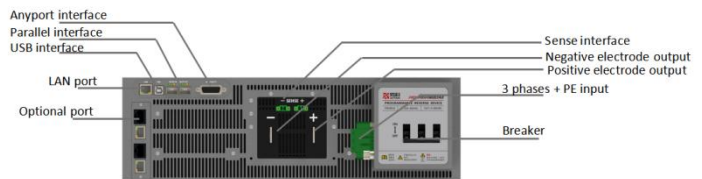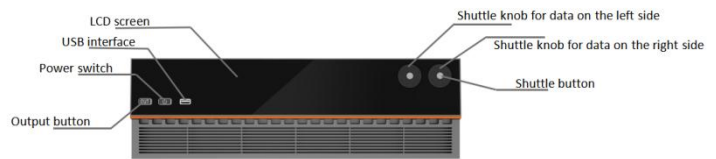# Programmable DC Power Supply
MODEL PVD

XI'AN ACTIONPOWER ELECTRIC CO., LTD.

Product Overview

With high precision, high dynamic and wide-ranging output of universal programmable DC power supply, the PVD series products can be used in photovoltaic inverter test solar panel simulation and common electrical power testing. Built-in independent high-precision voltage and current measurement system, as well as convenient programming, which bringing DC test instruments into new level.

Selection

Power	Model	Voltage	Current
30kW	PVD0224	200V	240A
	PVD0324	360V	240A
	PVD0518	500V	180A
	PVD0618	600V	180A
	PVD0808	800V	80A
	PVD1008	1000V	80A
	PVD1506	1500V	60A
	PVD2006	2000V	60A

LCD screen
USB interface
Power switch
Output button
Shuttle knob for data on the left side
Shuttle knob for data on the right side
Shuttle button

Anyport interface
Parallel interface
USB interface
LAN port
Optional port
Sense interface
Negative electrode output
Positive electrode output
3 phases + PE input
Breaker

Power	Model	Voltage	Current	Power	Model	Voltage	Current
20kW	PVD4V66E	40V	667A	15kW	PVD4V50E	40V	667A
	PVD6V66E	60V	667A		PVD6V50E	60V	667A
	PVD8V66E	80V	667A		PVD8V50E	80V	667A
	PVD0216E	200V	240A		PVD0212E	200V	160A
	PVD0316E	360V	240A		PVD0312E	360V	160A
	PVD0512E	500V	180A		PVD0509E	500V	120A
	PVD0612E	600V	180A		PVD0609E	600V	120A
	PVD0805E	800V	80A		PVD0804E	800V	54A
	PVD1005E	1000V	80A		PVD1004E	1000V	54A
	PVD1504E	1500V	60A		PVD1503E	1500V	45A
	PVD2004E	2000V	60A		PVD2003E	2000V	45A

Product Advantages

High dynamics

PVD model delivers dynamic performance in the order of 500μs to 1ms, capable to simulate field abnormal conditions in lab.
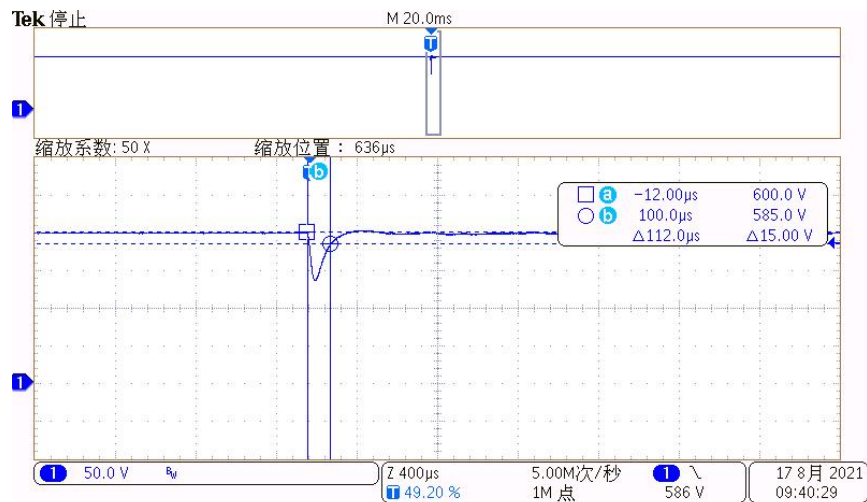
Transient full load, response time is 112μs

High accuracy

Up to 6½ digit measurement system; voltage and current accuracy up to mV/mA level.

