User manual V2.0

FRO Series Bidirectional Programmable DC Power Supply User Manual

FVO Series Programmable DC Power Supply User Manual

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ACTIONPOWER

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1...Contact Information

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2 Safety & Warranty Information

2.1 About this document

2.1.1 Retention and Use

This document is to be kept in the vicinity of the equipment for reference of the operation of the device. This document is to be delivered and kept with the equipment in case of change of location and/or user.

2.1.2 Copyright

Reprinting, copying, also partially, usage for other purposes as foreseen of this manual are forbidden and breach may lead to legal process

2.1.3 Validity

This manual is valid for the following eqiupment and its variants::

30kW Model				20kW Model				15kW Model			
PRD0518	PRD0618	PRD1506	PRD2006	PRD0512	PRD0612	PRD1504	PRD2004	PRD0509	PRD0609	PRD1503	PRD2003
PVD0518	PVD0618	PVD1506	PVD2006	PVD0512	PVD0612	PVD1504	PVD2004	PVD0509	PVD0609	PVD1503	PVD2003
PRD0224	PRD0324	PRD0808	PRD1008	PRD0216	PRD0316	PRD0805	PRD1005	PRD0212	PRD0312	PRD0804	PRD1004
PVD0224	PVD0324	PVD0808	PVD1008	PVD0216	PVD0316	PVD0805	PVD1005	PVD0212	PVD0312	PVD0804	PVD1004

20kW Model			15kW Model		
PRD4V66	PRD6V66	PRD8V66	PRD4V50	PRD6V50	PRD8V50
PVD4V66	PVD6V66	PVD8V66	PVD4V50	PVD6V50	PVD8V50

2.2 Limited Warranty

Xi'an Actionpower Electric Co., Ltd. shall guarantee free maintenance of the products manufactured and sold within one year from the date of delivery, if any failure or damage occurs under normal use.

During the guarantee period, the Company will not be responsible for free repair under the following circumstances, and the Company will charge fees after repair according to the repair condition:

Usage for purposes other than designed;

Use by untrained personnel;

Rebuilding by the customer;

Unauthorized parts were used;

Products not directly sold by us or our authorized agents;

Disassemble and repair or modify or add accessories without the consent of the company, resulting in failure or damage;

Failure or damage caused by an irresistible disaster or attributable to the user's failure to comply with the operating manual or the user's fault, such as improper operation or other disposal.

During the Warranty period, User shall be responsible for the delivery of faulty or damaged products to Company at User's expense and Company's expense after repair to User (only in Mainland China) or its designated place (only in Mainland China).

This Warranty is exclusion of all other warranties, expressed or implied.

2.3 Safety Information

2.3.1 Safety Mark

Warning and safety notices as well as general notices in this document are shown in a box with a symbol as follows:

	Prompt; Be sure to load the user manual of this product carefully first
	Notice! Important operation tips, product hazards, high voltage hazards/electric shock hazards
	Warning! Endangering personal and life safety

General safety precautions:

	The equipment must only be used as intended; The equipment is only approved for use within the connection limits stated on the product label Do not insert any object, particularly metallic, through the ventilator slots; Avoid any use of liquids near the equipment; Protect the device from wet, damp and condensation; When operating the device as power supply: do not connect loads, particularly such with low resistance, to the device while the DC output is switched on; sparking may occur which can cause burns as well as damage to the equipment and to the load; When operating the device as electronic load: do not connect power sources to the device while the DC input is switched on; sparking may occur which can cause burns as well as damage to the equipment and to the source.; ESD regulations must be applied when plugging interface cards or modules into the relative slot; Interface cards or modules may only be attached or removed after the device is switched off. It's not necessary to open the device. Always configure the various protecting features against overcurrent, overpower etc. for sensitive loads to what the target application requires; Before operate the device: must set various protection functions to avoid over voltage, over current, over power and other parameters to match the load that has been connected to the product Never connect external power sources to the DC terminal that can generate a higher voltage than the rated voltage of the device; It's not allowed to run the device on AC sources. It must only be connected to a power grid!!

Warning details:

	Electrical equipment operation means that some parts can be under dangerous voltage. Therefore all parts under voltage must be covered! Never touch cables or connectors directly after unplugging from mains supply as the danger of electric shock remains! Never touch the contacts on DC terminal directly after switching the device off, because when running in source mode there still can be dangerous voltage present! There can be dangerous potential between DC minus to PE or DC plus to PE due to charged X capacitors, even when the DC output/input is not switched on and the device is still running. Never touch PE and any of the DC poles at the same time with bare hands! Always follow 5 safety rules when working with electric devices: Disconnect completely! Secure against reconnection! Verify that the system is dead! Carry out earthing and short-circuiting! Provide protection from adjacent live parts! When the product is running, In situations where the device works in source mode, the output voltage can remain at the last setting after switching the DC output off again,! When the product is running, Even with the DC terminal being switched off, he device can generate a small, not loadable voltage (< 2 V) on this terminal!

2.3.2 Safety Rules

Do not install or replace replacement parts yourself, or perform any unauthorized modifications. If repairs are required, please return the instrument to the company's maintenance department for repairs to ensure its safety features

Please refer to the specific warnings or precautions provided in the user manual to avoid personal injury or device damage.

In order to prevent electric shock, it is strictly prohibited to disassemble the machine without the professional personnel authorized by the company.

Do not use this product on life support systems or any other equipment with safety requirements.

It is not responsible for any direct or indirect financial loss that may occur in the use of this product.

2.3.3 Safety Notices

The following general safety precautions must be observed during all phases of operation,service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture,and intended use of the instrument. Xi'an Actionpower Electric Co., Ltd. assumes no liability for the customer's failure to comply with these requirements.

WARNING: CLASS I INSTRUMENT

This product is a Safety Class 1 instrument (provided with a protective earth terminal). The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

WARNING: ENVIRONMENTAL CONDITIONS

This product is intended for installation in pollution degreel 2, altitudes of up to 2000 meters , the overvoltage is OVC II environments only, avoid direct sunlight, dust, flammable and explosive gas and strong magnetic field indoor environment use. It is designed to operate at temperature 0-40℃ and a maximum relative humidity of 75%.

CAUTION: BEFORE APPLYING POWER

Verify that the product AC input specifications noted on the model tag matches the available utility line voltage and frequency.。

SAFETY NOTICE: GROUNDING

This product is a Safety Class Ⅰ instrument (provided with a protective earth terminal). To minimize shock hazard, the instrument chassis or cabinet must be connected to an electrical safety ground. The instrument must be connected to the AC power supply mains through a properly rated three phase power cable with protective earth (L1-L2-L3-E).

Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

This instrument is equipped with a line filter to reduce electromagnetic interference and must be properly grounded to minimize electric shock hazard. Operation at line voltages or frequencies in excess of those stated on the model type plate may cause leakage currents in excess of 5.0 mA peak.


WARNING: DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the instrument in the presence of flammable gases or fumes.


AVERTISSEMENT:DISCONNECT DEVICE

The AC input connections must include a disconnect device (an external switch or circuit-breaker)as part of the installation. The disconnect device must be suitably located and easily reached and must be marked as the disconnecting device for the equipment. The disconnect device mustdisconnect all line conductors simultaneously.

An external overcurrent protection must be provided (by, e.g., fuses or circuit breaker)..

The breaking capacity of the overcurrent protection device should be compatible with the current rating of the installation.

A minimum of basic insulation is required between mains-connected parts of opposite polarity on the supply side of the overcurrent protection device.

Overcurrent protection devices shall not be fitted in the protective conductor. Fuses or single pole circuit-breakers shall not be fitted in the neutral conductor of multi-phase equipment.Installation should be in accordance with GB19517-2009.

After disconnecting grid power, ALWAYS use a Digital Voltmeter (DMM) in VDC Mode to check for any residual DC voltage from each Line terminal to the Chassis ground stud to check for safe voltage levels (< 5 Vdc) before touching the unit or any terminal blocks or pins.

Figure 1-Power Port Residual Voltage Check Diagram

WARNING: DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to a Xi' an Actionpower Electric Co., Ltd. Source Customer and Service Office for service and repair to ensure that safety features are maintained.

Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

. CAUTION: INSTRUMENT LOCATION

Do not position this instrument in such a way as to block easy access to any mains disconnect device or in any way that makes it difficult to operate the mains disconnect device.

CAUTION: KEEP SURFACE CLEAN AND DRY;

CAUTION: DO NOT PLACE HEAVY OBJECTS ON DEVICE HOUSING

CAUTION: AVOID SERIOUS IMPACT OR IMPROPER DISPOSAL;

CAUTION: DO NOT BLOCK THE VENTS ON THE SIDE AND FRONT/REAR PANELS

WARNING: TO PREVENT FIRE, ONLY FUSES OF THE SPECIFIED SPECIFICATIONS OF THIS PRODUCT ARE ALLOWED

CAUTION: KEEP CLEAN

Please do not maintain and clean this product with electricity, otherwise there is danger of electric shock. Wet a soft cloth with mild detergent and water. Do not spray the detergent directly. Do not use chemicals or cleaners containing abrasive products such as benzene, toluene, xylene and acetone.

Non-professional personnel are not allowed to repair and maintain the product. Otherwise, personal injury or equipment damage will be caused.

WARNING: DO NOT OPEN THE SHELL FOR OPERATION OR MAINTENANCE UNTIL 10 MINUTES AFTER POWER FAILURE

The product is designed with electrolytic capacitors, which can discharge for a long time after power failure. Therefore, professionals need to discharge the electrolytic capacitor after power off or wait until the voltage drops to the safe voltage 10 minutes later before performing operations or maintenance to prevent electric shock caused by the remaining voltage.

3 Product Overview

This chapter provides an overview of the product..

3.1 General Description

The product incorporating the function of a power supply and an electronic load into one unit. Switching between source and sink operation is seamless and without delay at zero point, can simplify the power conifg and system complexity. It is also a high precision, high dynamic, easy to use recovery type DC programmable source/load product. With industry-leading power density, independent high precision measurement system, good industry load adaptability. Switching

The sink feature furthermore includes an energy recovery function, which inverts the consumed DC energy with an efficiency of up to 95% and feeds it back into the local mains.

In addition to the basic source/load function, the product also has built-in function generator function, program function, and support sine wave, rectangular wave, triangle wave, custom wave and so on. At the same time with waveform point editing function, support U disk import/export.

For remote control the devices are provided as standard with USB and Ethernet ports on the rear side, as well as a galvanically isolated analog interface.

This product can be added to the built-in interface module Maigc-Bus, to extend the standard RS232, RS485, CAN and other standard industry bus.

Equipped with a matrix high speed fiber digital parallel system, the product can combine up to 100 units into a complete system, resulting in a total power of up to 3000 kW. The parallel system can still achieve the performance standard of single machine.

For details about the product performance parameters, see "3.5 Technical Parameters ". These data are typically measured at ambient temperatures of 20℃-30℃, rated input, rated output, and resistance load conditions.

Note: The bidirectional characteristics described above are only valid for PRD series products.

3.2 Appearance

The product is a standard 19-inch structure and can be placed on a standard cabinet system or desktop. The dimensions are shown in Figure 2 and Figure 3.

Figure 2-PRD Size

Figure 3-PVD Size

3.3 Features

Setting and measuring system up to 6 1/2 Bit;

Voltage/current accuracy up to mV/mA;

Power resolution up to 0.1W;

Dynamic response time in the order of 100 us;

Performance indicators of 3MW capacity expansion are not derated;

Intelligent Magic-Box, Magic-Bus module, quickly adapt to industry standards;

3.4 Block Diagram

This product uses high-frequency power conversion devices to improve the performance index to a new height. Figure 4 shows the function blocks for this models.

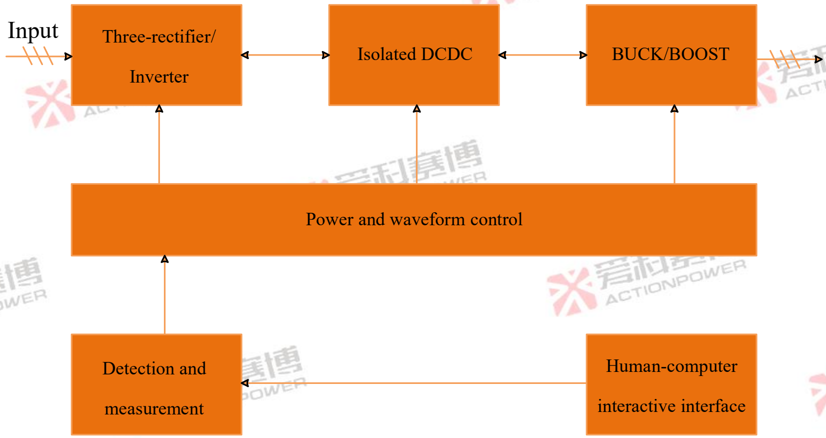


Figure 4-Product Block Diagram

3.5 Technical Specifications

Table 1 shown here apply at an ambient temperature of 25° C ± 5° C.

Table 1-Technical specifications

Parameter / Mode	30kW Model				20kW Model				15kW Model			
	PRD0518	PRD0618	PRD1506	PRD2006	PRD0512	PRD0612	PRD1504	PRD2004	PRD0509	PRD0609	PRD1503	PRD2003
AC Supply												
Voltage Range	304Vac~480Vac/380V±20%											
Frequency	47Hz ~ 63Hz											
Connection	3ph+PE											
Inrush Current	<50A											
Efficiency	~ 95%											
Power Factor	~ 0.99											
DC terminal												
Max.Voltage(F.S.)	500V	600V	1500V	2000V	500V	600V	1500V	2000V	500V	600V	1500V	2000V
Max.Current(F.S.)	±180A	±180A	±60A	±60A	±120A	±120A	±40A	±40A	±90A	±90A	±30A	±30A
Max.Power(F.S.)	±30kW	±30kW	±30kW	±30kW	±20kW	±20kW	±20kW	±20kW	±15kW	±15kW	±15kW	±15kW
OverVoltage Protection Range	0 ~rated 110%(±1%F.S.)											
OverVoltage Protection Range	0 ~rated ±110%(±1%F.S.)											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PRD0518	PRD0618	PRD1506	PRD2006	PRD0512	PRD0612	PRD1504	PRD2004	PRD0509	PRD0609	PRD1503	PRD2003
OverVoltage Protection Range	0 ~rated ±110%(±1%F.S.)											
Voltage regulation												
Adjustment Range	0-550V	0-650V	0-1550V	0-2050V	0-550V	0-650V	0-1550V	0-2050V	0-550V	0-650V	0-1550V	0-2050V
Setting Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Setting Accuracy(at 25℃±5℃)	± 10mV											
Display Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Display Resolution(at 25℃±5℃)	1mV	1mV	10mV	10mV	1mV	1mV	10mV	10mV	1mV	1mV	10mV	10mV
Line regulation(±10%Uac)	± 0.01%F.S.											
Load regulation(0V~100%F.S.)ΔIOUT	± 0.01%F.S.											
Remote sensing compensation	Max.Voltage and 2%F.S.±1V											
Rise time(10-90%)F.S.	500μs											
Transient time after (50%F.S.)	Recovery to steady state ±0.75% F.S. within 500μs with 50% to 100% or 100% to 50% load change											
Ripple(peak)@20MHz bandwide	1Vpp	1Vpp	2.4Vpp	2.4Vpp	1Vpp	1Vpp	2.4Vpp	2.4Vpp	1Vpp	1Vpp	2.4Vpp	2.4Vpp
Ripple(rms)@300kHz LF	0.2Vrms	0.2Vrms	0.4Vrms	0.4Vrms	0.2Vrms	0.2Vrms	0.4Vrms	0.4Vrms	0.2Vrms	0.2Vrms	0.4Vrms	0.4Vrms
Fall time without load	10-30s											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PRD0518	PRD0618	PRD1506	PRD2006	PRD0512	PRD0612	PRD1504	PRD2004	PRD0509	PRD0609	PRD1503	PRD2003
Slew rate(Without load)	1.2kV/ms	1.5kV/ms	5kV/ms	5kV/ms	1.5kV/ms	1.5kV/ms	5kV/ms	5kV/ms	1.5kV/ms	1.5kV/ms	5kV/ms	5kV/ms
Slew rate(Full load)	0.5kV/ms	0.5kV/ms	1.5kV/ms	1.5kV/ms	0.5V/ms	0.5kV/ms	1.5kV/ms	1.5kV/ms	0.5kV/ms	0.5kV/ms	1.5kV/ms	1.5kV/ms
Current regulation												
Adjustment Range	0-±189A	0-±189A	0-±63A	0-±63A	0-±126A	0-±126A	0-±42A	0-±42A	0-±94.5A	0-±94.5A	0-±31.5A	0-±31.5A
Setting Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Setting Accuracy(at 25℃±5℃)	± 10mA											
Display Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Display Resolution(at 25℃±5℃)	1mA											
Line regulation(±10%Uac)	± 0.01%F.S.											
Load regulation(0V~100%F.S.)ΔUOUT	± 0.05%F.S.											
Rise time(10-90%)F.S.	500μs											
Power regulation												
Adjustment Range	0-30kW	0-30kW	0-30kW	0-30kW	0-20kW	0-20kW	0-20kW	0-20kW	0-15kW	0-15kW	0-15kW	0-15kW
Setting Accuracy(at 25℃±5℃)	± 0.01%F.S.											
Setting Accuracy(at 25℃±5℃)	± 1W											
Display Accuracy(at 25℃±5℃)	± 3W											

Parameter / Mode	30kW Model				20kW Model				15kW Model			
	PRD0518	PRD0618	PRD1506	PRD2006	PRD0512	PRD0612	PRD1504	PRD2004	PRD0509	PRD0609	PRD1503	PRD2003
Display Resolution(at 25°C±5°C)	± 1W											
Resistor regulation												
Adjustment Range	0.5-3000Ω											
Setting Accuracy(at 25°C±5°C)	0.1Ω											
Setting Accuracy(at 25°C±5°C)	0.1Ω											
Display Accuracy(at 25°C±5°C)	0.1Ω											
Display Resolution(at 25°C±5°C)	0.1Ω											
Anyport												
Signals	See“Anyport interface specification”											
Isolation	707VDC											
Interfaces												
Rear	Type-B USB、LAN、Share Bus、Magic-BUS、Magic-BOX DC terminal、AC supply、Remote sensing、Analog interface											
Front	Type-A USB、ON/OFF Button、Out Button、Touch screen、Rotary knob											
Ambient												
Operation temperature	0 °C~50°C(Power derating over 35°C)											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PRD0518	PRD0618	PRD1506	PRD2006	PRD0512	PRD0612	PRD1504	PRD2004	PRD0509	PRD0609	PRD1503	PRD2003
Memory temperature	-20 °C~70 °C											
Humidity	≤ 80%. Not condensing											
Altitude	Output current derating 2%/100m or Ta derating 1°C/100m above 2000m											
Safety												
Standards	EN 61010-1:2007-11, EN 50160:2011-02 EN 61000-6-2:2016-05, EN 61000-6-3:2011-09											
EMC	IEC/EN 61204-3											
Insulation												
Negative DC to PE	±1500 V DC											
Positive DC to PE	+2000 V DC											
AC input <-> PE	2.5 kV AC											
other												
Dimensions	W435mm x H132mm x D670 mm(770mm With Breaker)											
weight	35kg											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PVD0518	PVD0618	PVD1506	PVD2006	PVD0512	PVD0612	PVD1504	PVD2004	PVD0509	PVD0609	PVD1503	PVD2003
\AC Supply												
Voltage Range	304Vac~480Vac/380V±20%											
Frequency	47Hz ~ 63Hz											
Connection	3ph+PE											
Inrush Current	<50A											
Efficiency	~ 95%											
Power Factor	~ 0.99											
DC terminal												
Max.Voltage(F.S.)	500V	600V	1500V	2000V	500V	600V	1500V	2000V	500V	600V	1500V	2000V
Max.Current(F.S.)	180A	180A	60A	60A	120A	120A	40A	40A	90A	90A	30A	30A
Max.Power(F.S.)	30kW	30kW	30kW	30kW	20kW	20kW	20kW	20kW	15kW	15kW	15kW	15kW
OverVoltage Protection Range	0V ~rated 110%(±1%F.S.)											
OverVoltage Protection Range	0V ~rated 110%(±1%F.S.)											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PVD0518	PVD0618	PVD1506	PVD2006	PVD0512	PVD0612	PVD1504	PVD2004	PVD0509	PVD0609	PVD1503	PVD2003
OverVoltage Protection Range	0V ~rated 110%(±1%F.S.)											
Voltage regulation												
Adjustment Range	0-550V	0-650V	0-1550V	0-2050V	0-550V	0-650V	0-1550V	0-2050V	0-550V	0-650V	0-1550V	0-2050V
Setting Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Setting Accuracy(at 25℃±5℃)	± 10mV											
Display Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Display Resolution(at 25℃±5℃)	1mV	1mV	10mV	10mV	1mV	1mV	10mV	10mV	1mV	1mV	10mV	10mV
Line regulation(±10%Uac)	± 0.01%F.S.											
Load regulation(0V~100%F.S.)ΔIOUT	± 0.01%F.S.											
Remote sensing compensation	Max.Voltage and 2%F.S.±1V											
Rise time(10-90%)F.S.	500μs											
Transient time after (50%F.S.)	Recovery to steady state ±0.75% F.S. within 500μs with 50% to 100% or 100% to 50% load change											
Ripple(peak)@20MHz bandwide	1Vpp	1Vpp	2.4Vpp	2.4Vpp	1Vpp	1Vpp	2.4Vpp	2.4Vpp	1Vpp	1Vpp	2.4Vpp	2.4Vpp
Ripple(rms)@300kHz LF	0.2Vrms	0.2Vrms	0.4Vrms	0.4Vrms	0.2Vrms	0.2Vrms	0.4Vrms	0.4Vrms	0.2Vrms	0.2Vrms	0.4Vrms	0.4Vrms
Fall time without load	10-30s											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PVD0518	PVD0618	PVD1506	PVD2006	PVD0512	PVD0612	PVD1504	PVD2004	PVD0509	PVD0609	PVD1503	PVD2003
Slew rate(Without load)	1.5kV/ms	1.5kV/ms	5kV/ms	5kV/ms	1.5kV/ms	1.5kV/ms	5kV/ms	5kV/ms	1.5kV/ms	1.5kV/ms	5kV/ms	5kV/ms
Slew rate(Full load)	0.5kV/ms	0.5kV/ms	1.5kV/ms	1.5kV/ms	0.5kV/ms	0.5kV/ms	1.5kV/ms	1.5kV/ms	0.5kV/ms	0.5kV/ms	1.5kV/ms	1.5kV/ms
Current regulation												
Adjustment Range	0-189A	0-189A	0-63A	0-63A	0-126A	0-126A	0-42A	0-42A	0-94.5A	0-94.5A	0-31.5A	0-31.5A
Setting Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Setting Accuracy(at 25℃±5℃)	± 10mA											
Display Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Display Resolution(at 25℃±5℃)	1mA											
Line regulation(±10%Uac)	± 0.01%F.S.											
Load regulation(0V~100%F.S.)ΔUOUT	± 0.05%F.S.											
Rise time(10-90%)F.S.	500μs											
Power regulation												
Adjustment Range	0-30kW	0-30kW	0-30kW	0-30kW	0-20kW	0-20kW	0-20kW	0-20kW	0-15kW	0-15kW	0-15kW	0-15kW
Setting Accuracy(at 25℃±5℃)	± 0.01%F.S.											
Setting Accuracy(at 25℃±5℃)	± 1W											
Display Accuracy(at 25℃±5℃)	± 3W											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PVD0518	PVD0618	PVD1506	PVD2006	PVD0512	PVD0612	PVD1504	PVD2004	PVD0509	PVD0609	PVD1503	PVD2003
Display Resolution(at 25°C±5°C)	± 1W											
Resistor regulation												
Adjustment Range	0.5-3000Ω											
Setting Accuracy(at 25°C±5°C)	0.1Ω											
Setting Accuracy(at 25°C±5°C)	0.1Ω											
Display Accuracy(at 25°C±5°C)	0.1Ω											
Display Resolution(at 25°C±5°C)	0.1Ω											
Anyport												
Signals	See“Anyport interface specification”											
Isolation	707VDC											
Interfaces												
Rear	Type-B USB、LAN、Share Bus、Magic-BUS、Magic-BOX DC terminal、AC supply、Remote sensing、Analog interface											
Front	Type-A USB、ON/OFF Button、Out Button、Touch screen、Rotary knob											
Ambient												
Operation temperature	0 °C~50°C(Power derating over 35°C)											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PVD0518	PVD0618	PVD1506	PVD2006	PVD0512	PVD0612	PVD1504	PVD2004	PVD0509	PVD0609	PVD1503	PVD2003
Memory temperature	-20 °C~70 °C											
Humidity	≤ 80%. Not condensing											
Altitude	Output current derating 2%/100m or Ta derating 1°C/100m above 2000m											
Safety												
Standards	EN 61010-1:2007-11, EN 50160:2011-02 EN 61000-6-2:2016-05, EN 61000-6-3:2011-09											
EMC	IEC/EN 61204-3											
Insulation												
Negative DC to PE	±1500 V DC											
Positive DC to PE	+2000 V DC											
AC input <-> PE	2.5 kV AC											
other												
Dimensions	W435mm x H132mm x D670 mm(770mm With Breaker)											
weight	35kg											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PRD0224	PRD0324	PRD0808	PRD1008	PRD0216	PRD0316	PRD0805	PRD1005	PRD0212	PRD0312	PRD0804	PRD1004
AC Supply												
Voltage Range	304Vac~480Vac/380V±20%											
Frequency	47Hz ~ 63Hz											
Connection	3ph+PE											
Inrush Current	<50A											
Efficiency	~ 94%											
Power Factor	~ 0.99											
DC terminal												
Max.Voltage(F.S.)	200V	360V	800V	1000V	200V	360V	800V	1000V	200V	360V	800V	1000V
Max.Current(F.S.)	±240A	±240A	±80A	±80A	±160A	±160A	±54A	±54A	±120A	±120A	±40A	±40A
Max.Power(F.S.)	±30kW	±30kW	±30kW	±30kW	±20kW	±20kW	±20kW	±20kW	±15kW	±15kW	±15kW	±15kW
OverVoltage Protection Range	0V ~rated 110%(±1%F.S.)											
OverVoltage Protection Range	0V ~rated ±110%(±1%F.S.)											

Parameter / Mode	30kW Model				20kW Model				15kW Model			
	PRD0224	PRD0324	PRD0808	PRD1008	PRD0216	PRD0316	PRD0805	PRD1005	PRD0212	PRD0312	PRD0804	PRD1004
OverVoltage Protection Range	0V ~rated ±110%(±1%F.S.)											
Voltage regulation												
Adjustment Range	0-220V	0-380V	0-820V	0-1020V	0-220V	0-380V	0-820V	0-1020V	0-220V	0-380V	0-820V	0-1020V
Setting Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Setting Accuracy(at 25℃±5℃)	± 10mV											
Display Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Display Resolution(at 25℃±5℃)	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV
Line regulation(±10%Uac)	± 0.01%F.S.											
Load regulation(0V~100%F.S.)ΔIOUT	± 0.01%F.S.											
Remote sensing compensation	Max.Voltage and 2%F.S.±1V											
Rise time(10-90%)F.S.	500μs											
Transient time after (50%F.S.)	Recovery to steady state ±0.75% F.S. within 500μs with 10% to 60% or 60% to 10% load change											
Ripple(peak)@20MHz bandwide	0.48Vpp	0.48Vpp	1.2Vpp	1.2Vpp	0.48Vpp	0.48Vpp	1.2Vpp	1.2Vpp	0.48Vpp	0.48Vpp	1.2Vpp	1.2Vpp
Ripple(rms)@300kHz LF	0.06Vrms	0.06Vrms	0.2Vrms	0.2Vrms	0.06Vrms	0.06Vrms	0.2Vrms	0.2Vrms	0.06Vrms	0.06Vrms	0.2Vrms	0.2Vrms
Fall time without load	≤20s											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PRD0224	PRD0324	PRD0808	PRD1008	PRD0216	PRD0316	PRD0805	PRD1005	PRD0212	PRD0312	PRD0804	PRD1004
Slew rate(Without load)	200V/ms	200V/ms	600V/ms	600V/ms	200V/ms	200V/ms	600V/ms	600V/ms	200V/ms	200V/ms	600V/ms	600V/ms
Slew rate(Full load)	100V/ms	100V/ms	300V/ms	300V/ms	100V/ms	100V/ms	300V/ms	300V/ms	100V/ms	100V/ms	300V/ms	300V/ms
Current regulation												
Adjustment Range	0-±252A	0-±252A	0-±84A	0-±84A	0-±168A	0-±168A	0-±56.7A	0-±56.7A	0-±126A	0-±126A	0-±42A	0-±42A
Setting Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Setting Accuracy(at 25℃±5℃)	± 10mA											
Display Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Display Resolution(at 25℃±5℃)	1mA											
Line regulation(±10%Uac)	± 0.01%F.S.											
Load regulation(0V~100%F.S.)ΔUOUT	± 0.05%F.S.											
Rise time(10-90%)F.S.	500μs											
Power regulation												
Adjustment Range	0-30kW	0-30kW	0-30kW	0-30kW	0-20kW	0-20kW	0-20kW	0-20kW	0-15kW	0-15kW	0-15kW	0-15kW
Setting Accuracy(at 25℃±5℃)	± 3W											
Setting Accuracy(at 25℃±5℃)	± 1W											
Display Accuracy(at 25℃±5℃)	± 3W											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PRD0224	PRD0324	PRD0808	PRD1008	PRD0216	PRD0316	PRD0805	PRD1005	PRD0212	PRD0312	PRD0804	PRD1004
Display Resolution(at 25°C±5°C)	± 1W											
Resistor regulation												
Adjustment Range	0.05-100Ω											
Setting Accuracy(at 25°C±5°C)	0.01Ω											
Setting Accuracy(at 25°C±5°C)	0.01Ω											
Display Accuracy(at 25°C±5°C)	0.01Ω											
Display Resolution(at 25°C±5°C)	0.01Ω											
Anyport												
Signals	See“Anyport interface specification”											
Isolation	707VDC											
Interfaces												
Rear	Type-B USB、LAN、Share Bus、Magic-BUS、Magic-BOX DC terminal、AC supply、Remote sensing、Analog interface											
Front	Type-A USB、ON/OFF Button、Out Button、Touch screen、Rotary knob											
Ambient												
Operation temperature	0 °C~50°C(Power derating over 35°C)											

