



APS PV Simulator Technical Specifications



XI'AN ACTIONPOWER ELECTRIC CO., LTD.

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1. Product Overview

APS PV simulator is a DC power supply featuring high precision, high dynamics and high-speed switching. With the complete I-V curve simulation function, it can simulate the output characteristics of various PV panels, and provide various kinds of user-defined curves, static and dynamic I-V curves and shadow occlusion simulations. The programming function can simulate different waveform outputs through three programming modes like Step, List and Wave, in order to fulfill the test requirements of various industries.

The power supply can not only provide standard power supply environment for electrical equipment, but also receive the energy from load and feed it back to the grid, with feedback efficiency of above 94%, to save energy and improve the test environment.



2. Product Series

Model	Power (kW)	Output Voltage (V)	Output Current (A)	Size (mm) Width x Height x Depth	Weight(kg)
APS-30-1206	±300	12~1200	±600A	1610×1955×1200	2030
APS-40-1208	±400	12~1200	±800A	2010×1955×1200	2470
APS-50-1210	±500	12~1200	±1000A	2010×1955×1200	2850
APS-60-1212	±600	12~1200	±1200A	2410×1955×1200	3500
APS-75-1215	±750	12~1200	±1500A	3410×1955×1200	4530
APS-100-1220	±1000	12~1200	±2000A	3410×1955×1200	4960
APS-30-2004	±300	20~2000	±400A	1610×1955×1200	1900
APS-40-2006	±400	20~2000	±600A	1610×1955×1200	2430
APS-50-2007	±500	20~2000	±700A	2010×1955×1200	2670
APS-60-2008	±600	20~2000	±800A	3410×1955×1200	3500
APS-75-2010	±750	20~2000	±1000A	3410×1955×1200	4390
APS-100-2014	±1000	20~2000	±1400A	3410×1955×1200	4940

3. Product Advantages

3.1 Complete I-V Curve Simulation

Built-in Sandia, EN50530, CGC/GF004 standard curve for static and dynamic MPPT testing. Moreover, user-defined curve simulation is supported with one click call. It has curve programming function, and can import multiple curves in a user-defined way in sequence automatically. It has shadow occlusion simulation function, and can simulate the real

scenarios like the photovoltaic panels occluded by cloud or dirt.

I-V curves can be simulated by both parameters such as Voc, Isc, and fill factor and .CSV files import. The characteristics of monocrystalline, polycrystalline, amorphous, and other solar cells can be simulated. The number of simulation points is more than 4000, which enables accurate simulation of the static characteristics of I-V curves.