PVD model has a built-in independent high precision voltage and current measurement system, with performance comparable to a 6½ digit multi-meter, which could save the cost for extra high precision DC voltmeter, high precision ammeter, power meter and impedance meter. The device data can be used as a basis for product performance judgement, and when used as a PV inverter tester, the high accuracy measurement system can more accurately

measure the tracking efficiency of the product under test.

PVD measuring voltage vs. 6½ digit multi-meter

Digital matrix parallel system

PVD model is equipped with a matrix, high-speed fiber-optic digital parallel system that can combine up to 100 units into a complete system, creating a total power up to 3000 kW. After parallel installation, the performance of the system still equivalent to the standards of a single machine.

PVD model is equipped with parallel redundancy, so that if some of the slave machines are protected on the non-output or AC side during operation, the remaining PVD can continue to work and actively distribute the current to ensure the normal conduct of the test.

Function Generation

All models of PVD series can superimpose sine, triangle, pulse and square waves on the DC output; the frequency resolution of the expected waveform output waveform is 0.01, up to 10kHz; the DC component value of the expected output waveform, with a resolution of 0.001; to meet the test article for DC voltage ripple adaptability testing.
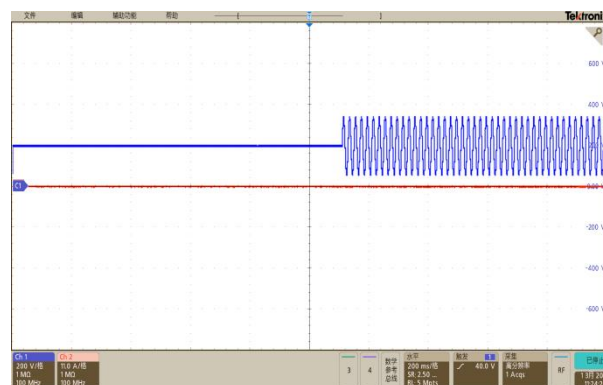
DC200V superimposed on AC100V sine wave

High power density: 3U/30kW

PVD model has the highest power density and feed-back efficiency compared to similar products, with up to 30kW of power in a 3U volume and a light weight of 35kg. A single standard 42U cabinet can be configured with 300kW capacity, and the matrix parallel system can be easily expanded to 3MW capacity, which greatly reduces the test fields and meets the transportation, load-bearing and power distribution requirements of standard commercial office buildings.

## Product Features

Function Programming

In addition to the traditional List, Wave, Step and Advanced programming functions, PVD model also supports function editing, sine wave, pulse wave, triangle wave and custom wave programming functions to meet the individual needs of product development and testing, regulatory testing and certification, production line testing and quality control.

The programming data can be saved and exported to another machine for operation, reducing the user's workload.
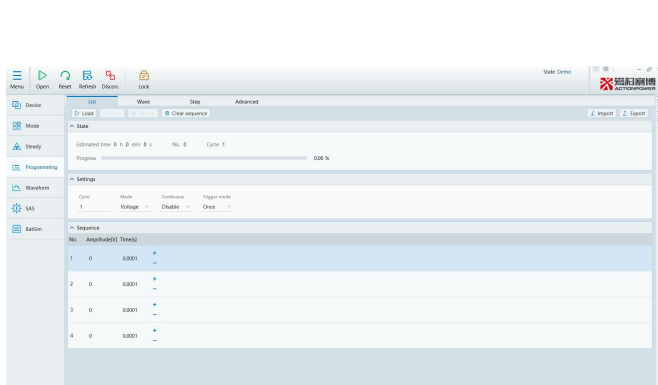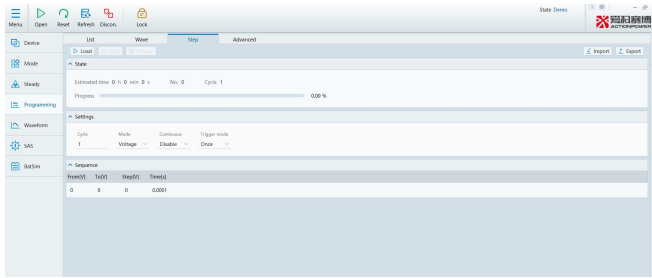

