Ultra-high 250 - 1500VDC input for Renewable Energy

RoHS

FEATURES

- Ultra-wide 250 - 1500VDC input voltage range (Transient 1700VDC last for 10s)
- Operating ambient temperature range: -40℃ to +85℃
- High I/O isolation voltage up to 4000VAC
- High reliability, efficiency up to 93%
- Input under-voltage protection, input reverse polarity protection, output short circuit, over-current, over-voltage protection
- Operating altitude up to 5000m
- Meets Class I (terminal/lead type), Class II (lead type)
- Design refer to UL1741, EN/IEC/BS EN62109

PV200-29BxxR3S is a regulated DC-DC series converter with an ultra-wide and ultra-high DC input of 250-1500VDC, which design based on standard of CSA-C22.2 No.107.1, UL1741, EN/IEC/BS EN62109. The products feature high efficiency, high reliability, high insulation and a high level of safety protection. It is widely used in renewable energy industries, such as photovoltaic inverter, energy storage systems, charging pile, industrial control. The converters provide multiple protection features and guarantee stable and safe operating environments even under abnormal working conditions. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

Selection Guide

Certification	Part No.*	Output Power (W)	Nominal Output Voltage and Current (Vo/Io)	Efficiency at 850VDC (%) Typ.	Capacitive Load (μF) Max.
/	PV200-29B12R3S	150	12V/12.5A	88	5000
	PV200-29B24R3S	200	24V/8.33A	91	5000
	PV200-29B28R3S		28V/7.143A	91	3500
	PV200-29B48R3S		48V/4.167A	93	1250

Note: *Use suffix "WR3S" for lead type version and suffix "R3SA6" for terminal DIN-Rail mounting, suffix "WR3SA6" for lead type version DIN-Rail mounting.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Voltage Range	Transient (10s)		--	--	1700	VDC
			250	--	1500	
Input Current	300VDC		--	--	1.2	A
	850VDC		--	--	0.45	
Inrush Current	850VDC	Cold start	--	100	150	
	1500VDC		--	180	250	
Input Under-voltage Protection	Under-voltage protection start (Input voltage drops from high to low)		130	160	190	VDC
	Under-voltage protection release (Input voltage rises from low to high)		180	210	250	
Input Reverse Polarity Protection			Available			
Start-up Delay Time*			--	1	3	s
External Input Fuse			1500VAC/6A, required (brand: Adler models: A851600b00 base models: BH300)			
Hot Plug			Unavailable			

Note: *Start-up delay time test conditions: full voltage input range, full output load range (the cooling-time between input power-off and power-on again is greater than 10s.)

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	All load range		--	±1.5	--	%
Line Regulation	Rated load		--	±0.5	--	
Load Regulation	850VDC		--	±0.5	--	
Stand-by Power Consumption	Room temperature, full voltage range		--	3	5	W
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)		--	150	300	mV
Temperature Coefficient			--	±0.02	--	%/℃
Short Circuit Protection			Hiccup, continuous, self-recovery			
Over-current Protection			≥110 %Io, hiccup, self-recovery			
Over-voltage Protection	12V		≤20V	Output voltage clamp or hiccup		
	24V		≤32V			
	28V		≤35V			
	48V		≤58V			
Minimum Load			0	--	--	%
Hold-up Time	Room temperature, full load	1000VDC input	--	10	--	ms

Note: *The "Tip and barrel method" is used for ripple and noise test, please refer to PV Converter Application Notes for specific information.