Parameter / Mode	30kW Model				20kW Model				15kW Model			
	PRD0224	PRD0324	PRD0808	PRD1008	PRD0216	PRD0316	PRD0805	PRD1005	PRD0212	PRD0312	PRD0804	PRD1004
Memory temperature	-20 °C~70 °C											
Humidity	≤ 80%. Not condensing											
Altitude	Output current derating 2%/100m or Ta derating 1°C/100m above 2000m											
Safety												
Standards	EN 61010-1:2007-11, EN 50160:2011-02 EN 61000-6-2:2016-05, EN 61000-6-3:2011-09											
EMC	IEC/EN 61204-3											
Insulation												
Negative DC to PE	±1500 V DC											
Positive DC to PE	+1500 V DC											
AC input <-> PE	2.5 kV AC											
other												
Dimensions	W435mm x H132mm x D670 mm(770mm With Breaker)											
weight	35kg											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PVD0224	PVD0324	PVD0808	PVD1008	PVD0216	PVD0316	PVD0805	PVD1005	PVD0212	PVD0312	PVD0804	PVD1004
AC Supply												
Voltage Range	304Vac~480Vac/380V±20%											
Frequency	47Hz ~ 63Hz											
Connection	3ph+PE											
Inrush Current	<50A											
Efficiency	~ 94%											
Power Factor	~ 0.99											
DC terminal												
Max.Voltage(F.S.)	200V	360V	800V	1000V	200V	360V	800V	1000V	200V	360V	800V	1000V
Max.Current(F.S.)	240A	240A	80A	80A	160A	160A	54A	54A	120A	120A	40A	40A
Max.Power(F.S.)	30kW	30kW	30kW	30kW	20kW	20kW	20kW	20kW	15kW	15kW	15kW	15kW
OverVoltage Protection Range	0V ~rated 110%(±1%F.S.)											
OverVoltage Protection Range	0V ~rated 110%(±1%F.S.)											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PVD0224	PVD0324	PVD0808	PVD1008	PVD0216	PVD0316	PVD0805	PVD1005	PVD0212	PVD0312	PVD0804	PVD1004
OverVoltage Protection Range	0V ~rated 110%(±1%F.S.)											
Voltage regulation												
Adjustment Range	0-220V	0-380V	0-820V	0-1020V	0-220V	0-380V	0-820V	0-1020V	0-220V	0-380V	0-820V	0-1020V
Setting Accuracy(at 25°C±5°C)	± 0.02%F.S.											
Setting Accuracy(at 25°C±5°C)	± 10mV											
Display Accuracy(at 25°C±5°C)	± 0.02%F.S.											
Display Resolution(at 25°C±5°C)	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV
Line regulation(±10%Uac)	± 0.01%F.S.											
Load regulation(0V~100%F.S.)ΔIOUT	± 0.01%F.S.											
Remote sensing compensation	Max.Voltage and 2%F.S.±1V											
Rise time(10-90%)F.S.	500µs											
Transient time after (25%%F.S.)	Recovery to steady state ±0.75% F.S. within 500µs with 25% to 50% or 50% to 25% load change											
Ripple(peak)@20MHz bandwide	0.48Vpp	0.48Vpp	1.2Vpp	1.2Vpp	0.48Vpp	0.48Vpp	1.2Vpp	1.2Vpp	0.48Vpp	0.48Vpp	1.2Vpp	1.2Vpp
Ripple(rms)@300kHz LF	0.06Vrms	0.06Vrms	0.2Vrms	0.2Vrms	0.06Vrms	0.06Vrms	0.2Vrms	0.2Vrms	0.06Vrms	0.06Vrms	0.2Vrms	0.2Vrms
Fall time without load	≤20s											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PVD0224	PVD0324	PVD0808	PVD1008	PVD0216	PVD0316	PVD0805	PVD1005	PVD0212	PVD0312	PVD0804	PVD1004
Slew rate(Without load)	200V/ms	200V/ms	600V/ms	600V/ms	200V/ms	200V/ms	600V/ms	600V/ms	200V/ms	200V/ms	600V/ms	600V/ms
Slew rate(Full load)	100V/ms	100V/ms	300V/ms	300V/ms	100V/ms	100V/ms	300V/ms	300V/ms	100V/ms	100V/ms	300V/ms	300V/ms
Current regulation												
Adjustment Range	0-252A	0-252A	0-84A	0-84A	0-168A	0-168A	0-56.7A	0-56.7A	0-126A	0-126A	0-42A	0-42A
Setting Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Setting Accuracy(at 25℃±5℃)	± 10mA											
Display Accuracy(at 25℃±5℃)	± 0.02%F.S.											
Display Resolution(at 25℃±5℃)	1mA											
Line regulation(±10%Uac)	± 0.01%F.S.											
Load regulation(0V~100%F.S.)ΔUOUT	± 0.05%F.S.											
Rise time(10-90%)F.S.	500µs											
Power regulation												
Adjustment Range	0-30kW	0-30kW	0-30kW	0-30kW	0-20kW	0-20kW	0-20kW	0-20kW	0-15kW	0-15kW	0-15kW	0-15kW
Setting Accuracy(at 25℃±5℃)	± 3W											
Setting Accuracy(at 25℃±5℃)	± 1W											
Display Accuracy(at 25℃±5℃)	± 3W											

Parameter / Mode	30kW Model				20kW Model				15kW Model			
	PVD0224	PVD0324	PVD0808	PVD1008	PVD0216	PVD0316	PVD0805	PVD1005	PVD0212	PVD0312	PVD0804	PVD1004
Display Resolution(at 25°C±5°C)	± 1W											
Resistor regulation												
Adjustment Range	0.05-100Ω											
Setting Accuracy(at 25°C±5°C)	0.01Ω											
Setting Accuracy(at 25°C±5°C)	0.01Ω											
Display Accuracy(at 25°C±5°C)	0.01Ω											
Display Resolution(at 25°C±5°C)	0.01Ω											
Anyport												
Signals	See“Anyport interface specification”											
Isolation	707VDC											
Interfaces												
Rear	Type-B USB、LAN、Share Bus、Magic-BUS、Magic-BOX DC terminal、AC supply、Remote sensing、Analog interface											
Front	Type-A USB、ON/OFF Button、Out Button、Touch screen、Rotary knob											
Ambient												
Operation temperature	0 °C~50°C(Power derating over 35°C)											

Parameter \ Mode	30kW Model				20kW Model				15kW Model			
	PVD0224	PVD0324	PVD0808	PVD1008	PVD0216	PVD0316	PVD0805	PVD1005	PVD0212	PVD0312	PVD0804	PVD1004
Memory temperature	-20 °C~70 °C											
Humidity	≤ 80%. Not condensing											
Altitude	Output current derating 2%/100m or Ta derating 1°C/100m above 2000m											
Safety												
Standards	EN 61010-1:2007-11, EN 50160:2011-02 EN 61000-6-2:2016-05, EN 61000-6-3:2011-09											
EMC	IEC/EN 61204-3											
Insulation												
Negative DC to PE	±1500 V DC											
Positive DC to PE	+1500 V DC											
AC input <-> PE	2.5 kV AC											
other												
Dimensions	W435mm x H132mm x D670 mm(770mm With Breaker)											
weight	35kg											

Parameter / Mode	20kW Model			15kW Model		
	PRD4V66	PRD6V66	PRD8V66	PRD4V50	PRD6V50	PRD8V50
AC Supply						
Voltage Range	304Vac~480Vac/380V±20%					
Frequency	47Hz ~ 63Hz					
Connection	3ph+PE					
Inrush Current	<50A					
Efficiency	~ 93.5%					
Power Factor	~ 0.99					
DC terminal						
Max.Voltage(F.S.)	40V	60V	80V	40V	60V	80V
Max.Current(F.S.)	±667A	±667A	±667A	±500A	±500A	±500A
Max.Power(F.S.)	±20kW	±20kW	±20kW	±15kW	±15kW	±15kW
OverVoltage Protection Range	0V ~rated 110%(±1%F.S.)					
OverVoltage Protection Range	0V ~rated ±110%(±1%F.S.)					

Parameter \ Mode	20kW Model			15kW Model		
	PRD4V66	PRD6V66	PRD8V66	PRD4V50	PRD6V50	PRD8V50
OverVoltage Protection Range	0V ~rated ±110%(±1%F.S.)					
Voltage regulation						
Adjustment Range	0-42V	0-62V	0-82V	0-42V	0-62V	0-82V
Setting Accuracy(at 25℃±5℃)	± 0.02%F.S.					
Setting Accuracy(at 25℃±5℃)	± 1mV					
Display Accuracy(at 25℃±5℃)	± 0.02%F.S.					
Display Resolution(at 25℃±5℃)	1mV	1mV	1mV	1mV	1mV	1mV
Line regulation(±10%Uac)	± 0.01%F.S.					
Load regulation(0V~100%F.S.)ΔIOUT	± 0.01%F.S.					
Remote sensing compensation	Max.Voltage±1V					
Rise time(10-90%)F.S.	1ms					
Transient time after (50%F.S.)	Recovery to steady state ±0.75% F.S. within 500μs with 10% to 60% or 60% to 10% load change					
Ripple(peak)@20MHz bandwide	0.3Vpp	0.3Vpp	0.3Vpp	0.3Vpp	0.3Vpp	0.3Vpp
Ripple(rms)@300kHz LF	0.025Vrms	0.025Vrms	0.025Vrms	0.025Vrms	0.025Vrms	0.025Vrms
Fall time without load	≤20s					

Parameter \ Mode	20kW Model			15kW Model		
	PRD4V66	PRD6V66	PRD8V66	PRD4V50	PRD6V50	PRD8V50
Slew rate(Without load)	150V/ms	150V/ms	150V/ms	150V/ms	150V/ms	150V/ms
Slew rate(Full load)	100V/ms	100V/ms	100V/ms	100V/ms	100V/ms	100V/ms
Current regulation						
Adjustment Range	0-±680A	0-±680A	0-±680A	0-±510A	0-±510A	0-±510A
Setting Accuracy(at 25℃±5℃)	± 0.1%F.S.					
Setting Accuracy(at 25℃±5℃)	± 100mA					
Display Accuracy(at 25℃±5℃)	± 0.1%F.S.					
Display Resolution(at 25℃±5℃)	10mA					
Line regulation(±10%Uac)	± 0.01%F.S.					
Load regulation(0V~100%F.S.)ΔUOUT	± 0.05%F.S.					
Rise time(10-90%)F.S.	1ms					
Power regulation						
Adjustment Range	0-20kW	0-20kW	0-20kW	0-15kW	0-15kW	0-15kW
Setting Accuracy(at 25℃±5℃)	± 30W					
Setting Accuracy(at 25℃±5℃)	± 10W					
Display Accuracy(at 25℃±5℃)	± 30W					

Parameter \ Mode	20kW Model			15kW Model		
	PRD4V66	PRD6V66	PRD8V66	PRD4V50	PRD6V50	PRD8V50
Display Resolution(at 25°C±5°C)	± 10W					
Resistor regulation						
Adjustment Range	0.003-100Ω					
Setting Accuracy(at 25°C±5°C)	1mΩ					
Setting Accuracy(at 25°C±5°C)	1mΩ					
Display Accuracy(at 25°C±5°C)	1mΩ					
Display Resolution(at 25°C±5°C)	1mΩ					
Anyport						
Signals	See"Anyport interface specification"					
Isolation	707VDC					
Interfaces						
Rear	Type-B USB、LAN、Share Bus、Magic-BUS、Magic-BOX DC terminal、AC supply、Remote sensing、Analog interface					
Front	Type-A USB、ON/OFF Button、Out Button、Touch screen、Rotary knob					
Ambient						
Operation temperature	0 °C~50°C(Power derating over 35°C)					

Mode / Parameter	20kW Model			15kW Model		
	PRD4V66	PRD6V66	PRD8V66	PRD4V50	PRD6V50	PRD8V50
Memory temperature	-20 °C~70 °C					
Humidity	≤ 80%. Not condensing					
Altitude	Output current derating 2%/100m or Ta derating 1°C/100m above 2000m					
Safety						
Standards	EN 61010-1:2007-11, EN 50160:2011-02 EN 61000-6-2:2016-05, EN 61000-6-3:2011-09					
EMC	IEC/EN 61204-3					
Insulation						
Negative DC to PE	±500 V DC					
Positive DC to PE	+500 V DC					
AC input <-> PE	2.5 kV AC					
other						
Dimensions	W435mm x H132mm x D670 mm(770mm With Breaker)					
weight	40kg					

Parameter \ Mode	20kW Model			15kW Model		
	PVD4V66	PVD6V66	PVD8V66	PVD4V50	PVD6V50	PVD8V50
AC Supply						
Voltage Range	304Vac~480Vac/380V±20%					
Frequency	47Hz ~ 63Hz					
Connection	3ph+PE					
Inrush Current	<50A					
Efficiency	~ 93.5%					
Power Factor	~ 0.99					
DC terminal						
Max.Voltage(F.S.)	40V	60V	80V	40V	60V	80V
Max.Current(F.S.)	667A	667A	667A	500A	500A	500A
Max.Power(F.S.)	20kW	20kW	20kW	15kW	15kW	15kW
OverVoltage Protection Range	0V ~rated 110%(±1%F.S.)					
OverVoltage Protection Range	0V ~rated 110%(±1%F.S.)					

Parameter \ Mode	20kW Model			15kW Model		
	PVD4V66	PVD6V66	PVD8V66	PVD4V50	PVD6V50	PVD8V50
OverVoltage Protection Range	0V ~rated 110%(±1%F.S.)					
Voltage regulation						
Adjustment Range	0-42V	0-62V	0-82V	0-42V	0-62V	0-82V
Setting Accuracy(at 25°C±5°C)	± 0.02%F.S.					
Setting Accuracy(at 25°C±5°C)	± 1mV					
Display Accuracy(at 25°C±5°C)	± 0.02%F.S.					
Display Resolution(at 25°C±5°C)	1mV	1mV	1mV	1mV	1mV	1mV
Line regulation(±10%Uac)	± 0.01%F.S.					
Load regulation(0V~100%F.S.)ΔIOUT	± 0.01%F.S.					
Remote sensing compensation	Max.Voltage±1V					
Rise time(10-90%)F.S.	1ms					
Transient time after (50%F.S.)	Recovery to steady state ±0.75% F.S. within 500μs with 10% to 60% or 60% to10% load change					
Ripple(peak)@20MHz bandwide	0.3Vpp	0.3Vpp	0.3Vpp	0.3Vpp	0.3Vpp	0.3Vpp
Ripple(rms)@300kHz LF	0.025Vrms	0.025Vrms	0.025Vrms	0.025Vrms	0.025Vrms	0.025Vrms
Fall time without load	≤20s					

Parameter \ Mode	20kW Model			15kW Model		
	PVD4V66	PVD6V66	PVD8V66	PVD4V50	PVD6V50	PVD8V50
Slew rate(Without load)	150V/ms	150V/ms	150V/ms	150V/ms	150V/ms	150V/ms
Slew rate(Full load)	100V/ms	100V/ms	100V/ms	100V/ms	100V/ms	100V/ms
Current regulation						
Adjustment Range	0-680A	0-680A	0-680A	0-510A	0-510A	0-510A
Setting Accuracy(at 25℃±5℃)	± 0.1%F.S.					
Setting Accuracy(at 25℃±5℃)	± 100mA					
Display Accuracy(at 25℃±5℃)	± 0.1%F.S.					
Display Resolution(at 25℃±5℃)	10mA					
Line regulation(±10%Uac)	± 0.01%F.S.					
Load regulation(0V~100%F.S.)ΔUOUT	± 0.05%F.S.					
Rise time(10-90%)F.S.	1ms					
Power regulation						
Adjustment Range	0-20kW	0-20kW	0-20kW	0-15kW	0-15kW	0-15kW
Setting Accuracy(at 25℃±5℃)	± 30W					
Setting Accuracy(at 25℃±5℃)	± 10W					
Display Accuracy(at 25℃±5℃)	± 30W					

Parameter \ Mode	20kW Model			15kW Model		
	PVD4V66	PVD6V66	PVD8V66	PVD4V50	PVD6V50	PVD8V50
Display Resolution(at 25°C±5°C)	± 10W					
Resistor regulation						
Adjustment Range	0.003-100Ω					
Setting Accuracy(at 25°C±5°C)	1mΩ					
Setting Accuracy(at 25°C±5°C)	1mΩ					
Display Accuracy(at 25°C±5°C)	1mΩ					
Display Resolution(at 25°C±5°C)	1mΩ					
Anyport						
Signals	See“Anyport interface specification”					
Isolation	707VDC					
Interfaces						
Rear	Type-B USB、LAN、Share Bus、Magic-BUS、Magic-BOX DC terminal、AC supply、Remote sensing、Analog interface					
Front	Type-A USB、ON/OFF Button、Out Button、Touch screen、Rotary knob					
Ambient						
Operation temperature	0 °C~50°C(Power derating over 35°C)					

Parameter \ Mode	20kW Model			15kW Model		
	PVD4V66	PVD6V66	PVD8V66	PVD4V50	PVD6V50	PVD8V50
Memory temperature	-20 °C~70 °C					
Humidity	≤ 80%. Not condensing					
Altitude	Output current derating 2%/100m or Ta derating 1°C/100m above 2000m					
Safety						
Standards	EN 61010-1:2007-11, EN 50160:2011-02 EN 61000-6-2:2016-05, EN 61000-6-3:2011-09					
EMC	IEC/EN 61204-3					
Insulation						
Negative DC to PE	±500 V DC					
Positive DC to PE	+500 V DC					
AC input <-> PE	2.5 kV AC					
other						
Dimensions	W435mm x H132mm x D670 mm(770mm With Breaker)					
weight	40kg					

