT system / IT system

Output Ratings / Characteristics[1)]

Nominal Output Voltage			13.8Vdc	13.6Vdc[2)]	27.6Vdc	27.4Vdc[2)]
Factory Set Point Tolerance			± 2%			
Output Voltage Adjustment Range			13.52-14.00V	-	27.04-28.00V	-
Output Current[3)]	Enclosed	Normal Mode	3.5A (0-4.3A)	0.8A (0-0.8A)	1.4A (0-2.15A)	0.75A (0-0.75A)
		Buffering Mode	-	0-4.3A	-	0-2.15A
	L Frame	Normal Mode	3.5A (0-4.3A)	0.8A (0-0.8A)	1.4A (0-2.15A)	0.75A (0-0.75A)
		Buffering Mode	-	0-4.3A	-	0-2.15A
	Open Frame	Normal Mode	3.9A (0-4.3A)	0.4A (0-0.4A)	1.75A (0-2.15A)	0.4A (0-0.4A)
		Buffering Mode	-	0-4.3A	-	0-2.15A
Output Power			60W (max)			
Line Regulation		V+	< 0.5% (90-264Vac @ 100% load)			
Load Regulation		V+	< 1.0% (90-264Vac @ 0-100% load)			
PARD[4)] (20MHz)		V+	< 100mVpp			
Rise Time		V+	< 50ms @nominal input			
Start-up Time		V+	< 3,000ms @ 115Vac (100% load), < 1,500ms @ 230Vac (100% load)			
Hold-up Time		V+	> 10ms @ 115Vac (100% load)			
Dynamic Response (Overshoot & Undershoot O/P Voltage)		V+	± 5%, @ 115-264Vac input, 0-100% load (Slew Rate: 0.1A/μS, 50% duty cycle @ 5Hz to 1kHz)			
Start-up with Capacitive Loads		V+	3,600μF at 13.8V/4.3A		3,600μF at 27.6V/2.15A	
Voltage Drop Between V+ and B+		Normal Mode	0.2V typ.			
		Buffering Mode	0.4V typ.			
Series Operation			No			
Parallel Operation			No			

1) For power de-rating by surrounding air temperature and power de-rating at input voltage, see pages 12-13.
2) If a battery is not connected to B+ and B-, when PJU is turned on, a voltage cannot be seen at these terminals.
3) The maximum combined output power from V+ and B+ is 60W at 115-264Vac input but the output power is reduced to 57W at 90-110Vac input
For example;
60W; V+: 27.6V/1.4A (38.6W), B+: 27.4V/0.75A (20.6) or V+: 27.6V/2.15A (59.3W), B+: 27.4V/0A (0W).
57W; V+: 27.6V/1.32A (36.4W), B+: 27.4V/0.75A (20.6) or V+: 27.6V/2.06A (56.9W), B+: 27.4V/0A (0W).
4) PARD is measured with an AC coupling mode, 5cm wires, and in parallel with 0.1μF ceramic capacitor & 47μF electrolytic capacitor.

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PJU-60W Series / PJU-☐V60W☐☐☐

Model Number	PJU-13V60W☐☐☐		PJU-27V60W☐☐☐	
	V+	B+	V+	B+

Battery Input / Output Characteristics

Nominal Battery Voltage (Batteries not included with power supply)		12Vdc SLA Sealed lead acid battery	24Vdc SLA Sealed lead acid battery 2 x 12Vdc SLA Sealed lead acid battery
Battery Voltage Range	Continuously Operating	11-13Vdc (nominal at 12V)	22-27Vdc (nominal at 24V)
	Cut off voltage	11Vdc	22Vdc
	Maximum Allowed Voltage	16Vdc Max	32Vdc Max
	Battery Low Voltage	Cut off voltage +0.5V typ. (the voltage level of battery to enable "BAT Low" function, for PJU-☐V60W☐B☐ model only)	
	Minimum Voltage[1)]	11Vdc	22Vdc
Battery Capacity		3.2AH - 15AH	3.2AH – 7AH
Charging Time[2)]		< 9hrs ± 1hr for battery 12V/7AH	< 10hrs ± 1hr for battery 24V/7AH
Buffering Time		Approx.1hrs 30mins for battery 12V/7AH	Approx.3hrs for battery 24V/7AH
Recommended External Fuse for Battery		Automotive 20A / 80V, 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	

1) 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.
2) 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.

PJU Open Frame Power Supply with Integrated DC-UPS

PJU-60W Series / PJU-☐V60W☐☐☐

Model Number			PJU-13V60W☐☐☐		PJU-27V60W☐☐☐	
			V+	B+	V+	B+

Mechanical

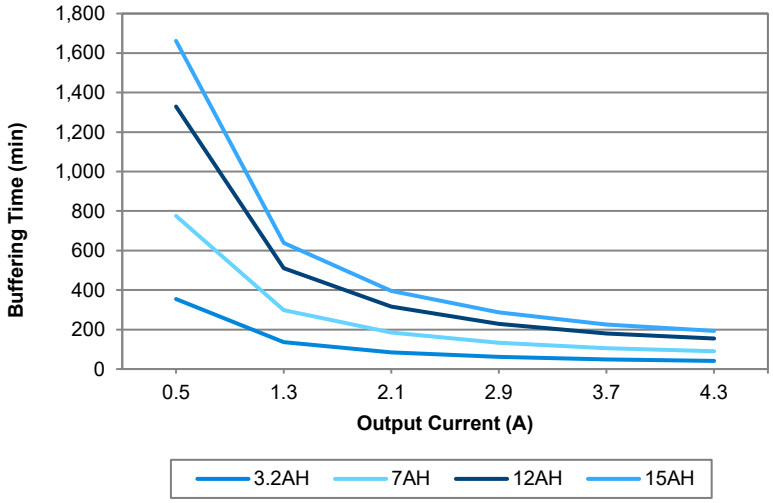
Case Chassis / Cover			SECC	
Dimensions (L x W x D)		Enclosed	103.4 x 62 x 37 mm (4.07 x 2.44 x 1.46 inch)	
		L Frame	103.4 x 61.45 x 37 mm (4.07 x 2.42 x 1.46 inch)	
		Open Frame	101.6 x 50.8 x 30.6 mm (4.00 x 2.00 x 0.12 inch)	
Unit Weight		Enclosed	0.25 kg (0.56 lb)	
		L Frame	0.23 kg (0.51 lb)	
		Open Frame	0.12 kg (0.26 lb)	
LED Indicator		Green LED	DC OK	
Cooling System			Convection	
Terminal	PJU-☐V60W☐☐A	Input	3 Pins (Rated 300V/16A)	
		Output	**PJU-☐V60W☐AA** 4 Pins (Rated 300V/8A)	
		Output with Signal	**PJU-☐V60W☐BA** 6 Pins (Rated 300V/8A)	
	PJU-☐V60W☐☐B	Input	Power Supply Header: B3P5-VH(LF)(SN) Mating Connector: VHR-5N Terminal: SVH-21T-P1.1	
		Output	**PJU-☐V60W☐AB** Power Supply Header: B4P-VH(LF)(SN) Mating Connector: VHR-4N Terminal: SVH-21T-P1.1	
		Output with Signal	**PJU-☐V60W☐BB** Power Supply Header: B6P-VH(LF)(SN) Mating Connector: VHR-6N Terminal: SVH-21T-P1.1	
	PJU-☐V60W☐☐C	Input	Power Supply Header: 26-62-4051 Mating Connector: 26-03-3051 Terminal: 08-52-0113	
		Output	**PJU-☐V60W☐AC** Power Supply Header: 26-60-4040 Mating Connector: 26-03-3041 Terminal: 08-52-0113	
		Output with Signal	**PJU-☐V60W☐BC** Power Supply Header: 26-60-4060 Mating Connector: 26-03-3061 Terminal: 08-52-0113	
Wire	PJU-☐V60W☐☐A	Input	AWG 22-12	AWG 24-12
		Output	AWG 22-16	AWG 24-16
		Output with Signal	AWG 22-16	AWG 24-16
	PJU-☐V60W☐☐B	Input	AWG 22-18	
		Output	AWG 22-18	
		Output with Signal	AWG 22-18	
	PJU-☐V60W☐☐C	Input	AWG 20-18	
		Output	AWG 20-18	
		Output with Signal	AWG 22-18	
Noise (1 Meter from power supply)			Sound Pressure Level (SPL) < 25dBA	