General Specifications

Item		Operating Conditions		Min.	Typ.	Max.	Unit
Isolation	Input - output	Electric strength test for 1min., leakage current ≤5mA		4000	--	--	VAC
	Input - Shell			4000	--	--	
	Output - Shell			2000	--	--	
Insulation Resistance	Input - output	Ambient temperature: 25 ± 5℃ Relative humidity: < 95%RH, no condensation Test voltage: 500VDC		100	--	--	MΩ
	Input - Shell						
	Output - Shell						
Operating Temperature				-40	--	+85	℃
Storage Temperature				-40	--	+85	
Storage Humidity		Non-condensing		--	--	95	%RH
Power Derating		Operating temperature derating	-40℃ to -25℃	3.33	--	--	%/℃
			+55℃ to +85℃	2.33	--	--	
		Input voltage derating	250 - 300VDC	0.40	--	--	%/VDC
			300 - 400VDC	0.20	--	--	
			1400 - 1500VDC	0.20	--	--	
		Altitude derating	2000m - 5000m	10.00	--	--	%/Km
Safety Standard				Design refer to UL1741, EN/IEC/BS EN62109-1			
Safety Class				Class I (terminal/lead type), Class II (lead type)			
MTBF		MIL-HDBK-217F@25℃		≥300,000h			

Mechanical Specifications

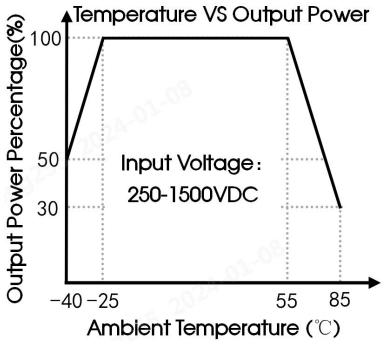
Case Material		Metal
Dimensions	Hrizontal package	171.00 x 70.00 x 42.00mm
	Din-Rail mounting	179.00 x 70.00 x 55.00mm
Weight	Hrizontal package	550g (Typ.)
	Din-Rail mounting	715g (Typ.)
Cooling Method		Free air convection

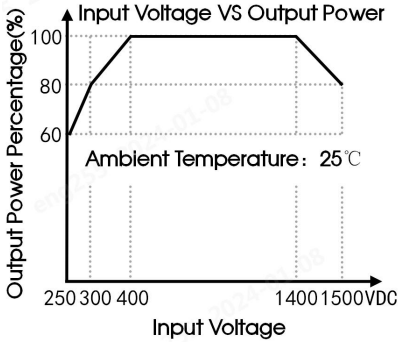
Electromagnetic Compatibility (EMC)

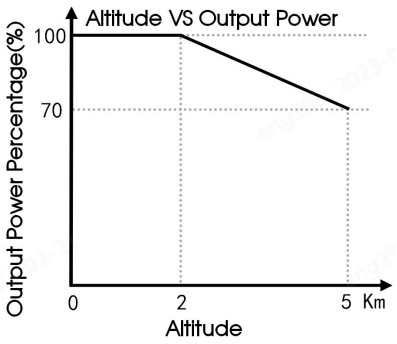
Emissions	CE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (See Fig. 2 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	Perf. Criteria A
	RS	IEC/EN61000-4-3	10V/m	Perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV ±4KV (See Fig. 2 for recommended circuit)	Perf. Criteria A
	Surge	IEC/EN61000-4-5	Line to line ±1KV/ line to PE ±2KV	Perf. Criteria A
	CS	IEC/EN61000-4-6	10Vr.m.s	Perf. Criteria A
	PFMF	IEC/EN61000-4-8	30A/m	Perf. Criteria A

Note: PE connection is required for CLASS I (terminal/lead type) application; no PE connection is required for CLASS II (lead type) application.