Charts below show the power of different PRD models

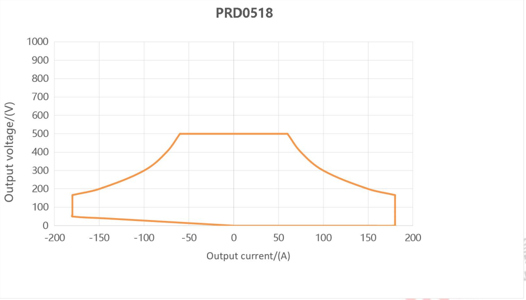


Figure 5-PRD0518 power graph

Figure 6-PRD0618 power graph

Figure 7-PRD1506 power graph

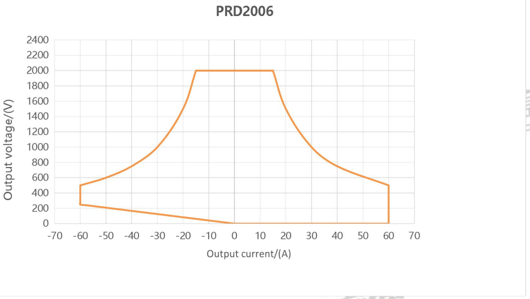


Figure 8-PRD2006 power graph

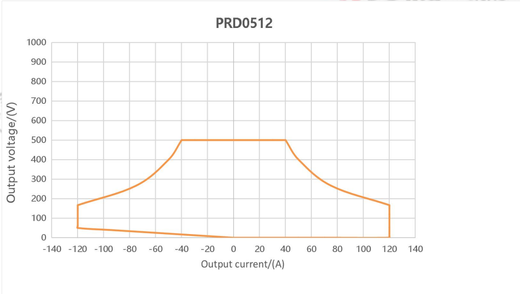


Figure 9-PRD0512 power graph

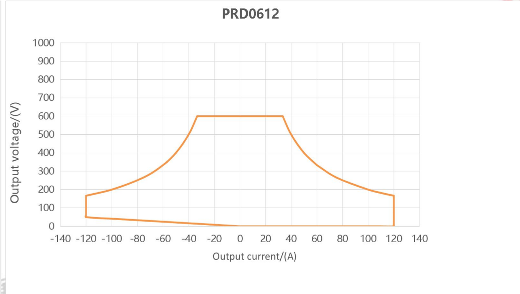


Figure 10-PRD0612 power graph

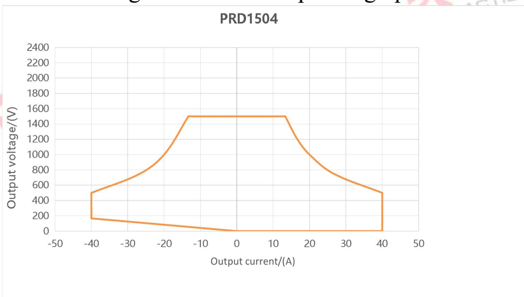


Figure 11-PRD1504 power graph

Figure 12-PRD2004 power graph

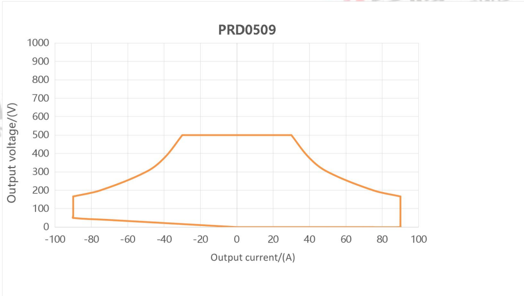


Figure 13-PRD0509 power graph

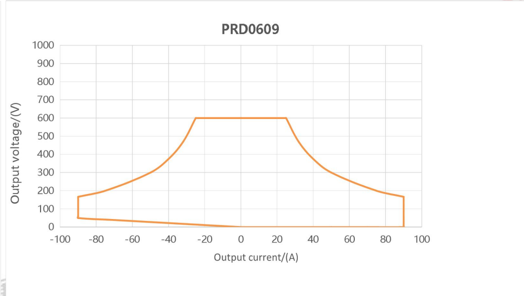


Figure 14-PRD0609 power graph

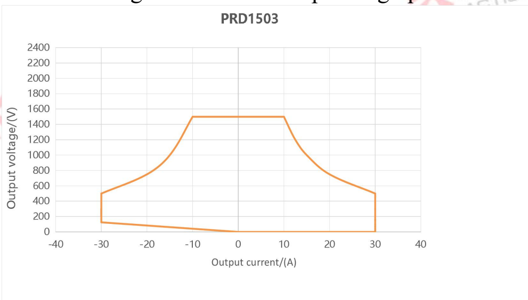


Figure 15-PRD1503 Power graph

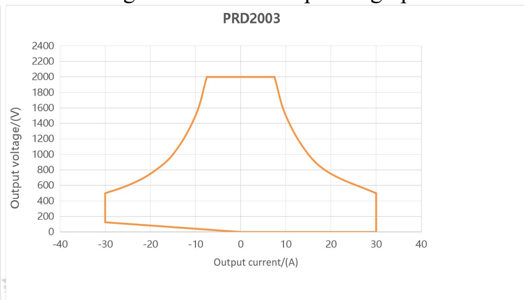


Figure 16-PRD2003 Power graph

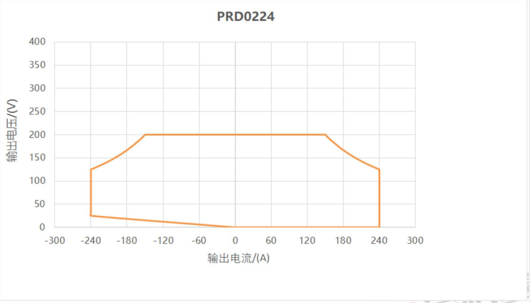


Figure 17-PRD0224 Power graph

Figure 18-PRD0324 Power graph

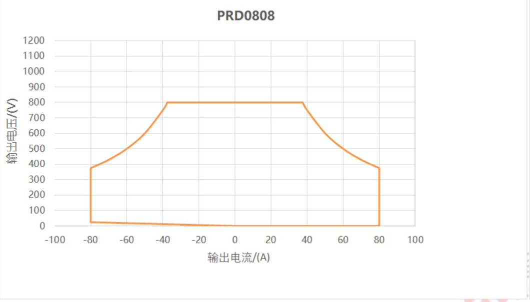


Figure 19-PRD0808 Power graph

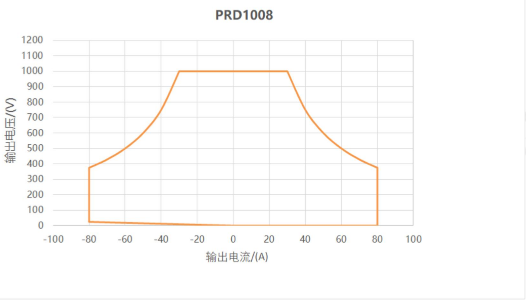


Figure 20-PRD1008 Power graph

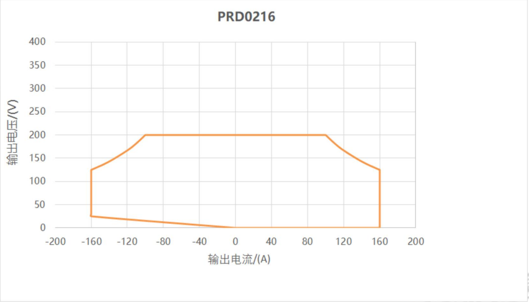


Figure 21-PRD0216 Power graph

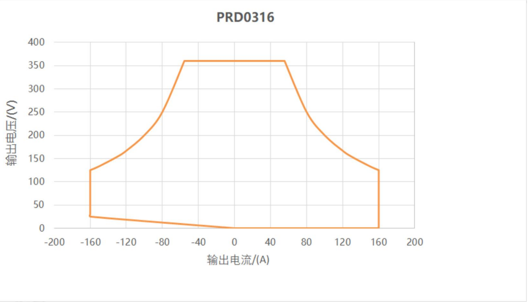


Figure 22-PRD0316 Power graph

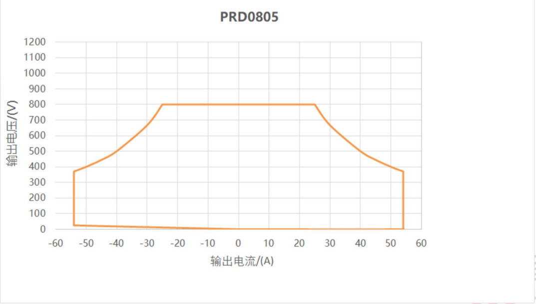


Figure 23-PRD0805 Power graph

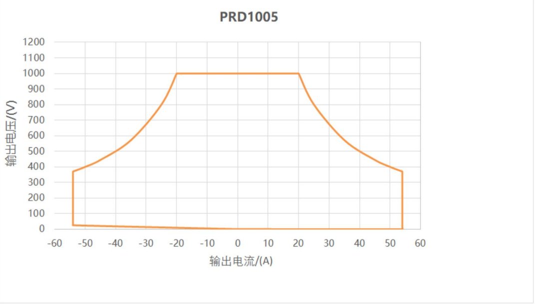


Figure 24-PRD1005 Power graph

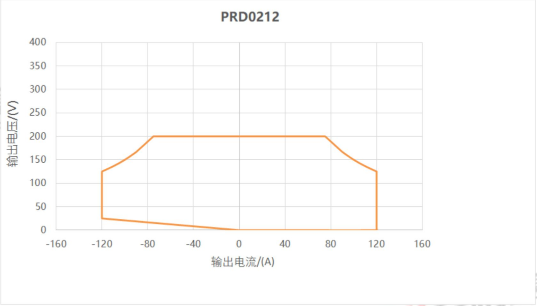


Figure 25-PRD0212 Power graph

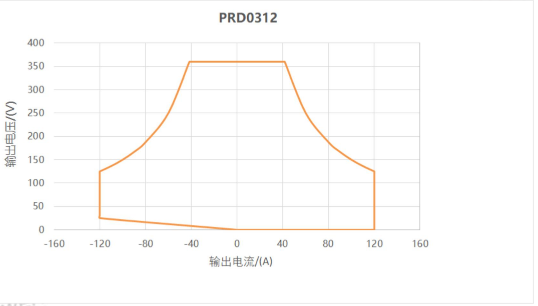


Figure 26-PRD0312 Power graph

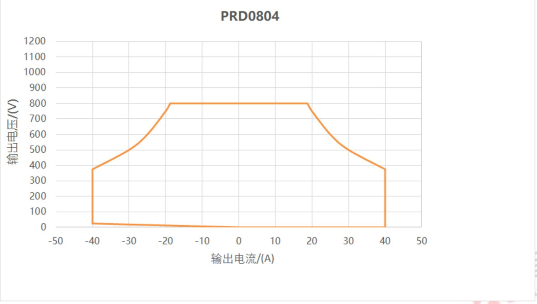


Figure 27-PRD0804 Power graph

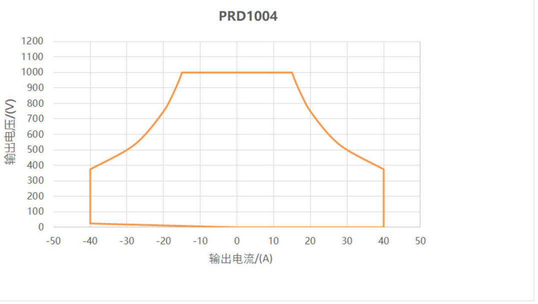


Figure 28-PRD1004 Power graph

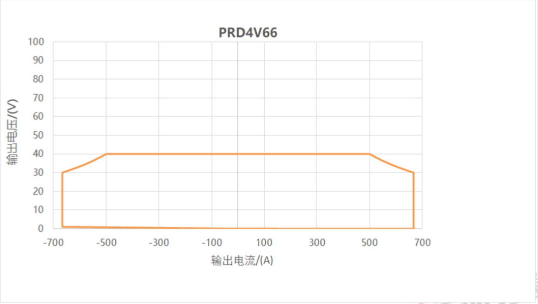


Figure 29-PRD4V66 Power graph

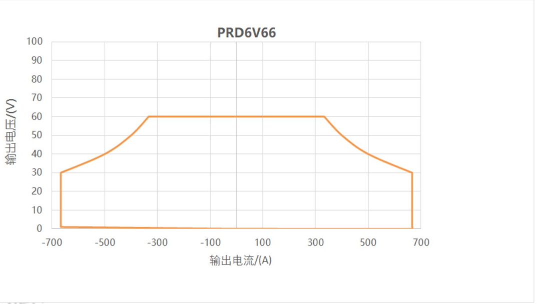


Figure 30-PRD6V66 Power graph

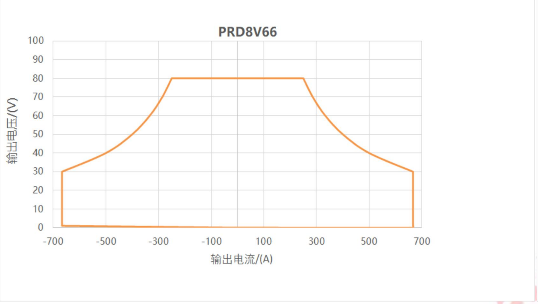


Figure 31-PRD8V66 Power graph

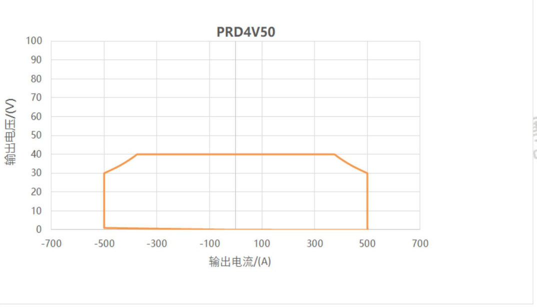


Figure 32-PRD4V50 Power graph

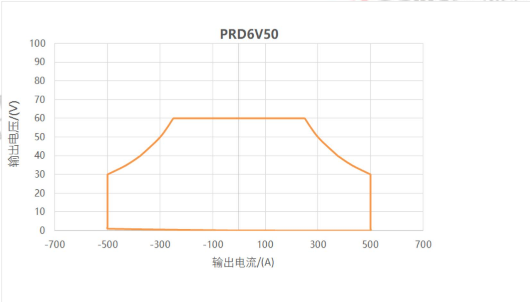


Figure 33-PRD6V50 Power graph

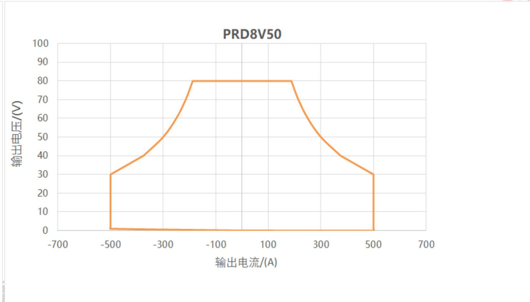


Figure 34-PRD8V50 Power graph

Charts below shows the power of different PVD models

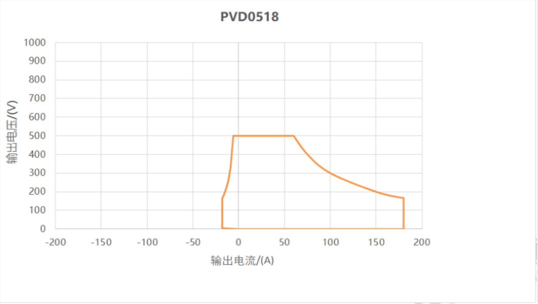


Figure 35-PVD0518 Power graph

Figure 36-PVD0618 Power graph

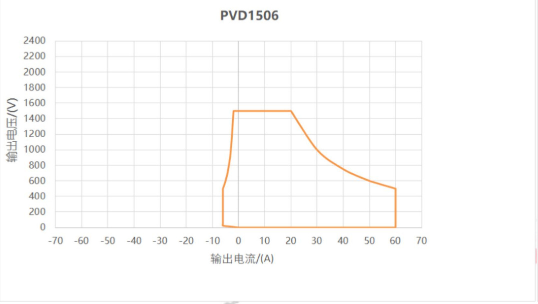


Figure 37-PVD1506 Power graph

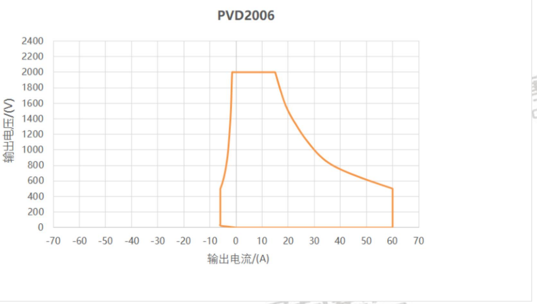


Figure 38-PVD2006 Power graph

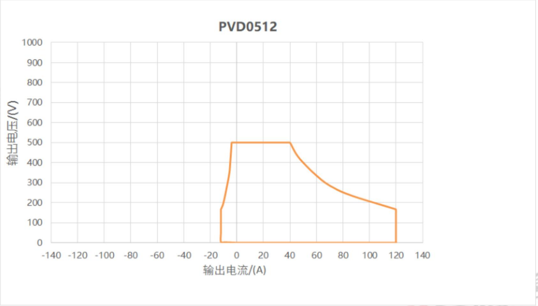


Figure 39-PVD0512 Power graph

Figure 40-PVD0612 Power graph

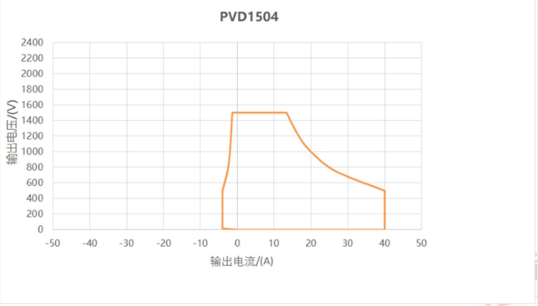


Figure 41-PVD1504 Power graph

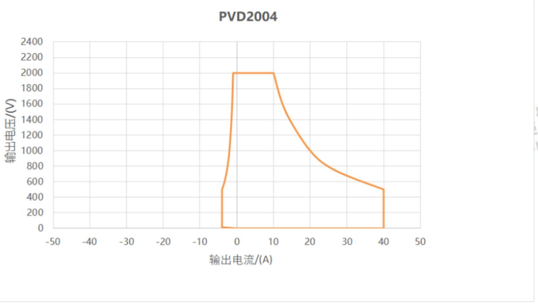


Figure 42-PVD2004 Power graph

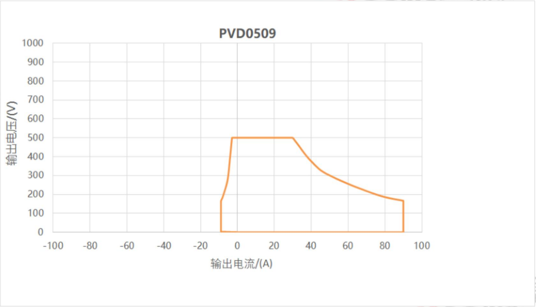


Figure 43-PVD0509 Power graph

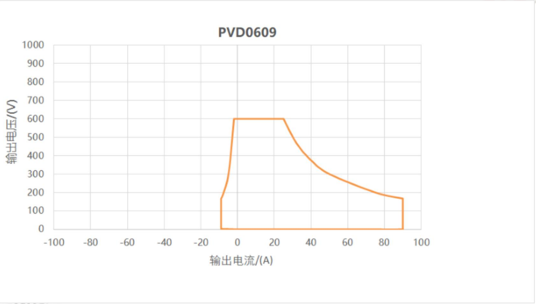


Figure 44-PVD0609 Power graph

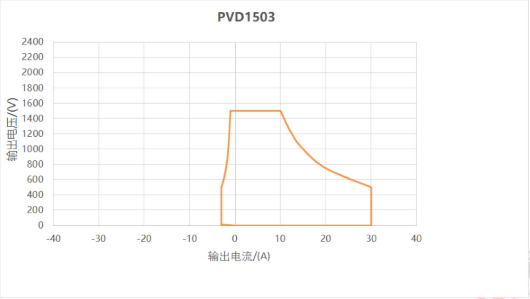


Figure 45-PVD1503 Power graph

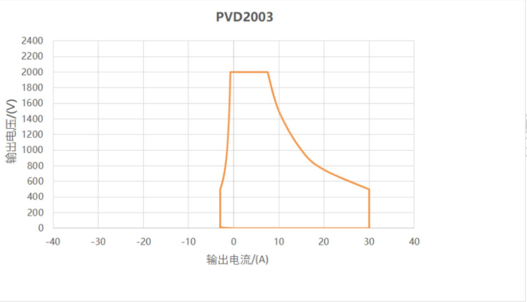


Figure 46-PVD2003 Power graph

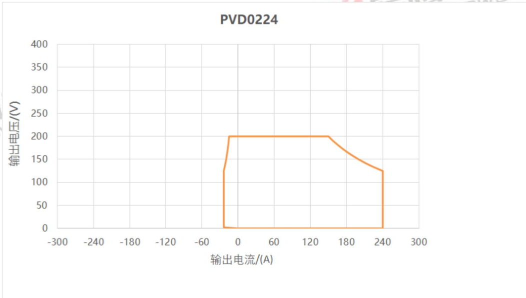


Figure 47-PVD0224 Power graph

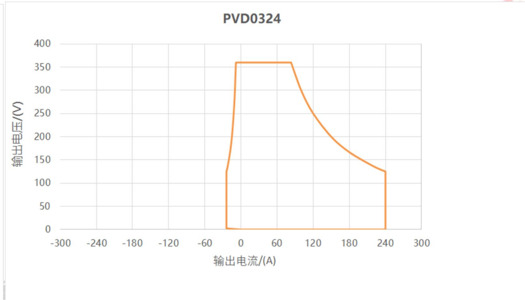


Figure 48-PVD0324 Power graph

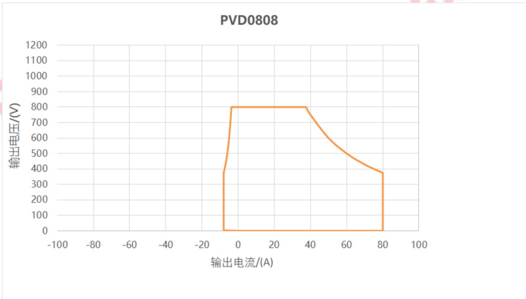


Figure 49-PVD0808 Power graph

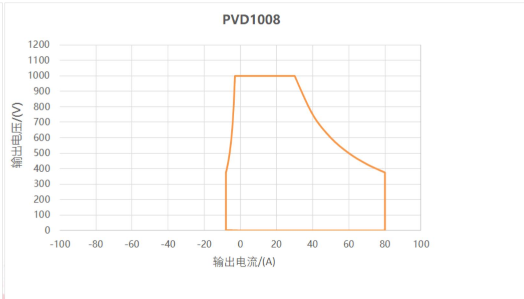


Figure 50-PVD1008 Power graph

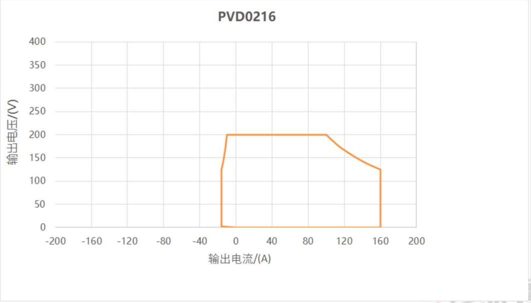


Figure 51-PVD0216 Power graph

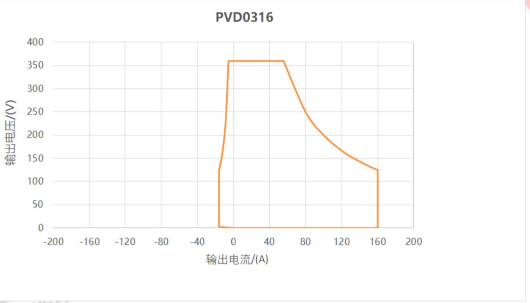


Figure 52-PVD0316 Power graph

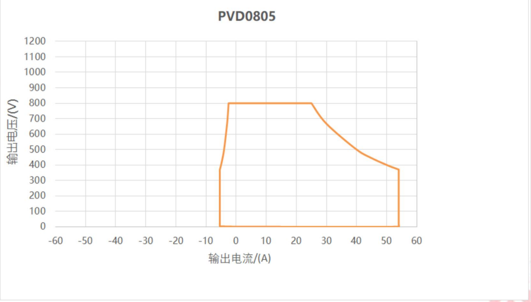


Figure 53-PVD0805 Power graph

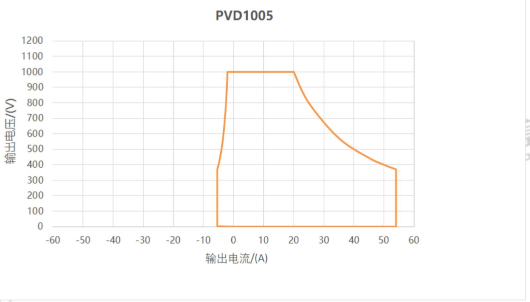


Figure 54-PVD1005 Power graph

Figure 55-PVD0212 Power graph

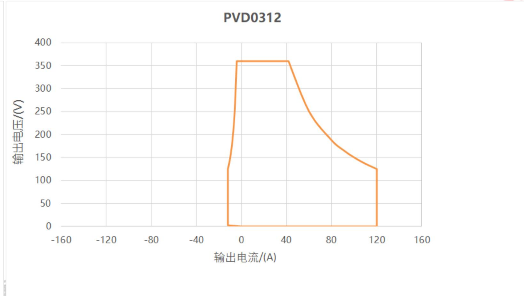


Figure 56-PVD0312 Power graph

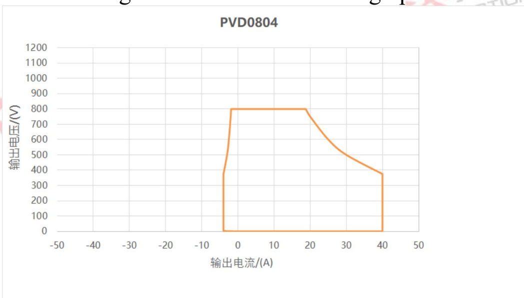


Figure 57-PVD0804 Power graph

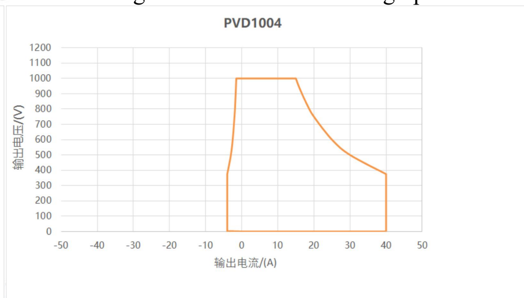


Figure 58-PVD1004 Power graph

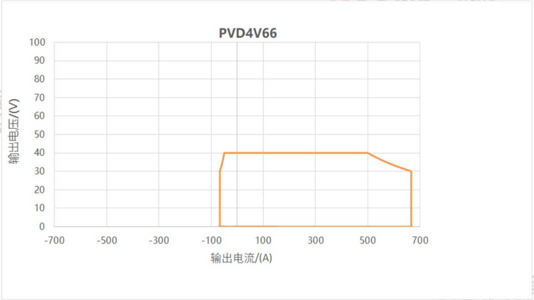


Figure 59-PVD4V66 Power graph

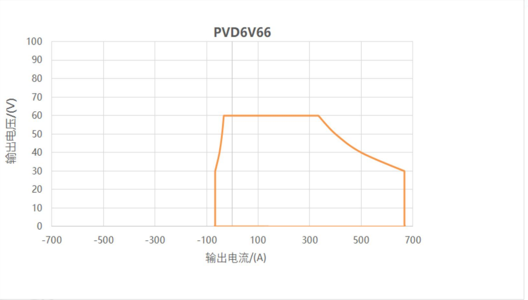


Figure 60-PVD6V66 Power graph

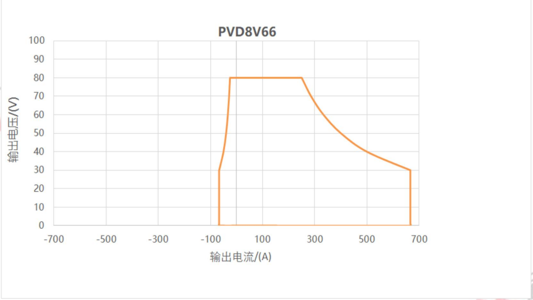


Figure 61-PVD8V66 Power graph

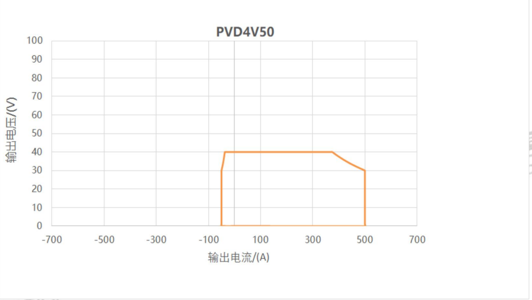


Figure 62-PVD4V50 Power graph

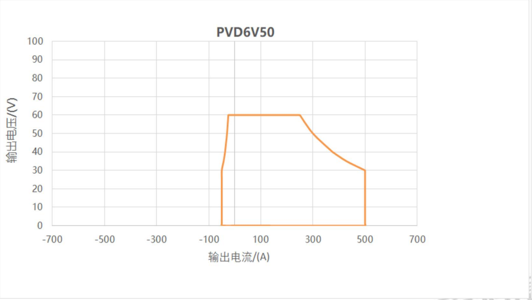


Figure 63-PVD6V50 Power graph

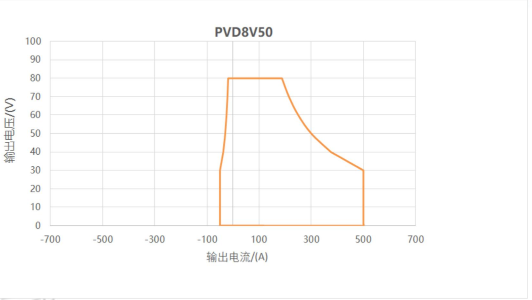


Figure 64-PVD8V50 Power graph

3.6 Scope of delivery

This product ships with the accessories listed in Table 2、Table 3. If you find that one or more accessories are wrong or missing, please contact our customer service.

Table 2-Table of attachment names and quantities

Model	Accessories	Quantity/Unit
PRD4V50 PVD4V50 PRD6V50 PVD6V50 PRD8V50 PVD8V50 PRD4V66 PVD4V66 PRD6V66 PVD6V66 PRD8V66 PVD8V66	3-bit input connector	1/pcs
	Analog program adapter box	1/pcs
	Input cable	1/set
	installation kit	1/set
	Parallel kit	1/set

Table 3-Table of attachment names and quantities

<table>
<tr><th>Model</th><th>Accessories</th><th>Quantity or Unit</th></tr>
<tr><td rowspan="6">PRD0518 PRD0512 PRD0509
PVD0518 PVD0512 PVD0509
PRD0224 PRD0216 PRD0212
PVD0224 PVD0216 PVD0212
PRD0618 PRD0612 PRD0609
PVD0618 PVD0612 PVD0609
PRD0324 PRD0316 PRD0312
PVD0324 PVD0316 PVD0312
PRD1506 PRD1504 PRD1503
PVD1506 PVD1504 PVD1503
PRD0808 PRD0805 PRD0804
PVD0808 PVD0805 PVD0804
PRD2006 PRD2004 PRD2003
PVD2006 PVD2004 PVD2003
PRD1008 PRD1005 PRD1004
PVD1008 PVD1005 PVD1004</td><td>3-bit input connector</td><td>1/pcs</td></tr>
<tr><td>Analog program adapter box</td><td>1/pcs</td></tr>
<tr><td>Input cable</td><td>1/set</td></tr>
<tr><td>Installation kit</td><td>1/set</td></tr>
<tr><td>Protective cover</td><td>1/pcs</td></tr>
<tr><td>Parallel kit</td><td>1/set</td></tr>
</table>

4 Unpacking and Installation

4.1 Shipment and Storage

4.1.1 Shipment

> The handles on the front and rear side of the device are not for carrying!
> Because of its weight, transport by hand should be avoided where possible. If unavoidable then only the housing should be held and not on the exterior parts (handles, DC terminal, rotary knobs).
> Do not transport when switched on or connected!
> When the location of the product changes, it is recommended to use the original packaging materials to carry the product.
> The device should always be carried and mounted horizontally.
> Use suitable safety clothing, especially safety shoes, when carrying the equipment, as due to its weight a fall can have serious consequences.

During product use, it is recommended to keep the complete packaging materials of the original factory for use when the product is moved or returned to the original factory for repair. Otherwise, the packaging materials should be disposed of in accordance with environmental protection regulations.

4.1.2 Storage

In case of long term memory of the equipment it’s recommended to use the original packaging or similar. Memory must be in dry rooms, if possible in sealed packaging, to avoid corrosion, especially internal, through humidity.

4.2 Verify

Please carefully check the integrity of the package before unpacking. If there is any abnormality or it may cause equipment damage, please contact the customer service of Xi’an Actionpower Electric Co., Ltd. immediately.

After unpacking the package, please check the standard conifg list carefully . please contact the customer service of Xi’an Actionpower Electric Co., Ltd. Immediately with any abnormality or equipment damage, When transporting the product with or without packaging, check whether the product is intact and damaged according to the standard conifg list (see Section 3.6 Standard Conifg List) Products with obvious damage (e.g. loose internal components, damaged shell) should not be put into use under any conditions.

4.3 Environmental

4.3.1 Ventilation and Derating

This product adopts the front panel air inlet, rear panel air exhaust. To ensure the normal operation of the product, reserve at least 30cm space behind the product for ventilation during installation to avoid overheating protection. For maximum output power, refer to Figure 65 power-temperature curve and Figure 66 power-input voltage curve.

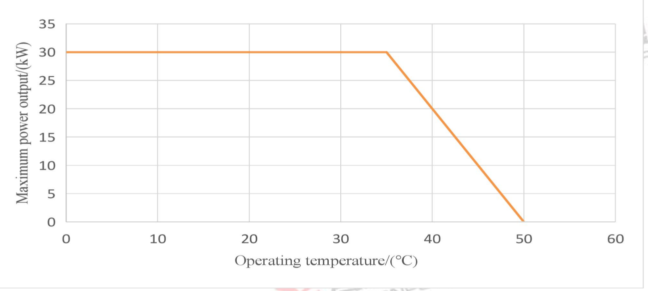


Figure 65-Power/Temperature

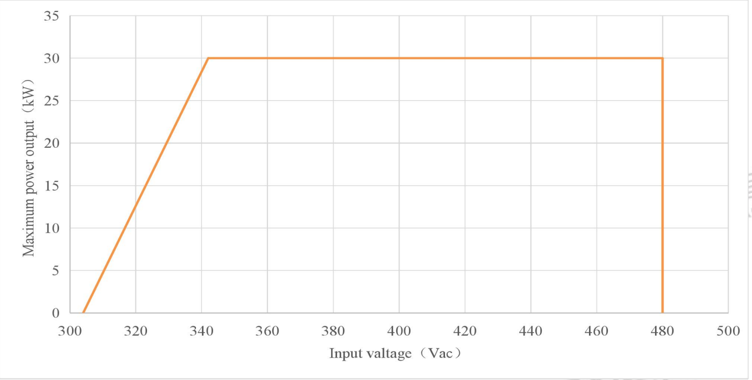


Figure 66-Power/Input Voltage

4.3.2 Sound Levels

In a high-temperature environment, when the device runs at or near the rated full power, the fan speed reaches the maximum. The noise level of the product may exceed 70dB at 1 meter away from the front panel of the product. The installer shall provide measures to reduce the sound pressure level at the operator's point of use to a safe level. These measures may include the fitting of noise-reducing baffles or hoods or provision of protective earpieces.

4.3.3 Liquids

This product is not protected against liquid spills. Do not install where chemicals are used or where liquids could be spilled into the unit.

4.3.4 Cleaning

This product has no user cleaning design or cleaning accessories, and can be used for a long time in the recommended environment. If you need cleaning, please contact the ActionPower source customer service.

4.4 Installation Specification

⚠	The device has a considerable weight. Therefore the proposed location of the equipment (table, cabinet, shelf, 19” rack) must be able to support the weight without restriction. The bottom of the product is equipped with an instrument pad, which can prevent sliding damage to the desktop when it is used. But do not push the when moving product, to prevent the rubber parts of the instrument pad from falling off or even damaging the desktop. When using a rack, rails suitable for the width of the housing and the weight of the device are to be used. When placing the product on a rack or cabinet, pay attention to the depth of the product. The handles on the front panel are used to push or pull out of the cabinet only. Before connecting to the mains ensure the supply voltage is as shown on the product label. Overvoltage on the AC supply can cause equipment damage. Devices of this series feature an energy recovery function which, similar to solar energy equipment, which feeds energy back into the local or public grid. Recovery into the public grid must not be operated without adherence of directives from the local energy supplying company and it must be investigated before the installation or latest before initial commission if there is requirement to install a grid protection device. Select a location for the product that is as close to the load or external source as possible. Leave enough space behind the product for ventilation, at least 30cm.

Position ① as shown in Figure 67 is the only correct way to place the product..

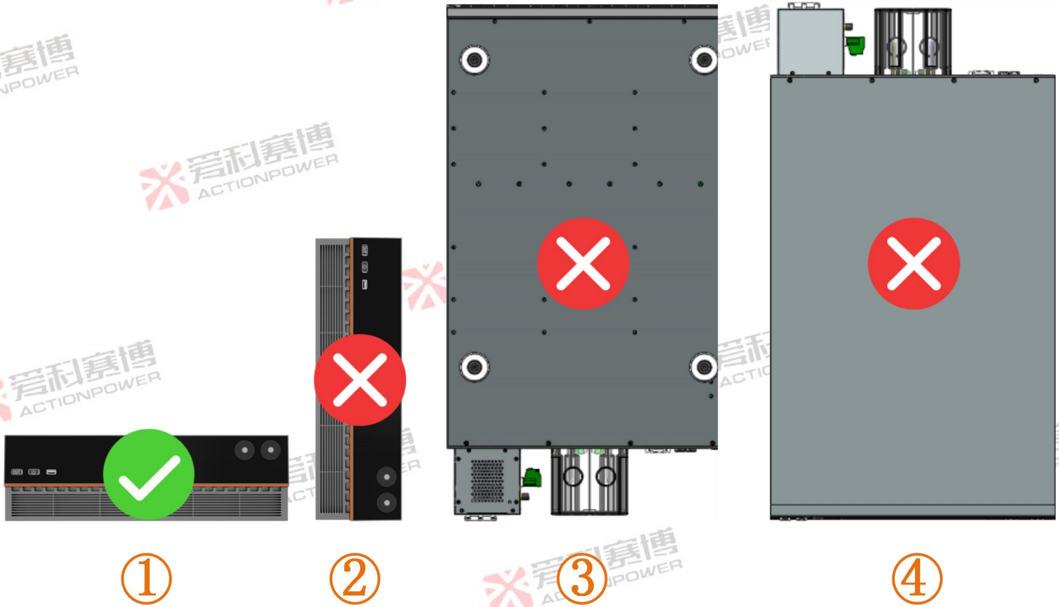


Figure 67-Product Placement

4.5 Hanger Installation

If the product is to be placed in a standard cabinet, install hanger as shown in Figure 68.

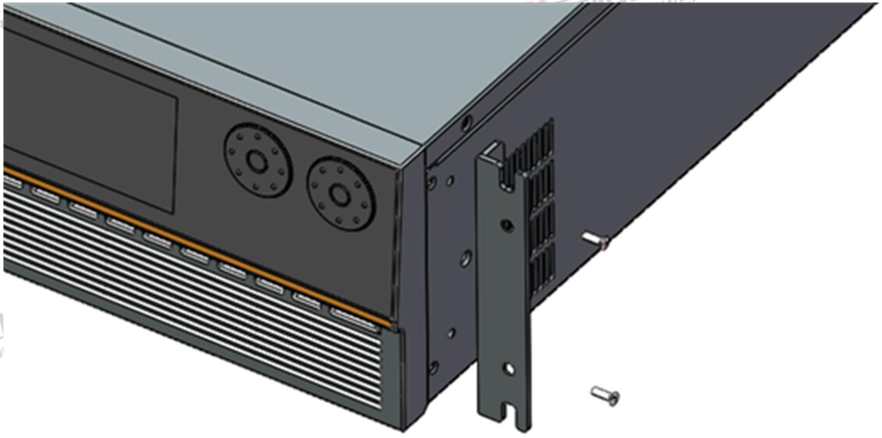


Figure 68-Hanger Installation

4.6 Handle Installation

If you need to push or pull the product in the cabinet, install the handle as shown in Figure 69.

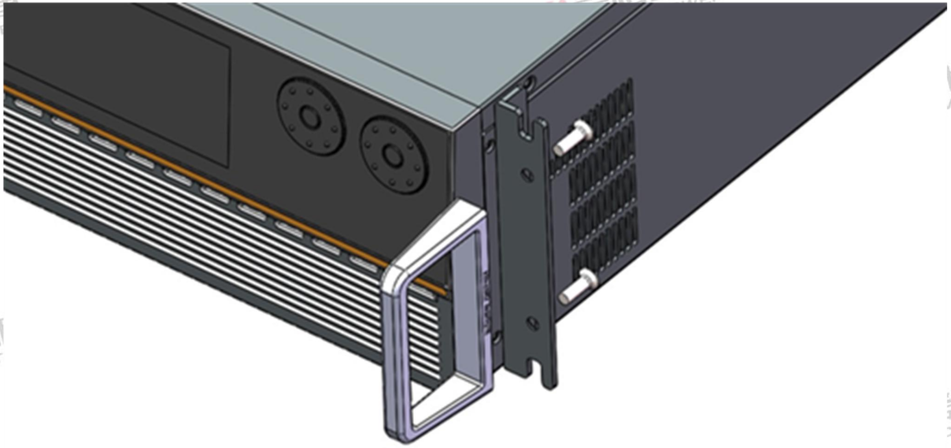


Figure 69-Handle Installation

4.7 Pad Installation

This product has been installed with pads by default. If the product needs to be raised, we have prepared a set of high foot pads for users, which can be replaced as shown in Figure 70。

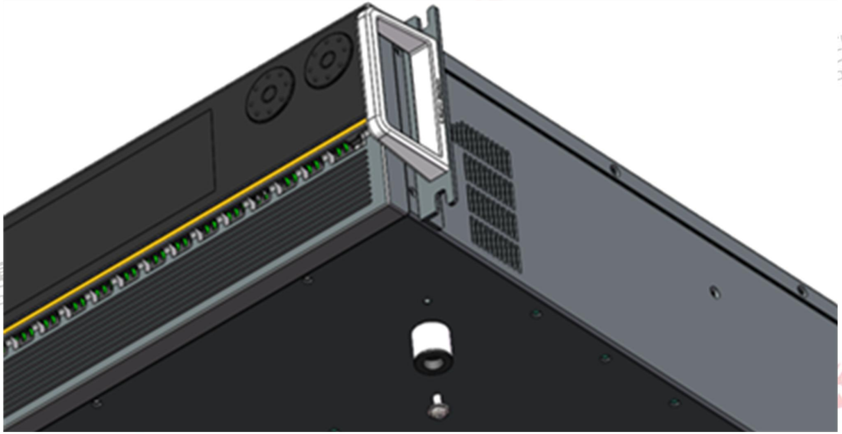


Figure 70-Pad Installation

4.8 AC Connection

> Connection to an AC supply must only be carried out by qualified personnel .
> The device must always be run directly on a power grid (transformer are permitted) and not on generators or UPS equipment!
> Cable cross section must be suitable for the maximum input current of the device!
> Ensure that all regulations for the operation of the device and connection to the public grid of energy back-feeding equipment have been considered and requirements have been met!
> The connecting wire must be secured in the nylon retaining ring!

Product input support a wide range of voltage and frequency, AC input voltage phase adaptive. Before connecting AC power to the product, you must check the label on the device or this manual to verify that its AC input conifg matches the local power grid. If the AC input voltage and frequency do not match, do not connect the AC power to the product.

The product AC input connection must include a disconnecting device (external switch or circuit breaker) as part of the installation. The disconnection device must be located at the appropriate location on the AC side and must be marked as the disconnection device of the device. The disconnecting device must disconnect all wires at the same time.

External overcurrent protection (e.g. fuse or circuit breaker) must be provided.

The breaking capacity of the overcurrent protection device is appropriate to the rated current of the device.

At least basic insulation is required between power connection components of opposite polarity on the power side of the overcurrent protection device.

The overcurrent protection device shall not be installed in the protective conductor. Neutral lines of polyphase equipment shall not be equipped with fuses or single-pole circuit breakers, and shall be installed in accordance with the requirements of GB19517-2009.

Select the appropriate cross-sectional screen and wire length according to the rated AC current of the product. Since the maximum input current of this series single product at full load is 50A, the cross-sectional screen of each phase line should be greater than 6mm². The included connection plug can receive lose/soldered cable ends of up to 16 mm² (AWG 6). The longer the connection cable, the higher the voltage loss due to the cable resistance. Therefore the mains cables should be kept as short as possible or use bigger cross section. Connection scheme.

Longer cables should be secured in the nylon ring under the input circuit breaker to prevent input cables or terminals from being pulled out when the device is moved.

Figure 71 shows the connection mode of AC terminal:

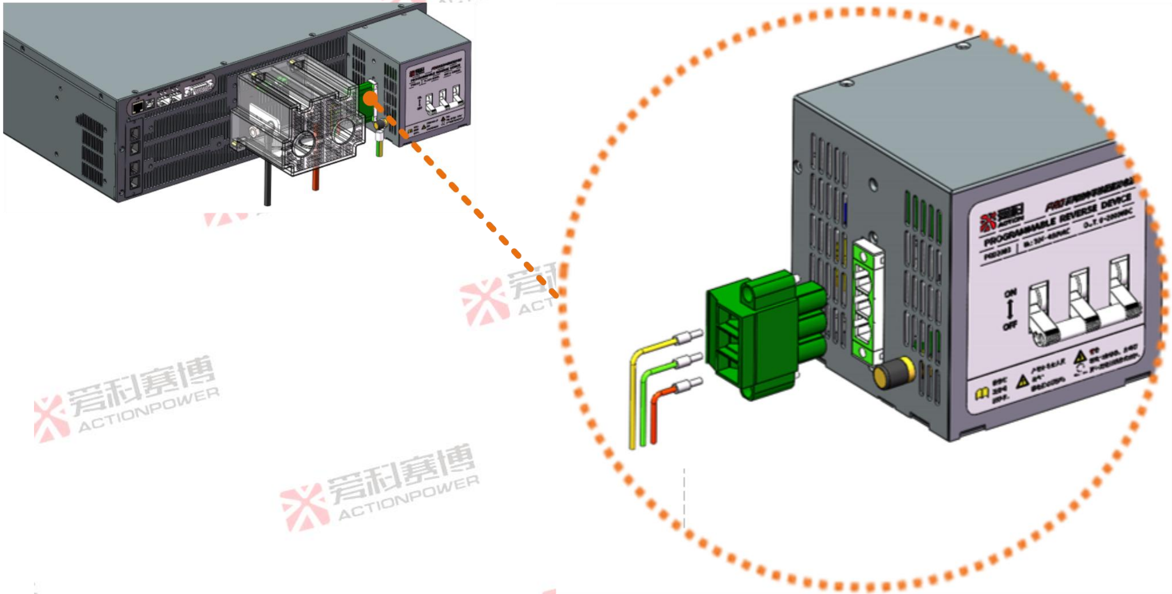
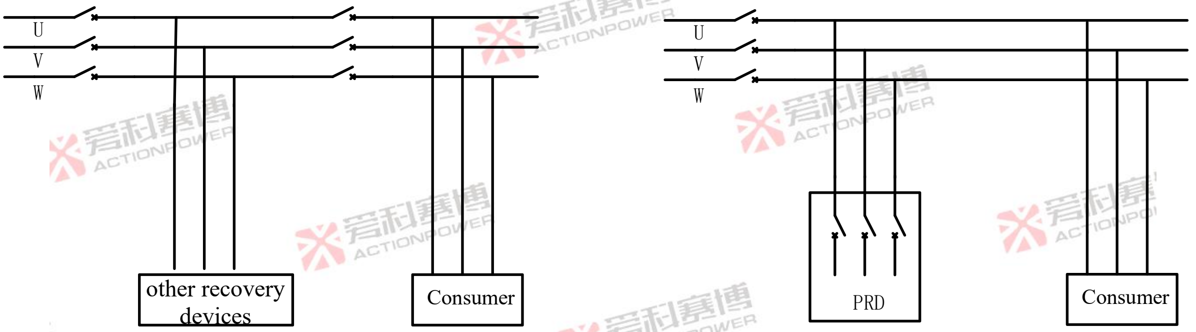


Figure 71-AC Wiring Connection

Note: Precautions for recovery equipment

A circuit breaker or fuse is usually not installed between any two output sockets on the grid. Figure 72 illustrates one of the typical conditions. Once the AC part of any electrical equipment fails (such as short circuit), not only the power grid will output a large current to the electrical equipment, but also the recovery equipment may output a large current to the electrical equipment, and the current will increase with the increase of the power of the recovery equipment. Even if the circuit breaker in the grid is tripped, the recovery product will continue to supply power to the electrical equipment. This can lead to further failure of the electrical equipment or cause a fire at the wire or connection. To avoid such problems, a circuit breaker or fuse must be installed between the two output outlets in the grid.