PJU Open Frame Power Supply with Integrated DC-UPS

PJU-60W Series / PJU-□V60W□□□

Buffering Times VS Output Load and Battery Capacity

PJU-13V60W□□□

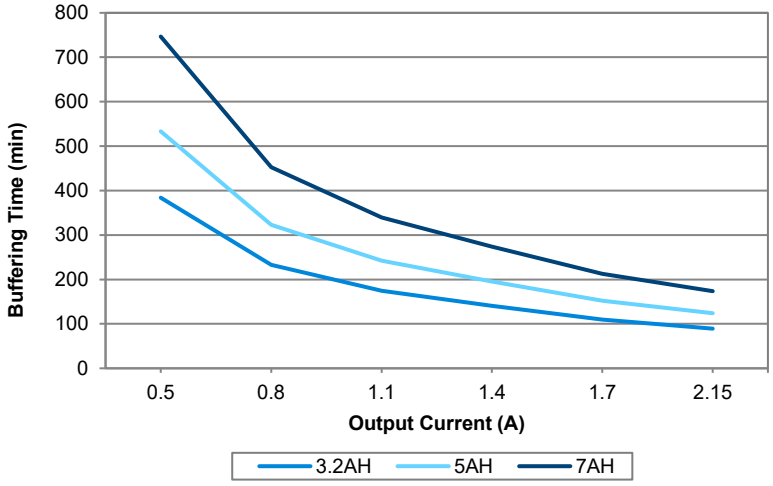


Output Current	Buffering Time			
	3.2AH	7AH	12AH	15AH
0.5A	354m	775m	1329m	1662m
1.3A	136m	298m	511m	639m
2.1A	84m	185m	316m	396m
2.9A	61m	134m	229m	286m
3.7A	48m	105m	180m	225m
4.3A	41m	90m	155m	193m

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

Fig. 1 Buffering Time VS Output Current (PJU-13V60W□□□)

PJU-27V60W□□□



Output Current	Buffering Time		
	3.2AH	5AH	7AH
0.5A	384m	533m	747m
0.8A	233m	323m	453m
1.1A	175m	242m	339m
1.4A	141m	196m	274m
1.7A	109m	152m	213m
2.15A	89m	124m	174m

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

Fig. 2 Buffering Time VS Output Current (PJU-27V60W□□□)

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PJU-60W Series / PJU-☐V60W☐☐☐

Model Number	PJU-13V60W☐☐☐		PJU-27V60W☐☐☐	
	V+	B+	V+	B+

Environment

Surrounding Air Temperature		Operating	-20°C to +70°C
		Storage	-40°C to +85°C
Power De-rating	Temperature	Vertical base mounting	**PJU-☐V60WC☐☐ & PJU-☐V60WL☐☐ & PJU-27V60WB☐☐** > 40°C de-rate power by 1.67% / °C
		Vertical side mounting	**PJU-13V60WC☐☐ & PJU-13V60WL☐☐** > 35°C de-rate power by 1.43% / °C **PJU-27V60WC☐☐ & PJU-27V60WL☐☐** > 40°C de-rate power by 1.67% / °C
		Horizontal base mounting	**PJU-13V60WB☐☐** > 35°C de-rate power by 1.43% / °C **PJU-27V60WB☐☐** > 40°C de-rate power by 1.67% / °C
		Horizontal side mounting	**PJU-☐V60WC☐☐ & PJU-☐V60WL☐☐** > 35°C de-rate power by 1.43% / °C
	Input voltage	Vertical base mounting	**PJU-☐☐V60WC☐☐ & PJU-☐V60WL☐☐ & PJU-27V60WB☐☐** Power will not de-rate for entire input voltage range
		Vertical side mounting	**PJU-☐V60WC☐☐ & PJU-☐V60WL☐** Power will not de-rate for entire input voltage range
		Horizontal base mounting	**PJU-13V60WB☐☐** Output de-rate is required at 90-115Vac **PJU-27V60WB☐☐** Power will not de-rate for entire input voltage range
		Horizontal side mounting	**PJU-☐V60WC☐☐ & PJU-☐V60WL☐☐** Power will not de-rate for entire input voltage range
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, Half Sine Wave: 50G for a duration of 11ms; 3 times per direction, 9 times in total
		Operating	IEC 60068-2-27, Half Sine Wave: 10G for a duration of 11ms; 1 time in X axis
Vibration		Non-Operating	IEC 60068-2-6, Random: 5-500Hz; 2.09Grms; 20 min per axis for all X, Y, Z directions
		Operating	IEC 60068-2-6, Sine Wave: 10-500Hz; 2G peak; displacement of 0.35mm; 60 min per axis for all X, Y, Z directions
Over Voltage Category			II
Pollution Degree			2

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Model Number		PJU-13V60W□□□		PJU-27V60W□□□	
		V+	B+	V+	B+

Protections

Overvoltage	V+	<16V, Latch Mode	<34.8V, Latch Mode
	B+	16Vdc Max will not cause damage to the unit	32Vdc Max will not cause damage to the unit
Overload / Overcurrent	Normal Mode	105-160% of rated load current, Hiccup mode, Non-Latching (Auto recovery)	
	Buffering Mode	4.5-8.0A, Latch mode	3.0-5.0A, 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	Yes
Wrong Battery Voltage Protection		Yes, 16Vdc Max will not cause damage to the unit	Yes, 32Vdc Max will not cause damage to the unit
Deep Discharge Protection[1)]		9.0V ± 0.3V	18.0V ± 0.3V
Internal fuse at L pin		T3.15AH	
Protection Against Shock		Class I with PE[2)] connection	

1) The unit will stop operating when the battery voltage detected is less than specified values.
2) PE: Primary Earth

Reliability Data

MTBF	> 700,000 hrs. as per Telcordia SR-332 I/P: 115Vac & 230Vac, Ta: 25°C O/P: 13.8V/4.3A for 13V model and 27.6V/2.15A for 27V model
Expected Cap Life Time	10 years (115Vac & 230Vac, 50% load @ 35°C)

Safety Standards / Directives

Safety Entry Low Voltage		SELV (EN 60950-1, EN 62368-1)
Electrical Safety	SIQ Bauart	EN 60950-1, 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)
	CCC	GB4943.1
	CB scheme	IEC 60950-1, IEC 62368-1
CE		In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU
Material and Parts		RoHS Directive (2011/65/EU)
Galvanic Isolation	Input to Output	3.0KVac
	Input to Ground	1.5KVac
	Output to Ground	0.5KVac