List programming interface
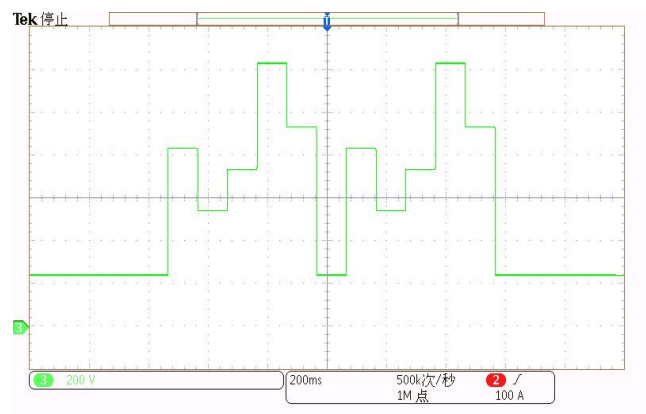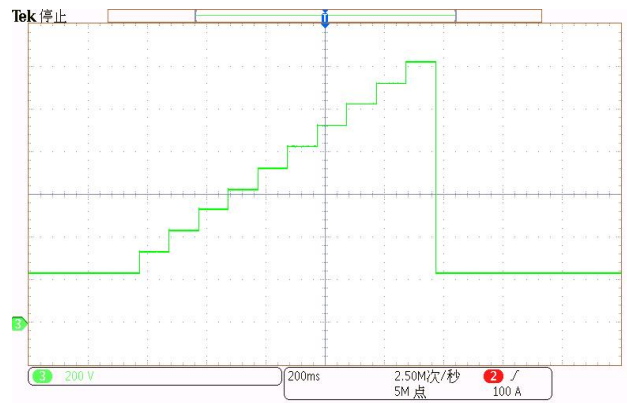

Programming waveform
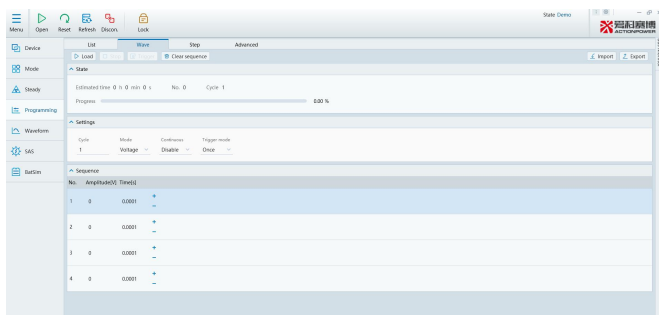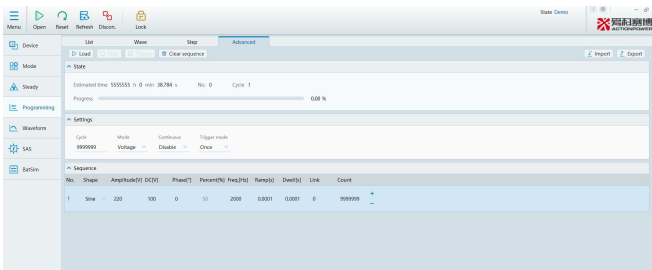