This product takes this dangerous situation into account. The circuit breaker is alloady installed inside the product, so users do not need to install additional circuit breakers.



(a)Other recovery grid connections (b)PRD power grid connections

Figure 72- Recovery Device Connection

4.9 PE Connection

⚠	PE wire is very important and must always be connected reliably! Figure 73 shows the connection mode of PE:

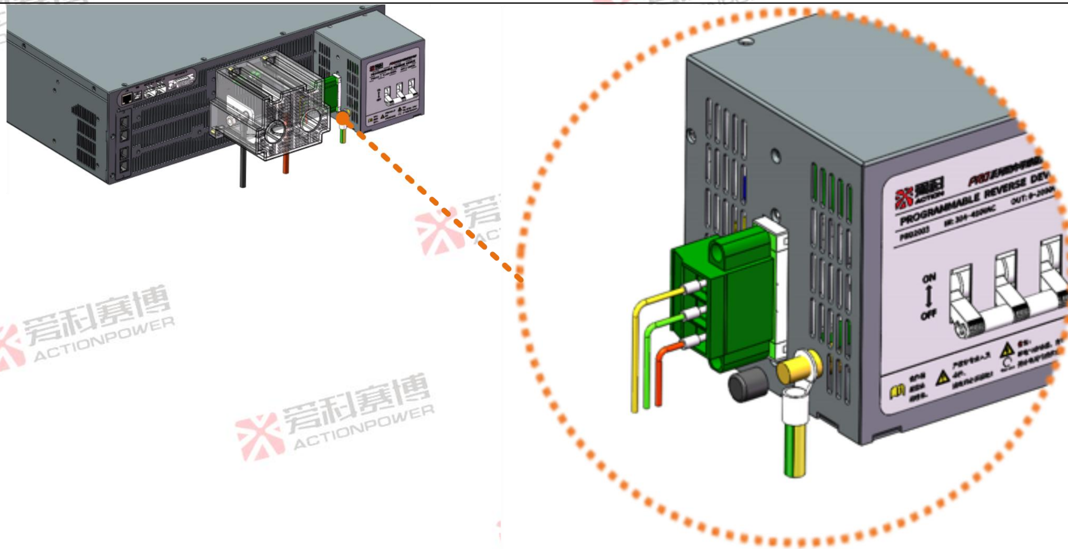


Figure 73-PE Wiring Connection

4.10 Output Connection

> In the case of a device with a high nominal DC current and hence a thick and heavy DC connection cable. it’s necessary to take account of the weight of the cable and the strain imposed on the DC connection. Especially when mounted in a 19” cabinet or similar, where the cable could hang on the DC terminal, a strain reliever should be used.
> Due to the construction, the device will always draw a small pulsed current which is about 15mA when being connected to an external source and while the DC input is switched off.
> No false polarity protection inside! When connecting sources with false polarity the device will be damaged, also when not powered!

The output terminal is located on the rear side of the device and is not protected by a fuse. The cross section of the connection cable is determined by the current consumption, cable length and ambient temperature. For cables up to 5 m (16.4 ft) and average ambient temperature up to 30°C (86 °F), we recommend.

Route the cable through the protective cover, secure the cable to the copper bar at the output end, and then install the protective cover. Only (PRD4V50, PVD4V50, PRD6V50, PVD6V50, PRD8V50, PVD8V50, PVD8V66, PVD4V66, PRD6V66, PVD6V66, PRD8V66, PVD8V66) directly fix the cable to the copper bar. Figure 74 and Figure 75 show the connection mode of the output terminal.

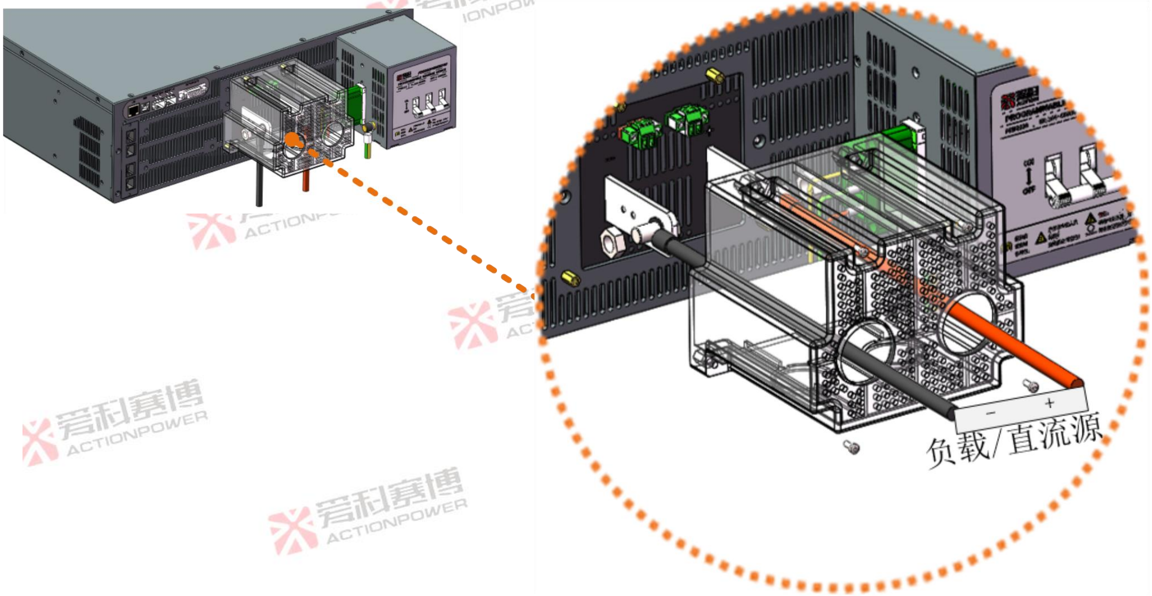


Figure 74-Output Wiring Connection

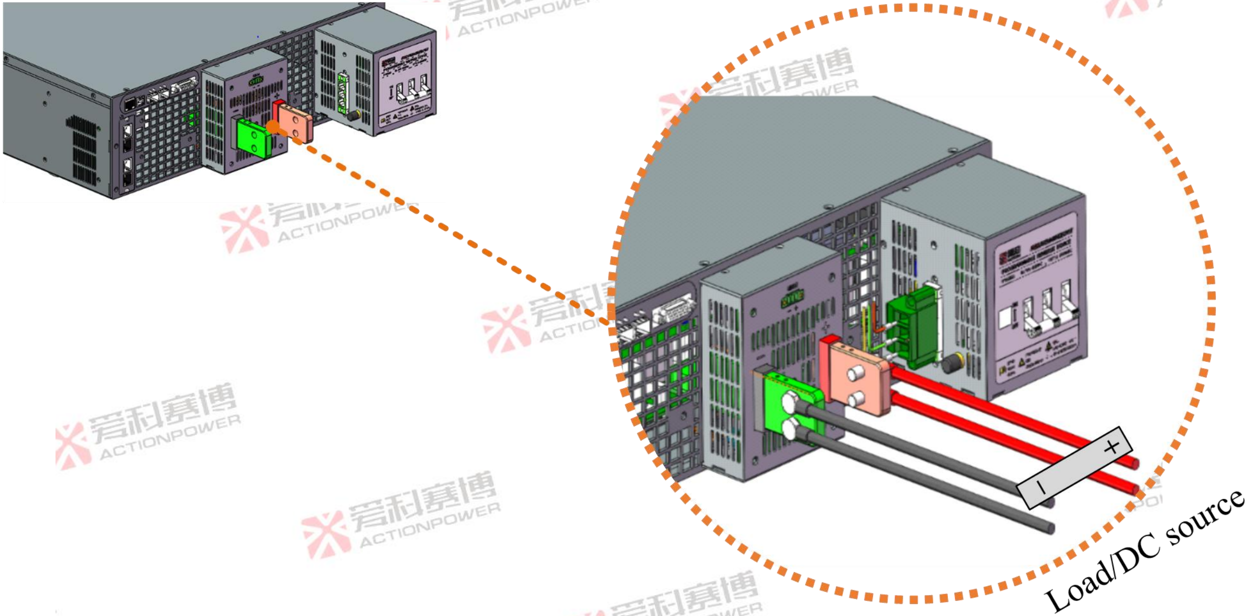


Figure 75-Output Wiring Connection

4.11 Remote Sensing Connection

⚠	The cross section of the sense cables is noncritical. Recommendation for cables up to 5 m: use at least 0.5 mm². Sense cables shouldn’t be twisted, but laid close to the DC cables The Sense+ cable must be connected to DC+ on the load and Sense- to DC- at the load, otherwise the sense input of the power supply can be damaged In parallel mode, the remote sensing should be connected to the master unit only The dielectric strength of the sense wires must always at least match the DC voltage rating! When using a power supply with an output voltage greater than 60VDC, there is a potential shock hazard at the compensation point. Ensure that the connection on the load side is shielded to prevent contact with dangerous voltages. When using the shield compensation wire, the shield layer should be grounded to a single point.

In order to compensate for voltage drops along the DC cables to the load or external source, the Sense input can be connected to the load resp. external source. The maximum compensation is Max.Voltage and 2%F.S.±1V for 200V and above models and Max.Voltage±1V for 200V and below models. The Allowed connection is shown in Figure 76 and Figure 77.

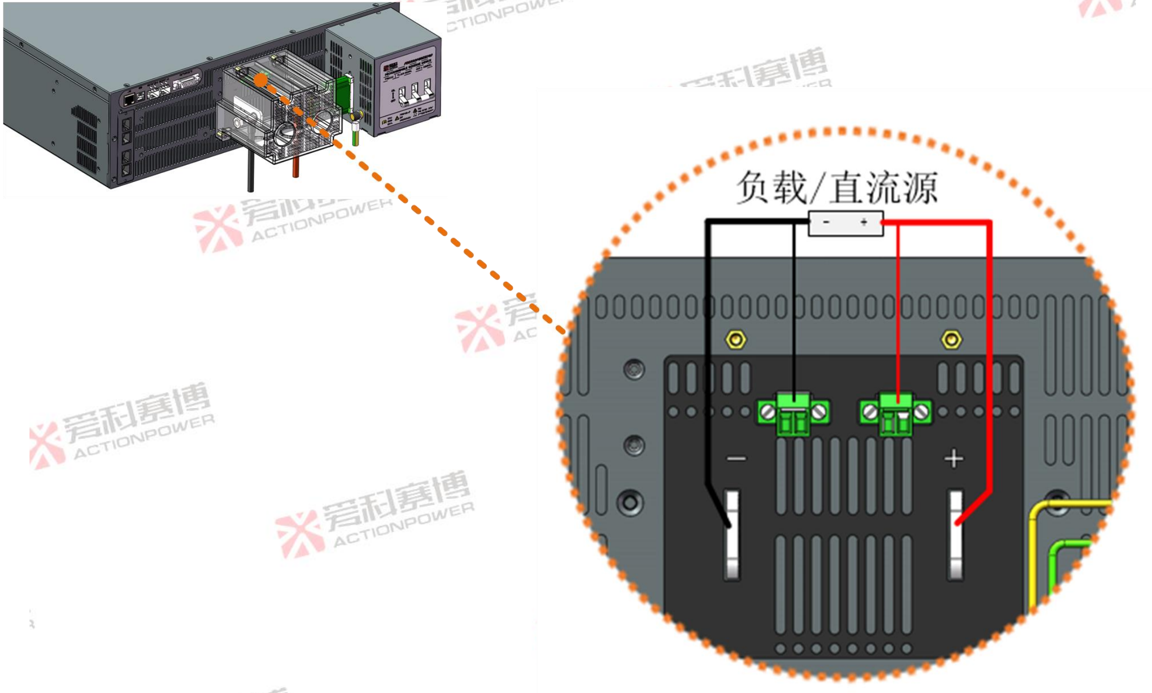


Figure 76-Remote Sensing Wiring

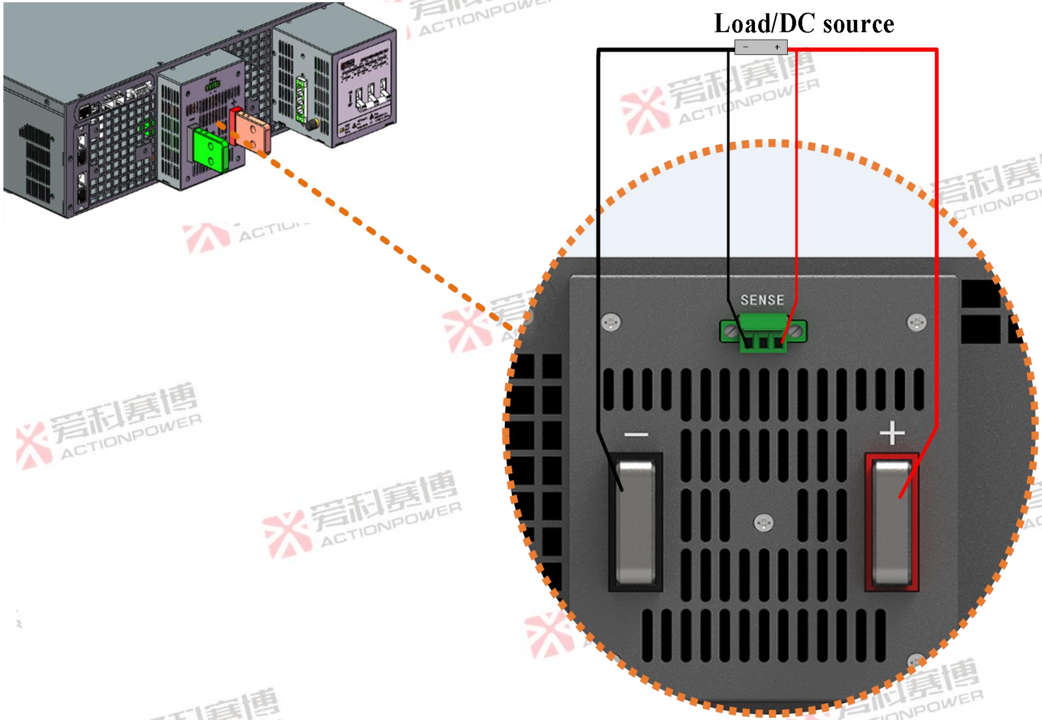


Figure 77-Remote Sensing Wiring

4.12 Magic-Box/ Magic-Bus Installation

⚠	Common ESD protection procedures apply when inserting or exchanging a module. The device must be switched off before insertion or removal of a module. Never insert any other hardware other than an interface module into the slot.

This product has two external function expansion interface, which adopts bus design, can be used without distinguishing location.

Magic-Box/ Magic-Bus board has various models. Users can purchase the Magic-Box/ Magic-Bus board by referring to the Magic-box/Magic-Bus board manual. The Magic-Box/ Magic-Bus board can be disassembled by the user.

Remove the Magic-Box/ Magic-Bus slot cover. using a screw driver, and pull out the original Magic-Box/ Magic-Bus board. Insert the interface module into the slot, The screws are provided for fixing the module and should be fully screwed in.

Figure 78 shows the installation diagram of the Magic-Box/ Magic-Bus board Magic-Box/ Magic-Bus:

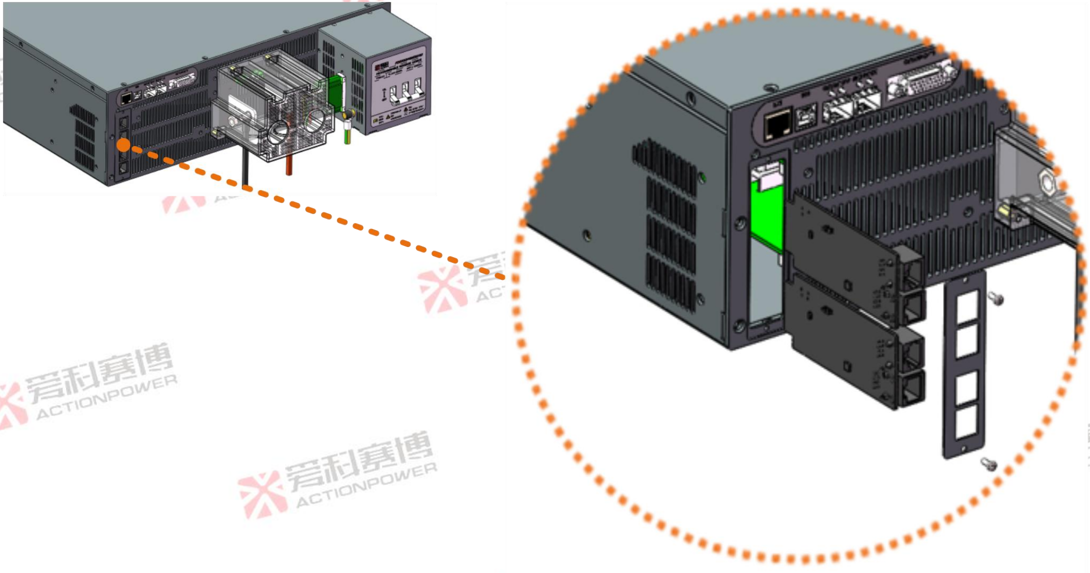


Figure 78-Installation of the Magic-Box/ Magic-Bus Board

4.13 Anyport Interface Installation

Anyport is a multifunction interface. If you want to use this interface, you can connect it using an analog program converter.

It’s generally advisable to switch the device completely off before connecting or disconnecting this connector, but at least the DC terminal.

Figure 79 shows how to install Anyport

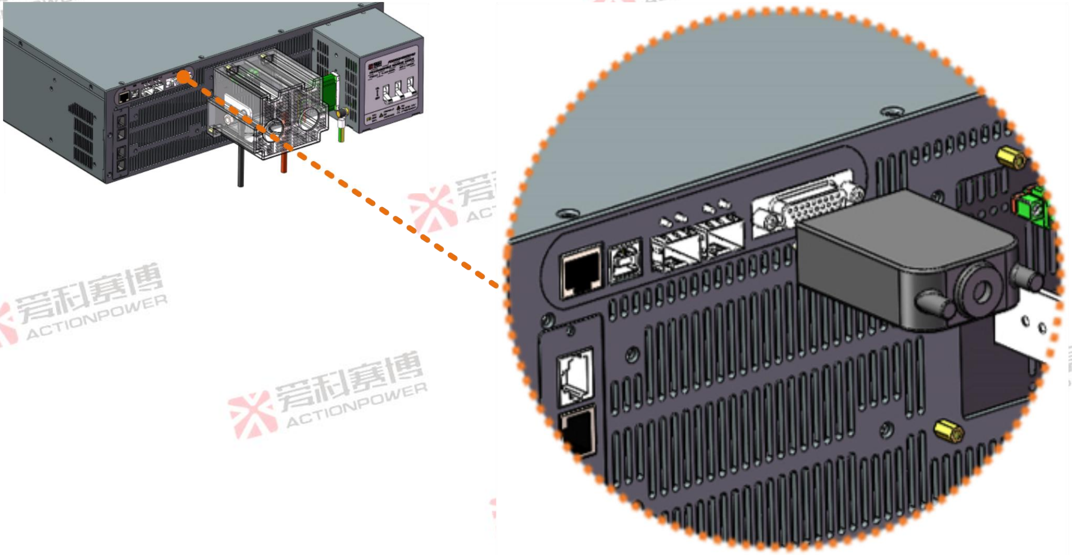


Figure 79-Installation of Anyport

4.14 Energy Matrix Interface Installation

⚠	Before inserting the optical module into the Energy Matrix interface of the product, ensure that the product has been powered off before performing operations!

When the product is combined, the output copper bar needs to be short-connected according to positive and negative polarity respectively and the optical fiber line is used to communicate. Because the single-direction parallel is limited by the communication rate, the parallel machines can be separated by row and column directions to maximize the capacity in parallel conifg. Take the parallel mode with 3 rows and 3 columns as an example, as shown in Figure 80, insert the optical fiber into the optical module, fasten the optical module, and then insert the optical module into the Energy Matrix interface of this product.

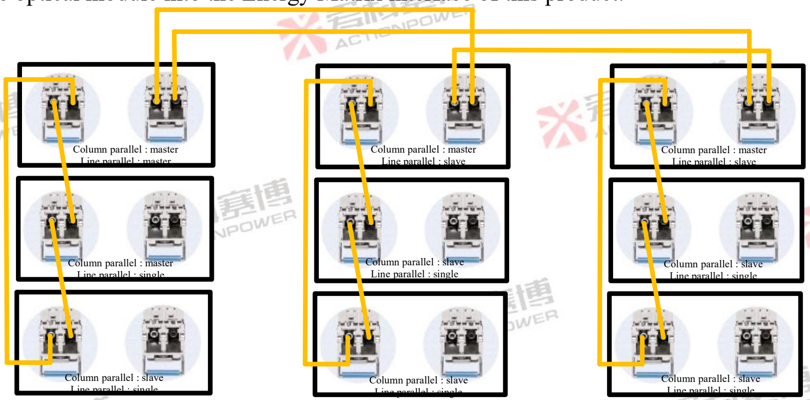


Figure 80-Parallel Pptical Fiber Connection

5 Introduction

5.1 User notes

5.1.1 Important notes

	In order to guarantee safety when using the device, it's essential that only persons operate the device who are fully acquainted and trained in the required safety measures to be taken when working with dangerous electrical voltages. For models which can generate a voltage which is dangerous by contact, or is connected to such, the included DC terminal cover, or an equivalent, must always be used. Load and follow all safety warnings in safety information!

5.1.2 Genera

	The optimal working point of the device is between 10% and 100% voltage and current.

5.2 Front panel

This product is designed with an integrated panel, integrating physical buttons into the panel, and the panel and the device are perfectly integrated without power-on.The operation function is distributed according to the principle of frequency of use and operation habits, the button function is placed in the lower left, and the rotation function is placed on the upper right.The number of buttons is kept to a minimum to ensure simple front panel operation for casual and experienced users alike.

The front panel layout is shown in Figure 81 and Figure 82,Including display screen, manufacturer LOGO, external memory interface, power/reset button, output button, left shuttle knob, left shuttle button, right shuttle knob and right shuttle button.

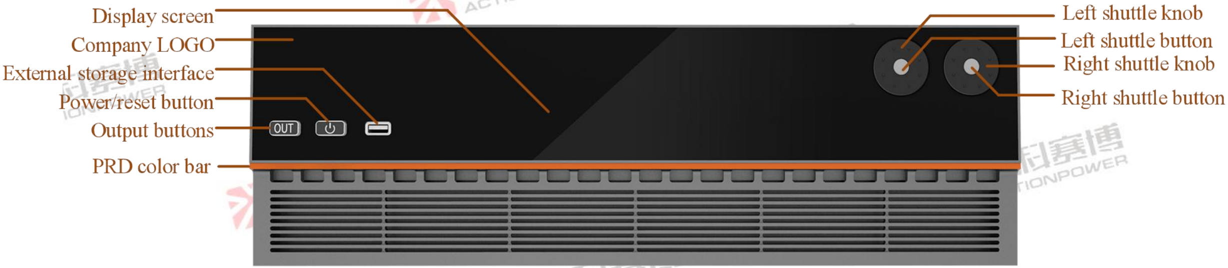


Figure 81-PRD Front Function Partition

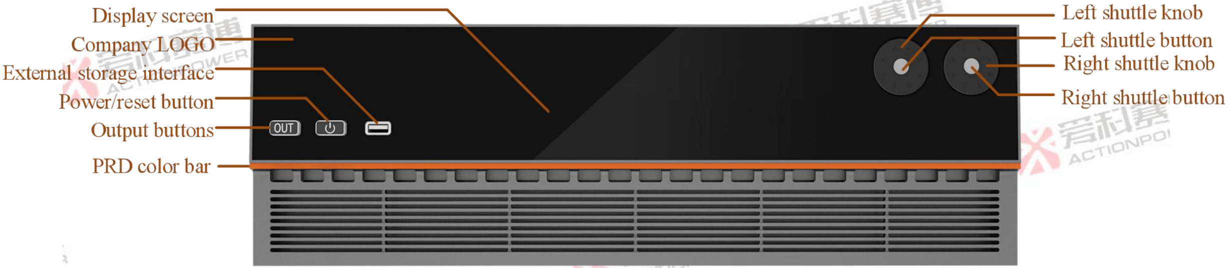


Figure 82-PRD Front Panel Function Partition

5.2.1 Display screen

This product adopts 8.8-inch, 1920*480 resolution, 16-bit RGB ultra-large aspect ratio LCD touch display screen, which can display more information.Users can control the product by touching the display screen and physical buttons.

5.2.2 Company LOGO

The Company LOGO is shown in Figure 83, the LOGO also has the function of indicating the product status, when the PRD is powered on, the LOGO will be lit red.In the upper left corner is the company logo,On the right is the series names of PRD,The bottom is the full name of the product, PROGRAMABLE REVERSE DEVICE,That is, bidirectional programmable DC power supply.

Figure 83-Company LOGO

5.2.3 External memory interface

This interface is used for external USB memory devices, which can access and exchange information of internal and external USB memory devices of the product, and the use and operation are detailed in the relevant sections.

5.2.4 Power/reset button

The power/reset button is the button for this product to turn on, off or reset, with a three-color indicator function. Yellow means the product is on standby, green means the product is operating normally, red means the product is protected.Press and hold this button to turn the device on or off, short press to reset or clear the relevant protection/alarm/event information.

5.2.5 Output button

The output button is to turn the output function on or off.When the key indicator is not lit, indicates the output end is not operational, A green color indicates the output is off, red color indicates the output is on, yellowcolor indicates waiting mode.

5.2.6 Left/right shuttle knobs and buttons

The left and right shuttle knobs are used to set the value of the output setting screen in the follow-up, and the user can use the shuttle knob instead of the on-screen numeric keypad to set the required value, the shuttle knob rotates clockwise to increase the value, and the counterclockwise rotation value decreases.

When the backlight of the shuttle button is off, the shuttle and button functions can be turned on after pressing, and the left and right shuttle buttons can move the cursor to the corresponding base position to quickly and accurately set the value. The button has an anti-misoperation function, and the device will automatically lock the shuttle knob and button without any operation within 5 seconds.

5.3 Rear panel

The rear panel includes Anyport interface, Energy matrix interface, LAN interface, USB interface, optional interface, SENSE interface, output copper bar positive, output copper bar negative electrode, 3 phase input connector, PE connector, AC terminal circuit breaker. The rear panel of models with an output of 200V and above is shown in Figure 84, and the rear panel of models with an output of 200V or less is shown in Figure 85.

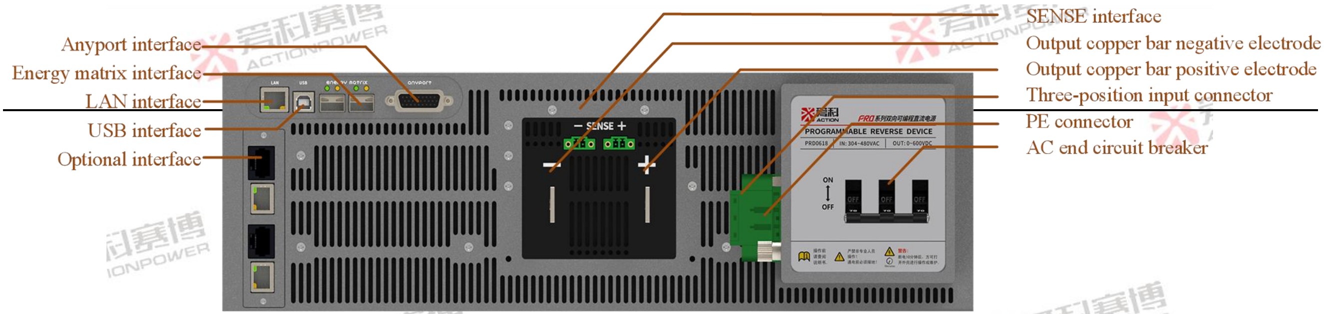


Figure 84- Rear panel function partition

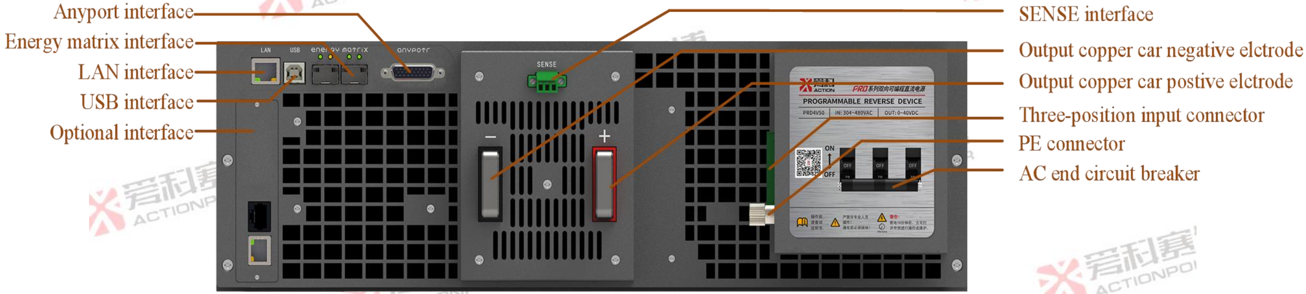


Figure 85- Rear panel function partition（Output voltage 200V or less）

5.3.1 Anyport interface

Anyport is a multi-function interface with input, output and analog categories. Users can configure the corresponding functions of this interface to implement the operation and monitoring of the running status .

6 input interfaces and 6 output interfaces can be individually configured to achieve different demand control, and the input and

output interface functions are shown in Figure 86.

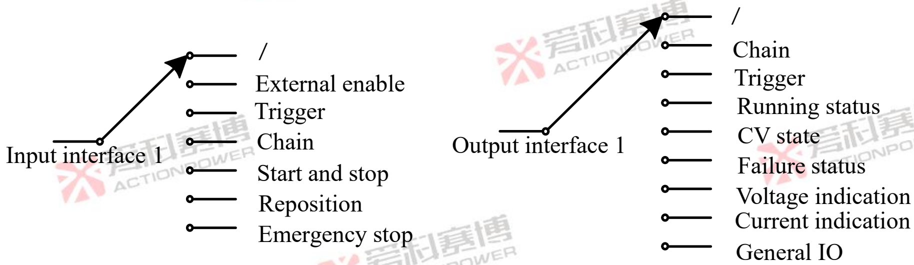


Figure 86- Anyport input and output interface functions

The analog interface function is fixed, but the input range can be configured, and voltage, current, power, internal resistance, and analog control can be realized after being enabled. See the table below for detailed feature information.