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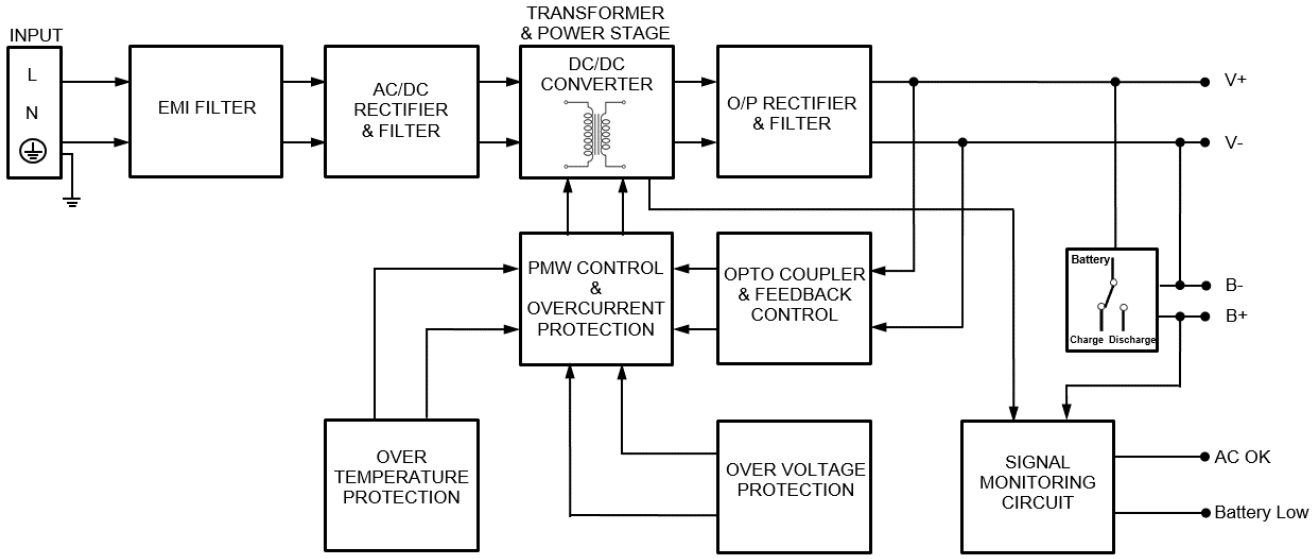
Model Number		PJU-13V60W□□□		PJU-27V60W□□□	
		V+	B+	V+	B+

EMC

Emissions (CE & RE)		CISPR 32, EN 55032, FCC Title 47: Class B GB9254.1	
Immunity		EN 55024	
Electrostatic Discharge	IEC 61000-4-2	Level 3 Criteria A[1)] Air Discharge: 8kV Contact Discharge: 6kV	
Radiated Field	IEC 61000-4-3	Level 3 Criteria A[1)] 80MHz-1GHz, 10V/M with 1kHz tone / 80% modulation	
Electrical Fast Transient / Burst	IEC 61000-4-4	Level 3 Criteria A[1)] 2kV (Input power ports)	
Surge	IEC 61000-4-5	Level 3 Criteria A[1)] Common Mode[2)]: 2kV Differential Mode[3)]: 1kV	
Conducted	IEC 61000-4-6	Level 3 Criteria A[1)] 150kHz-80MHz, 10Vrms	
Power Frequency Magnetic Fields	IEC 61000-4-8	Criteria A[1)] 10A/Meter	
Voltage Dips and Interruptions	IEC 61000-4-11	0% of 100Vac, 20ms 70% of 100Vac, 500ms 0% of 100Vac, 5000ms 0% of 240Vac, 20ms 70% of 240Vac, 500ms 0% of 240Vac, 5000ms	Criteria A[1)] Criteria A[1)] Criteria B[2)] Criteria A[1)] Criteria A[1)] Criteria B[2)]
Low Energy Pulse Test (Ring Wave)	IEC 61000-4-12	Level 3 Criteria A[1)] Common Mode[2)]: 2kV Differential Mode[3)]: 1kV	
Harmonic Current Emission		IEC/EN 61000-3-2, Class A, GB17625.1	
Voltage Fluctuation and Flicker		IEC/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



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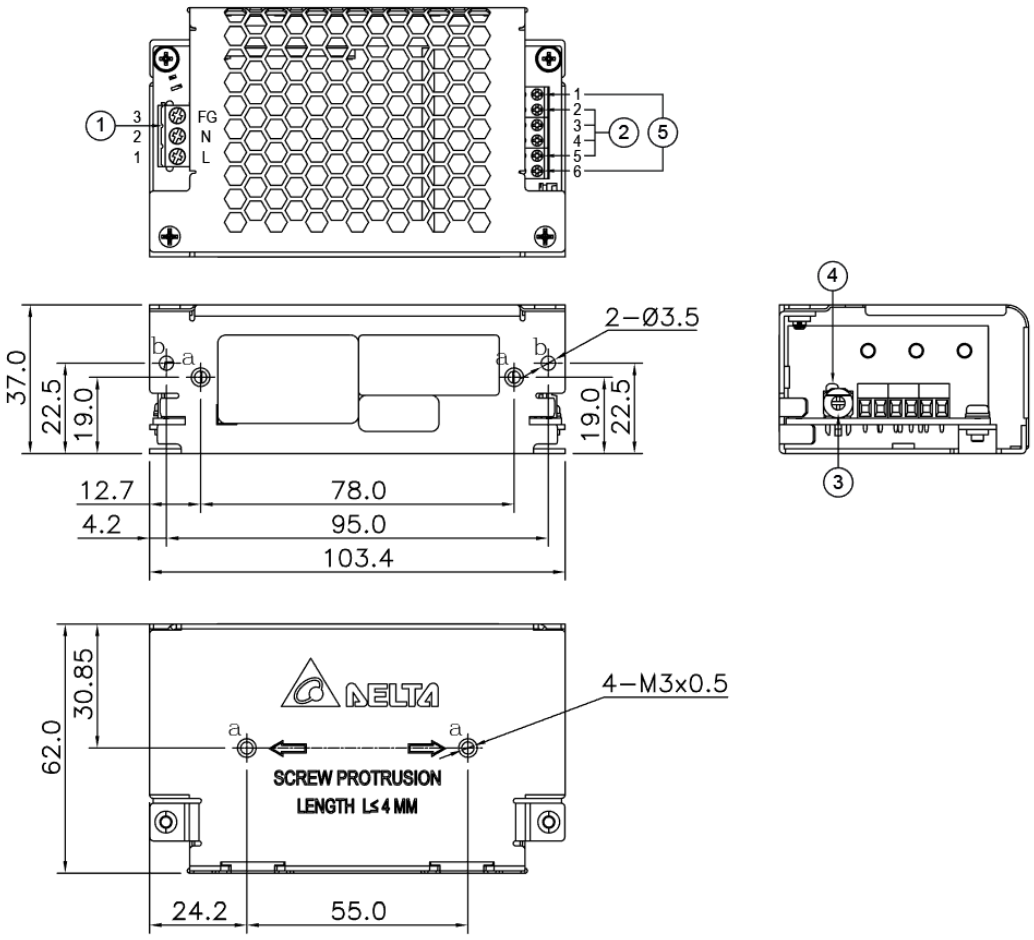
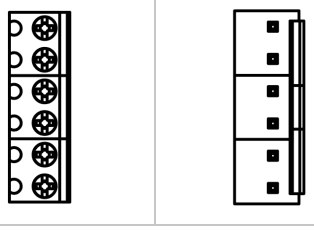
Dimensions

■ **PJU-☐V60WC☐A: Enclosed with Terminal Block**
L x W x D: 103.4 x 62 x 37 mm (4.07 x 2.44 x 1.46 inch)



Item	Device Description
1	Input connector Pin 1: Line Pin 2: Neutral Pin 3: FG
2	Output connector Pin 2: V+ Pin 3: V- Pin 4: Battery - Pin 5: Battery +
3	DC voltage adjustment potentiometer
4	DC OK control LED (Green)
5	Signal connector (for PJU-☐V60W☐B☐ only) Pin 1: AC OK Pin 6: Battery Low