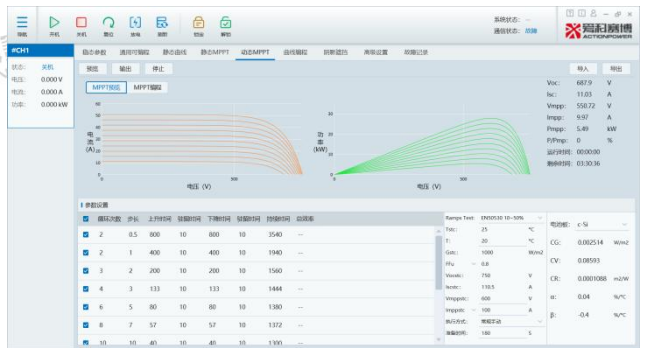
Static Curve-Sandia Interface



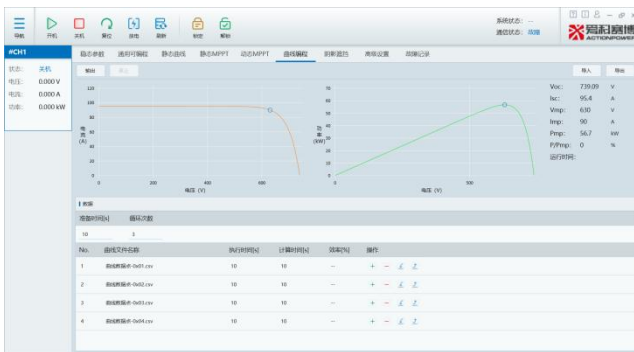
Static Curve-EN50530 Interface



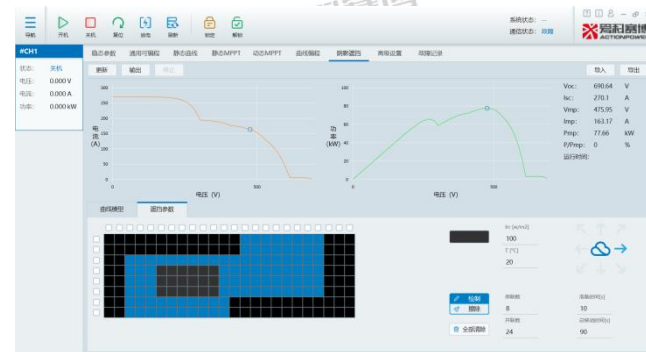
Static MPPT interface



Dynamic MPPT interface



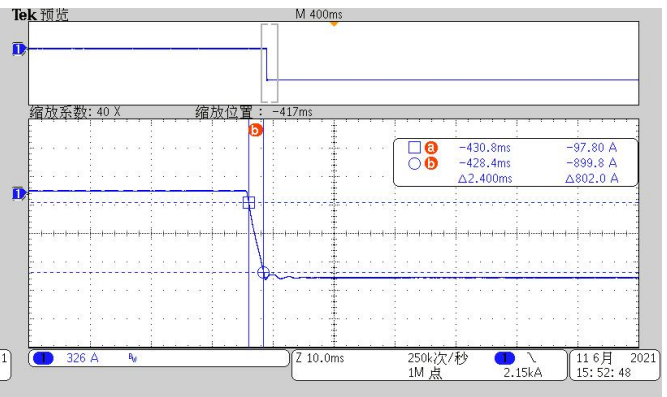
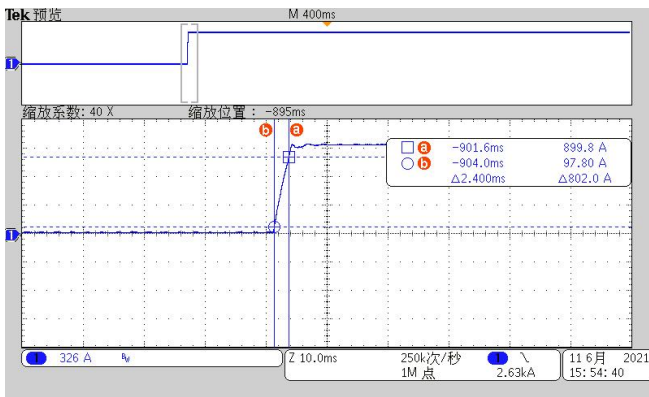
Curve Programming Interface



Shadow Barrier Interface

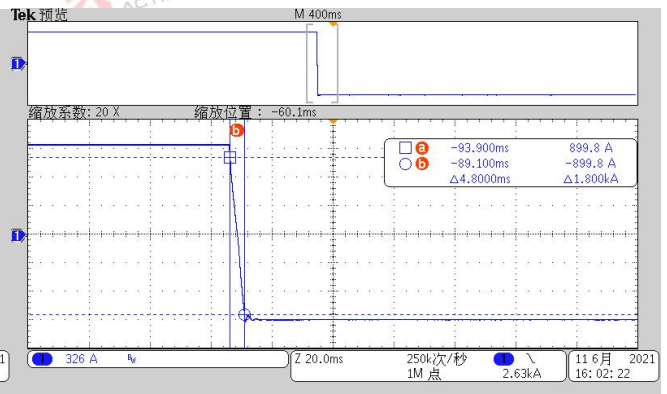
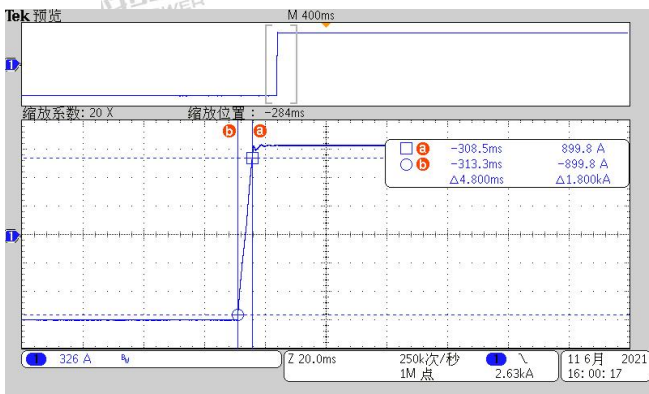
3.2 High Dynamics

The rise/drop time at 10%~90% load is less than 2.5ms, and the switching time at +90%~90% load is less than 5ms. The voltage slew rate can reach 200V/ms.