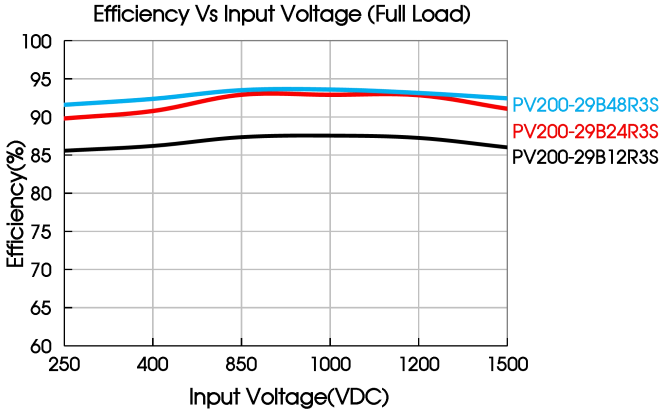
Product Characteristic Curve

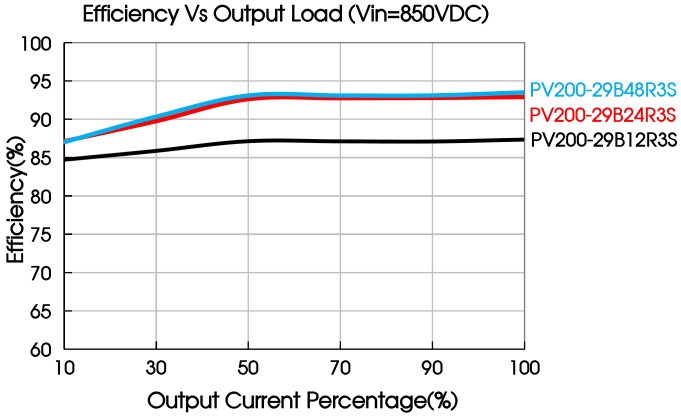






Note: 1.With an DC input between 250-400VDC/1400-1500VDC, the output power must be derated as per temperature derating curves;
2.This product is suitable for applications using natural free air cooling; for applications in closed environment please consult Mornsun FAE.





Design Reference

1. Typical application circuit

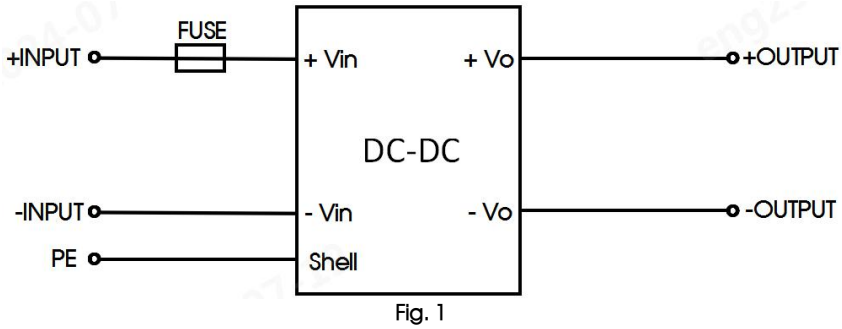


Fig. 1

Model	Recommended value
FUSE	1500VAC/6A, required (brand: Adler models: A851600b00 base models: BH300)
Note: No PE connection is required for CLASS II application.	