Connector Type	
Terminal Block	Harness*



*Options

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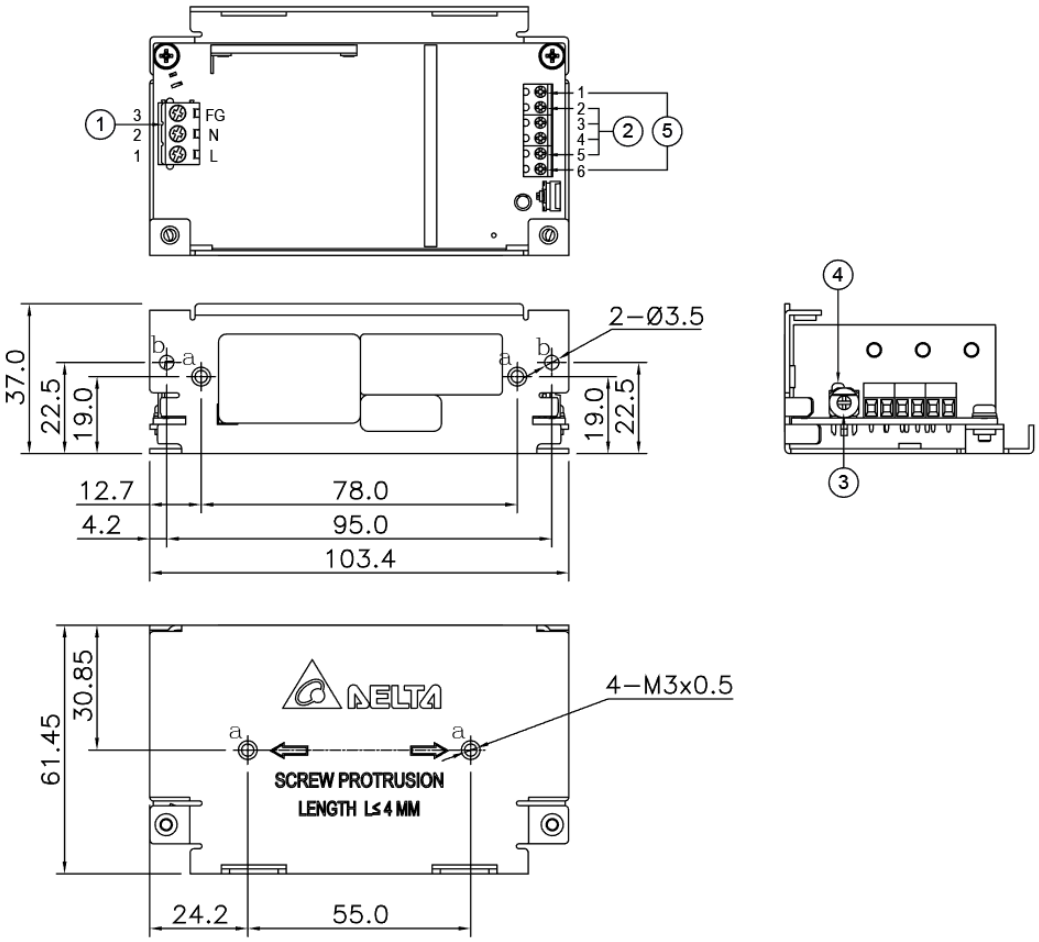
■ **PJU-☐V60WL☐A: L Frame with Terminal Block**
L x W x D: 103.4 x 61.45 x 37 mm (4.07 x 2.42 x 1.46 inch)



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2	Output connector Pin 2: V+ Pin 3: V- Pin 4: Battery - Pin 5: Battery +
3	DC voltage adjustment potentiometer
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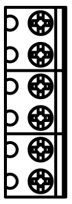
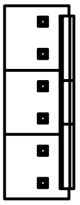
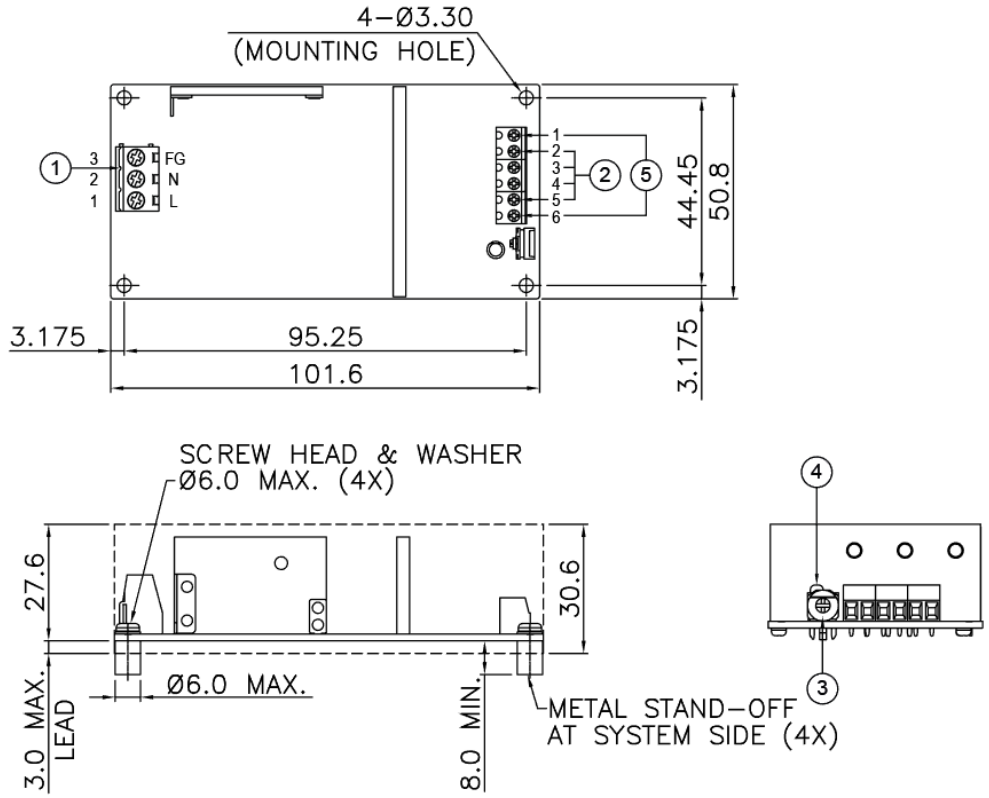
Connector Type	
Terminal Block	Harness*
	

*Options

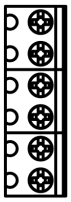
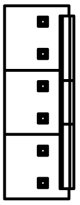
PJU Open Frame Power Supply with Integrated DC-UPS

PJU-60W Series / PJU-☐V60W☐☐☐

■ **PJU-☐V60WB☐A: Open Frame with Terminal Block**
L x W x D: 101.6 x 50.8 x 30.6 mm (4.00 x 2.00 x 0.12 inch)



Item	Device Description
1	Input connector Pin 1: Line Pin 2: Neutral Pin 3: FG
2	Output connector Pin 2: V+ Pin 3: V- Pin 4: Battery - Pin 5: Battery +
3	DC voltage adjustment potentiometer
4	DC OK control LED (Green)
5	Signal connector (for PJU-☐V60W☐B☐ only) Pin 1: AC OK Pin 6: Battery Low