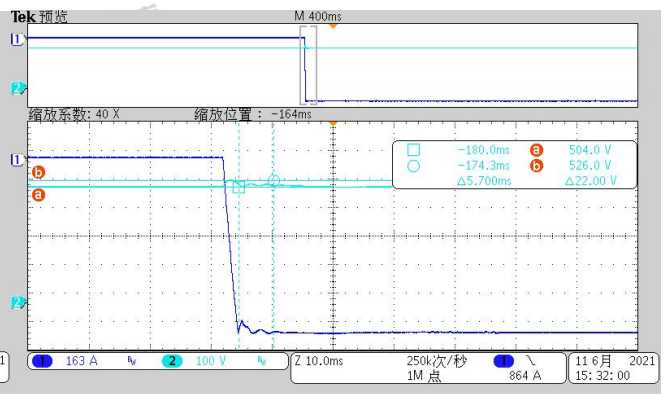
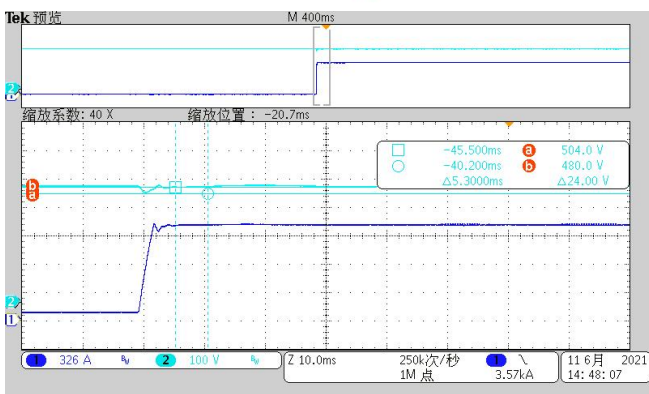
Rise time at 10%~90% current is 2.4ms

Drop time at 90%~10% current is 2.4ms



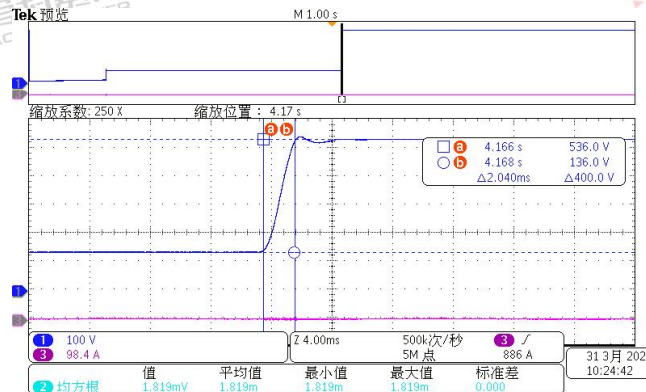
Switching time at -90%~+90% current is 4.8ms.

Switching time at +90%~-90% current is 4.8ms



500V transient loading voltage fluctuation is 24V

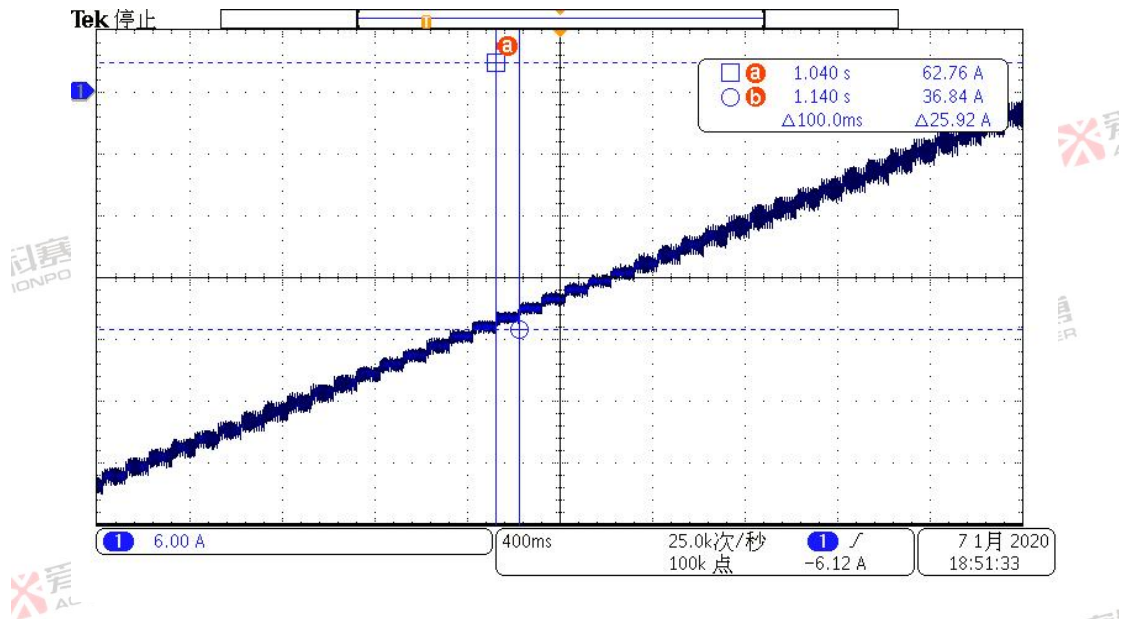
500V transient unloading voltage fluctuation is 22V