2. EMC compliance recommended circuit

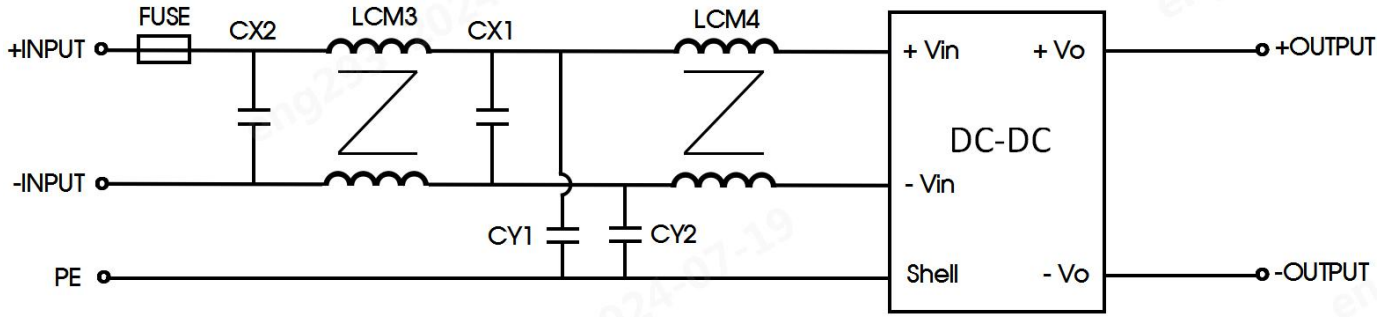


Fig. 2: CLASS I recommended circuit

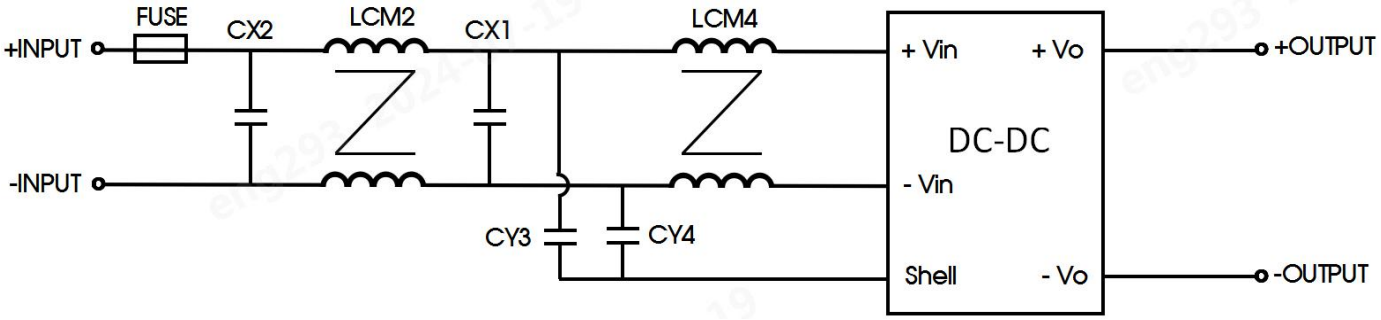


Fig. 3: CLASS II recommended circuit

Component	Recommended value
FUSE	1500VAC/6A, required (brand: Adler models: A851600b00 base models: BH300)
CX1/CX2	Safety capacitor 105K/≥1500VDC
CY1/CY2	222M/1500VDC
CY3/CY4	471K/1500VDC
LCM2	7mH (recommended to use MORNSUN's FL2D-10-702B)
LCM3	20mH (recommended to use MORNSUN's FL2D-10-203B)
LCM4	1mH (recommended to use MORNSUN's FL2D-10-102B)

Note: 1. Please refer to Fig 1 for common applications;
2. If the electromagnetic compatibility environment is harsh, please refer to Fig 2, Fig 3;
3. This recommened list based on full input voltage, output load range. If it works under other input voltages, please consult FAE for parameter optimization;
4. The PE cable can be connected to any screw on the product housing;
5. No PE connection is required for CLASS II application.

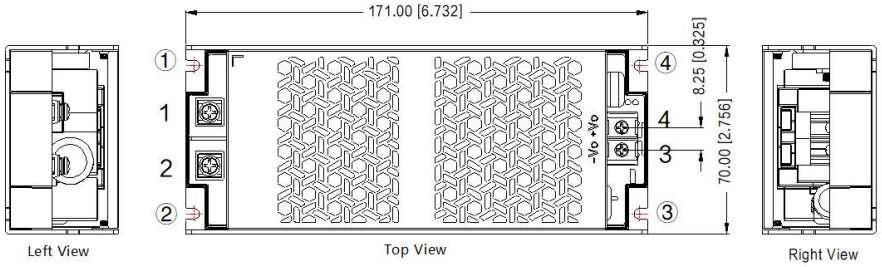
3. IMPORTANT SAFETY INSTRUCTIONS

Additional protective devices, such as lightning protector need to be added if there is an transient pulse voltage greater than 6KV at the input of PV products in system applications.