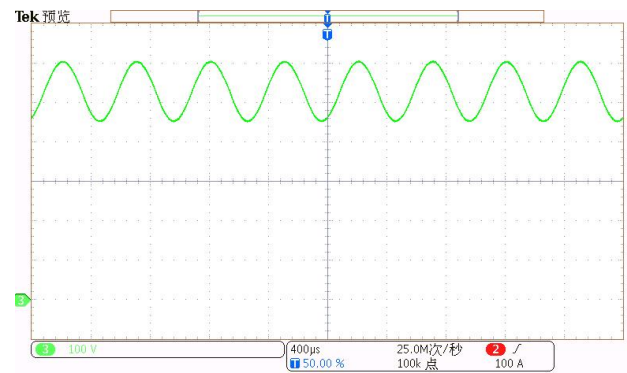Wave programming interface

Programming waveform
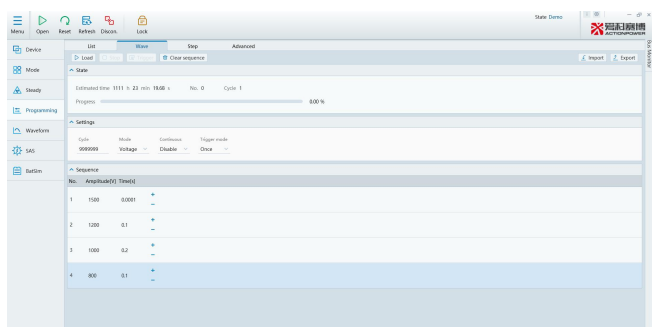
Step programming interface
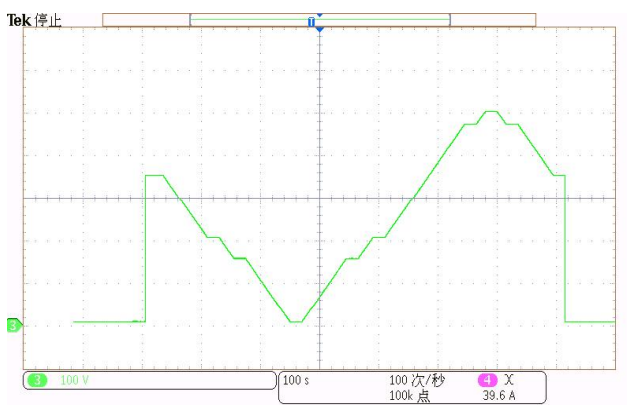

Programming waveform

Superimposed 2000Hz sine wave

Programming interface Programming waveform

VW80300 EHV-03 High Voltage Cycle

Programming Interface Programming Waveform

Four output modes

The PVD has four modes of constant voltage (CV), constant current (CC), constant power (CP) and constant resistance (CR) indication, of which the CC, CV and CP modes can be switched automatically according to the formula P=UI, i.e. the PVD will work in this mode when any of the voltage, current or power parameters at the output reaches the limit value

first.

CV mode　　　CC mode　　　CP mode　　　CR mode
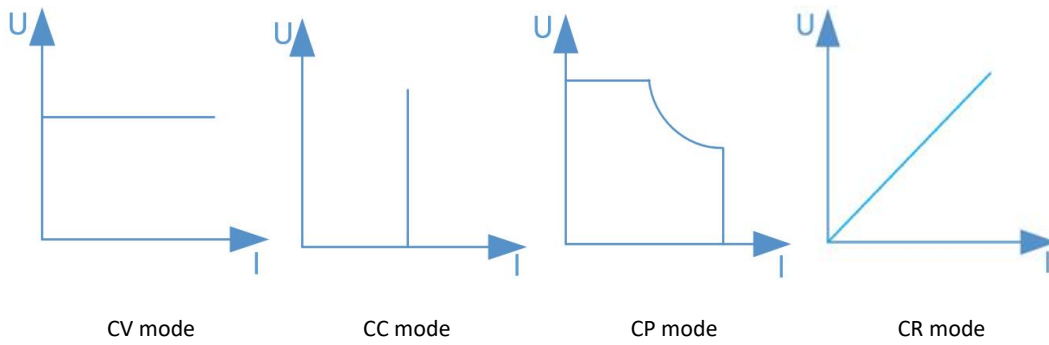
SAS model

The SAS solar cell simulator function can accurately simulate the output I-V characteristic curve of solar panels, with built-in SAS models from EN50530, Sandia, CGC/GF004, CGC/GF035 and other standards, for testing static and dynamic MPPT of PV inverters. For MPPT efficiency, the "Programmable Power Supply Virtual Terminal" software is required for complete testing of the PV industry.