Voltage slew rate: 200V/ms: 136V~536V, change time: 2.04ms

3.3 Quick Switching

Two groups of I-V curves can be switched quickly (in 100ms) with the optimized communication transmission mode, to accurately simulate the rapid change characteristics tracking of dynamic MPPT.



Curve switching

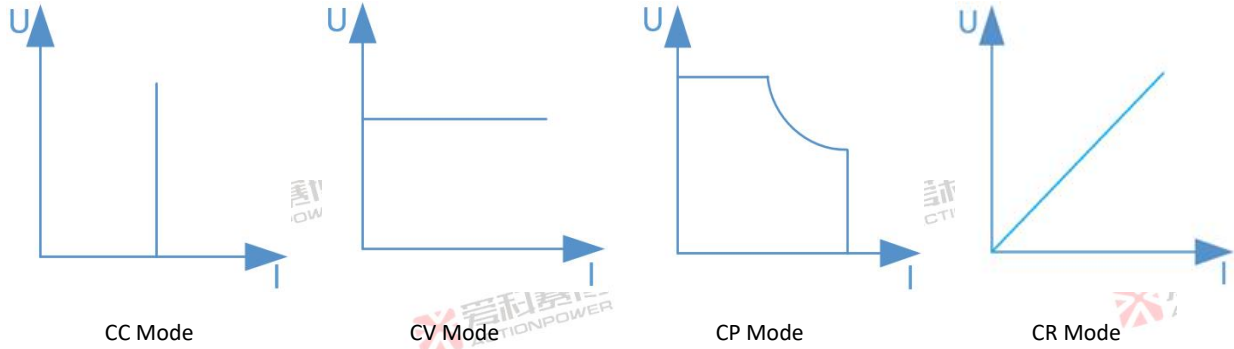
4. Product Function

4.1 Multiple Output Modes

The power supply provides four output modes: CC constant current mode, CV constant voltage mode, CP constant power mode and CR constant resistance mode.

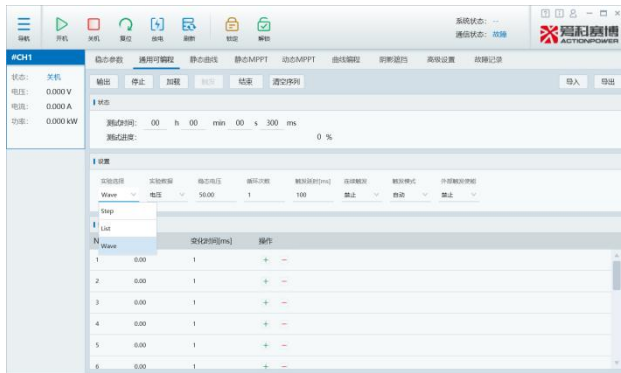


Stable-state Parameter Setting Interface

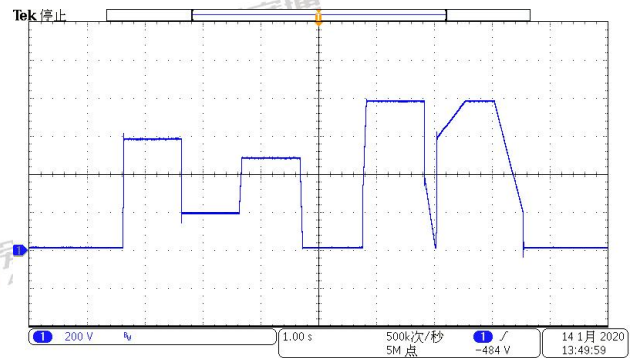


4.2 Universal Programmable Function

It supports up to 200 programming steps, and the whole program can be repeated for 999 times. The output voltage, current, and power can be programmed and output according to the customer's requirements. The advanced output modes can be combined by Step, List, Wave, programming steps, variation time, cycle times etc., to meet the test requirements under complex conditions, and can be used for programming tests of various parameters such as voltage, current and power. Programming data has memory function and supports import and export.