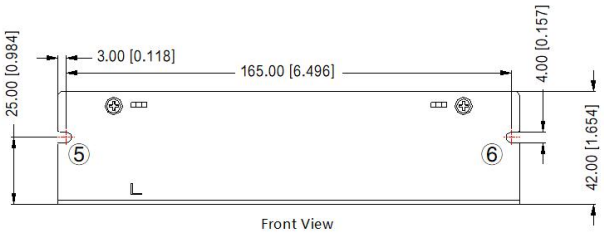
Dimensions and Recommended Layout

PV200-29BxxR3S Series

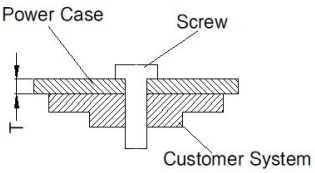
THIRD ANGLE PROJECTION

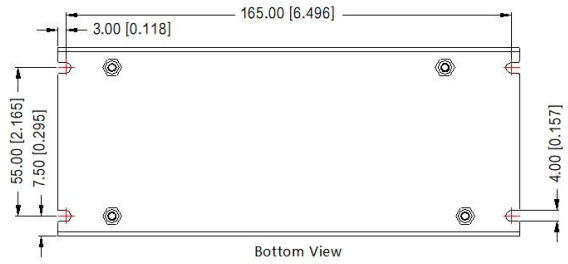


Pin-Out	
Pin	Function
1	+Vin
2	-Vin
3	-Vo
4	+Vo
Position	Shell



Position	Screw Spec.	T	Torque(max)
①-⑥	M3	1.5mm	0.4N · m

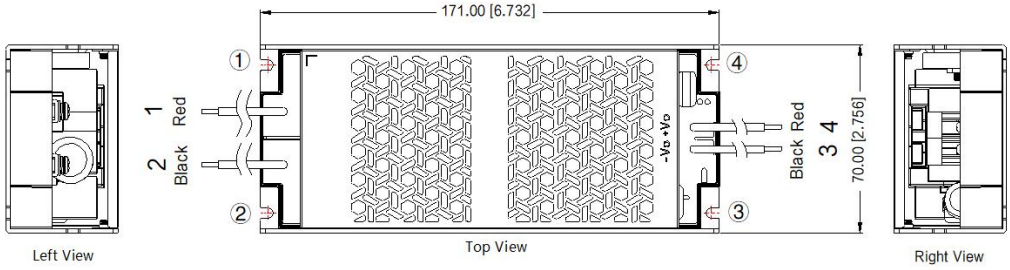




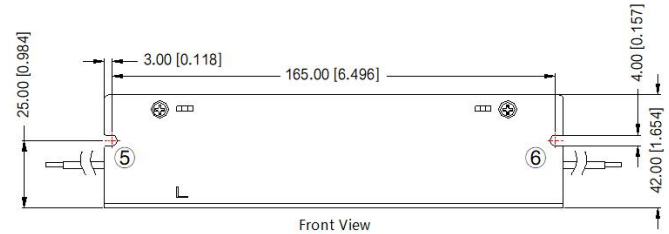
Note:
1. Unit: mm[inch]
2. General tolerances: ± 1.00 [± 0.040]
3. Wire range: Input: 20-12AWG
   Output: 16-12AWG
4. Input connector tightening torque: M4, 0.9N · m(Max)
   Output connector tightening torque: M3, 0.4N · m(Max)

PV200-29BxxWR3S Series

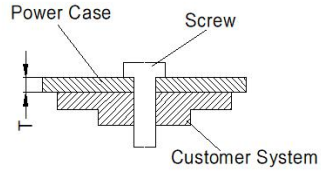
THIRD ANGLE PROJECTION

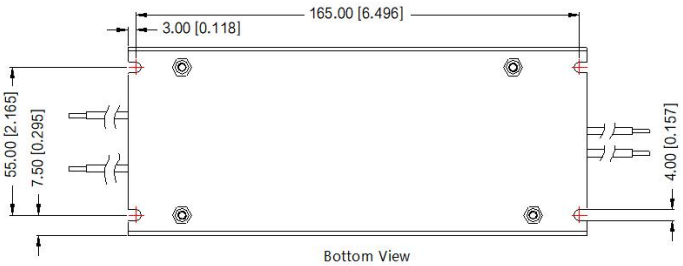


Pin-Out	
Pin	Function
1	+Vin
2	-Vin
3	-Vo
4	+Vo
Position	Shell(Class I)
	NC(Class II)