Connector Type	
Terminal Block	Harness*
	

*Options

PJU Open Frame Power Supply with Integrated DC-UPS

PJU-60W Series / PJU-□V60W□□□

Engineering Data

Output Load De-rating VS Surrounding Air Temperature

Enclosed / L Frame

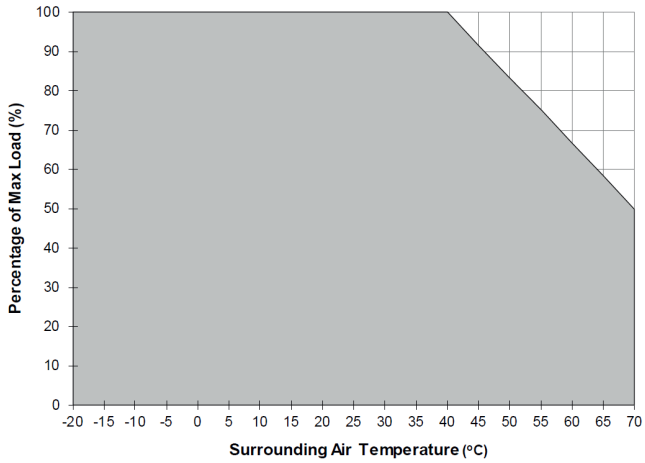


Fig. 3.1 De-rating for Vertical Base Mounting

PJU-13V & PJU-27V

> 40°C derate power by 1.67% / °C

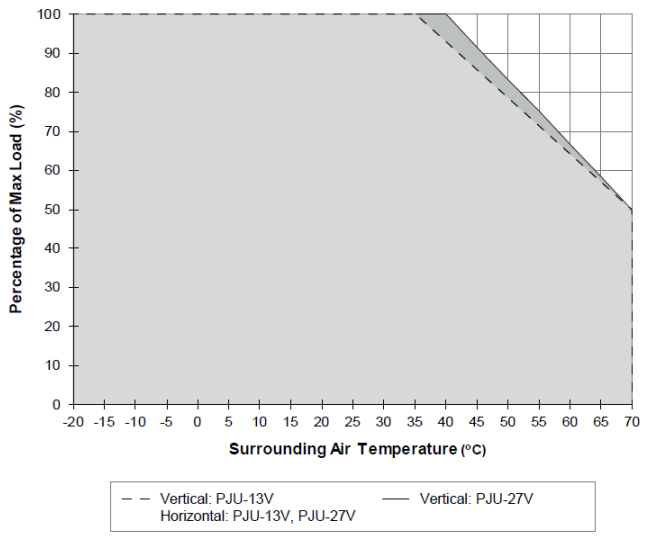


Fig. 3.2 De-rating for Vertical & Horizontal Side Mounting

PJU-13V

Vertical & Horizontal Orientation: > 35°C derate power by 1.43% / °C

PJU-27V

Vertical Orientation: > 40°C derate power by 1.67% / °C

Horizontal Orientation: > 35°C derate power by 1.43% / °C

Open Frame

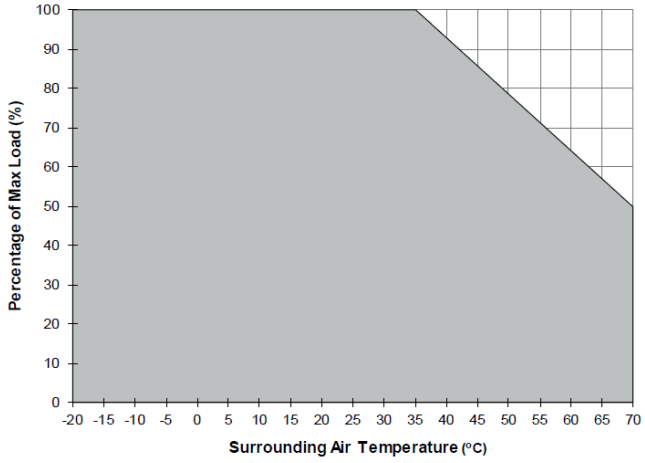


Fig. 3.3 De-rating for Horizontal Base Mounting

PJU-13V

> 35°C derate power by 1.43% / °C

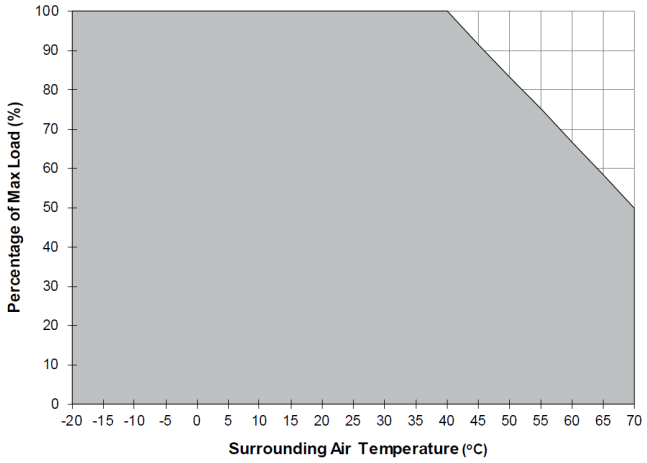


Fig. 3.4 De-rating for Vertical & Horizontal Base Mounting

PJU-27V

> 40°C derate power by 1.67% / °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 graphs shown in Fig. 3.1-3.4.
2. If the output capacity is not reduced when surrounding air temperature exceeds its specification as defined on Page 6 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.

PJU Open Frame Power Supply with Integrated DC-UPS

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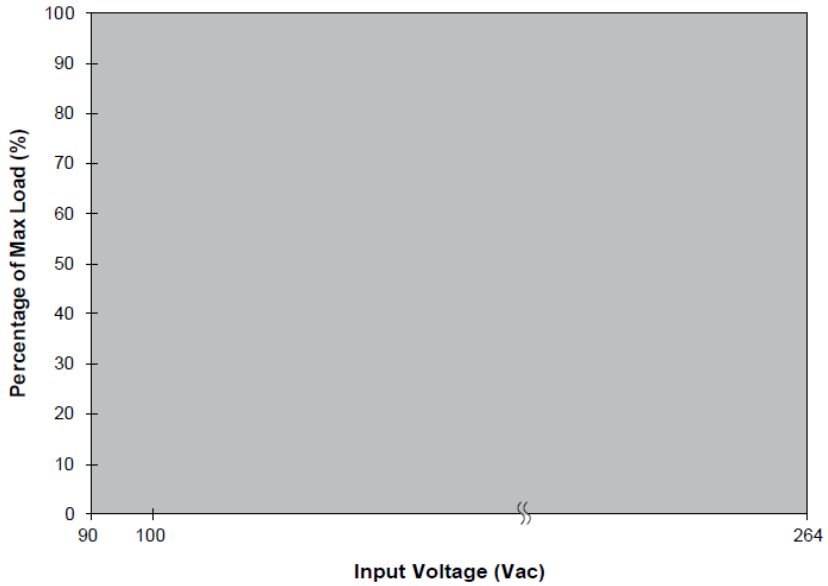
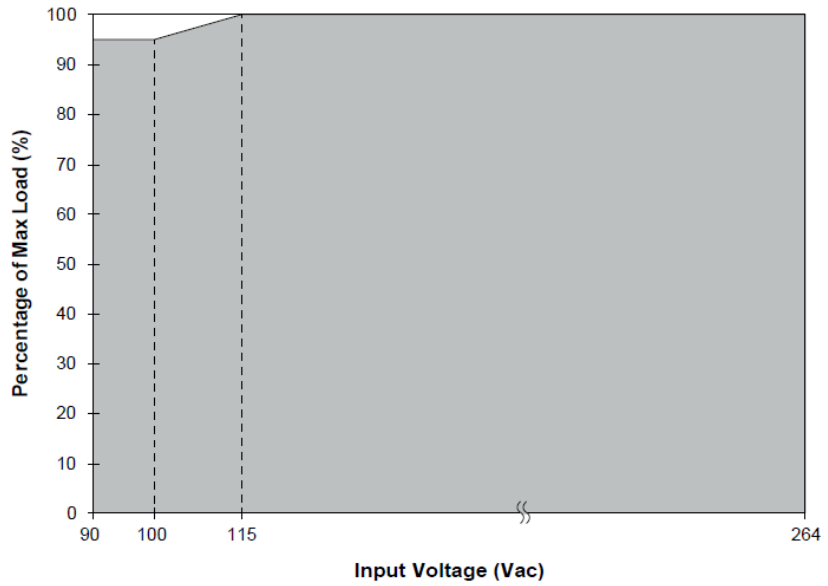
Output Load De-rating VS Input Voltage



- No output power de-rating for the input voltage range, refer to Fig. 4.1.

Fig. 4.1 De-rating for Vertical Base & Side Mounting
Enclosed / L Frame

De-rating for Vertical & Horizontal Base Mounting
Open Frame (PJU-27V)



- Output power de-rating for the input voltage range, refer to Fig. 4.2.