Table 4-Anyport interface function table

Interface type	Pin position	Signal level	Feature description
Input	Pin10	0V~10V	Six pins correspond to six input interfaces, each of which can be configured with external enable, trigger, interlock, start-stop, reset, and emergency stop functions. The interface defaults to TTL high. For details of interface conifg and function introduction, see 6.4.5.1 Anyport input.
	Pin11		
	Pin19		
	Pin20		
	Pin21		
	Pin22		
Output	Pin1	0V~10V	6 pins correspond to 6 output interfaces, and each pin can be configured to monitor the operating

Interface type	Pin position	Signal level	Feature description
	Pin2 Pin3 Pin4 Pin14 Pin15		status, CV status, protection status, voltage indication, and current indication of the product. The default interface is OC (open collector), when using it need to be connected to an external high level pull-up, it is recommended to pull up the high level to a voltage of 5V or not more than 10V, pull-up resistor 1kΩ, see Figure 31. For details of interface conifg and function introduction, see 6.4.5.2Anyport output.
Analog	Pin6	-10V~10V	This pin is given externally for the internal resistance, and the internal resistance value of the product is set by a given voltage signal. The given voltage value is proportional to the internal resistance of this product, and its maximum range corresponds to the maximum settable internal resistance of this product. The range can be configured in the "Conifg-Anyport interface", see 6.4.5.3 Anyport analog
	Pin7	-10V~10V	This pin is externally given for power, and the power limit of the product is set by a given voltage signal. The given voltage value is proportional to the output power, and its maximum range corresponds to the rated power of the product output. The range can be configured in the "Conifg-Anyport interface", see 6.4.5.3 Anyport analog.
	Pin8	-10V~10V	This pin is externally given for the current and the current limit of the product is set by a given voltage signal. The given voltage value is proportional to the output current, and its maximum range corresponds to the rated current at the output of this product. The range can be configured in the "Conifg-Anyport interface", see 6.4.5.3 Anyport analog.
	Pin9	0V~10V	This pin is externally given for the voltage, and the voltage limit of this product is set by a given voltage signal. The given voltage value is proportional to the output voltage, and its maximum range corresponds to the rated voltage at the output of this product. The range can be configured in the "Conifg-Anyport interface", see 6.4.5.3 Anyport analog.
	Pin24	10V	This pin is a 10V voltage reference output. Users can divide this pin appropriately and connect to the voltage/current/power/internal resistance external pin to set the setting value of this product.
	Pin25	0V~10V	This pin voltage represents the voltage at the output of this product, and this voltage value is proportional to the output voltage.

Interface type	Pin position	Signal level	Feature description
	Pin26	-10V~10V	This pin voltage represents the current at the output of this product, and this voltage value is proportional to the output current.
Ground terminal	Pin4		These 7 pins are the negative terminals of the input, output, and analog interface pins, common ground.
	Pin12		
	Pin13		
	Pin16		
	Pin17		
	Pin 18		
	Pin 23		

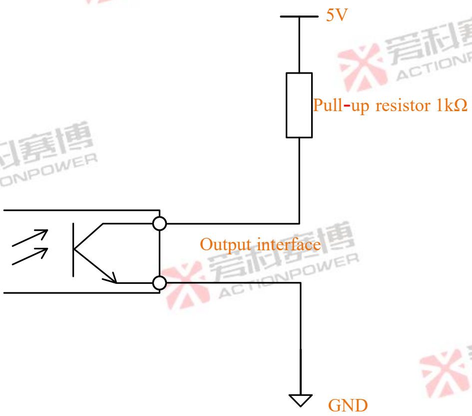


Figure 87-Anyport output interface external high level schematic

5.3.2 Energy Matrix interface

Energy Matrix is an energy matrix interface, which is a unique matrix parallel function of this product, which can easily expand 100 devices in parallel to 3MW capacity.Generally, the parallel system equipment will have uneven current after parallel expansion, and the maximum output capacity will be less than the stand-alone capacity and parallel connections, which will become more and more obvious as the number of parallel systems increases.The product's Energy Matrix interface provides up to less than 0.02% uneven current with virtually no loss of capacity.

The Energy Matrix interface also provides a two-dimensional matrix paralleling capability to connect the same number of devices in parallel.The response speed of the system is much less than that of a one-dimensional parallel system.

5.3.3 LAN interface

LAN interface for remote control. Standard RJ45 interface, the default port number is 502. Support SCPI or Modbus-TCP protocol instruction sets, see 6.4.1 communication.

Note: LAN and USB interfaces can only be selected for use.

5.3.4 USB interface

USB interface for remote control, interface for Type-B type interface, support USB2.0 type, transmission rate can reach 480Mbps, in order to ensure communication reliability, the length of the connection line is not allowed to exceed 2m, also support SCPI or Modbus-RTU two protocol instruction sets, see 6.4.1 communication for details.

Note: USB and LAN interfaces can only be selected for use.

5.3.5 Optional interface

The optional interface expands the functions of this product for use in different industries, users can refer to the Magic-Box/Magic-Bus manual to purchase the required expansion components.The optional interface has two card slots, both of which automatically recognize Magic-Box/Magic-Bus function components, but only one Magic-Box and Magic-Bus can be installed, and two different functions of Magic-Box or Magic-Bus cannot be recognized.

5.3.6 SENSE interface

This product has a high-precision sampling system of up to 6 and a half bits, and is designed with an independent control sampling and display system, which can protect this product even when the control system is abnormal.

The SENSE interface features remote voltage compensation to directly compensate for voltage drops across the output to an external load/DC source line.The values displayed in the output display are calculated from SENSE interface sampling, so the remote compensation line must always be connected to the output or load.

5.3.7 Output copper bar positive/negative poles

The copper bar is the output of product, which can be connected to external load or DC source.Before use, be sure to connect the positive pole to the positive pole and the negative pole to the negative pole. Even if it is not turned on, the wrong wiring can cause irreversible damage to this product. The output may carry danger voltages after start-up and must be connected according to the 4.10 output and installed with a protective cover.

5.3.8 Three-position input connector

The three-position input connector is the AC this product, which can be directly connected to the power grid, and the upper circuit breaker must be unplugged to OFF before connecting.

5.3.9 PE connector

The PE connector is the GND terminate of product, must be connected to the GND all the way to ensure the safety of people and equipment.

5.3.10 AC circuit breaker

AC terminal circuit breaker is an important switch connecting product to the network side, with overload, short circuit protection function, dial ON to power on, dial OFF to power off. Not using this product, be sure to turn the circuit breaker to OFF.

5.4 Manual Operation

5.4.1 Power on/off

When using this product, you need to start the operation, the specific operation is as follows:

Figure 88-Power-on state diagram

Step1:Dial the AC side circuit breaker to ON, as shown in Figure 88 State 1;

Step2:Wait for the front panel manufacturer LOGO to light up, as shown in Figure 88 State 2, after the power / reset button indicator color changes to yellow, press the power / reset button until the indicator turns green and then release, as shown in Figure 88 State 3;

When shutting down this product, shut down the computer, the specific operation is as follows:

Figure 89-Shutdown state diagram

Step1:After turning off the output, press the power/reset button as shown in Figure 89 State 1 until the indicator light changes from green to yellow and then releases, as shown in Figure 89 State 2;

Step2:Dial the AC terminal circuit breaker to OFF as shown in Figure 89 State 3;

Although this product is a regenerative device, it has an anti-islanding function, and in an emergency, when energy is recovery to the grid through this product, it can still be shut down by directly disconnecting the AC terminal circuit breaker. However, in general, it is recommended to follow the above shutdown procedure specifications.

5.4.2 On/ off output

Switching on the output operation: press the output button in standby, the output button indicator from green-yellow-red to open the output output, part of the operation due to the very short time process, may not see the yellow state of the indicator, as shown in Figure 90.

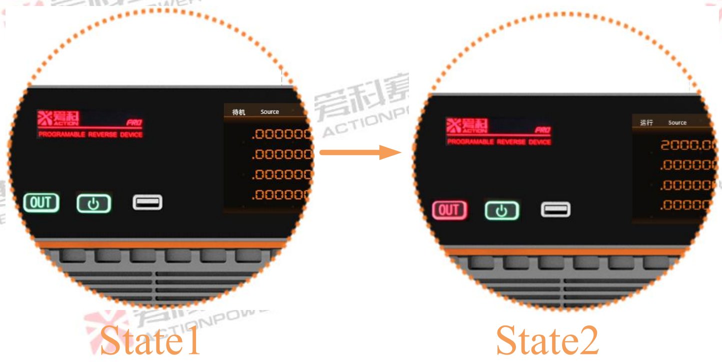


Figure 90-Turn on the output state diagram

Turn off the output operation: press the output button in the running state, the output button indicator can turn off the output output from red-yellow-green, and some operations may not see the yellow state of the indicator due to the very short time process, as shown in Figure 91.

Figure 91-Turn off the output state diagram

5.4.3 Reset

When the output button indicator turns red and the status display screen appears in the protection state, as shown in Figure 92 State 1, press the power/reset button shortly, the indicator flashes until the output button indicator and the power/reset button indicator turn green, and the reset action is completed when the status display screen changes from the protection state to the standby state, as shown in Figure 92 State 2.

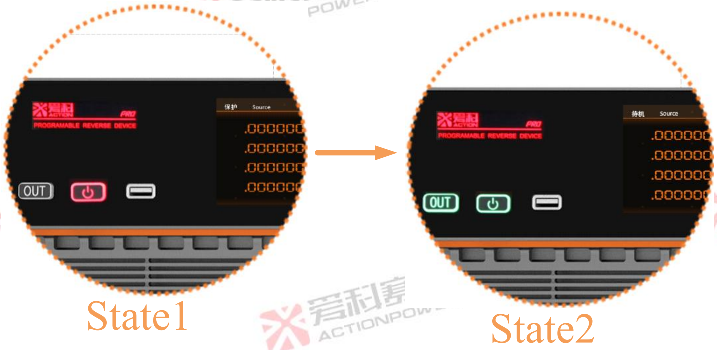


Figure 92-Reset state diagram

6 Operation and Application

This product has many functions, not only can implement the basic source/load function, but also built-in function generator function, support the output of sine wave, pulse wave, triangle wave, custom wave and a series of waveform. The parameter performance of waveform can be adjusted by setting function. Various modes of the waveform can be selected in the conifg function. All functions can be implemented by operating the display screen, which is divided into 6 parts, as shown in Figure 93.

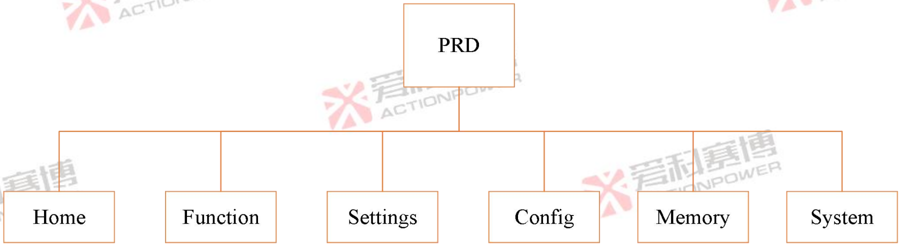


Figure 93-Function Tree

6.1 Home Screen

The home screen, as shown in Figure 94, is divided into the following six screens: drop-down shortcut screen, status display screen, output display screen, function editing screen, menu operation screen, and output setting screen. Different screens can achieve different functions, and users can quickly obtain the required information on these screens.

Figure 94-Home Screen

6.1.1 Drop-down Shortcut Screen

The drop-down shortcut screen provides some common basic operations to improve user operation efficiency. The same functions can still be performed in the corresponding menu items. The corresponding functions cannot be adjusted or modified.

Users can click the middle button " " at the top of the screen to call the drop-down shortcut screen, and click the key " " on the upper right to close the drop-down shortcut screen. The established functions are shown in Figure 95 and Table 5.

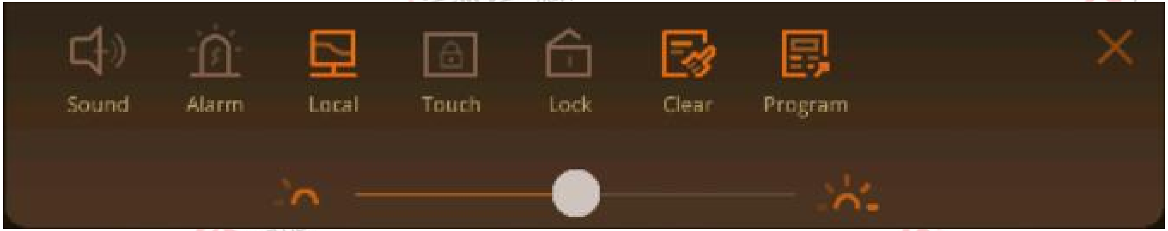


Figure 95-Drop-Down Shortcut Screen

Table 5-Shortcut list

Key	Explaination and operation
Sound	When the operation screen needs a prompt tone, light this key, and the device will feedback the operation result by sound.
Alarm	When you need protection/alarm/event signal sound prompt, turn on this button. When the device screen displays the status, an alarm tone will sound.
Local	Click this button to switch between local, USB, and LAN status.
Touch	This button is lit to prevent misoperation or to lock the screen, but the same operation can be used to remove this function.
Lock	When this button is lit to prevent remote commands from modifying control rights, the device can only assign control rights through the display screen.
Clear	Clears events and states that have occurred.
Program	Quickly jump to the program screen or corresponding function interface.

6.1.2 Status Display Screen

The status display screen at the top of the screen indicates the working state and mode of the product. See Table 6 for details.

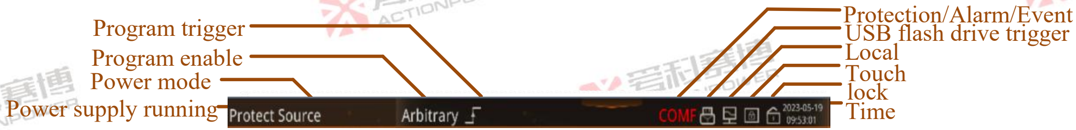


Figure 96-Status Display Screen

Table 6-Status display screen function table

State screen	Display	Explaination and application
Power supply running	Standby	The output terminal of the product is closed. When the output terminal is not needed, the product can work in standby state. For details, see 5.4.2 Enabling or Disabling the Output Terminal.
	Run	The output end of the product is started. When you need to use the output terminal, you can work the product in the running state. For details, see 5.4.2 Enabling or Disabling the Output Terminal.
	Protect	When the product enters the protected state, the output terminal is closed and the standby state can be resaved only after the reset operation. To protect products and devices within a safe range, you can set protection parameters. For details, see 6.3.4 Protection.
	Reset	Product reset can be resaved to standby state. When a protection/alarm/event occurs, the user can click the power/reset button or use the Anyport external input reset signal to resave the standby state. See 6.4.5.1 Anyport Input.
	Emergency stop	The output of this product is shut down. When the user needs to shut down the output in an emergency, he can click the output button or use the Anyport external input emergency stop signal for emergency stop operation, see 6.4.5.1 Anyport Input.
Power mode	Load	When the device absorbs power, the output voltage is positive and the current is negative. If you want to absorb external power, you can set the device to work in Load mode. For details, see 6.1.6 Output Setting Screen.
	Source	The output power, output voltage and current of the device are positive values. When the user needs to output power, the product can be set to work in Source mode. For details, see 6.1.6 Output Setting Screen.
	SAS	Solar Array Analog : Enable the solar panel analog function.
Program enable	Arbitrary wave	This indicator will light up when any wave mode in the waveform screen is loaded.
	Step	This indicator lights up when Step mode loads in the program screen.
	List	This indicator lights up when List mode loads in the program screen.
	Wave	This indicator lights up when Wave mode loads in the program screen.
	Advance	This indicator lights up when Advance mode loads in the program screen.
	Curve scanning	When the curve scanning mode in the PV interface is loaded, this indicator will light up.
Program trigger		This icon will light up when function mode starts running.

State screen	Display	Explaination and application
Protection/Alarm/ Event	CHAF	Chain protection
	SLAF	Slave protection
	INSF	Internal protection
	POWF	Power supply protection
	OPP	Output overpower protection
	OCP	Output overcurrent protection
	OVP	Output overvoltage protection
	SASL	SAS overload protection
	OTP	Outlet overtemperature protection
	PARF	Parallel communication protection
	COMF	Communication timeout protection
	SENF	Sensing alarm
	WAIT	Output WAIT alarm
	PARA	Parallel alarm
Event	Event 1	Displays the current event, for example, Event 1.
USB Flash Drive Trigger		This icon lights up when the product recognizes an external USB memory device..
Local		When remote control is enabled, this icon will light up.
Touch		This icon will light up when the screen lock is on.

State screen	Display	Explaination and application
Lock		This icon lights up when the local lock is enabled.
Time	2021-06-11 13:29:14	Display the current time (year-month-day-hour-minute-second).

6.1.3 Output Display Screen

The output display screen is the display screen of the output parameters of the device. It is divided into four lines. The first three lines are fixed to display the output voltage, output current and output power. The fourth line screen can be edited to display one of the three electric quantity, energy and internal resistance, see 6.4.4 Measurement.

The data in this screen can display a maximum of 6 bits of half data, with the function of adjusting display resolution and display rate. When displaying low precision applications or small data range, the display can be reduced to 5 and a half or 4 and a half bits to obtain better display effect.

When the device is used in static scenarios, adjust the display rate at a lower rate to obtain a more stable loading. For details, see 6.4.4 Measurement.

This product adopts automatic mode design, the user is no longer limited to first set the constant voltage, constant current and other working states of the equipment, automatic mode, the user only needs to set the working voltage of the equipment under test, the maximum current parameters, the electrical parameters of the equipment under test will be limited between the two, whether working in source mode or load mode. When working in automatic mode, the left side of the output display screen will indicate different modes of the device.

Figure 97-Output Display Screen

This product has four modes indicating constant voltage (CV), constant current (CC), constant power (CP) and constant resistance (CR), among which CC, CV and CP modes can be switched automatically according to the formula P=UI, that is, when any of the output voltage, current and power parameters first reach the low limit, the product will work in this mode. Internal resistance mode must be enabled for CR mode. For details, see 6.4.3 Advance.

1、Constant voltage (CV)

The output voltage of this product is constant and equal to the voltage set value. Under the condition of source mode, the relationship between load impedance and load current satisfies Ohm's law R=U/I, and the load current is less than the current set value. In load mode, the voltage of the device under test is higher than the set value of the product, and the current is determined by the product or the device under test.

When the current/power reaches the limit value, the output voltage will automatically be lower than the set voltage limit value, and the output voltage is only determined by the formula U=P/I, and the product will automatically switch to the constant current/constant power mode. The voltage is no longer constant, falling below the set value in source mode and rising above it in load mode.

2、Constant current (CC)

The output current of the product flowing to the load (source mode) or absorbed from the load (load mode) is constant and equal to the current set value. In source mode, the voltage and power at this time are determined by Ohm's law U=IR. In load mode, the voltage and power are determined by the voltage and power of the external DC source.

When the output current is lower than the set current limit value and the voltage/power reaches the current/power limit value, the product will automatically switch to the constant voltage/constant power mode according to the formula I= P/U. If the voltage reaches the maximum set value first, the product will automatically switch to the constant voltage mode. If the power first reaches the maximum set value, the product will automatically switch to the constant power mode.

3、Constant power (CP)

The output power of this product is constant. In the source mode, the voltage and current at this time are determined by the formula P=UI and $P=U^2/R$ by the real resistance value of the connected load. In load mode, the voltage and current are determined by the voltage and current of the external DC source. At lower voltage, the flow of current is larger, at higher voltage, the flow of current is smaller, so that the power is stable within the power curve range.

When the output power is lower than the set power limit, and the voltage/current reaches the voltage/current limit, the product will automatically switch to the constant voltage/constant current mode according to the formula P = U * I. If the voltage reaches the maximum set value first, the product will automatically switch to the constant voltage mode. If the current reaches the maximum set value first, the product will automatically switch to the constant current mode.

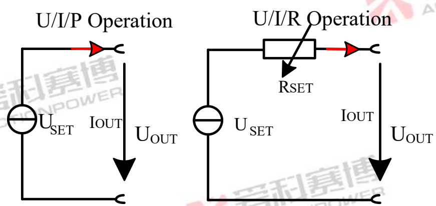
If the actual current value/voltage value/power value is close to the set current value/voltage value/power value, this product may jump conversion in CC/CV/CP mode, in which case the accuracy of the output parameters of this product may exceed the specification.

It is suggested that other parameters should be properly amplified when the established parameters are defined so that they can work in a controlled mode.

Example: Assume that the voltage is set to 500V, the current is set to 10A in source mode, and the power is set to 10kW in source mode. When the load is about 50Ω, the actual current fluctuates around 10A. When the current is equal to 10A, the product will work in CC mode; when it is less than 10A, the product will work in CV mode, resulting in the product will jump in CC/CV mode.

4、Constant resistance (CR)

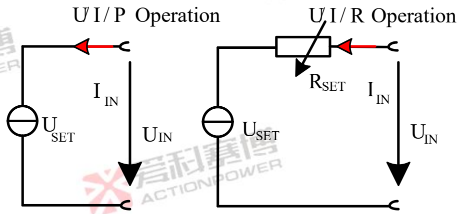
The internal resistance of this product is constant. In the source mode, the principle of the constant resistance mode is to simulate a virtual internal resistance in series with the voltage source, which can be connected with the load in series. According to Ohm's law, due to the existence of internal resistance, the output terminal voltage will drop, so that the voltage set value is different from the actual output terminal voltage, the principle diagram is shown in Figure 98.



$$U_{SET} - U_{OUT} = I_{OUT} * R_{Set}$$

Figure 98- Constant Resistance Source Mode

In load mode, according to the formula IIN = (UIN -- USET)/RSET, (IIN is the output current, UIN is the external voltage of the output, USET is the voltage of the product, and RSET is the internal resistance of the product), the actual current is determined by the difference between the external supply voltage and the set value of the product voltage, as shown in Figure 99.



$$U_{IN} - U_{SET} = I_{IN} * R_{Set}$$

Figure 99- Constant Resistance Load Mode

For example, if the voltage of the external DC source is 200 V, the internal resistance RSET is 10 Ω and the voltage USET is 0 V. Start the output input, the current rises to 20 A, the actual resistance value RMON should be close to 10 Ω. When the voltage USET is adjusted to 100 V, the actual resistance RMON remains at 10 Ω and the current is reduced to 10 A.

Note: When the output voltage of the external DC source is equal to the set voltage, the product will not absorb any current and will enter CV mode instead. If the input voltage is almost equal to or oscillates around the set voltage, the operating mode will always switch between CV and CR modes. Therefore, you are advised not to adjust the set voltage to the same level as the external DC source voltage。

Refer to Table 7 for the working mode status.

Table 7-Working status table

Comparison of PRD and user device parameter Settings				PRD operating status	
Voltage	Current	Power	Internal resistance	Source/Load mode	Indication
H	H	MAX	OFF	Source mode	CV
H	L	MAX	OFF	Source mode	CC
H	MAX	H	OFF	Source mode	CV
H	MAX	L	OFF	Source mode	CP
L	H	MAX	OFF	Load mode	CV
L	L	MAX	OFF	Load mode	CC
L	MAX	H	OFF	Load mode	CV
L	MAX	L	OFF	Load mode	CP

Note:

H:The product value is higher than custommer.

L:The product set value is lower than custommer.

MAX:This product parameter is set to the maximum value and will not be restricted during operation.

ON:The internal resistance mode is enabled.

OFF:Internal resistance mode forbidden.

6.1.4 Function Editing Screen

The function editing screen is shown in Figure 100. There are three interfaces for selecting Shuttle function screen, power curve screen and waveform reproduction screen in this screen. You can switch to the corresponding screen by pressing the lower right button.

Figure 100-Function Edit Screen

By default, Shuttle function screen is displayed on startup, as shown in Figure 101. You can also click shuttle function button to switch to this screen.

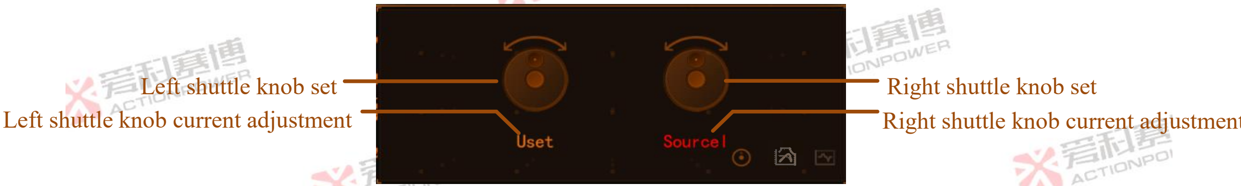


Figure 101-Shuttle Function Screen

For some specific applications, the left and right shuttle knob functions can be configured with voltage, source current, load current, source power, load power, source resistance, load resistance, one of the seven parameters. Click the left/right shuttle knob setting button to be configured, and select the function parameters to be configured on the screen shown in Figure 102. Once the function is determined, the device will retain the current conifg of the adjustment parameters until the next change.

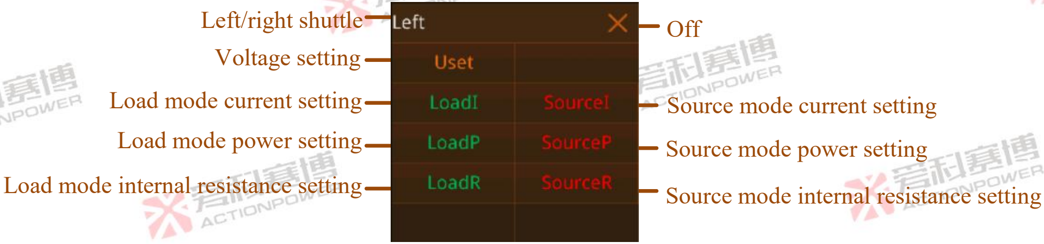


Figure 102-Shuttle Parameter Selection Screen

This product is designed for constant power characteristics, that is, when the output of low voltage/current, you can output rated power, to clearly indicate this state, and direct indication of the relationship between voltage, current, power parameters and rated parameters after limiting the range of set values, the display screen designed a power curve boundary indication function.

Press to switch to the power curve screen, as shown in Figure 103. The white line shows the rated power curve of the PRD, and the orange line shows the current power curve of the PRD. The horizontal coordinate of the curve is current and the vertical coordinate is voltage. The current on the left side is negative, the current on the right side is positive, and the voltage is positive.

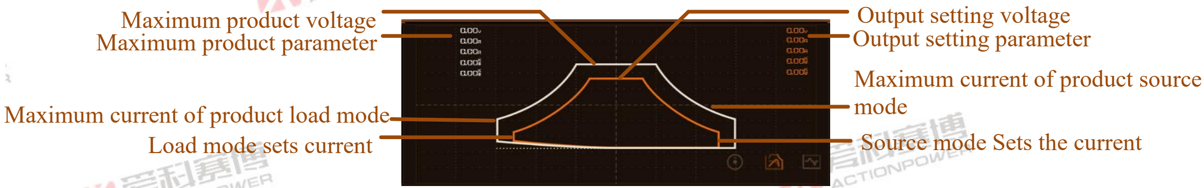


Figure 103-Power Screen

This product is designed to reproduce the waveform function, in program, adjusting the output parameters, can directly indicate the voltage, current, power changes, and draw it on the screen.

Click to switch to the waveform reproduction screen, as shown in Figure 104. The accuracy of waveform reproduction function is affected by sampling rate and memory depth, and higher frequency waveform may cause distortion. The waveform is for users' reference only. If there are more requirements, professional oscilloscope is recommended.

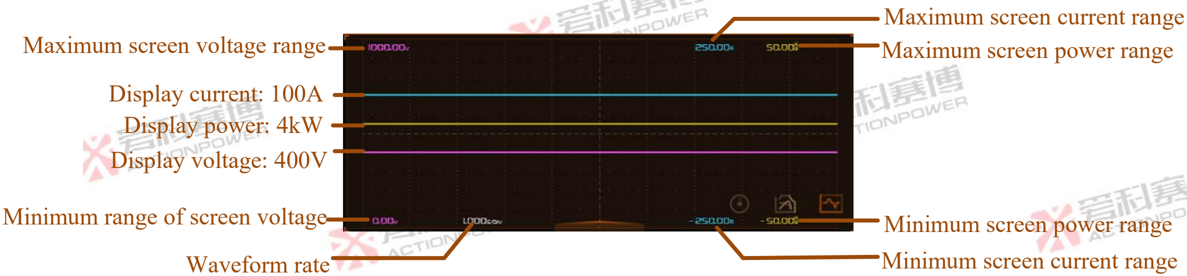


Figure 104-Waveform Reproduction Diagram

In the waveform reproduction screen, click the shortcut key " " at the bottom of the screen, as shown in FIG. 105. The amplitude and time scale unit values can be set on this screen.

Figure 105-Up-Down Shortcut Screen

Table 8-Parameters of the up-down shortcut screen

Parameters	Unit	Explaination and application	Model	Resolution	Initial value	Range
Voltage range	V/DIV	The voltage amplitude represented by each cell on the screen. Parameter can be scaled down or enlarged when waveform needs to be scaled up or down.	ALL	10	500	10~500
Current range	A/DIV	The current amplitude represented by each cell in the screen.Parameter can be scaled down or enlarged when waveform needs to be scaled up or down.	ALL	1	20	1~100
Power range	KW/DIV	The power amplitude represented by each cell in the screen. Parameter can be scaled down or enlarged when waveform needs to be scaled up or down.	ALL	1	10	1~50
Waveform rate	S/DIV	The wave time represented by each cell in the screen. Parameter can be reduced or enlarged when needs to speed up or slow down the waveform speed.	ALL	0.1	1	0.1~10

6.1.5 Menu Operation Screen

The menu operation screen is shown in Figure 106. Click any button below to enter to Home screen, and click any button to enter the menu screen.

Figure 106-Master Operation Screen

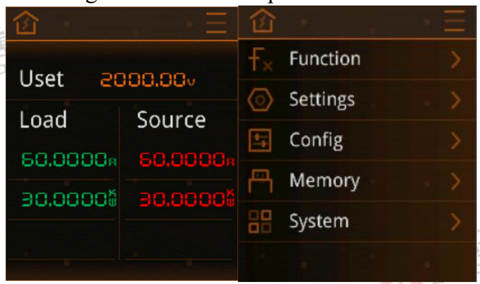


Figure 107-Home Screen and Menu Screen

6.1.6 Output Setting Screen

The output setting screen is shown in Figure 108, where the output voltage, current in source mode or load mode, power and internal resistance can be set. The internal resistance is displayed only after the internal resistance mode is enabled. For details, see 6.4.3 Advance.

Figure 108-Output Settings Screen

This product integrates power supply and load, and can switch seamlessly between the two modes (PVD can only work in source mode).

Power mode: This product works in power mode to provide DC voltage for external DC loads. In this mode, the output is the output.

Load mode: This product works in load mode and can obtain power from an external DC source. In this mode, the output is the input.

Source and load can be automatically switched, external load, working in power mode; External DC source:

When the output voltage of the product is greater than the external DC source voltage, it works in power mode;

When the output voltage of the product is less than the external DC source voltage, it works in load mode.

6.2 Function

This product is equipped with powerful waveform and program functions, greatly convenient for users to simulate a variety of working conditions, equipment features. Dedicated solar cell simulator features can be used to simulate a variety of standard photovoltaic arrays. Optional screen also supports the addition of automobile, energy memory and other industries special functions. The function performance in Figure 109.