Position	Screw Spec.	T	Torque(max)
①-⑥	M3	1.5mm	0.4N · m

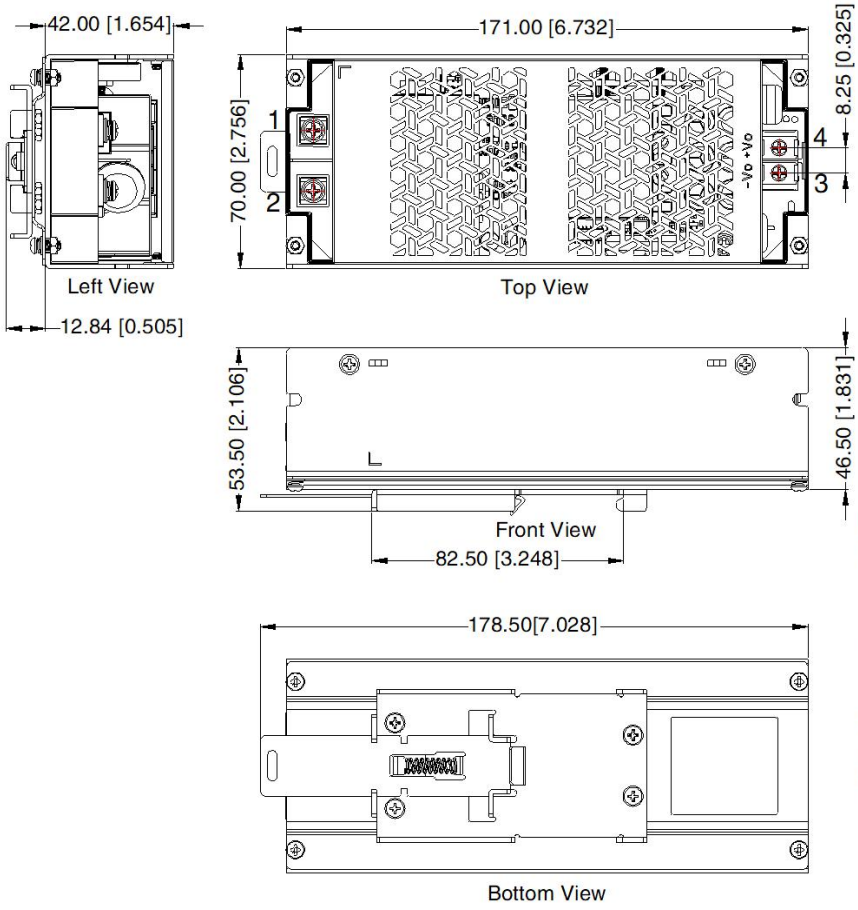




Note:
1-2 wire spec.: UL3239 18AWG
3-4 wire spec.: UL1015 14AWG
Unit: mm[inch]
General tolerances: ± 1.00[± 0.039]