Its high precision measurement and control system enables more accurate testing of the maximum tracking efficiency of solar inverters. The I-V curve can be simulated by setting parameters such as Voc and Isc. It supports the simulation of a wide range of panel types, with shading masking and custom curve editing functions. Built-in curves up to 4096 points to accurately simulate I-V curves. Log and report generation to record curve changes.
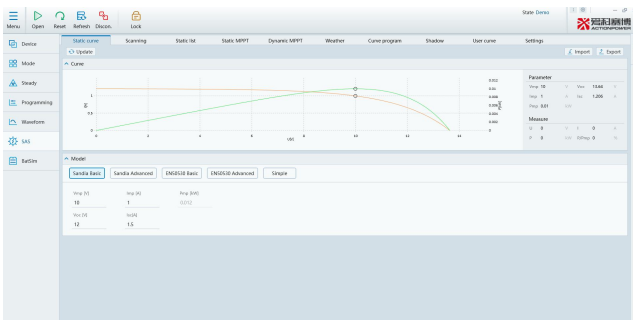
Static curves
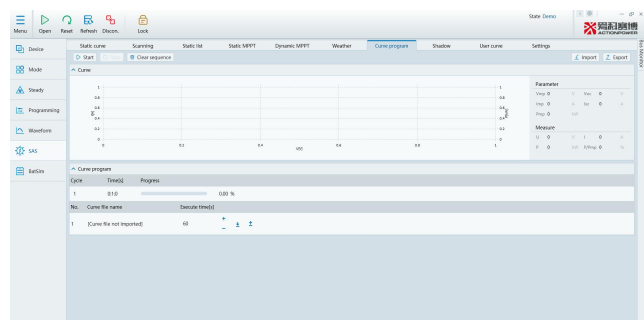
Curve programming
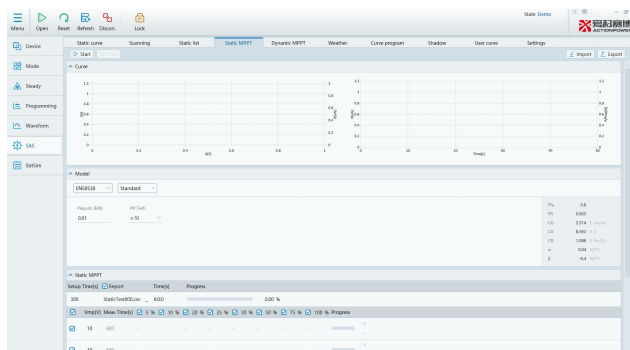
Static MPPT

Dynamic MPPT

Weather Simulation

Shading of photovoltaic panels

Curve import and export

Once a valid USB storage device is plugged in, clicking on the "USB" button will switch to the data import screen.
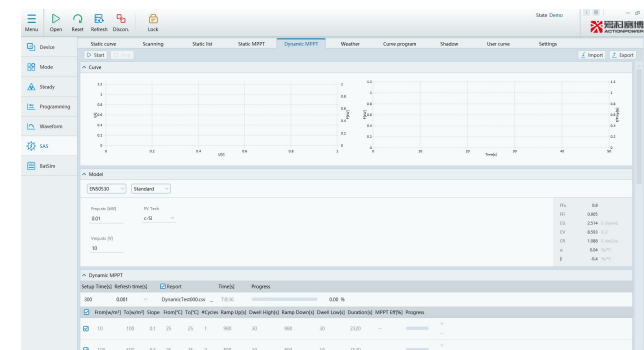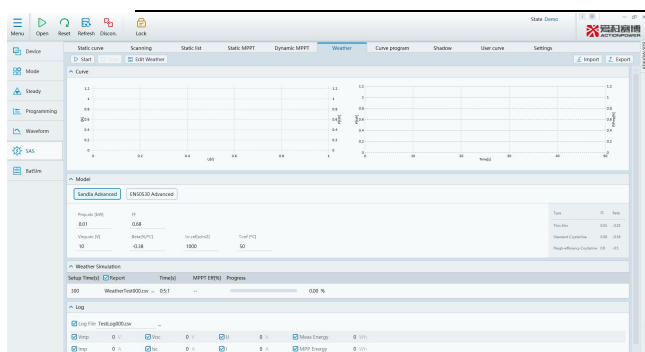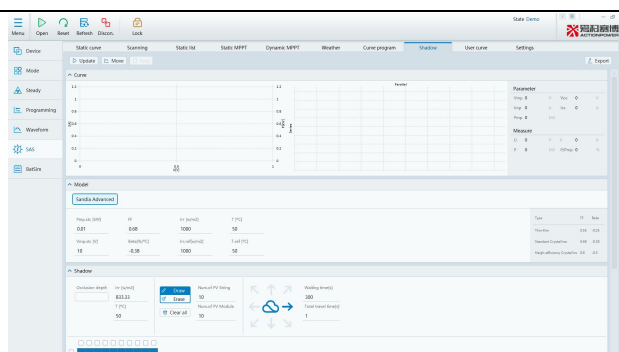
Press "Export" to export the static curve data from the device to an external USB memory device; the screen will display "Data export in progress..." If the operation is successful, "Data export successful!" will be displayed. ." will be displayed. If the export is successful, the display will be refreshed with a list of files.