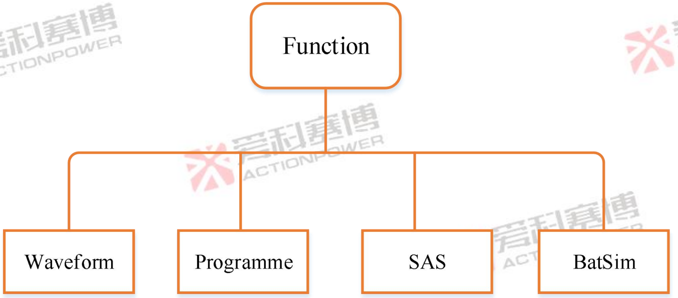


Figure 109-Function Tree

6.2.1 Amplitude-Frequency Characteristic Curve

Ttable below shows the sine wave amplitude-frequency characteristics of the output voltage and current. The voltage amplitude-frequency characteristic curve is measured under no load (open circuit), and three curves correspond to three response speeds. The current amplitude-frequency characteristic curve is measured when the output is resistive load

Table 9-Amplitude-frequency characteristic curve screen table

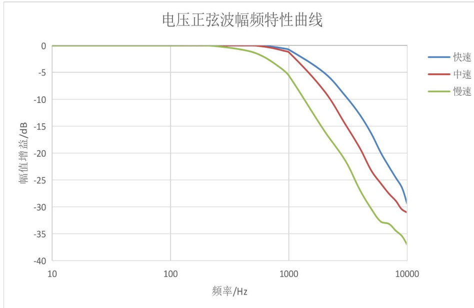
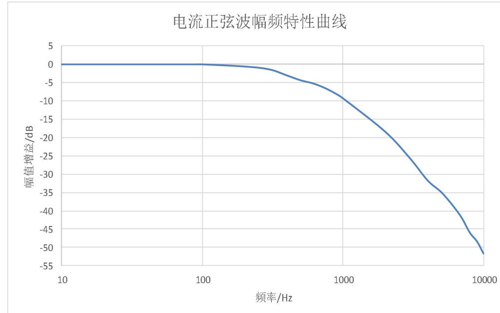
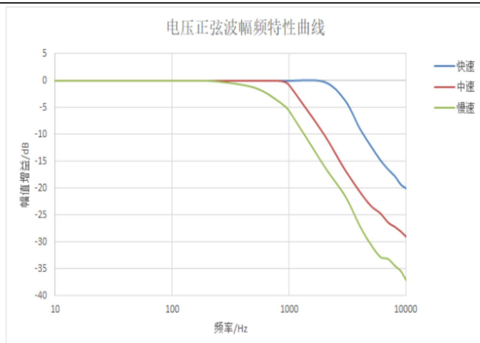
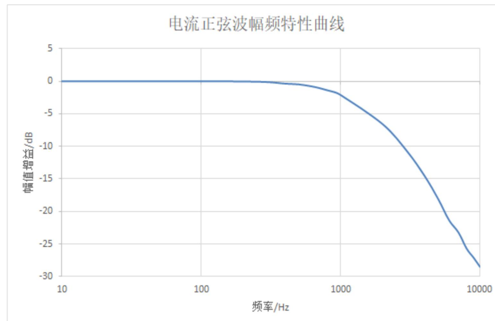
Model	Voltage sine wave amplitude-frequency characteristic curve	Amplitude and frequency characteristic curve of current sine wave
PRD1503 PVD1503 PRD1504 PVD1504 PRD1506 PVD1506 PRD2003 PVD2003 PRD2004 PVD2004 PRD2006 PVD2006		
PRD0509 PVD0509 PRD0512 PVD0512 PRD0518 PVD0518 PRD0609 PVD0609 PRD0612 PVD0612 PRD0618 PVD0618		

Table 10-Amplitude-frequency characteristic curve screen table

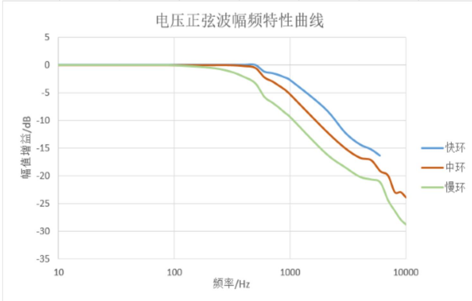
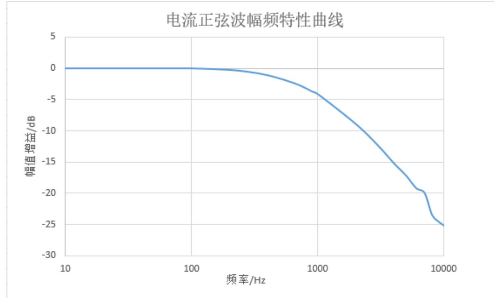
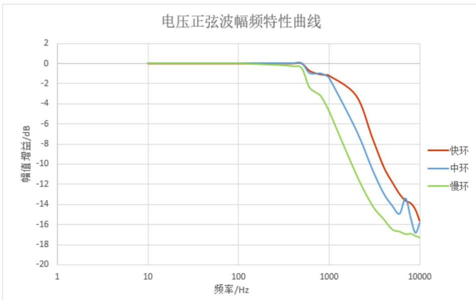
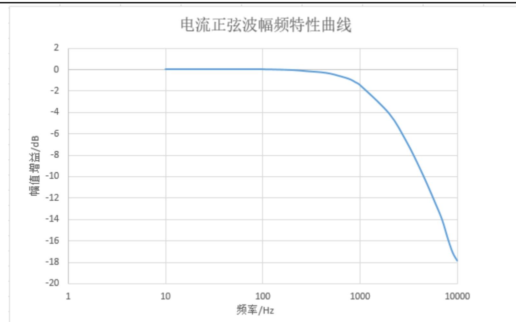
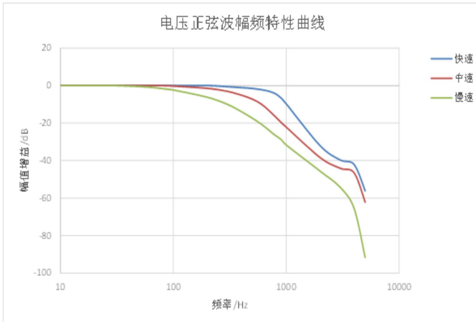
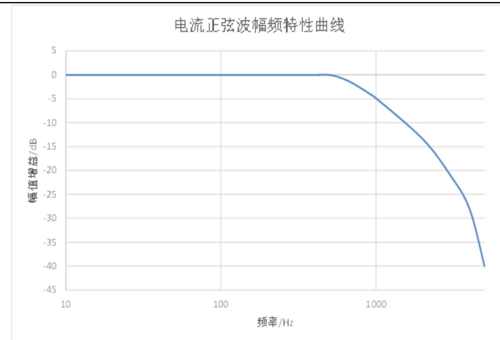
Model	Voltage sine wave amplitude-frequency characteristic curve	Amplitude and frequency characteristic curve of current sine wave
PRD0804 PVD0804 PRD0805 PVD0805 PRD0808 PVD0808 PRD1004 PVD1004 PRD1005 PVD1005 PRD1008 PVD1008		
PRD0212 PVD0212 PRD0216 PVD0216 PRD0224 PVD0224 PRD0312 PVD0312 PRD0316 PVD0316 PRD0324 PVD0324		

Table 11-Amplitude-frequency characteristic curve screen table

Model	Voltage sine wave amplitude-frequency characteristic curve	Amplitude and frequency characteristic curve of current sine wave
PRD4V50 PVD4V50 PRD6V50 PVD6V50 PRD8V50 PVD8V50 PRD4V66 PVD4V66 PRD6V66 PVD6V66 PRD8V66 PVD8V66		

6.2.2 Waveform

This function can realize the overlay of periodic waveform information on the DC output signal, such as DC low-frequency ripple analog, wave analog. In addition to the standard conifg of sine wave, triangle wave, pulse wave, also open up to 27 groups of waveform can be edited by users, at the same time with waveform preview and external memory import functions.

The waveform function has two subitems, arbitrary wave and waveform data. Arbitrary wave includes the function of editing and previewing waveform information. Waveform data is used to replace and edit 27 groups of Shap04-Shap30 data.

6.2.2.1 **Arbitrary wave**

The waveform-arbitrary wave screen is shown in Figure 110. There are four subterms.

Figure 110-Arbitrary Waveforms-Edit Screen

Waveform: Expected output waveform, sinusoidal wave, triangle wave, pulse wave, Shape04~Shape30 one of them can be selected;

Mode: The edited waveform is used to adjust the output voltage or output current. When the voltage is selected, the edited waveform is used to output voltage. The maximum value of the output current will be limited by the current setting in Figure 108. When selecting the current, the edited waveform is used to output the current. The maximum output voltage will be limited by the voltage setting in Figure 108. If the current waveform is distorted, please adjust the amplitude or offset to check whether it is limited.

Offset: Value of the DC component of the expected output waveform, resolution 0.001V/A, minimum 0 for mode voltage maximum rating, minimum negative rating for mode current maximum positive rating, initial value 0;

Amplitude: the amplitude of expected output waveform, sine wave is half peak, other waveform is peak-peak value; When setting, ensure that the amplitude must be smaller than the offset value, otherwise the output waveform may be distorted. Resolution is

0.001V/A, minimum value is 0, maximum value is rated, and initial value is 0;

Frequency: Frequency of expected output waveform, resolution is 0.01Hz, minimum value is 0.01Hz, maximum value is 10000Hz, initial value is 1Hz;

Percent: Select only the unique parameters of pulse wave and triangle wave, corresponding to the pulse wave duty ratio, triangle wave symmetry parameters, resolution is 0.01, minimum value is 0, maximum value is 100, initial value is 0; Due to the impact of device precision and bandwidth parameters, when a small value is combined with a high frequency, the device may not respond to waveform. If the minimum pulse width time is 1μs when the duty cycle of the 10kHz pulse wave is 1%, the device cannot output the expected waveform.

Load: Load the expected output waveform to the output state, after loading, waveform information and parameters will be locked as uneditable state, and can not be edited until it is triggered to end or exit the loading state.

Trigger: Transition from steady state output to expected output waveform, only valid when Trigger Input is inside.

Note: The expected output waveform is still limited by power parameters, and improper power Settings may distort the expected output waveform.

The diagram of sinusoidal wave, triangular wave and pulse wave selected by arbitrary wave program is shown in Figure 111~ Figure 113. Set the amplitude, frequency and offset of the three waveforms, with triangle wave percent set as 25% and pulse wave percent set as 75%.

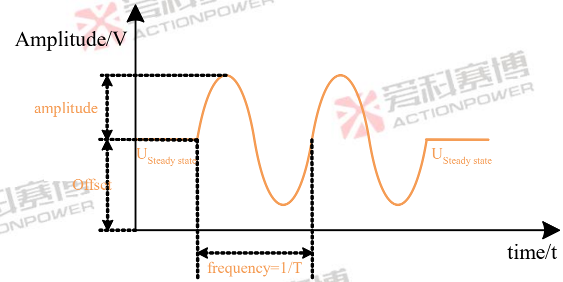


Figure 111-Arbitrary Waveforms-Sinusoidal Waveforms Diagram

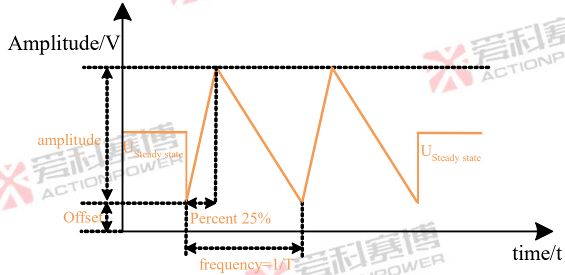


Figure 112-Arbitrary Waveforms-Triangular Waveforms Diagram

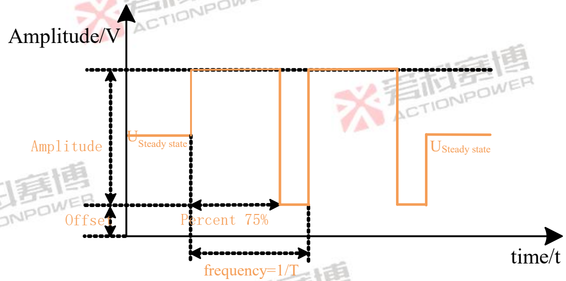


Figure 113-Arbitrary Waveforms-Pulse Waveforms Diagram

This product has 30 waveforms to choose from. Sine wave, triangle wave and pulse wave have been fixed in the first three, which cannot be edited or changed. Shape04~Shape30 can be edited or changed, and the screen is shown in Figure 114. See Section 6.2.2.2 for the method of customizing waveform editing.

Figure 114-Function- Waveform- Arbitrary-Waveform Screen

This product is configured with the function of arbitrary wave single-period preview, which is used to check and confirm the waveform state, and identify the parameter information. If the amplitude is set as 310V, the offset as 100V, and the frequency as 50Hz, the waveform preview is shown in Figure 115.

Figure 115-Arbitrary -Preview Screen

The configured arbitrary wave data (including waveform, mode, offset, amplitude, frequency, and percent information) can be transferred between the same devices to reduce the user's repeated conifg of the same operation. There are "memory", "load", "USB" three operation keys to achieve this operation. The page is shown in Figure 116.

Figure 116-Function-Waveforms-Arbitrary Waveforms-Data Screen

For an intuitive description, the device is divided into three screens: "Display screen", "This product internal data (arbitrary 01-arbitrary 30)", and "external USB memory data", but this state does not exist in reality.

To quantify and confirm the accuracy of data transfer between the three screens. These three screens are always mediated by the "display screen" as shown in Figure 117.

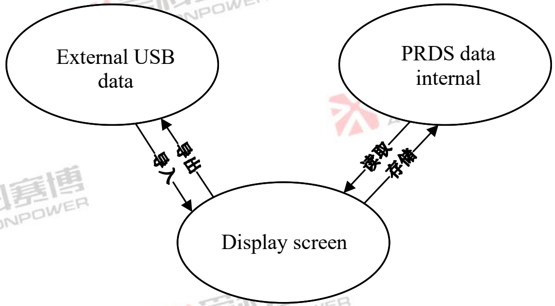


Figure 117 - Waveform Storage Diagram

Save: Save the "display screen" data to the "Internal memory data (arbitrary Wave 01- Arbitrary Wave 30)";

Load: load the "internal saved data (arbitrary wave 01- arbitrary wave 30)" data to the "display screen";

Press "save", any wave - edit screen data save in the selected No. Display The screen displays "In Data Save..." If the operation succeeds, the system displays "Data save succeeded!".

Press "load", and the data in the selected No. will be load to the arbitrary wave-edit screen; Display The screen displays "Data loading...", if the operation succeeds, the message "Data load success!" is displayed.

After connecting a valid external USB memory device, click the "USB" button to switch to the screen shown in Figure 118.

Figure 118-Function-Waveform-Arbitrary Waveforms-Data -USB Screen

Export: Save Display Screen data to External USB memory data;

Import: Load the "external USB Memory data" data;

Press "Export" to export the parameters of the arbitrary wave-edit screen to an external USB memory device; The message "Exporting Data..." is displayed. If the operation succeeds, the system displays "Data exported success! . After the export is success, the file list is refreshed on the screen.

Press "Import" to import the files from the selected external USB memory device into this product. The parameters in the file will be displayed on the screen. "Data Import..." is displayed on the screen. If the operation succeeds, the system displays "Data import succeeded! ".

6.2.2.2 Waveform data

This product reserves 27 groups of Shape04 to Shape30 waveforms for users to customize and edit. The product only recognizes the waveforms verified and processed by the special upper computer software.

The imported waveform can be invoked in any wave-waveform screen. The product's internal waveform can also be exported to an external USB memory device, as shown in Figure 119. After the external USB device is connected, the export button is valid. After you click the export button, the export button starts. During the export process, the message "Exporting Data..." is displayed. , if the operation succeeds, the message "Data exported success! " .

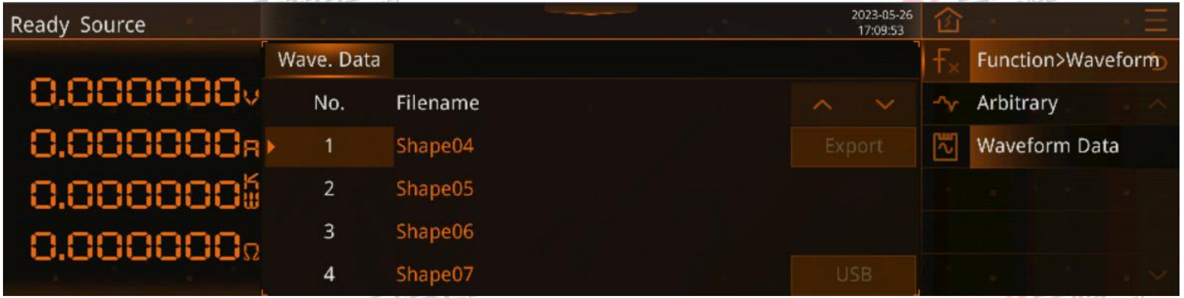


Figure 119-Function-Waveform-Waveform Data Screen

After a valid external USB device is connected, the USB button is lit and pressed to enter the waveform data-USB screen, as shown in Figure 120. Importing waveform data from an external USB memory device consists of two steps. Step 1: click "Import To" on the screen shown in Figure 120 to switch to Figure 121. Step 2: Select the No. in Figure 121 and click OK. "Data Import..." will be displayed. If the operation succeeds, the message "Data import succeeded!".

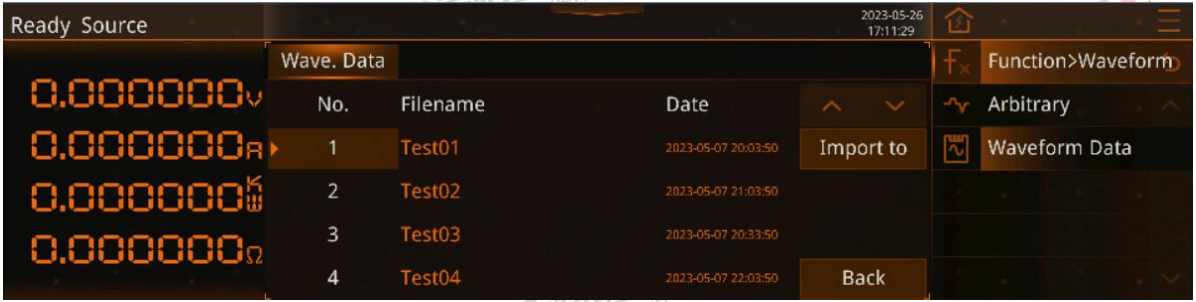


Figure 120-Function-Waveform-Wave. Data -USB Screen

Figure 121-Function-Waveform-Wave. Data -USB Import Screen

6.2.3 Program

This product is designed for amplitude and time program functions, single function support up to 200 sequences of program, you can choose a variety of modes to edit voltage and current waveform, through flexible conifg parameters, you can edit the required waveform.

The whole program strategy is to start from steady state and then return to steady state.

6.2.3.1 **List**

List function is to program a group of curves describing the relationship between a period of time and the amplitude, up to 200 sequences of voltage and current data can be added program. The program-list-edit screen is shown in Figure 122.

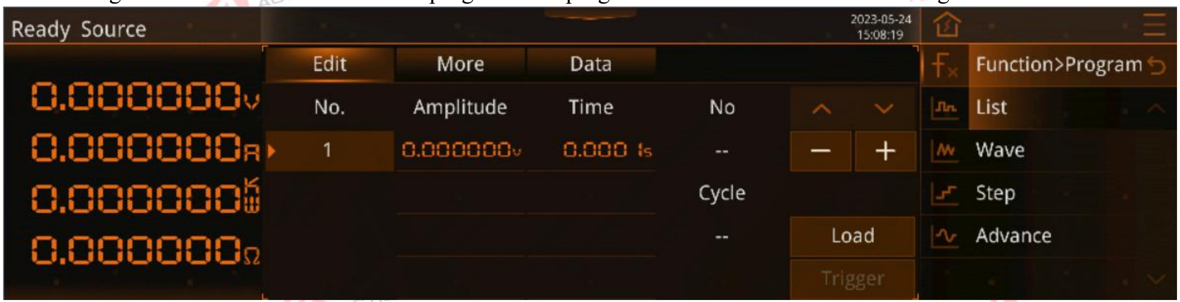


Figure 122-Function-Program-List-Edit Screen

No.:Sequence number. Supports a maximum of 200 steps;

Amplitude: Current sequence voltage/current amplitude, resolution 0.001V/A, minimum 0 for mode voltage maximum rating, minimum negative rating for mode current maximum positive rating, initial value 0;

Time: The current sequence moment, resolution is 0.0001s, minimum value is 0, maximum value is 9999999s, initial value is 1s;

No: Indicates the number of the sequence being executed;

Cycle: Indicates the cycle being executed;

+:Add a line below the selected sequence;

-:Delete selected sequence;

Load: Load the expected output waveform to the output state, after loading, waveform information and parameters will be locked as uneditable state, and can not be edited until it is triggered to end or exit the loading state;

Trigger: Transition from steady state output to expected output waveform, only valid when Trigger Input is inside.

Note: The expected output waveform is still limited by power parameters, and improper power Settings may distort the expected output waveform.

As shown in Figure 123, the amplitude and time of the sequence No.1 were set as $U_{No.1}$ and $t_{No.1}$; the amplitude and time of the sequence No.2 were set as $U_{No.2}$ and $t_{No.2}$; and the amplitude and time of the sequence No.2 were set as $U_{No.2}$ and $t_{No.2}$. After the waveform is triggered, the voltage rises from the steady state to $U_{No.1}$ set in List mode within a very short rising time, as shown by the blue arrow in the figure. The rising rate is controlled by the voltage swing rate and can reach 5V/μs at the fastest, as shown in 6.3.2 Parameter. $U_{No.1}$ is constant in the time of $t_{No.1}$, and the amplitude of $U_{No.2}$ sequence is constant in $t_{No.2}$; the amplitude of $U_{No.2}$ sequence is constant in $t_{No.2}$; the amplitude of U_{No3} sequence is constant in t_{No3}; the amplitude of U_{No3} sequence is constant in t_{No3}; the waveform output will quickly return to steady state.

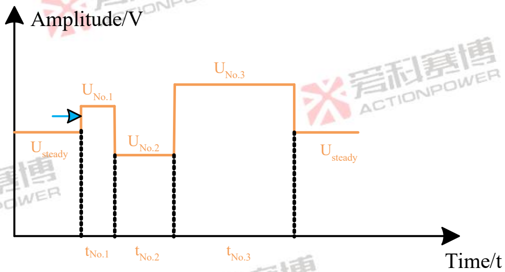


Figure 123-List Waveform

Figure 124 shows the program-list-conifg screen.

Figure 124-Program-List-More Screen

Mode: The edited waveform is used to adjust the output voltage or output current. When the voltage is selected, the edited waveform is used to output voltage. The maximum value of the output current will be limited as shown in Figure 108. When selecting the current, the edited waveform is used for the output stream. The maximum output voltage will be limited by the voltage setting in Figure 108. If the current waveform is distorted, please adjust the amplitude to check whether it is limited.

Continuous: Whether the edited waveform automatically exits the loading option after being triggered. If this function is enabled, the waveform will remain in the post-loading state;

Trigger: Whether all the edited waveforms run after being triggered. Automatic mode means the whole List will run, and one step will be run once triggered.

Cycle: The whole List is run as a cycle. maximum value up to 9999999, initial value is 1. Set 0 for infinite cycles.

Figure 125 shows the List conifg waveform. Set the amplitude and time of No.1 sequence as $U_{No.1}/I_{No.1}$ and $t_{No.1}$, and set the amplitude and time of No.2 sequence as $U_{No.2}/I_{No.2}$ and $t_{No.2}$, and set the cycle as 4 times. and the set value should be within the blue line range. The waveform rapidly rose from steady state to $U_{No.1}/I_{No.1}$, and then quickly jumped to $U_{No.2}/I_{No.2}$, and $t_{No.2}$. Due to the setting of cycle number 4, the sequence No.1 and No.2 were cycled for 4 times, Return to steady state after the waveform ends.

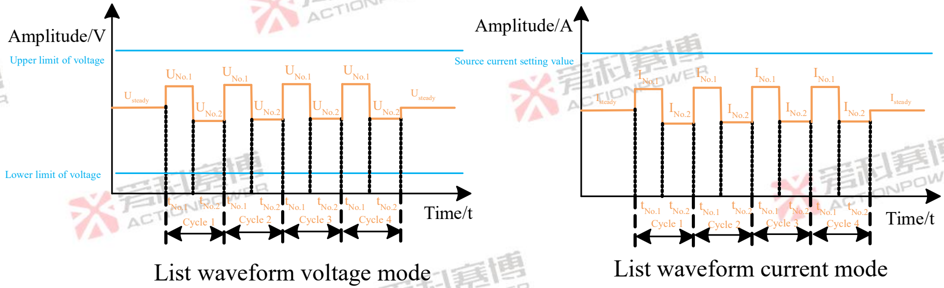


Figure 125-List Voltage and Current Mode Waveform

The configured List data can be transferred between the same devices to prevent users from repeatedly configuring the same operations. There are "save", "load", "USB" three operation buttons to achieve this operation. The page is shown in Figure 126. The operations are similar to those in 6.2.2.1.

Press "Save" to save the List data in the edit screen to the selected No. Sequence; Display The screen displays "In Data Save..." , if the operation succeeds, the message "Data save succeeded!" is displayed.

Press "Load" to load the data in the selected No. Number to the List editing screen. Display The screen displays "Data loading...". , if the operation succeeds, the message "Data load success!" is displayed.

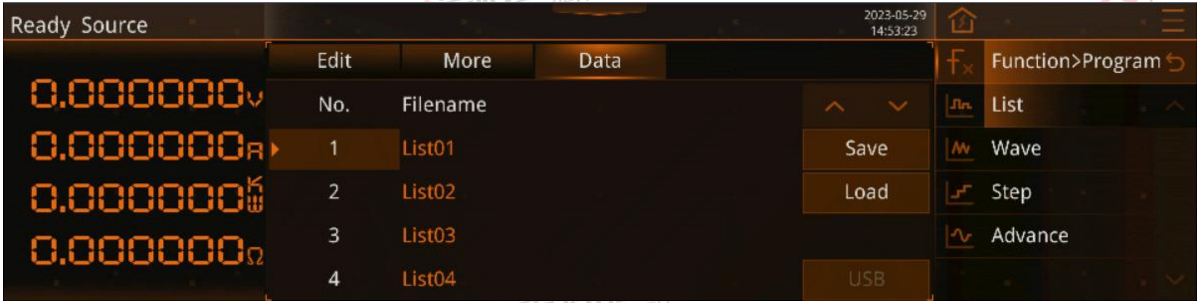


Figure 126-Program-List-Data Screen

After the external USB memory device is inserted, click the "USB" button to switch to the screen shown in Figure 127.

Press "Export" to export the selected List data to an external USB memory device; "Data exporting..." will be displayed on the screen. If the operation is success, "Data export success!" will be displayed. After the export is success, the display screen will refresh the file list.

Press "Import" to import the file in the selected external USB memory device into this product, and the parameters in the file will be displayed on the screen; "Data importing..." will be displayed on the screen. If the operation is success, " Data import success!". ".

Figure 127-Program-List-Data-USB Screen

6.2.3.2 **Wave**

Wave function is programmed to describe a group of time point and amplitude point coordinates (time, amplitude) of the relationship curve, such as 3s after the voltage amplitude to reach 1000V and 5s after the voltage amplitude to reach 200V. By setting a series of status points at the moment, the system automatically generates wires through these status points to program the waveform. The program-wave-edit screen is shown in Figure 128.

Figure 128-Program-Wave-Edit Screen

No.:Sequence number. Supports a maximum of 200 steps;

Amplitude: Current sequence voltage/current amplitude, resolution 0.001V/A, minimum 0 for mode voltage maximum rating, minimum negative rating for mode current maximum positive rating, initial value 0;

Time: The current sequence moment, resolution is 0.0001s, minimum value is 0, maximum value is 9999999s, initial value is 1s;

No: Indicates the number of the sequence being executed;

Cycle: Indicates the cycle being executed;

+:Add a line below the selected sequence;

-:Delete selected sequence;

Load: Load the expected output waveform to the output state, after loading, waveform information and parameters will be locked as uneditable state, and can not be edited until it is triggered to end or exit the loading state;

Trigger: Transition from steady state output to expected output waveform, only valid when Trigger Input is inside.

Note: The expected output waveform is still limited by power parameters, and improper power Settings may distort the expected output waveform.

The Explaination of Wave waveform is shown in Figure 129. Set the magnitude and time of sequence No.1 to $U_{No.1}$1 and $t_{No.1}$, the magnitude and time of sequence No.2 to $U_{No.2}$ and $t_{No.2}$, the magnitude and time of sequence No.3 to $U_{No.3}$ and $t_{No.3}$, and the amplitude and time of sequence No.4 to U_{No4} and $t_{No.4}$. After the waveform is triggered, the timing starts at the steady-state t0. The linear change of the waveform reaches $U_{No.1}$ after the time amplitude of $t_{No.1}$, $U_{No.2}$ after the time amplitude of $t_{No.2}$, $U_{No.3}$ after the time amplitude of $t_{No.4}$, the waveform will quickly return to the steady-state after the output is completed.

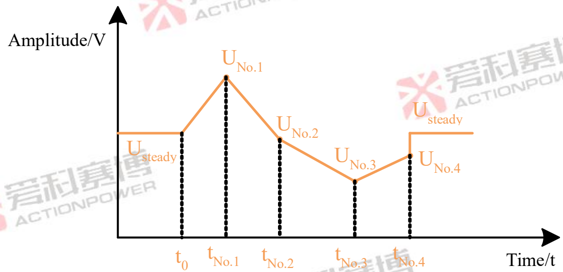


Figure 129- Waveform

Figure 130 shows the Wave conifg screen.

Figure 130-Program-Wave-More Screen

Mode: The edited waveform is used to adjust the output voltage or output current. When the voltage is selected, the edited waveform is used for the output voltage, and the maximum output current will be limited to the current setting value in Figure 108. If the voltage waveform is distorted, please adjust the amplitude to check Is it restricted. When current is selected, the edited waveform is used for output flow, and the maximum output voltage will be limited by the voltage setting value in Figure 108. If the current waveform is distorted, please adjust the amplitude to check whether it is limited.

Continuous: Whether the edited waveform automatically exits the loading option after being triggered. If this function is enabled, the waveform will remain in the post-loading state;

Trigger: Whether all the edited waveforms will run after being triggered. If automatic is selected, the whole Wave will run.

Cycles: The number of times the whole Wave runs as a cycle. The maximum value is 9999999, the initial value is 1, and the value is 0 for infinite cycles.

Figure 131 shows the Wave conifg waveform. Set the amplitude and time of No.1 to $U_{No.1}/I_{NO1}$ and $t_{No.1}$, the amplitude and time of No.2 to $U_{No.2}/I_{NO2}$ and $t_{No.2}$, and set the cycle to 4 times. The waveform rises linearly from steady state to $U_{No.1}/I_{NO1}$ after $t_{No.1}$, and decreases linearly to $U_{No.2}/I_{NO2}$ after $t_{No.2}$. Since the cycle number is 4 and the cycle number of No.1 and No.2 is 4 times, the waveform quickly returns to steady state after the end.

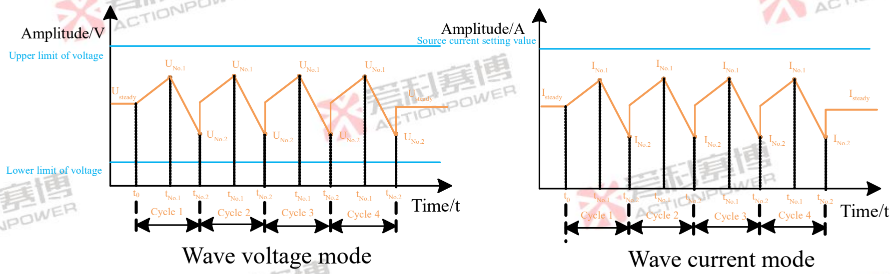


Figure 131-Wave Configure Voltage/Current Mode Waveforms

Configured Wave data can be passed between the same devices to reduce the risk of users repeating the same conifg. There are "save", "load", "USB" three operation buttons to achieve this operation. The page is shown in Figure 132. The operations are similar to those in 6.2.2.1.

Press "Save" to save the Wave data in the edit screen to the currently selected No. Sequence; Display The screen displays "In Data Save..." If the operation succeeds, the system displays "Data save succeeded!".

Press "Load" to load the data in the selected No. Number to the Wave editing screen; Display The screen displays "Data loading...". , if the operation succeeds, the message "Data load success!" is displayed.