Universal Programmable Interface



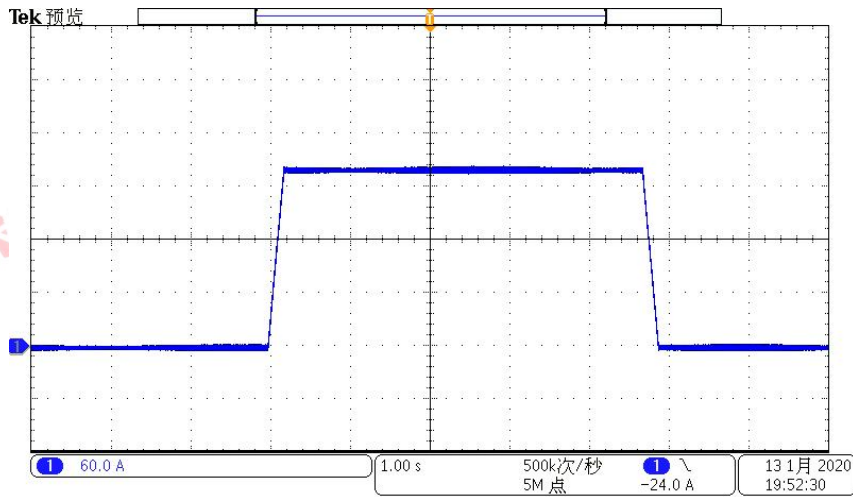
Programming Waveform Example

4.3 Wide-voltage Output

The max output voltage of traditional power supplies is equal to the nominal voltage, while the max output voltage of the power supply from Actionpower far exceeds the nominal voltage. The output mode keeps constant power (CP) while the output voltage of the power supply is higher than the nominal voltage, therefore maximizing the output capacity of the power supply.

4.4 Output Slow Start Function

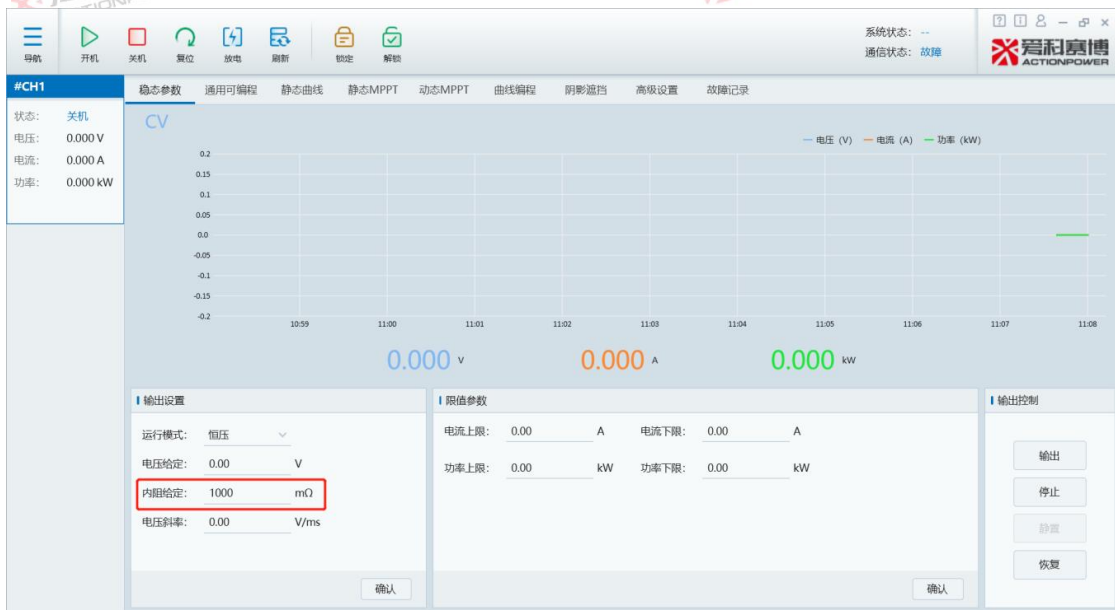
The rising/dropping slope of the power supply's output voltage/current/power can be adjusted to control the speed of power supply output rise or fall, reducing the surge impact of the power supply on the test object.