Pressing "Import" will import the file from the currently selected external USB memory device into the device and the parameters in the file will be displayed on the screen; "Data import in progress..." will be displayed on the screen If the operation is successful, the display will show "Data imported successfully.
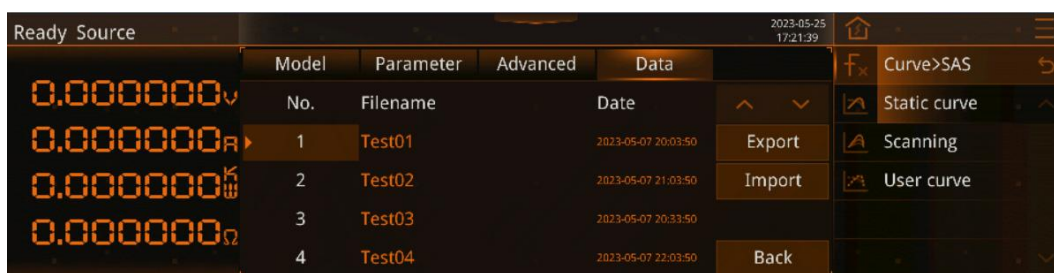
Waveform reproduction

The unique waveform reproduction function, which comes with its own display in the absence of an oscilloscope, provides an overview of the output status and solves the problem of temporarily viewing the output waveform.

Large aspect ratio touch screen

The PVD features an 8.8" screen, high resolution LCD touch display screen. It runs fast and is sensitive to touch. The user can operate and control the PVD by touching the display screen.
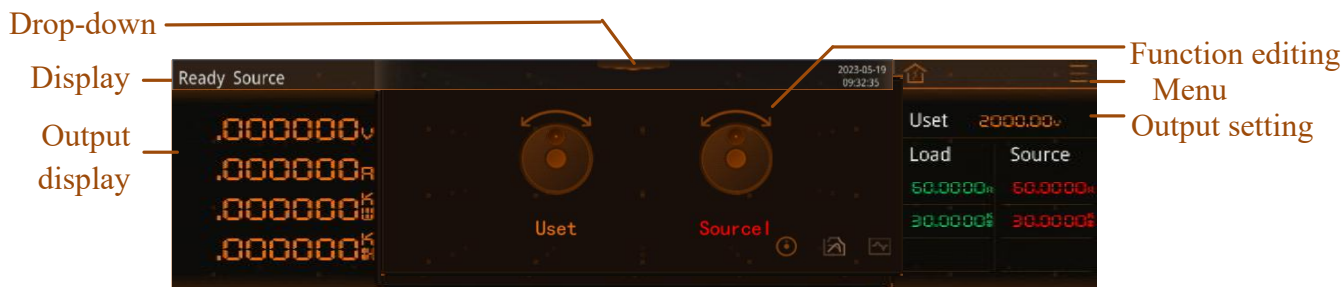
Dimensions

PVD models conform to a standard 19" chassis configuration and can be used in standard cabinet systems or desktop applications.

Cabinet models available: PVD-26U, PD-42U

Cabinet	Dimensions (W*D*H) mm	Range of applications
26U	600*800*1338	For 2-5 power supplies in parallel
42U	600*800*2050	For 5-8 power supplies in parallel