Figure 132-Program-Wave-Data Screen

After the external USB memory device is inserted, click the "USB" button to switch to the screen shown in Figure 133.

Press "Export" to export the selected Wave data to an external USB memory device. The message "Exporting Data..." is displayed. If the operation succeeds, the system displays "Data exported success! . After the export is success, the file list is refreshed on the screen.

Press "Import" to import the files from the selected external USB memory device into this product. The parameters in the file will be displayed on the screen. "Data Import..." is displayed on the screen. If the operation succeeds, the system displays "Data import succeeded! ".

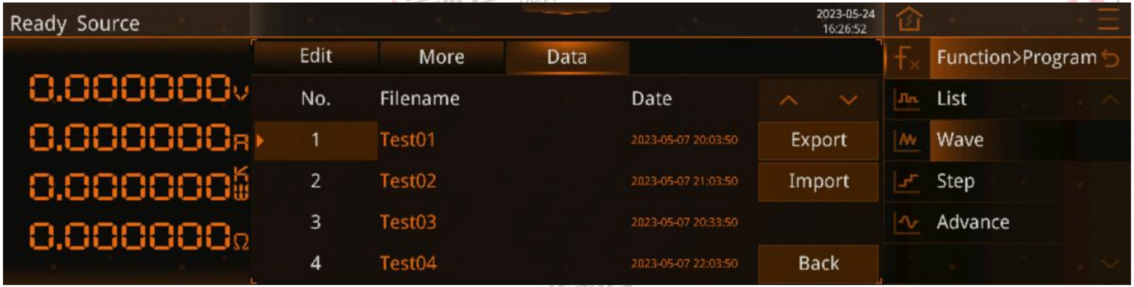


Figure 133-Program-Wave-Data-USB Screen

6.2.3.3 **Step**

Step describes the function of increasing/decreasing the initial output value by a fixed number of steps to the end value. This function is suitable for accurate measurement of over/under voltage, over current protection value, so that users can quickly locate the protection critical value Figure 134 shows the program-Step-conifg screen.

Figure 134-Program-Step-Edit Screen

From: Starting voltage/current amplitude, resolution 0.001V/A, minimum 0 for mode voltage, maximum rated value, minimum negative rated value for mode current, maximum positive rated value, initial value 0;

To: Target voltage/current amplitude, resolution 0.001V/A, minimum 0 for mode voltage maximum rating, minimum negative rating for mode current maximum positive rating, initial value 0;

Cycle: Single step value, especially the amount of change, resolution 0.001V/A, minimum 0, maximum rated, initial 1;

Dwell: single step hold time, resolution is 0.001s, minimum value is 0, maximum value is 9999999s, initial value is 1;

Load: Load the expected output waveform to the output state, after loading, waveform related information and parameters will be locked as uneditable state, and can not be edited until it is triggered to end or exit the loading state;

Trigger: Transition from steady state output to expected output waveform, only valid when Trigger Input is inside.

Note: The expected output waveform is still limited by power parameters, and improper power Settings may distort the expected output waveform.

The waveform Explaination of Step is shown in Figure 135. After setting the from, to and cycle voltage values U_{start}, U_{end}, $U_{increment}$ and Dwell t_{hold}, the waveform amplitude will quickly jump from the steady state to the beginning of U_{start}, and the Wave mode will start. In Wave mode, the number of hops and the hold time of each step are calculated automatically according to the set start, end, and increment within the hold time t_{hold}, and the waveform output quickly returns to steady state. If the increment of the last step is to exceed the end value, the waveform will directly jump to U_{end}, as shown in the blue arrow.

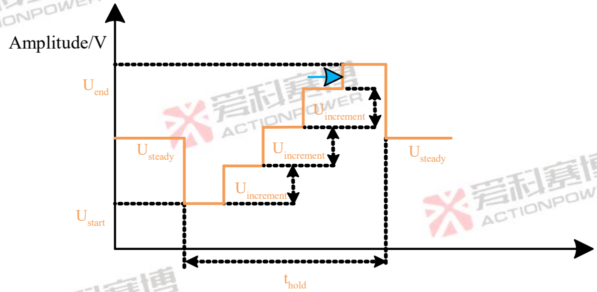


Figure 135-Step Waveforms

The Step-More screen provides more modes to enrich the variety of waveforms, as shown in Figure 136.

Figure 136-Program-Step-More Screen

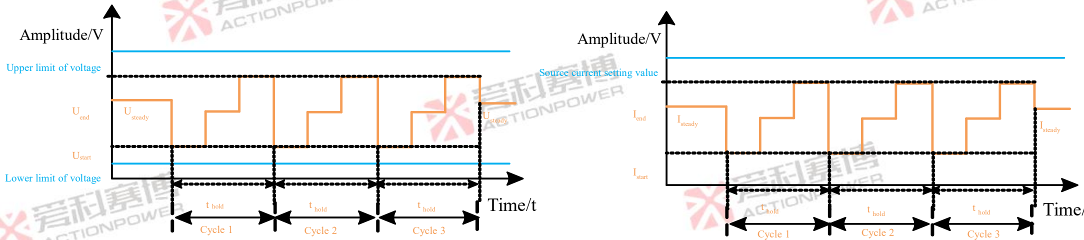
Mode: The edited waveform is used to adjust the output voltage or output current. When the voltage is selected, the edited waveform is used to output voltage, and the maximum value of the output current will be limited as shown in Figure 94. If the voltage waveform is distorted, please adjust the amplitude to check whether it is limited. When selecting the current, the edited waveform is used to output the current, and the maximum output voltage will be limited by the voltage setting in Figure 94. If the current waveform is distorted, please adjust the amplitude to check whether it is limite.

Continuous: whether the edited waveform automatically exits the loading option after being triggered. If enabled, it will keep the state after loading.

Trigger: Whether all the edited waveforms run after being triggered. If automatic is selected, the whole Step will run, and one step will be run once triggered.

Cycle: The number of times the whole Step is run as a cycle. The maximum value is 9999999, the initial value is 1, and 0 for infinite cycle.

Step waveform is explained in Figure 137. Set the start, end and increment within the range of the blue line, and set the cycle to 3. The waveform drops rapidly from steady state to U_{start}/I_{start}, and the Step mode begins. Within the holding time t, the Step mode will automatically calculate the number of hops and the holding time of each Step according to the set start, end and increment. Since the cycle is set to 3, the STEP waveform will cycle for 3 times and quickly return to the steady state after the cycle.



Step waveform voltage mode

Step waveform current mode

Figure 137-Step Configure Voltage/Current Mode Waveforms

Configured Step data can be passed between the same devices to reduce the risk of users repeating the same conifg. There are "save", "load", "USB" three operation buttons to achieve this operation. The page is shown in Figure 138. The operations are similar to those in 6.2.2.1.

Press "Save" to save the Step data in the edit screen to the currently selected No. Sequence; Display The screen displays "In Data Save..." If the operation succeeds, the system displays "Data save succeeded!".

Press "Load" to load the data in the selected No. Number to the Step editing screen; Display The screen displays "Data loading...". , if the operation succeeds, the message "Data load success!" is displayed.

Figure 138-Program-Step-Data Screen

After the external USB memory device is inserted, click the "USB" button to switch to the screen shown in Figure 139.

Press "Export" to export the selected Step data to an external USB memory device. The message "Exporting Data..." is displayed. If the operation succeeds, the system displays "Data exported success!". After the export is success, the file list is refreshed on the screen.

Press "Import" to import the files from the selected external USB memory device into this product. The parameters in the file will be displayed on the screen. "Data Import..." is displayed on the screen. If the operation succeeds, the system displays "Data import succeeded! ".

Figure 139-Program-Step-Data-USB Screen

6.2.3.4 **Advance**

Advance function is an advance program function of this product, which can edit various waveforms to simulate complex working conditions. The screen of program-advance editing is shown in Figure 140. Press more keys to enter Figure 141.

Figure 140-Program-Advance-Edit Screen

Figure 141-Program-Advance-Edit-Other Screen

Advance waveforms editing can refer to arbitrary waveforms。

Waveform: Select the expected output waveform, which can be sinusoidal wave, triangle wave, pulse wave, Shape04~Shape30;

Frequency: Frequency of the expected output waveform. Resolution is 0.01Hz, minimum value is 0.01Hz, maximum value is 10000Hz, and initial value is 1Hz;

Amplitude: the amplitude of expected output waveform, sine wave is half peak, other waveform is peak-peak value; When setting, ensure that the amplitude must be smaller than the offset value, otherwise the output waveform may be distorted. The resolution is 0.001, the minimum value is 0 the maximum value is rated and the initial value is 0;

Offset: Value of the DC component of the expected output waveform, resolution 0.001, minimum 0 for mode voltage maximum rating, minimum negative rating for mode current maximum positive rating, initial value 0;

Phase: Phase of the expected output waveform, resolution 0.01, minimum 0, maximum 360, initial 0;

Percent: Select only the unique parameters of pulse wave and triangle wave, corresponding to the pulse wave duty ratio, triangle wave symmetry parameters, resolution is 0.01, minimum value is 0, maximum value is 100, initial value is 0; Due to the impact of device precision and bandwidth parameters, when a small value is combined with a high frequency, the device may not respond to waveform. If the minimum pulse width time is 1μs when the duty cycle of the 10kHz pulse wave is 0.01%, the device cannot output the expected waveform.

No.: The change time from the state of the previous No. Sequence to the current No.;

Count: The duration of the current No. Sequence state;

Sequence combination: Combine the current No. Sequence with the previous X sequence as a combination;

The number of combinations of repeated sequences;

Load: Load the expected output waveform to the output state, after loading, waveform related information and parameters will be locked as uneditable state, and can not be edited until it is triggered to end or exit the loading state;

Trigger: Transition from steady state output to expected output waveform, only valid when Trigger Input is inside.

Note: The expected output waveform is still limited by power parameters, and improper power Settings may distort the expected output waveform.

Waveform Explaination of Advance is shown in Figure 142. Waveform, amplitude, offset and frequency are consistent with any wave. See 6.2.2.1 Arbitrary Waveforms for details. Advance can set additional phase, change, hold, phase is the initial phase Angle when the waveform is triggered. Change indicates the time from the previous No. Status to the current No. Hold indicates the current No. The duration of the state. As shown in the picture on the right.

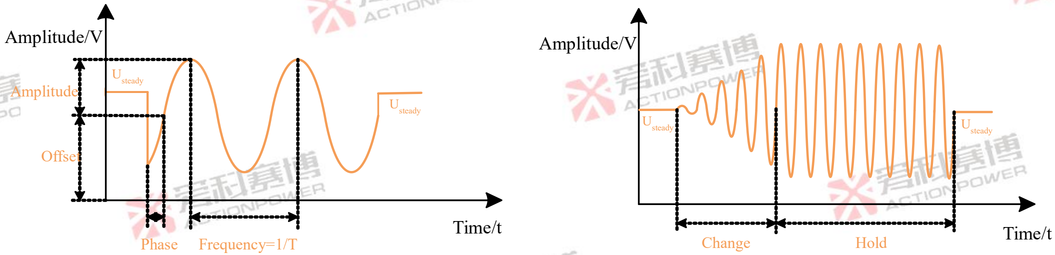


Figure 142-Waveforms of Advance

Advance can set sequence combination and number of repetitions waveform in more screens. Set sequence combination as 1 and number of repetitions as 2 in No.3. After the waveform is triggered, it quickly changes from steady state to No.1, and the Advance program starts. When the execution reaches No.3, since the sequence combination is set to 1, this sequence is combined with the previous sequence, and the number of repetitions is set to 2, repeats above tiwce, as shown in Figure 143.

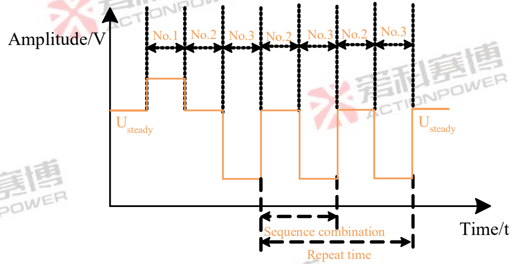


Figure 143-Sequence Combination and Number of Repeats

Figure 144 shows the Advance conifg.

Figure 144-Program-Advance-More Screen

Mode: The edited waveform is used to adjust the output voltage or output current. When the voltage is selected, the edited waveform is used to output voltage, and the maximum value of the output current will be limited as shown in Figure 108. If the voltage waveform is distorted, please adjust the amplitude to check whether it is limited. When selecting the current, the edited waveform is used to output the current, and the maximum output voltage will be limited by the voltage setting in Figure 108. If the current waveform is distorted, please adjust the amplitude to check whether it is limited.

Continuous: whether the edited waveform automatically exits the loading option after being triggered. If enabled, it will keep the state after loading.

Trigger: Whether all the edited waveforms run after being triggered. If automatic is selected, the whole Advance will run, and one step will be run once triggered.

Cycle: The number of times the whole Advance is run as a cycle. The maximum value is 9999999, the initial value is 1, and the setting is 0 for infinite cycle.

The configured Advance data can be transferred between the same devices to prevent users from repeating the same conifg. There are "save", "load", "USB" three operation buttons to achieve this operation. The page is shown in Figure 145. The operations are similar to chapter 6.2.2.1.

Figure 145-Program-Advance-Data Screen

After the external USB memory device is inserted, click the "USB" button to switch to the screen shown in Figure 146.

Press "Export" to export the selected Advance data to an external USB memory device. The message "Exporting Data..." is displayed. If the operation succeeds, the system displays "Data exported success! . After the export is success, the file list is refreshed on the screen.

Press "Import" to import the files from the selected external USB memory device into display screen. The parameters in the file will be displayed on the screen. "Data Import..." is displayed on the screen. If the operation succeeds, the system displays " Data import success! ".

Figure 146-Program-Advance-Data-USB Screen

6.2.4 SAS（Solar Array Simulator）

This product has the function of SAS solar cell simulator. Limited by operation, the SAS function of the device only supports simple curve operation. More functions need to be combined with the software "programmable power virtual terminal", which can realize the photovoltaic industry standard test function.

The SAS function can be activated only after the Magic-Box component with SAS function is inserted and SAS mode is selected in Settings - Mode Settings. See 6.3.1 Modes. The function shows in Figure 147.

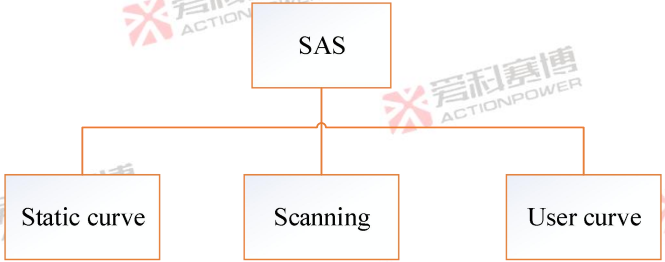


Figure 147-SAS function tree

SAS solar panel analog function can simulate I-V curve, related content in function editing screen, shows in Figure 148.

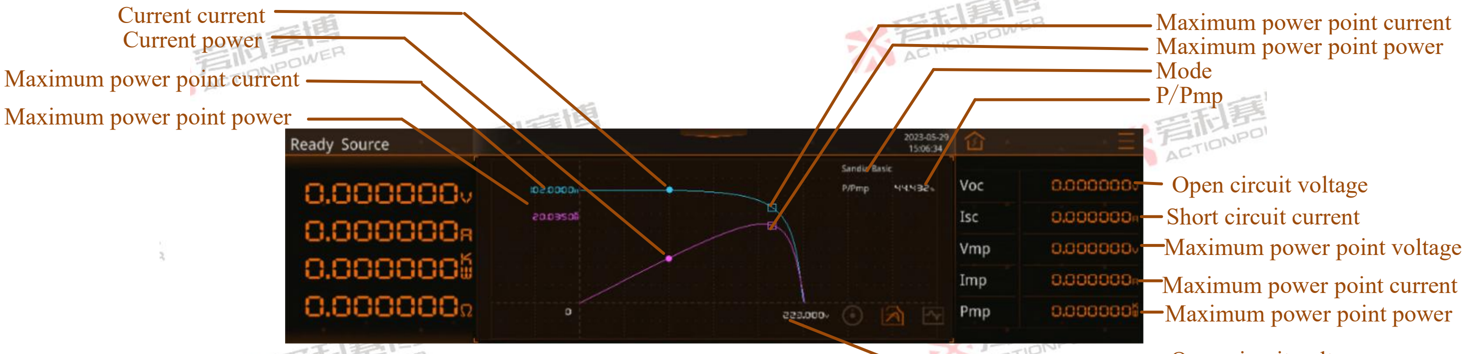


Figure 148-SAS Home screen

This product has designed the solar panel curve display screen, which can display two curves at the same time, P-V and I-V, and can dynamically display the tracking state in the way of box and dot. The data on the right shows the curve values under the selected model.

6.2.4.1 Static Curve

SAS has three Sandia, EN50530, and Simple curve models, which are suitable for most application scenarios. Sandia and EN50530 models have two setting modes, Basic and Advance, for choice, as shown in Figure 149.

Figure 149-SAS-Static Curve -Curve Model Screen

The Basic mode and Simple model of Sandia and EN50530 models can quickly generate I-V curves, as shown in Figure 150.

Figure 150-SAS-Static Curve-Curve Parameter Screen

The function of each parameter shows in Table 12.

Table 12-Function list of curve parameters(Sandia_Basic, EN50530_Basic, Simple)

Parameters	UnIit	Explaination and application	Model	Resolution	Initial value	Range
Vmp	V	Voltage of max. power	ALL	0.001	10.000	0.000~Rated voltage
Imp	A	Current of max. power	ALL	0.001	1.000	0.000~ Rated current
Pmp	kW	Power of max. power	ALL	0.001	10.000	0.000~ Rated power
Voc	v	Open circuit voltage	ALL	0.001	12.000	Vmp~ Rated voltage
Isc	A	Short circuit current	ALL	0.001	1.500	Imp~ Rated current

The Advance mode of the Sandia model supports changing external parameters to generate curves to simulate more realistic conditions, as shown in Figure 151.

Figure 151-SAS-Static Curve- Curve Parameter Screen (Sandia_ Advance)

The functions of each parameter are shown in Table 13.

Table 13-Function list of curve parameters(Sandia_ Advance)

Parameters	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
Pmp	kW	Power of max. power	ALL	0.001	0.010	0.000~Rated power
Vmp	V	Voltage of max. power	ALL	0.001	10.000	0.000~Rated voltage
FF	\	Fill factor, defined as $FF=\frac{Vmp*Imp}{Voc*Isc}$。	ALL	0.001	0.680	0.3~0.95
β	%/℃	Temperature coefficient, Affects the extent to which the current and voltage need to scale due to changes in battery string temperature.	ALL	0.001	-0.380	-2.00~0.00
Irr	W/m²	Solar irradiance	ALL	0.001	1000.000	0~3000

Parameters	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
T	℃	Solar cell temperature	ALL	0.001	50.000	-40~150
Irr.ref	W/m²	Solar irradiance at reference or rated conditions	ALL	0.001	1000.000	0~3000
T.ref	℃	Solar cell temperature at reference or rated conditions	ALL	0.001	50.000	-40~150
PV Tech	\	See the FF and β parameter Settings recommended by different panels, as shown in Figure 152.	ALL	\	\	\
Load	\	Update the curve model, parameters and Settings in the static curve into the product processing system. You can view the updated curve in the function editing screen.	ALL	\	\	\

Figure 152-PV Tech（Sandia_ Advance）

This product can generate I-V curves in EN50530_Advance mode through advance parameters, as shown in Figure 153.

Figure 153-SAS-Static Curve- Curve Parameter Screen (EN50530_Advance)

The functions of each parameter are shown in Table 14.

Table 14-Function list of curve parameters(Sandia_ Advance)

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Range
Pmp	kW	Power of max. power。	ALL	0.001	0.010	0.000~Rated power
Vmp	V	Voltage of max. power。	ALL	0.001	10.000	0.000~Rated voltage
Irr	W/m²	Solar irradiance	ALL	0.001	1000.000	0~3000
T	℃	Solar cell temperature	ALL	0.001	25.000	-40~150
PV Tech	\	Panel material	ALL	\	c-Si	c-Si、Thin-Film、user
Irr.stc	W/m²	Solar irradiance under standard test conditions	ALL	\	\	\
T.stc	℃	Solar irradiance under standard test conditions	ALL	\	\	\

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Range
PV Tech	\	See the recommended parameter Settings for different panels。	ALL	\	\	\

Figure 154-PV Tech (EN50530_Advance, c-Si)

Figure 155-PV Tech（EN50530_Advance, User）

This product can set the advance parameters of the curve, as shown in Figure 156.

Figure 156-SAS-Static Curve-Advance Settings

The functions of each parameter are as follows.

Measure: The interval between two measurements.

Final state: Applicable to the curve scanning experiment. Set the state of the device after the curve scanning experiment. If enabled, the working point will keep the curve at the end time after the curve scanning experiment.

S Standard: Sandia pattern standard. When the Sandia mode is used to generate a standardized curve, the Sandia mode scales the set parameters in proportion to provide the voltage and power specified under the appropriate test conditions, which causes the actual parameters in the function editing screen in Sandia mode to differ from the values set in the curve parameters. If S normalization is enabled, the system will modify the actual parameters of the I-V curve in Sandia mode to the set values of the curve parameters.

When the user needs to save the edited data or call the data to other devices, waveform data can be accessed and saved in the SAS-Custom Curviline-Data screen, and waveform data can be accessed to the internal memory of the product or the external USB memory device, as shown in Figure 157.

Press "Save" to save the static curve parameters in the curve parameter screen to the selected No. Serial number; Display The screen displays "In Data Save...". If the operation succeeds, the system displays "Data save succeeded!".

Press "Load" to load the static curve parameter screen from the currently selected No. Display The screen displays "Data loading...". If the operation succeeds, the message "Data load success!" is displayed.

Figure 157-Funntion-SAS-Static Curve-Data Screen

After a valid USB memory device is connected, click the "USB" button to switch to the screen shown in Figure 158.

Press "Export" to export static curve data from the device to an external USB memory device. The message "Exporting Data..." is displayed. If the operation succeeds, the system displays "Data exported success!" . After the export is success, the file list is refreshed on the screen.

Press "Import" to import files from the selected external USB memory device to the device. The parameters in the file are displayed on the screen. "Data Import..." is displayed on the screen. If the operation succeeds, the system displays "Data import succeeded!" .

Figure 158-Function-SAS-Static Curve-Data-USB Screen

6.2.4.2 **Curve Scanning**

Curve scanning is a test to adjust the curve according to the percent of open circuit voltage and short circuit current on the basis of static curve. It can also be scaled according to the irradiation rate and temperature to simulate the MPPT efficiency of the solar array under dynamic weather conditions, so as to facilitate users to test the characteristics of the photovoltaic inverter more accurately, as shown in Figure 159.

Figure 159-Function-SAS-Curve Scanning-Percent Screen

The functions of each parameter are shown in Table 15.

Table 15-Function table of curve scanning percent parameters

Parameters	Unit	Explaination and application	Model	Resolution	Initial value	Range
Mode	\	Curve scanning way	ALL	\	百分比	百分比、高级
Slew Time	s	Total duration of curve scanning	ALL	1	0	1~86400
Refresh time	s	The refreshing time of each step from start to finish	ALL	0.001	5	0~8
V From	V	Set the percent of open circuit voltage Voc at the beginning	ALL	0.01	100.00	1~100.00
V To	V	Set the percent of open circuit voltage Voc at the end	ALL	0.01	100.00	1~100.00
I From	A	Set the Isc percent of the short circuit current at the beginning	ALL	0.01	100.00	1~100.00
I To	A	Set the Isc percent of the short circuit current at the end	ALL	0.01	100.00	1~100.00
V<->	\	Swap the values that Vstart and Vend	ALL	\	\	\

Parameters	Unit	Explaination and application	Model	Resolution	Initial value	Range
I<->	\	Swap the values that I start and I end	ALL	\	\	\
Start	\	Update the static curve parameters and start the curve scan test.	ALL	\	\	\

The advance function is used to set dynamic scanning of simulated illumination and temperature. The advance mode can be used only when the static curve is Sandia_Advance and EN50530_Advance, as shown in Figure 160.

Figure 160-Function-SAS-Curve Scanning-Advance Screen

The function of each parameter is shown in Table 16.

Table 16-Senior curve scanning parameter function

parameter	Unit	Explaination and application	Model	Resolution	Initial value	Range
Mode	\	Curve scanning way	ALL	\	Percent	Percent、advance
Slew Time	\	Total duration of curve scanning	ALL	1	0	1~86400
Refresh time	s	The switching time of each step from start to finish	ALL	0.001	5	0~8
Irr From	W/m²	Set the percent of start illumination, which is the Irr parameter of the static curve	ALL	0.01	1000.00	0~3000
Irr To	W/m²	Set the percent of end illumination, which is Irr of the static curve	ALL	0.01	1000.00	0~3000
T From	℃	Set the starting temperature percent as parameter T of the static curve.	ALL	0.01	25.00	-40~150
T To	℃	Set the end temperature percent. The temperature is T of the static curve.	ALL	0.01	25.00	-40~150
V<->	\	Swap the values that V start and V end	ALL	\	\	\
I<->	\	Swap the values that I start and I end	ALL	\	\	\
Start	\	Update the static curve parameters and start the curve scan test	ALL	\	\	\

6.2.4.3 **Custom Curve**

Users can use custom curve mode to generate non-standard I-V curve tests. The advantage of using custom curve mode is that users are no longer limited to Sandia or EN50503 models. The edited curve can be imported into the product through an external USB memory device, and the imported curve can take effect by updating the button. User-defined drawing curve, as shown in Figure 161.

Figure 161-Function-SAS-Custom Curve-Curve Screen

When the user needs to save the edited data or call the data to other devices, waveform data can be accessed and saved in the SAS-Custom Curve-data screen, and waveform data can be accessed to the internal memory of the product or the external USB memory device, as shown in Figure 162.

Press "Save" to save the parameters on the curve screen to the current selected No. Display The screen displays "In Data Save..." If the operation succeeds, the system displays "Data save succeeded!".

Press "Load" to load the curve screen from the currently selected No. Display The screen displays "Data loading...". , if the operation succeeds, the message "Data load success!" is displayed.

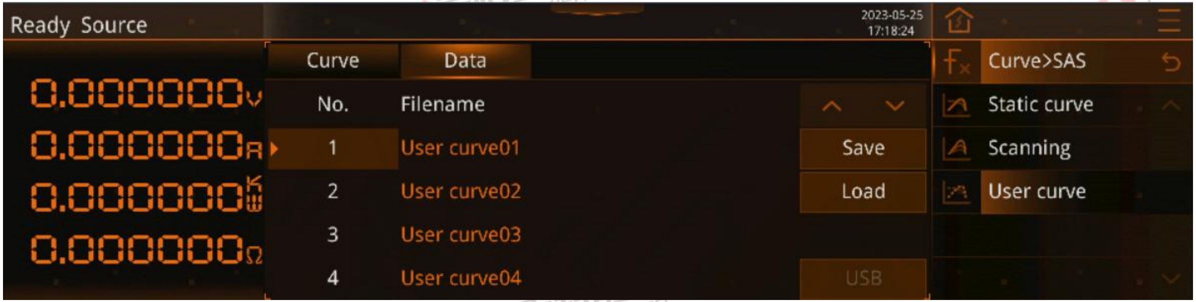


Figure 162-Function-SAS-Custom Curve-Data Screen

After a valid USB memory device is connected, click the "USB" button to switch to the screen shown in 163.

Press Export to export static curve data from the device to an external USB memory device. The message "Exporting Data..." is displayed. If the operation succeeds, the system displays "Data exported success!". After the export is success, the file list is refreshed on the screen.

Press Import to import files from the selected external USB memory device to the device. The parameters in the file are displayed on the screen. "Data Import..." is displayed on the screen. If the operation succeeds, the system displays "Data import succeeded!".

Figure 163-Function-SAS-Custom Curve-Data-USB Screen

6.2.5 BatSim（Battery Simulator）

This product has BatSim battery simulator function, subject to screen and operation restrictions, the BatSim function that comes with the device only supports the Basic mode of the battery model, if you need to use Advance and User mode, you need to use the "programmable power virtual terminal" software.This product has a high-precision measurement system and a high-speed arithmetic unit, which can simulate different types of batteries more realistically and accurately.

The BatSim function needs to be inserted into the Magic-Box component with BatSim function and select BatSim mode in the settings-mode setting to activate and use, see the 6.3.1 mode chapter, the function is shown in Figure 164.

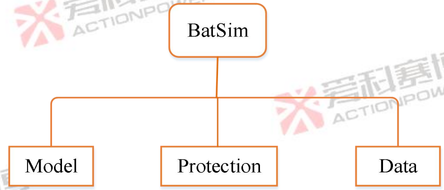


Figure 164-BatSim function tree view

6.2.5.1 Mode

The home screen of BatSim, shown in Figure 165.

Figure 165-BatSim home screen

The BatSim model data screen, as shown in Figure 166.

Figure 166-BatSim-model-data screen

The functions of each data are explained in Table 17.

Table 17-Function table of monomer patameters (basic, lithium iron phosphate)

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Initial SOC	%	The initial SOC of the single battery	ALL	0.01	100.000	0.00~100.00
Initial cap	Ah	The initial capacity of the single battery	ALL	0.01	5.00	0.00~999999.00
Initial Temp	℃	The initial temperature of the single battery	ALL	0.01	25.00	-55.00~85.00
Series	\	The number of single cells connected in series in the battery pack	ALL	1	1	1-9999999
R	mΩ	The equivalent impedance of single battery	ALL	0.01	53.00	0.00-999999.00

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Capacity	Ah	Single battery capacity	ALL	0.01	5.00	0.00-999999.00
Pack	mΩ	The cable equivalent impedance in the battery pack	ALL	0.01	0.00	0.00-999999.00
Parallel	\	The number of single battery connected in parallel in the battery pack	ALL	1	1	1-9999999

Battery technology includes lithium iron phosphate, ternary lithium, lithium titanate, lithium manganate, lithium cobalt oxide, nickel-metal hydride battery, lead-acid battery and other types of battery models, as shown in Figure 167 BatSim-Mode -Technology screen .

Figure 167-BatSim-Mode-Technology screen

The battery pack patameters include initial capacity, capacity, SOC0% voltage, SOC100% voltage, internal resistance, etc., and the screen is shown in Figure 168.

Figure 168-BatSim-model-patameters-battery pack screen

Table 18-Battery pack data function table

Data	Explaination
Initial cap.	Battery pack initial SOC
Capacity	Battery pack initial capacity
U0% SOC	The open-circuit voltage of the battery pack at 0%SOC
U100% SOC	The open-circuit voltage of the battery pack at 100%SOC
R	The equivalent impedance of the battery pack

The BatSim model setting screen of this product is shown in Figure 169.

Figure 169-BatSim-mode-settings screen

The functions of patameters are as follows.

Table 19-Model setting data function table

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Temperature	/	Effect of enable or disable temperature on battery model	ALL	1	0	0-1
Pre-charge	s	The time from softening of the output voltage to the open-circuit voltage	ALL	0.001	0.000	0.001-9999.999
Delay	s	The time at which the experiment was delayed	ALL	0.001	0.000	0.001-9999.999
Charge Eff	%	The conversion efficiency of battery charging energy	ALL	0.01	100.00	0.00-100.00
Discharge Eff	%	The loss efficiency of battery discharge energy	ALL	0.01	100.00	0.00-100.00
Measure	s	The interval between which the virtual terminal prints battery log data	ALL	0.001	0.200	0.010-10.000

This product BatSim mode cycle screen, as shown in Figure 170.

Figure 170-BatSim-mode-cycle screen

The functions of each data are as follows.

Table 20-Model cycle patameters function table

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Cycle	/	Enable or disable the experimental cycle function	ALL	1	0	0-1
Cycle Times	/	Number of times the battery analog experiment was performed	ALL	1	1	1-9999999
Cutoff SOC	%	Single cycle end condition （SOC）	ALL	0.01	50.00	0.00-100.00
Cutoff Cap.	Ah	Single cycle end condition （capacity）	ALL	0.01	2.50	0.00-999999.00

6.2.5.2 **Protection**

After the user enables the protection function, the product will stop the operation of the device according to the set Upper Volt., fusing current and other patameters. The protection screen is shown in Figure 171.