Fig. 4.2 De-rating for Horizontal Base Mounting
Open Frame (PJU-13V)

PJU Open Frame Power Supply with Integrated DC-UPS

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Assembly & Installation

■ **PJU-□V60WC□□ / PJU-□V60WL□□: Enclosed / L Frame**

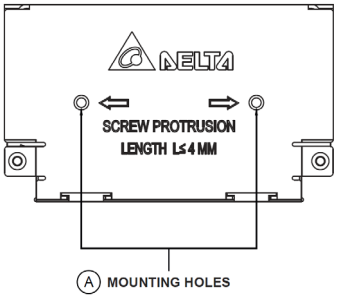
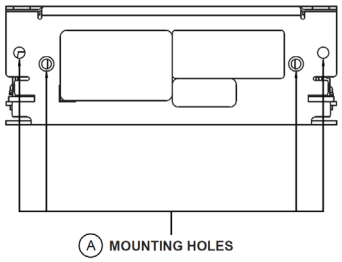
Base Mounting	Side Mounting
	

Fig. 5.1 Mounting Hole Locations

- The power supply shall be mounted on a sturdy heat conducting surface with minimum of 2 mounting holes (Fig. 5.1, Ⓐ) for base mounting or side mounting. Use M3 screws only. The screw penetration into the chassis must be 3.5-4mm. For the other mounting holes without screw threads, please use suitable screw and nut.
- Recommended mounting tightening torque 4~8 Kgf.cm.

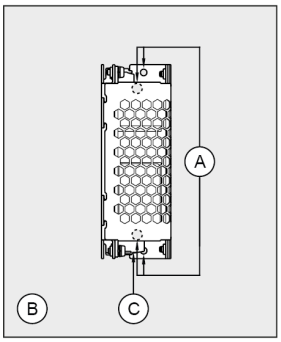
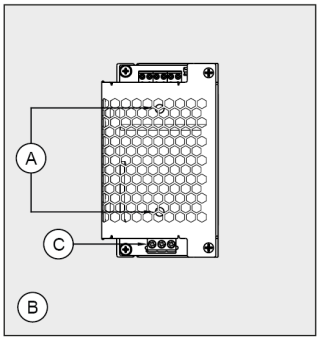
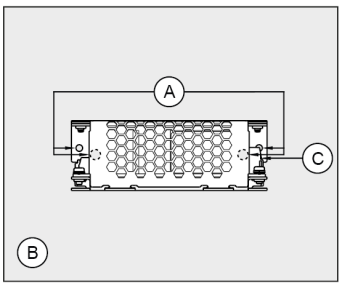
Side Mounting (Vertical)	Base Mounting (Vertical)	Side Mounting (Horizontal)
		

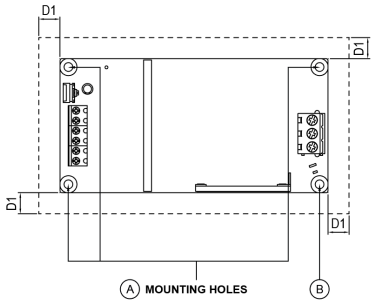
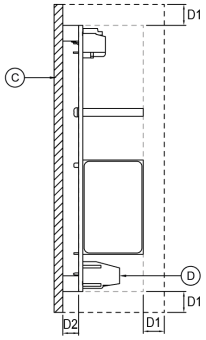
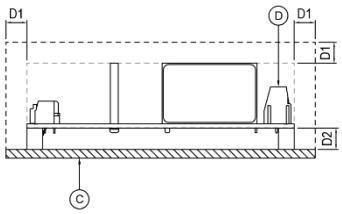
Fig. 5.2 Recommended Mounting Orientations

Ⓐ Mounting holes for enclosed and L frame type of power supply.
Ⓑ This surface belongs to customer's end system or panel where the power supply is mounted.
Ⓒ Input connector

PJU Open Frame Power Supply with Integrated DC-UPS

PJU-60W Series / PJU-☐V60W☐☐☐

■ **PJU-☐V60WB☐☐: Open Frame**

	Base Mounting (Vertical) (2)	Base Mounting (Horizontal)
		 D1 ≥ 8mm D2 ≥ 8mm
Fig. 6.1 Mounting Hole Locations	**Fig. 6.2 Recommended Mounting Orientations**	

Ⓐ Mounting holes for open frame type of power supply. (1)
Ⓑ Mounting hole should be connected to the system's protection earthing (PE). (1)
Ⓒ This surface belongs to customer's end system or panel where the power supply is mounted.
Ⓓ Input connector

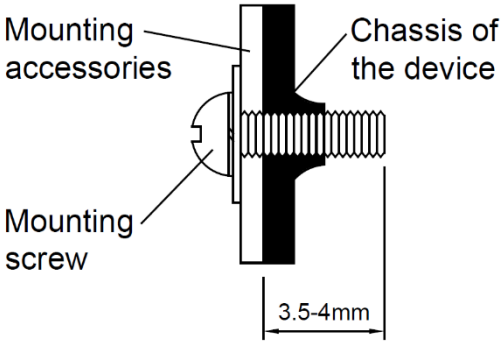
Note (1): 4 x Ø3.30 Mounting Holes; Ø6 Max Dimension of Screw Head and Stand-off. Recommended mounting torque for tighten 4~8 kgf.cm (3.47~6.94 lbf.in).
Note (2): For PJU-27V60WB☐☐ only.

- Please refer AWG number to Mechanical section on Page 4.
- **PJU-☐V60W☐☐A:** Use flexible cable (stranded or solid). The torque of terminal block connector shall not exceed 8 Kgf.cm (7 lbf.in) for input and 2.3 Kgf.cm (2 lbf.in) for output/signal. The stripping length should be 4-5mm.
- **PJU-☐V60W☐☐B / PJU-☐V60W☐☐C:** Please refer to Table 1 for the recommended Mating Connector and Terminal.

Table 1	Input / Output/ Signal	Power Supply Header	Mating Connector	Terminal
B – JST connector*	Input	B3P5-VH(LF)(SN)	VHR-5N	SVH-21T-P1.1
	Output	B4P-VH(LF)(SN)	VHR-4N	SVH-21T-P1.1
	Output with Signal	B6P-VH(LF)(SN)	VHR-6N	SVH-21T-P1.1
C – Molex connector*	Input	26-62-4051	26-03-3051	08-52-0113
	Output	26-60-4040	26-03-3041	08-52-0113
	Output with Signal	26-60-4060	26-03-3061	08-52-0113

*Options

Installation of Mounting Accessories



- Only use M3 screw 3.5-4mm (0.13-0.16 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).

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PJU-60W Series / PJU-□V60W□□□

Safety Instructions

- For enclosed and L frame type of power supply, to ensure sufficient convection cooling, always maintain a distance of ≥ 50mm (1.97 inch) from all surfaces while the device is in operation.
- For open frame type of power supply, please ensure the mounted device is kept at ≥ 8mm (0.32 inch) safety distance for D1 from other components and equipment (Refer to Fig 6.1). Please insert an insulation sheet between the system and product, it the safety distance is < 8mm (0.32 inch) for D2 (Refer to Fig 6.2).
- The device is not recommended to be placed on low thermal conductive surface, 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 to enter the device through the openings during installation. It can cause: Electric shock; Safety Hazard; Fire; Product failure
- Battery need to be protected from short circuit while installation & servicing. Danger of explosion.
- Signal connector should not interact with AC Input.
- Warning: The power supply must be mounted by metal screws onto a grounded metal surface. 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.
  For open frame type of installation, ensure the power supply's Protective Earthing (marked Ⓑ in Fig 6.1) is connected to the system's Protective Earthing (PE). It is also recommended that the input FG be connected to the system's PE.