PV200-29BxxR3SA6 Series

THIRD ANGLE PROJECTION

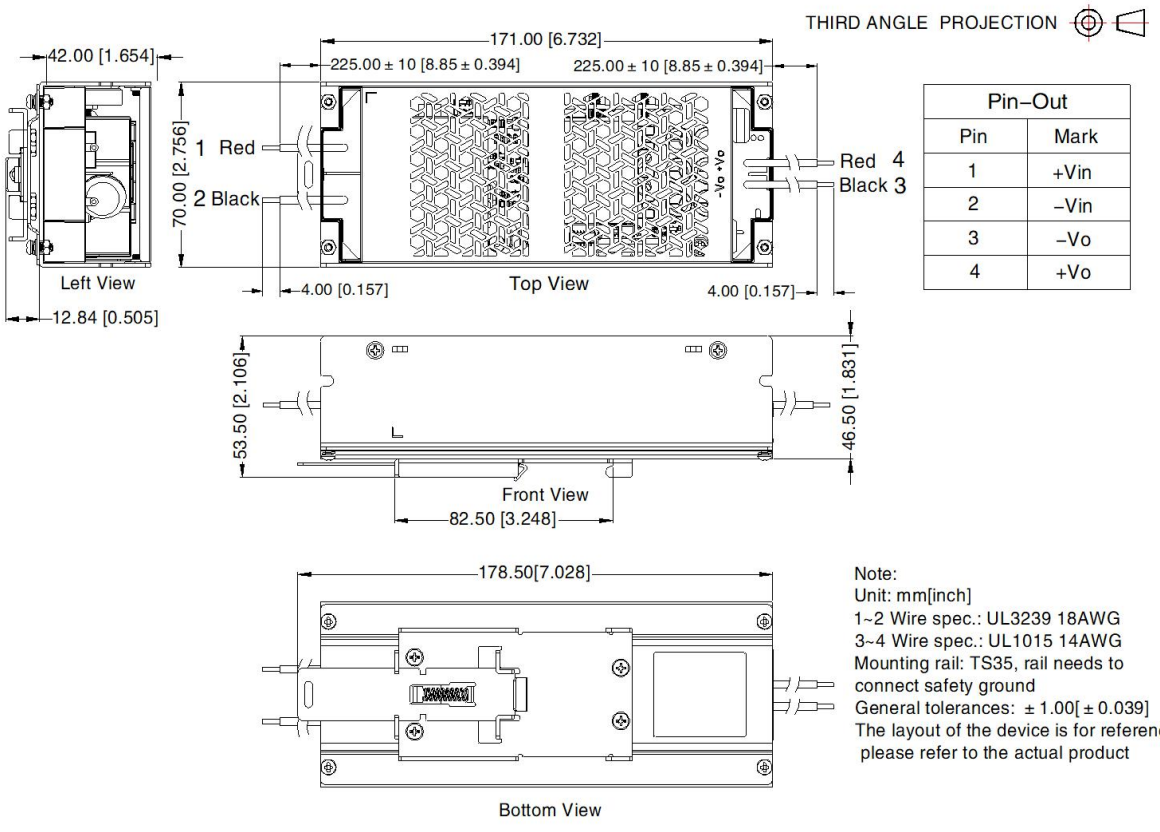


Pin–Out	
Pin	Mark
1	+Vin
2	–Vin
3	–Vo
4	+Vo

Note:
Unit: mm[inch]
Wire range:
Input: 20–12AWG
Output: 16–12AWG
Terminal torque:
Input: M4, Max0.9N・m
Output: M3, Max0.4N・m
Mounting rail: TS35, rail needs to connect safety ground
General tolerances: ± 1.00[± 0.039]
The layout of the device is for reference only, please refer to the actual product

PV200-29BxxWR3SA6 Series

THIRD ANGLE PROJECTION



Pin–Out	
Pin	Mark
1	+Vin
2	–Vin
3	–Vo
4	+Vo

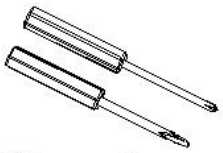
Note:
Unit: mm[inch]
1~2 Wire spec.: UL3239 18AWG
3~4 Wire spec.: UL1015 14AWG
Mounting rail: TS35, rail needs to connect safety ground
General tolerances: ± 1.00[± 0.039]
The layout of the device is for reference only, please refer to the actual product

Installation Diagram

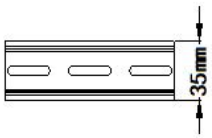
Bill Of Material		
1	Product	1 PCS
2	Phillips screwdriver Slotted screwdriver	1 PCS
3	TS35/7.5 or TS35/15	1 PCS

All above is only for reference, the actual connecting wire and locking torque refer to the appearance size diagram