Current slow start

4.5 Internal Resistance Function

The power supply can set the internal resistance for testing in special circumstances, such as compensating for the voltage drop caused by longer connecting cables, ensuring that the load can obtain the desired voltage value.



Internal Resistance Setting Interface

4.6 Complete Protection Mechanisms

The power supply features multiple protection mechanisms, including OC, OV, OP, and OT protection functions. The values for output protection can be configured to ensure the safety of both the power supply and the load. The fault function enables complete recording of the fault information of the power supply, with up to 200 of recorded information, and provides the fault inquiry instructions to facilitate secondary integration of tracking and maintenance functions for power supply faults.

4.7 Parallel Function

Multiple power supplies of the same model can be installed in parallel, and high-speed fiber optic communication technology is adopted to ensure high interference resistance and no delay. The highest output power of ABS in parallel can reach to 8MW. Moreover, the technical standards are equivalent to those of single unit, and to provide users test scenario reconstruction with multi-station, multi-capacity and multi-voltage class, and greatly improve test efficiency for customers.

5. Technical Specification

Category	
Basic Parameters	
Output mode	CV, CC, CP, programming and PV standard (EN50530\Sandia) dynamic & static MPPT tracking, PV array
Energy feedback	Receive load energy and feed it back to the grid
Isolation function	Electrical isolation of input and output
Parallel function	Multiple sets of the same model can be connected in parallel
DC output	
Voltage	
Resolution(V)	0.01
Accuracy	±0.1% F.S.
Effective ripple value	0.1% F.S (resistive load)
Voltage slew rate	200V/ms
Current	
Resolution (A)	0.01
Accuracy	±0.1% F.S.
Effective ripple value	0.2% F.S. (resistive load)
Rise time	2.5 ms (10%-90% rated current)
Switching time	5ms (switching from -90% to +90%)
I-V Curve	
Open-circuit voltage setting range	12~1200V
	20~2000V
Short-circuit current setting range	1A~Ie
Simulation fill factor range	0.3~0.95
Photovoltaic panel type	c-si, Thin-film, user-defined
I-V curve update rate	100ms with online curve switching function
I-V curve editing	EN 50530, Sandia, and simple with user-defined curves; static MPPT curves; dynamic MPPT curves; shadow barrier; curve programming
Number of points on a single curve	4096 points

Curve setting	1) IV curves can be user-defined using parameters such as Voc, Isc, FF and Pm; 2) The I-V curve database is provided, with the number of curves ≥ 100 ; 3) IV curves in different situations can be continuously output in the dynamic operating mode with the environmental impacts such as temperature change and irradiance 4) The dynamic I-V curve test program under EN50530 is built-in;
Universal programmable	
Programming steps	200 steps
Programming parameters	Voltage/current, rise time, hold time, trigger pulse output
Rise time range	1ms-99999s
Flat top time range	1ms-99999s
Minimum programming time step	1ms
Editing mode	Add, delete, import, export
Operation mode	Run, stop, loop
Trigger mode	Automatic, manual, external
Measurement	
Voltage accuracy	$\pm 0.1\%$ F.S.
Voltage resolution (V)	0.001
Current accuracy	$\pm 0.1\%$ F.S.
Current resolution (A)	0.001
Power accuracy	$\pm 0.2\%$ F.S.
Power resolution (kW)	0.001
AC input	
Wiring mode	Three-phase four-wire ABC+PE
Frequency (HZ)	47 - 63
Voltage range (V)	380V $\pm 15\%$
Power factor	0.99 @ full load
Efficiency	Models of 300kW and above: $> 94\%$ Others: $> 90\%$
Harmonic current	$\leq 3\%$
Other Parameters	
Protection function	OVP, OCP, OPP, OTP, Phase loss protection
Communication interface	Standard configuration: LAN; optional: RS485, CAN
External interlocking	External interlocking input is normally on/off; external interlocking output is normally on/off.
Trigger signal	Trigger input/output
Control and display	Local touch screen control and remote computer control; display voltage, current, power and operation trend chart
Insulation and	10M Ω /DC500V; 3600VAC(5000VDC)/1min

withstanding voltage	
Cooling mode	Fan cooling
Operating temperature	-10℃~40℃
Relative humidity	10% to 90% RAH
Altitude	≤2000m