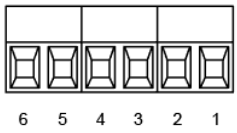
PJU Open Frame Power Supply with Integrated DC-UPS

PJU-60W Series / PJU-☐V60W☐☐☐

Functions

Monitoring Signal Characteristics

The power supply is equipped with monitoring signal outputs for PJU-☐V60W☐B☐ to remote monitoring of the unit.



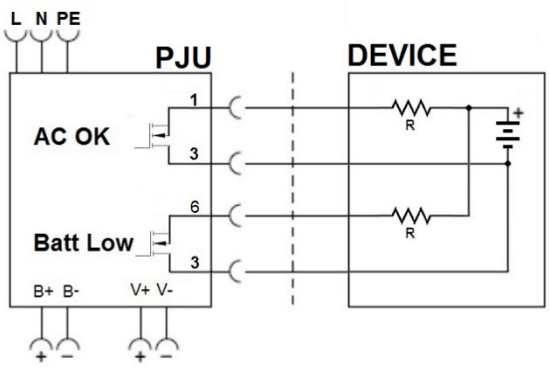
Pin No.	Description
1	AC OK
2	V+
3	V−
4	Battery −
5	Battery +
6	Battery Low

(1) AC OK and Battery Low monitoring signal outputs are TTL open collector. Must be connected through a pull up resistor to V+ output, or another voltage source.
(2) The applied voltage should be in the range of 5V to 28V with sink current of 2mA to 30mA.
(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)]
Battery Low[3)]	This signal turns active Low when battery voltage is lower than cut-off limit voltage +0.5V, or when no battery is connected.	Low[1)]
	This signal is active High when battery voltage is higher than cut-off limit voltage +0.5V (Normal and Buffering Mode)	High[2)]

1) Low: 0.5V with max 30mA
2) High: External applied voltage, 28V max
3) Battery Low status will be changed to Low in buffering mode only.

Monitoring Signals Wiring Diagram



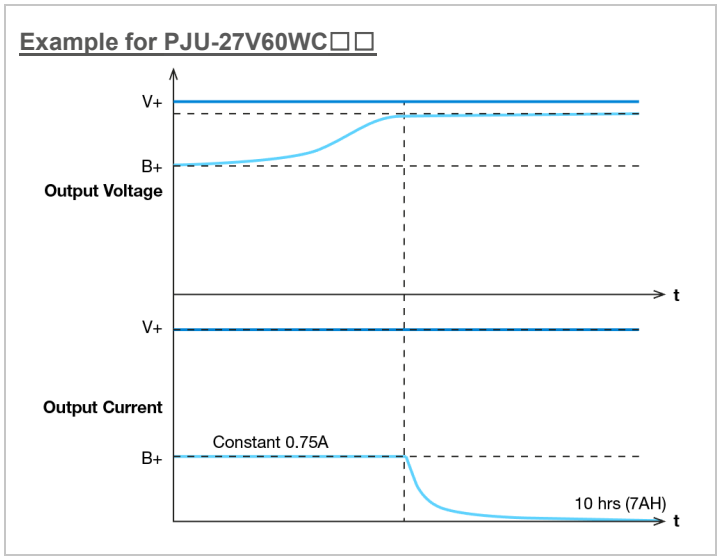
PJU Status	Monitoring Signal status		Green LED Indicator
	AC OK	Battery Low	
PJU OFF	High	High	OFF
Battery Reversed (no AC input)	High	High	OFF
PJU ON[1)] with Battery	Low	High	ON
Battery Charging			
Battery Fully Charged			
Battery Discharging (Buffering Mode)	High	High	ON
Battery Discharging (Low Battery detected)	High	Low	OFF
Output Shutdown	High	High	OFF

1) "PJU ON" means that PJU is operating from AC input voltage

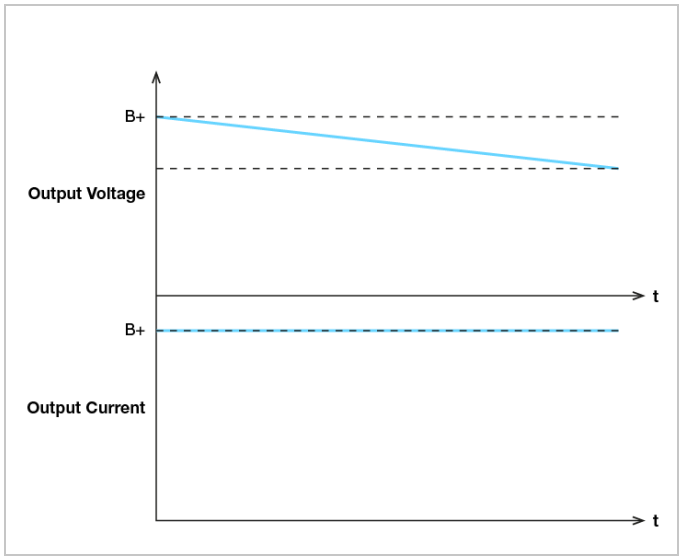
PJU Open Frame Power Supply with Integrated DC-UPS

PJU-60W Series / PJU-□V60W□□□

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



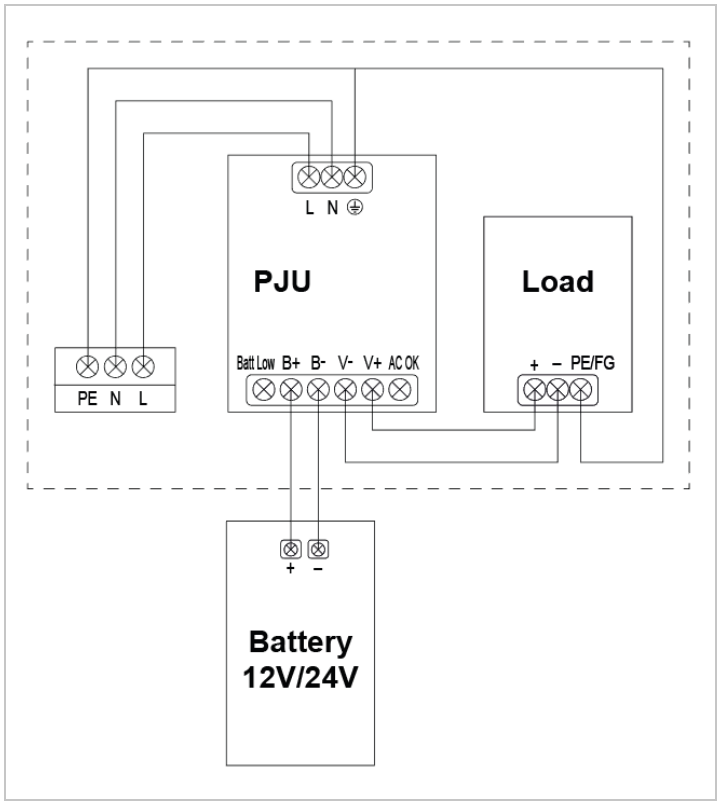
Buffering Mode (Battery discharging (B+))



The maximum combined output power from V+ and B+ is 60W at 115-264Vac input but the output power is reduced to 57W at 90-110Vac input.
For example;
60W; V+: 27.6V/1.4A (38.6W), B+: 27.4V/0.75A (20.6) or V+: 27.6V/2.15A (59.3W), B+: 27.4V/0A (0W).
57W; V+: 27.6V/1.32A (36.4W), B+: 27.4V/0.75A (20.6) or V+: 27.6V/2.06A (56.9W), B+: 27.4V/0A (0W).