Product

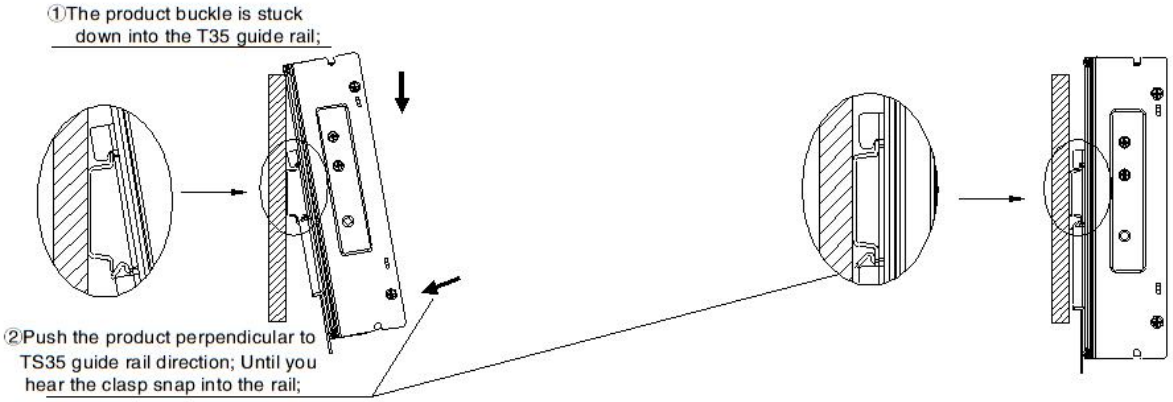


Phillips screwdriver
Slotted screwdriver
Diameter of the cutting tools: 3mm

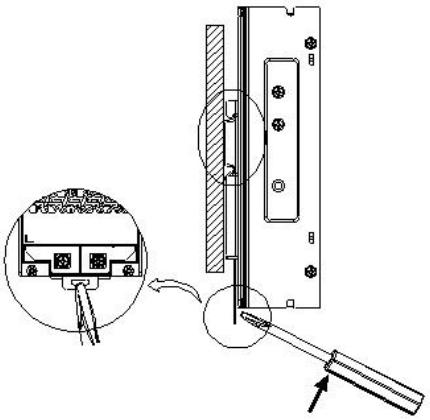


TS35/7.5 or TS35/15

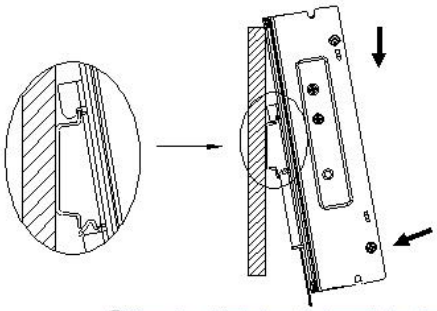
Installation procedure ①–②



Remove the step ③–④



③Insert the Slotted screwdriver into the square slot at the bottom of the buckle, and push the slider part of the buckle down to the top in the direction shown;



④Then the third step, first push the bottom of the product outward, and then lift it up, you can take the product out of the guide rail.

Note: Keep the following installation clearances: 20mm on top, 20mm on the bottom, 5mm on the left and right sides are recommended when the device is loaded permanently with more than 50% of the rated power. Increase this clearance to 15mm in case the adjacent device is a heat source (e.g. another power supply).

⚠WARNING:
1. CAUTION: "To reduce the risk of fire, connect only to a circuit provided with 4 amperes maximum branch-circuit over-current protection in accordance with the National Electrical Code, ANSI/NFPA70."
2. WARNING: REPLACE ONLY WITH THE SAME RATINGS AND TYPE OF FUSE.
3. DANGER — HIGH VOLTAGE.

AVERTISSEMENT:
1. Avertissement: Pour réduire le risque d'incendie, veuillez connecter uniquement à des circuits de dérivation avec protection contre les surintensités conformes au code électrique national ANSI/ NFPA 70.
2. AVERTISSEMENT : N'UTILISER QUE DES FUSIBLES DE MÊMECALIBRE ET DE MÊME TYPE QUE LE FUSIBLE DORIGINE.
3. DANGER ： HAUTE TENSION.

Note:
1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58220706(horizontal package), 58220707(din-Rail mounting);
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75% with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
7. If the final product application is connected to a photovoltaic array, the array needs to be grounded and the voltage between the positive and negative poles of the product shall not be greater than 1500VDC.

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