Specification

Output voltage	40V/60V/80V	200V/360V/800V/1000V		500V/600V1500V/2000V	
AC Input					
Voltage range	304Vac to 480Vac / 380V±20%				
Frequency	47Hz to 63Hz				
Wiring method	3ph+PE				
Inrush current	<50A				
Efficiency up to	93.5%	94%		95%	
Power Factor	0.99				
Protective functions					
OVP	Overvoltage protection adjustable 0 - 110% $U_{Nominal}$ (±1% F.S.)				
OCP	Overcurrent protection Adjustable 0V- ±110% $I_{Nominal}$ (±1% F.S.)				
OPP	Over-power protection range 0V ~ ±110% $P_{Nominal}$ (±1% F.S.)				
OT	Overtemperature protection				
Voltage					
Programming accuracy	± 0.02% F.S.				
Programming resolution	± 1mV	± 10mV		± 10mV	
Display accuracy	± 0.02% F.S.				
Line regulation CV	± 0.01% F.S. (208V-480V AC±10% input voltage, constant load and constant temperature)				
Load regulation CV	± 0.01% F.S. (0-100% load, constant input voltage and constant temperature)				
Ripple (rms) CV	<25mV	<60mV	<200mV	<200mV	<400mV
Ripple and noise p-p CV	<300mVpp	<480mVpp	<1000mVpp	<1200mVpp	<2400mVpp
Remote compensation	Max.voltage±1V	Max. voltage and 2%F.S.±1V			
Rise time 10%-90% CV	2.5ms	500µs		500µs	
Fall time 90%-10% CV	2.5ms	500µs		500µs	
Recovery time	Recovery to steady state within 2.5ms ±0.75% F.S. (25%-50% or 50% -25%) load	Recovery to steady state within 500µs ±0.75% F.S. (50% -100% or 100% -50% load)			
Discharge time	≤20s	≤20s		≤30s	
Current					
Programming accuracy	± 0.15% F.S.	± 0.02% F.S.		± 0.02% F.S.	
Programming resolution	± 100mA	± 10mA		± 10mA	
Display accuracy	± 0.15% F.S.	± 0.02% F.S.		± 0.02% F.S.	
Display resolution	± 10mA	± 1mA		± 1mA	
Line regulation CC	± 0.01% F.S. (208V-480V AC±10% input voltage, constant load and constant temperature)				
Load regulation CC	± 0.05% F.S. (0-100% load, constant input voltage and constant temperature)				

Rise time 10% - 90% CC	3ms	1ms	500μs
Full time 90% - 10% CC	1ms	1ms	500μs

Power			
Programming accuracy	± 30W	± 3W	±0.01% F.S.
Programming resolution	± 10W	± 1W	± 1W
Display accuracy	± 30W	± 3W	± 3W
Display resolution	± 10W	± 1W	± 1W

Resistance			
Range	0.003-100Ω	0.05-100Ω	0.5-3000Ω
Programming accuracy	1mΩ	0.01Ω	0.1Ω
Programming resolution	1mΩ	0.01Ω	0.1Ω

SAS	
Short-circuit current setting range	0A~Ie
Simulated fill factor range	0.3~0.95
Photovoltaic panel type selection	C-Si, Thin-film, Custom
I-V curve update rate	Typical time 1ms, with online curve switching function
IV curve criteria	EN50530, Sandia, simple
IV curve function	Static curves; curve scanning; static sequences; static MPPT; dynamic MPPT; weather simulation; Shading of photovoltaic panels; curve programming; custom curves etc.
Curve setting	1) IV curves can be customized with parameters such as Voc, Isc, FF and Pm; 2) Dynamic working mode takes into account environmental influences such as temperature changes and irradiance, and can continuously output IV curves for different environments; 3) Built-in EN50530/Sandia dynamic I-V curve test program；

Programming	
Programming mode	List, Wave, Step, Advanced
Number of programming steps	200
Cycle range	0~9999999 times
Minimum programming time	100μs
Mode of operation	Load, end, trigger

Interfaces/Any port	
Functions and definitions	See "Any port interface specification"
Isolation	707VDC

Interface	
Rear panel	Type-B USB, LAN, Share Bus, Magic-BUS, Magic-BOX DC terminal, AC supply, Remote sensing, Analog interface
Front panel	Type-A USB, ON/OFF Button, Out Button, Touch screen, Rotary knob

Environment	
Operating temperature	0 to 50 (°C) (power derating over 35°C)
Storage temperature	-20 to 70(°C)

Humidity	≤ 80%. Not condensing		
Height	Output current derating 2%/100m above 2000m or Ta derating 1°C/100m		
Insulation			
Negative - PE	±500 V DC	±1500VDC	±1500VDC
Positive - PE	+ 500 V DC	+ 1500VDC	+ 2000VDC
AC Input - PE	2.5 kV AC		
Other			
Size	W435mm x H132mm x D781mm		
Weight	40kg	35kg	35kg

Note: The above accuracy test conditions are: 25°C ± 5°C;

Ripple voltage/Ripple(peak)@20MHz bandwide;

Ripple voltage/Ripple (rms) @ 300kHz LF;

Voltage swing rate / Slew rate (Without load).