Typical Application Notes

Fig. 7 Provide backup power during AC source interruption or failure

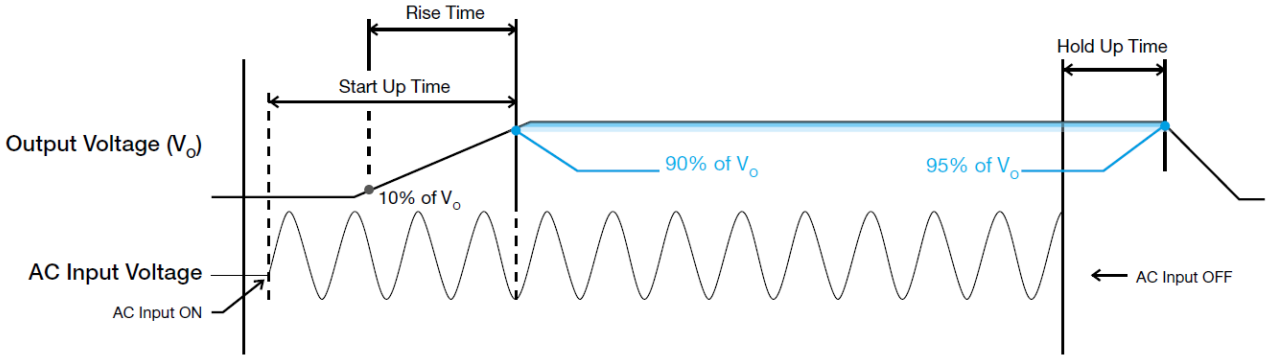


PJU can use as standalone as well and please refer output power to Normal Mode on page 2.

PJU Open Frame Power Supply with Integrated DC-UPS

PJU-60W Series / PJU-□V60W□□□

■ **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

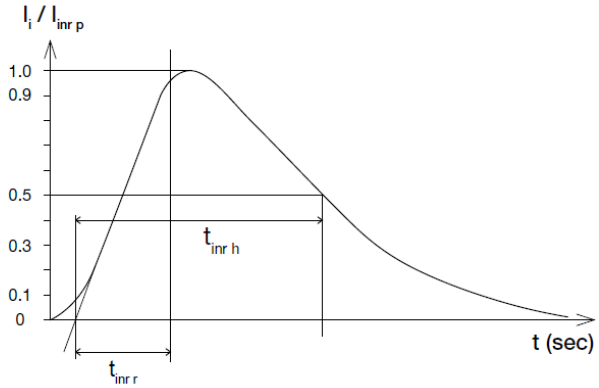
The time required for the output voltage to change from 10% to 90% of its final steady state set value.

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

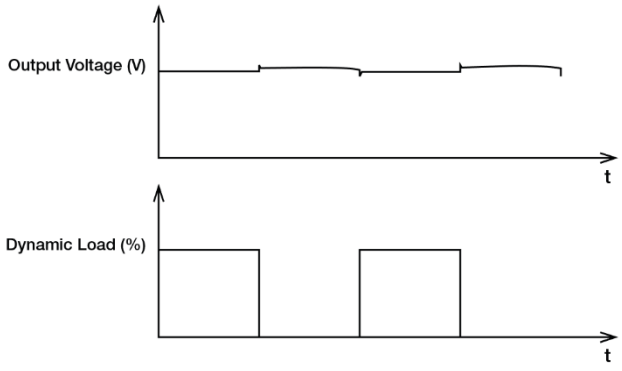
Inrush current is the peak, instantaneous, input current measured and, occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent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



Dynamic Response

The power supply output voltage will remain within ±5% of its steady state value, when subjected to a dynamic load from 0% to 100% of its rated current.

■ **50% duty cycle / 5Hz to 1KHz**



PJU Open Frame Power Supply with Integrated DC-UPS

PJU-60W Series / PJU-□V60W□□□

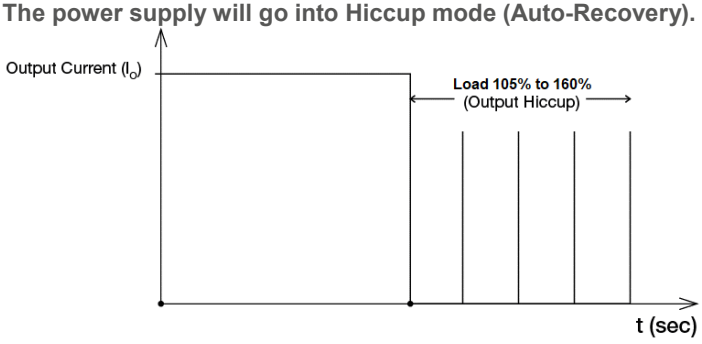
Overload & Overcurrent Protections (Auto-Recovery and Latch Mode)

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 (I_O) within 105% to 160% of Max load the output voltage (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.

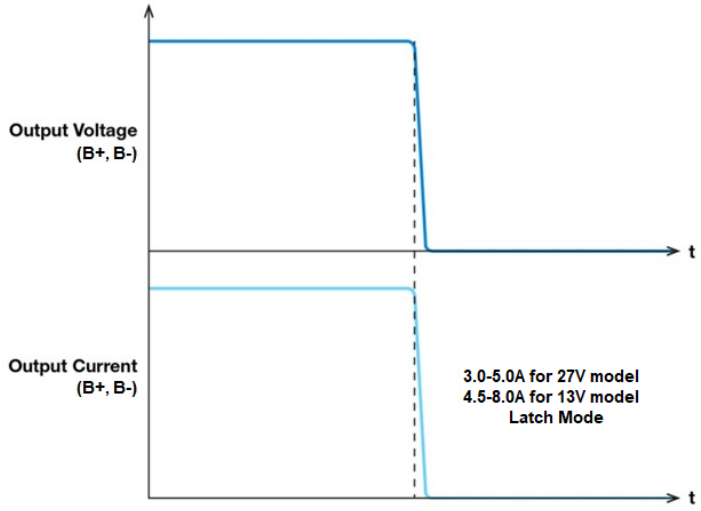
The power supply will go into Hiccup mode (Auto-Recovery).



Buffering Mode (Operation from Battery)

When the output current exceeds the maximum specified output value, the unit will latch. The power supply can 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)

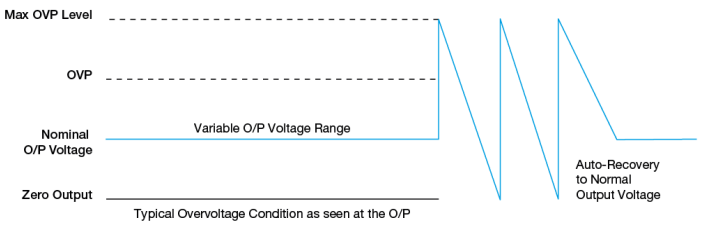
The power supply's output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate as shown in the illustration in the OLP/OCP section on this page.

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 7 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, 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

■ **PJU-□V60W□A□ (without Signal) and PJU-□V60W□B□ (with Signal)**

Problem	Possible Cause	Suggestion
PJU 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.
PJU 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 PJU datasheet. Make corrections as needed.
	Battery polarity is not corrected.	Check battery polarity. 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 PJU datasheet.
PJU does not charge and discharge battery	Battery polarity is not corrected.	Check battery polarity. Make corrections as needed.
	Battery is damaged.	Check battery and replace as needed.

■ **PJU-□V60W□B□ (with Signal)**

Problem	Possible Cause	Suggestion
Battery Low signal status is Low (Buffering mode)	Battery is discharged and its voltage is lower than cut-off limit +0.5V.	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.	

PJU Open Frame Power Supply with Integrated DC-UPS

PJU-60W Series / PJU-□V60W□□□

Others

Delta RoHS Compliant

Restriction of the usage of hazardous substances

The European directive 2011/65/EU limits the maximum impurity level of homogeneous materials such as lead, mercury, cadmium, chrome, polybrominated flame retardants PBB and PBDE for the use in electrical and electronic equipment. RoHS is the abbreviation for “Restriction of the use of certain hazardous substances in electrical and electronic equipment”.

This product conforms to this standard.

PFC – Norm EN 61000-3-2

Line Current Harmonic content

Typically, the input current waveform is not sinusoidal due to the 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.

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