Figure 171-BatSim-protect screen

The patameters are shown in Table 21

Table 21-Function table of monomer protection patameters

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Protect	\	Enable or disable experiment alerts	ALL	\	\	\
Upper SOC	%	Threshold for cell SOC protection during charge	ALL	0.01	100.00	0.00-100.00
Upper Volt.	%	Threshold for cell SOC protection during discharge	ALL	0.01	0.00	0.00-100.00
Lower SOC	V	Threshold for cell voltage protection during charge	ALL	0.01	Rated voltage110%	0.00-rated voltage110%
Lower Vol.	V	Threshold for cell voltage protection during discharge	ALL	0.01	0.00	0.00-rated voltage110%
Fuse	A	Charge or discharge current protection threshold	ALL	0.01	The rated current of the whole machine110%	0.00-the rated current of the whole machine110%

Figure 172-BatSim-protection-battery pack screen

Table 22-Battery pack protection data function table

Data	Explaination and application
Upper SOC	Battery pack SOC protection threshold when charging
Upper Volt.	Battery pack SOC protection threshold when discharging
Lower SOC	Battery pack voltage protection threshold when charging
Lower Volt.	Battery pack voltage protection threshold when discharging

After the user enables the alarm function, the product will alert according to the set Upper SOC, Upper Volt. and other patameters. Figure 173 shows the warn screen.

Figure 173-BatSim-protection-warn screen

Table 23 -Function table of warn patameters

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Warn	\	Enable or disable experiment alerts	ALL	\	\	\
Upper SOC	%	Single SOC alarm threshold when charging	ALL	0.01	100.00	0.00-100.00
Upper Volt.	%	Single SOC alarm threshold when discharging	ALL	0.01	0.00	0.00-100.00
Lower SOC	V	Single voltage alarm threshold when charging	ALL	0.01	Rated voltage110%	0.00-rated voltage110%
Lower Volt.	V	Single voltage alarm threshold when discharging	ALL	0.01	0.00	0.00-rated voltage110%

Figure 174-BatSim-protection-warn-pack screen

Table 24-Battery pack alarm data function table

Data	Explaination and application
Upper SOC	Battery pack SOC alarm threshold when charged
Upper Volt.	Battery pack SOC alarm threshold when discharged
Lower SOC	Battery pack voltage alarm threshold when charged
Lower Volt.	Battery pack voltage alarm threshold when discharged

6.2.5.3 **Data**

When the user needs to save the edited data or recall the data to other devices, waveform data can be accessed in the BatSim-data screen, and waveform data can be accessed to the internal memory of this product or an external USB memory device, as shown in the screen of Figure 175. Press "Save" to save the data patameters of the data data screen to the currently selected No.number; the display screen displays "Data memory...", if the operation is success, the display screen displays "Data memory success!" ”。

Press "Load" to load from the currently selected No.number to the data data screen; the display screen displays "Data loading...", if the operation is success, the display screen displays "Data load success!"

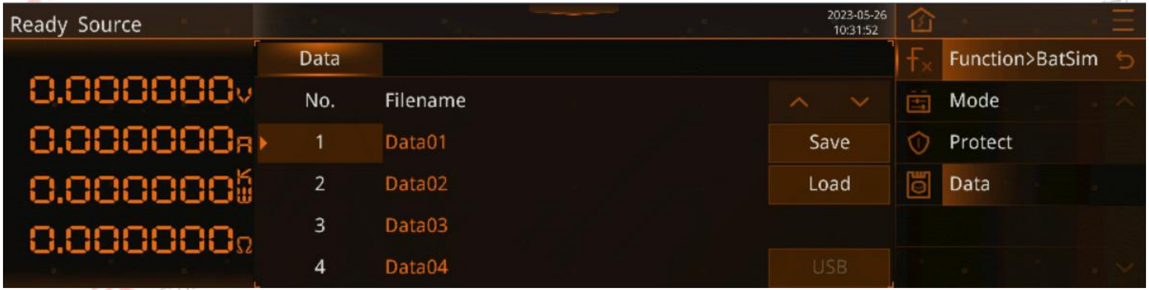


Figure 175-BatSim-Data Screen

After the valid USB memory device is connected, click the "USB" button, which will switch to the screen as shown in Figure 176.

Press "Export" to export the static curve data on the device to an external USB memory device; The screen will display "Data exporting...", if the operation is success, it will display "Data export success!" "。 After the export is success, the display screen refreshes the file list.

Press "Import" to import the file from the currently selected external USB memory device into the device, and the patameters in the file will be displayed on the screen; The screen will display "Data importing...", and if the operation is success, it will display "Data import success!"

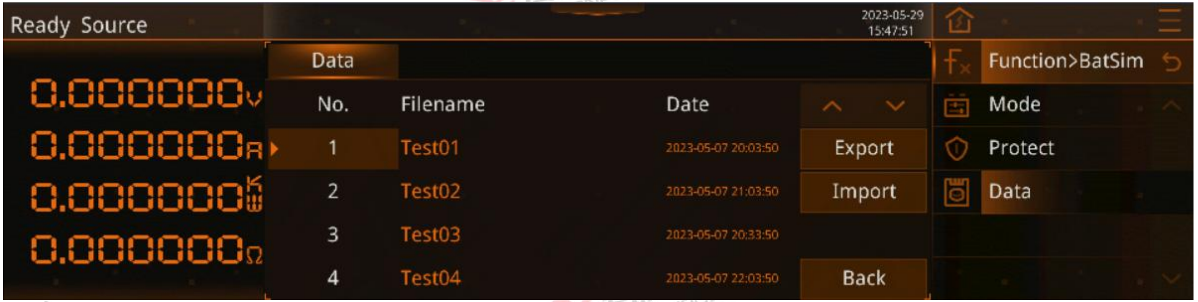


Figure 176-BatSim-data-USB screen

6.3 Settings

The setting function is shown in Figure 177, the user can set the product to operate in source-load or SAS mode, and can set the response time and response rate of voltage, current, and power.This product has perfect protection and limit value functions, including port protection, remote sensing protection and limit protection function of output setting screen data, which ensure the safe operation of the user-end device and this product. At the same time, this product is designed with an event function to prompt or record unexpected events in operation.

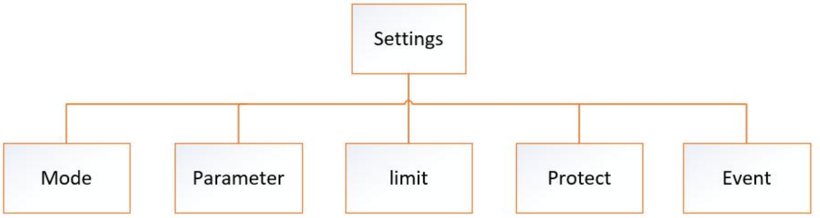


Figure 177-Setting tree

6.3.1 Mode

The mode setting function can optionally set the mode status of the PRD to source-load mode, SAS, and BatSim mode.PRD works in source-load mode by default, which is used in test industries, and can be used as test power supply or test load to achieve multi-purpose use. SAS mode is used in the photovoltaic industry, and PRD is only available after the Magic-Box module with photovoltaic function is assembled. BatSim mode simulates battery characteristics in real-world applications, allowing users to set custom battery-related patameters to simulate battery charging and discharging characteristics and assist in other tests. The settings are shown in Figure 178.

Figure 178-Settings-mode screen

6.3.2 patameter

The data setting function can set the output data performance, and the user can match the user device under different working conditions by setting the rise or fall time and response speed of voltage or current or power. The detailed functions of each data are shown in Table 25, the data time setting screen is shown in Figure 179, and the data rate setting screen is shown in Figure 180.

Figure 179-Settings-Parameter-Time screen

Figure 180-Setting-Parameter-Response screen

Table 25-data detailed function table

Table 25-Alarm enable data function table

Data items	Unit	Explaination and application	Model	Resolution	Initial value	Range
Voltage Rise	s	The time it takes for the output voltage to rise from a given value to the target value, and the user can control the slope of the output voltage rise when the output voltage rises too fast or too slowly.	ALL	0.001	0	0~9999
Voltage Fall	s	The time it takes for the output voltage to drop from a given value to the target value, and the user can control the slope of the output voltage drop when the output voltage drops too fast or too slowly.	ALL	0.001	0	0~9999
Current Rise	s	The time it takes for the output current to rise from a given value to the target value, and the user can control the slope of the output current rise when the output current rises too fast or too slowly.	ALL	0.001	0	0~9999
Current Fall	s	The time it takes for the output current to drop from a given value to the target value, and the user can control the slope of the output current drop when the output current drops too fast or too slowly.	ALL	0.001	0	0~9999
Power Rise	s	The time it takes for the output power to rise from a given value to the target value, and the user can control the slope of the output power rise when the output power rises too fast or too slowly.	ALL	0.001	0	0~9999
Power Fall	s	The time it takes for the output power to drop from a given value to the target value, and the user can control the slope of the output power drop when the output power drops too fast or too slowly.	ALL	0.001	0	0~9999
On-delay	s	When the user needs to extend the time to start the output after a certain period of time, the output startup time can be controlled by setting the time of the turn-on delay.	ALL	0.001	0	0~9999
Off-delay	s	When the user needs to extend the time to turn off the output after a certain period of time, the output disconnection time can be controlled by setting the time of the disconnection delay.	ALL	0.001	0	0~9999
Speed	\	The response bandwidth of the system, when the output voltage oscillates, the user can choose different loudness speeds to adapt to the user equipment.	ALL	\	fast	\

Data items	Unit	Explaination and application	Model	Resolution	Initial value	Range
du/dt	V/μs	The maximum slew rate that the product can control per μs of voltage increase. When the output voltage slope needs to be adjusted, it can be controlled by setting the slew rate.	ALL	0.01	1	0~9999
di/dt	A/μs	The maximum slew rate that the product can control per μs of current increase. When the output current slope needs to be adjusted, it can be controlled by setting the slew rate.	ALL	0.01	0.1	0~9999

Voltage / current / power rise and fall times is shown in Figure 181.

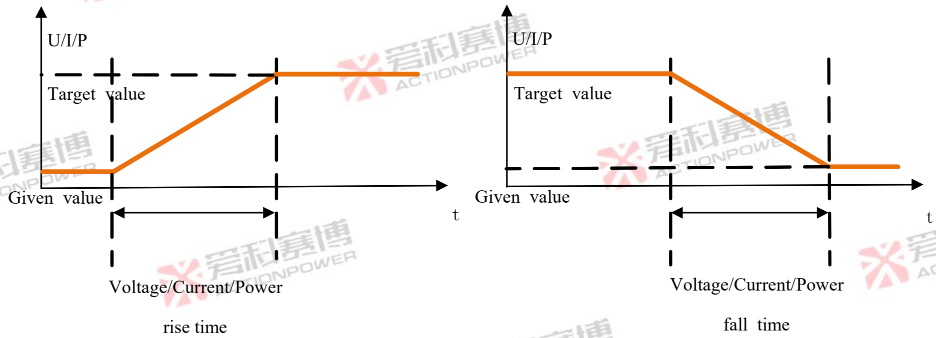


Figure 181-Voltage /current/power rise and fall time

Output on and off delay times is shown in Figure 182.

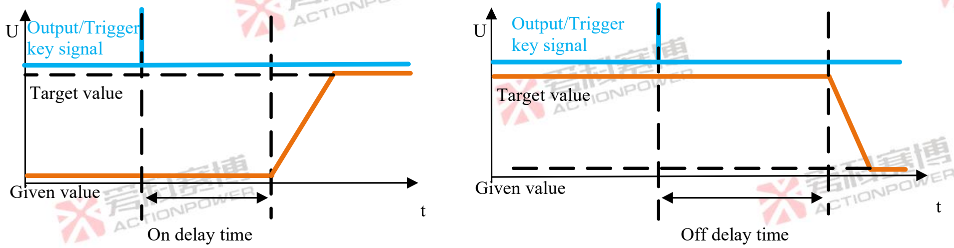


Figure 182-Output on or off delay time diagram

6.3.3 Limit

The limit setting function can limit the input range of the value of the output setting screen, which can effectively avoid the loss caused by the user's misoperation and effectively protect the user's equipment. It is recommended to set a reasonable limit value before use, the limit setting screen is shown in Figure 183, and the limit parameters are introduced in Table 26.

Figure 183-Setting-limit screen

Table 26-Limit function table

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper volt.	V	The maximum voltage of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive voltage at the output due to misoperation, where the upper voltage can be set within a safe range.	PRD0518	0.01	550	0.00~550
			PRD0618	0.01	650	0.00~650
			PRD1506	0.01	1550	0.00~1550
			PRD2006	0.01	2050	0.00~2050
			PRD0512	0.01	550	0.00~550
			PRD0612	0.01	650	0.00~650
			PRD1504	0.01	1550	0.00~1550
			PRD2004	0.01	2050	0.00~2050
			PRD0509	0.01	550	0.00~550
			PRD0609	0.01	650	0.00~650
			PRD1503	0.01	1550	0.00~1550
			PRD2003	0.01	2050	0.00~2050

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper volt.	V	The maximum voltage of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive voltage at the output due to misoperation, where the upper voltage can be set within a safe range.	PVD0518	0.01	550	0.00~550
			PVD0618	0.01	650	0.00~650
			PVD1506	0.01	1550	0.00~1550
			PVD2006	0.01	2050	0.00~2050
			PVD0512	0.01	550	0.00~550
			PVD0612	0.01	650	0.00~650
			PVD1504	0.01	1550	0.00~1550
			PVD2004	0.01	2050	0.00~2050
			PVD0509	0.01	550	0.00~550
			PVD0609	0.01	650	0.00~650
			PVD1503	0.01	1550	0.00~1550
			PVD2003	0.01	2050	0.00~2050

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper volt.	V	The maximum voltage of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive voltage at the output due to misoperation, where the upper voltage can be set within a safe range.	PRD0224	0.01	220	0.00~220
			PRD0324	0.01	380	0.00~380
			PRD0808	0.01	820	0.00~820
			PRD1008	0.01	1020	0.00~1020
			PRD0216	0.01	220	0.00~220
			PRD0316	0.01	380	0.00~380
			PRD0805	0.01	820	0.00~820
			PRD1005	0.01	1020	0.00~1020
			PRD0212	0.01	220	0.00~220
			PRD0312	0.01	380	0.00~380
			PRD0804	0.01	820	0.00~820
			PRD1004	0.01	1020	0.00~1020

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper volt.	V	The maximum voltage of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive voltage at the output due to misoperation, where the upper voltage can be set within a safe range.	PVD0224	0.01	220	0.00~220
			PVD0324	0.01	380	0.00~380
			PVD0808	0.01	820	0.00~820
			PVD1008	0.01	1020	0.00~1020
			PVD0216	0.01	220	0.00~220
			PVD0316	0.01	380	0.00~380
			PVD0805	0.01	820	0.00~820
			PVD1005	0.01	1020	0.00~1020
			PVD0212	0.01	220	0.00~220
			PVD0312	0.01	380	0.00~380
			PVD0804	0.01	820	0.00~820
			PVD1004	0.01	1020	0.00~1020

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper volt.	V	The maximum voltage of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive voltage at the output due to misoperation, where the upper voltage can be set within a safe range.	PRD4V66	0.01	42	0.00~42
			PVD4V66	0.01	42	0.00~42
			PRD6V66	0.01	62	0.00~62
			PVD6V66	0.01	62	0.00~62
			PRD8V66	0.01	82	0.00~82
			PVD8V66	0.01	82	0.00~82
			PRD4V50	0.01	42	0.00~42
			PVD4V50	0.01	42	0.00~42
			PRD6V50	0.01	62	0.00~62
			PVD6V50	0.01	62	0.00~62
			PRD8V50	0.01	82	0.00~82
			PVD8V50	0.01	82	0.00~82

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower volt.	V	The minimum voltage of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive voltage at the output due to misoperation, where the upper voltage can be set within a safe range.	PRD0518	0.01	0	0.00~550
			PRD0618	0.01	0	0.00~650
			PRD1506	0.01	0	0.00~1550
			PRD2006	0.01	0	0.00~2050
			PRD0512	0.01	0	0.00~550
			PRD0612	0.01	0	0.00~650
			PRD1504	0.01	0	0.00~1550
			PRD2004	0.01	0	0.00~2050
			PRD0509	0.01	0	0.00~550
			PRD0609	0.01	0	0.00~650
			PRD1503	0.01	0	0.00~1550
			PRD2003	0.01	0	0.00~2050

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower volt.	V	The minimum voltage of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive voltage at the output due to misoperation, where the upper voltage can be set within a safe range.	PVD0518	0.01	0	0.00~550
			PVD0618	0.01	0	0.00~650
			PVD1506	0.01	0	0.00~1550
			PVD2006	0.01	0	0.00~2050
			PVD0512	0.01	0	0.00~550
			PVD0612	0.01	0	0.00~650
			PVD1504	0.01	0	0.00~1550
			PVD2004	0.01	0	0.00~2050
			PVD0509	0.01	0	0.00~550
			PVD0609	0.01	0	0.00~650
			PVD1503	0.01	0	0.00~1550
			PVD2003	0.01	0	0.00~2050

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower volt.	V	The minimum voltage of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive voltage at the output due to misoperation, where the upper voltage can be set within a safe range.	PRD0224	0.01	0	0.00~220
			PRD0324	0.01	0	0.00~380
			PRD0808	0.01	0	0.00~820
			PRD1008	0.01	0	0.00~1020
			PRD0216	0.01	0	0.00~220
			PRD0316	0.01	0	0.00~380
			PRD0805	0.01	0	0.00~820
			PRD1005	0.01	0	0.00~1020
			PRD0212	0.01	0	0.00~220
			PRD0312	0.01	0	0.00~380
			PRD0804	0.01	0	0.00~820
			PRD1004	0.01	0	0.00~1020

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower volt.	V	The minimum voltage of the output setting screen can be set, and the user needs to avoid damage to the equipment due to low voltage at the output due to misoperation, where the lower voltage can be set within a safe range.	PVD0224	0.01	0	0.00~220
			PVD0324	0.01	0	0.00~380
			PVD0808	0.01	0	0.00~820
			PVD1008	0.01	0	0.00~1020
			PVD0216	0.01	0	0.00~220
			PVD0316	0.01	0	0.00~380
			PVD0805	0.01	0	0.00~820
			PVD1005	0.01	0	0.00~1020
			PVD0212	0.01	0	0.00~220
			PVD0312	0.01	0	0.00~380
			PVD0804	0.01	0	0.00~820
			PVD1004	0.01	0	0.00~1020

Data	Unit	Explaination and application	Model	Resolut ion	Initial value	Range
Lower volt.	V	The minimum voltage of the output setting screen can be set, and the user needs to avoid damage to the equipment due to low voltage at the output due to misoperation, where the lower voltage can be set within a safe range.	PRD4V66	0.01	0	0.00~42
			PVD4V66	0.01	0	0.00~42
			PRD6V66	0.01	0	0.00~62
			PVD6V66	0.01	0	0.00~62
			PRD8V66	0.01	0	0.00~82
			PVD8V66	0.01	0	0.00~82
			PRD4V50	0.01	0	0.00~42
			PVD4V50	0.01	0	0.00~42
			PRD6V50	0.01	0	0.00~62
			PVD6V50	0.01	0	0.00~62
			PRD8V50	0.01	0	0.00~82
			PVD8V50	0.01	0	0.00~82

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper curr.	A	The maximum current of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive current at the output due to misoperation, where the upper current can be set within a safe range.	PRD0518	0.01	180	0.00~189
			PRD0618	0.01	180	0.00~189
			PRD1506	0.01	60	0.00~63
			PRD2006	0.01	60	0.00~63
			PRD0512	0.01	120	0.00~126
			PRD0612	0.01	120	0.00~126
			PRD1504	0.01	40	0.00~42
			PRD2004	0.01	40	0.00~42
			PRD0509	0.01	90	0.00~94.5
			PRD0609	0.01	90	0.00~94.5
			PRD1503	0.01	30	0.00~31.5
			PRD2003	0.01	30	0.00~31.5

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper curr.	A	The maximum current of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive current at the output due to misoperation, where the upper current can be set within a safe range.	PVD0518	0.01	180	0.00~189
			PVD0618	0.01	180	0.00~189
			PVD1506	0.01	60	0.00~63
			PVD2006	0.01	60	0.00~63
			PVD0512	0.01	120	0.00~126
			PVD0612	0.01	120	0.00~126
			PVD1504	0.01	40	0.00~42
			PVD2004	0.01	40	0.00~42
			PVD0509	0.01	90	0.00~94.5
			PVD0609	0.01	90	0.00~94.5
			PVD1503	0.01	30	0.00~31.5
			PVD2003	0.01	30	0.00~31.5

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper curr.	A	The maximum current of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive current at the output due to misoperation, where the upper current can be set within a safe range.	PRD0224	0.01	250	0.00~252
			PRD0324	0.01	250	0.00~252
			PRD0808	0.01	80	0.00~84
			PRD1008	0.01	80	0.00~84
			PRD0216	0.01	160	0.00~168
			PRD0316	0.01	160	0.00~168
			PRD0805	0.01	50	0.00~56.7
			PRD1005	0.01	50	0.00~56.7
			PRD0212	0.01	120	0.00~126
			PRD0312	0.01	120	0.00~126
			PRD0804	0.01	40	0.00~42
			PRD1004	0.01	40	0.00~42

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper curr.	A	The maximum current of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive current at the output due to misoperation, where the upper current can be set within a safe range.	PVD0224	0.01	250	0.00~252
			PVD0324	0.01	250	0.00~252
			PVD0808	0.01	80	0.00~84
			PVD1008	0.01	80	0.00~84
			PVD0216	0.01	160	0.00~168
			PVD0316	0.01	160	0.00~168
			PVD0805	0.01	50	0.00~56.7
			PVD1005	0.01	50	0.00~56.7
			PVD0212	0.01	120	0.00~126
			PVD0312	0.01	120	0.00~126
			PVD0804	0.01	40	0.00~42
			PVD1004	0.01	40	0.00~42

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper curr.	A	The maximum current of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive current at the output due to misoperation, where the upper current can be set within a safe range.	PRD4V66	0.01	680	0.00~680
			PVD4V66	0.01	680	0.00~680
			PRD6V66	0.01	680	0.00~680
			PVD6V66	0.01	680	0.00~680
			PRD8V66	0.01	680	0.00~680
			PVD8V66	0.01	680	0.00~680
			PRD4V50	0.01	510	0.00~510
			PVD4V50	0.01	510	0.00~510
			PRD6V50	0.01	510	0.00~510
			PVD6V50	0.01	510	0.00~510
			PRD8V50	0.01	510	0.00~510
			PVD8V50	0.01	510	0.00~510

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower curr.	A	The maximum current of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive current at the output due to misoperation, where the lower current can be set within a safe range.	PRD0518	0.01	-180	-189~0.00
			PRD0618	0.01	-180	-189~0.00
			PRD1506	0.01	-60	-63~0.00
			PRD2006	0.01	-60	-63~0.00
			PRD0512	0.01	-120	-126~0.00
			PRD0612	0.01	-120	-126~0.00
			PRD1504	0.01	-40	-42~0.00
			PRD2004	0.01	-40	-42~0.00
			PRD0509	0.01	-90	-94.5~0.00
			PRD0609	0.01	-90	-94.5~0.00
			PRD1503	0.01	-30	-31.5~0.00
			PRD2003	0.01	-30	-31.5~0.00

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower curr.	A	The maximum current of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive current at the output due to misoperation, where the lower current can be set within a safe range.	PVD0518	0.01	-18	-18.9~0.00
			PVD0618	0.01	-18	-18.9~0.00
			PVD1506	0.01	-6	-6.3~0.00
			PVD2006	0.01	-6	-6.3~0.00
			PVD0512	0.01	-12	-12.6~0.00
			PVD0612	0.01	-12	-12.6~0.00
			PVD1504	0.01	-4	-4.2~0.00
			PVD2004	0.01	-4	-4.2~0.00
			PVD0509	0.01	-9	-9.45~0.00
			PVD0609	0.01	-9	-9.45~0.00
			PVD1503	0.01	-3	-3.15~0.00
			PVD2003	0.01	-3	-3.15~0.00

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower curr.	A	The maximum current of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive current at the output due to misoperation, where the lower current can be set within a safe range.	PRD0224	0.01	-250	-252~0.00
			PRD0324	0.01	-250	-252~0.00
			PRD0808	0.01	-80	-84~0.00
			PRD1008	0.01	-80	-84~0.00
			PRD0216	0.01	-160	-168~0.00
			PRD0316	0.01	-160	-168~0.00
			PRD0805	0.01	-50	-56.7~0.00
			PRD1005	0.01	-50	-56.7~0.00
			PRD0212	0.01	-120	-126~0.00
			PRD0312	0.01	-120	-126~0.00
			PRD0804	0.01	-40	-42~0.00
			PRD1004	0.01	-40	-42~0.00

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower curr.	A	The maximum current of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive current at the output due to misoperation, where the lower current can be set within a safe range.	PVD0224	0.01	-25	-25.2~0.00
			PVD0324	0.01	-25	-25.2~0.00
			PVD0808	0.01	-8	-8.4~0.00
			PVD1008	0.01	-8	-8.4~0.00
			PVD0216	0.01	-16	-16.8~0.00
			PVD0316	0.01	-16	-16.8~0.00
			PVD0805	0.01	-5	-5.67~0.00
			PVD1005	0.01	-5	-5.67~0.00
			PVD0212	0.01	-12	-12.6~0.00
			PVD0312	0.01	-12	-12.6~0.00
			PVD0804	0.01	-4	-4.2~0.00
			PVD1004	0.01	-4	-4.2~0.00

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower curr.	A	The maximum current of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive current at the output due to misoperation, where the lower current can be set within a safe range.	PRD4V66	0.01	-680	-680~0.00
			PVD4V66	0.01	-68	-68~0.00
			PRD6V66	0.01	-680	-680~0.00
			PVD6V66	0.01	-68	-68~0.00
			PRD8V66	0.01	-680	-680~0.00
			PVD8V66	0.01	-68	-68~0.00
			PRD4V50	0.01	-510	-510~0.00
			PVD4V50	0.01	-51	-51~0.00
			PRD6V50	0.01	-510	-510~0.00
			PVD6V50	0.01	-51	-51~0.00
			PRD8V50	0.01	-510	-510~0.00
			PVD8V50	0.01	-51	-51~0.00

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper power	KW	The maximum power of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive power at the output due to misoperation, where the upper power can be set within a safe range.	PRD0518	0.01	30	0.00~30
			PRD0618	0.01	30	0.00~30
			PRD1506	0.01	30	0.00~30
			PRD2006	0.01	30	0.00~30
			PRD0512	0.01	20	0.00~20
			PRD0612	0.01	20	0.00~20
			PRD1504	0.01	20	0.00~20
			PRD2004	0.01	20	0.00~20
			PRD0509	0.01	15	0.00~15
			PRD0609	0.01	15	0.00~15
			PRD1503	0.01	15	0.00~15
			PRD2003	0.01	15	0.00~15

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper power	KW	The maximum power of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive power at the output due to misoperation, where the upper power can be set within a safe range.	PVD0518	0.01	30	0.00~30
			PVD0618	0.01	30	0.00~30
			PVD1506	0.01	30	0.00~30
			PVD2006	0.01	30	0.00~30
			PVD0512	0.01	20	0.00~20
			PVD0612	0.01	20	0.00~20
			PVD1504	0.01	20	0.00~20
			PVD2004	0.01	20	0.00~20
			PVD0509	0.01	15	0.00~15
			PVD0609	0.01	15	0.00~15
			PVD1503	0.01	15	0.00~15
			PVD2003	0.01	15	0.00~15

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper power	KW	The maximum power of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive power at the output due to misoperation, where the upper power can be set within a safe range.	PRD0224	0.01	30	0.00~30
			PRD0324	0.01	30	0.00~30
			PRD0808	0.01	30	0.00~30
			PRD1008	0.01	30	0.00~30
			PRD0216	0.01	20	0.00~20
			PRD0316	0.01	20	0.00~20
			PRD0805	0.01	20	0.00~20
			PRD1005	0.01	20	0.00~20
			PRD0212	0.01	15	0.00~15
			PRD0312	0.01	15	0.00~15
			PRD0804	0.01	15	0.00~15
			PRD1004	0.01	15	0.00~15

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper power	KW	The maximum power of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive power at the output due to misoperation, where the upper power can be set within a safe range.	PVD0224	0.01	30	0.00~30
			PVD0324	0.01	30	0.00~30
			PVD0808	0.01	30	0.00~30
			PVD1008	0.01	30	0.00~30
			PVD0216	0.01	20	0.00~20
			PVD0316	0.01	20	0.00~20
			PVD0805	0.01	20	0.00~20
			PVD1005	0.01	20	0.00~20
			PVD0212	0.01	15	0.00~15
			PVD0312	0.01	15	0.00~15
			PVD0804	0.01	15	0.00~15
			PVD1004	0.01	15	0.00~15

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Upper power	KW	The maximum power of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive power at the output due to misoperation, where the upper power can be set within a safe range.	PRD4V66	0.01	20	0.00~20
			PVD4V66	0.01	20	0.00~20
			PRD6V66	0.01	20	0.00~20
			PVD6V66	0.01	20	0.00~20
			PRD8V66	0.01	20	0.00~20
			PVD8V66	0.01	20	0.00~20
			PRD4V50	0.01	15	0.00~15
			PVD4V50	0.01	15	0.00~15
			PRD6V50	0.01	15	0.00~15
			PVD6V50	0.01	15	0.00~15
			PRD8V50	0.01	15	0.00~15
			PVD8V50	0.01	15	0.00~15

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower power	KW	The minimum power of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive power at the output due to misoperation, where the upper power can be set within a safe range.	PRD0518	0.01	-30	-30~0.00
			PRD0618	0.01	-30	-30~0.00
			PRD1506	0.01	-30	-30~0.00
			PRD2006	0.01	-30	-30~0.00
			PRD0512	0.01	-20	-20~0.00
			PRD0612	0.01	-20	-20~0.00
			PRD1504	0.01	-20	-20~0.00
			PRD2004	0.01	-20	-20~0.00
			PRD0509	0.01	-15	-15~0.00
			PRD0609	0.01	-15	-15~0.00
			PRD1503	0.01	-15	-15~0.00
			PRD2003	0.01	-15	-15~0.00

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower power	KW	The minimum power of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive power at the output due to misoperation, where the upper power can be set within a safe range.	PVD0518	0.01	-3	-3~0.00
			PVD0618	0.01	-3	-3~0.00
			PVD1506	0.01	-3	-3~0.00
			PVD2006	0.01	-3	-3~0.00
			PVD0512	0.01	-2	-2~0.00
			PVD0612	0.01	-2	-2~0.00
			PVD1504	0.01	-2	-2~0.00
			PVD2004	0.01	-2	-2~0.00
			PVD0509	0.01	-1.5	-1.5~0.00
			PVD0609	0.01	-1.5	-1.5~0.00
			PVD1503	0.01	-1.5	-1.5~0.00
			PVD2003	0.01	-1.5	-1.5~0.00

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower power	KW	The minimum power of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive power at the output due to misoperation, where the upper power can be set within a safe range.	PRD0224	0.01	-30	-30~0.00
			PRD0324	0.01	-30	-30~0.00
			PRD0808	0.01	-30	-30~0.00
			PRD1008	0.01	-30	-30~0.00
			PRD0216	0.01	-20	-20~0.00
			PRD0316	0.01	-20	-20~0.00
			PRD0805	0.01	-20	-20~0.00
			PRD1005	0.01	-20	-20~0.00
			PRD0212	0.01	-15	-15~0.00
			PRD0312	0.01	-15	-15~0.00
			PRD0804	0.01	-15	-15~0.00
			PRD1004	0.01	-15	-15~0.00

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower power	KW	The minimum power of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive power at the output due to misoperation, where the upper power can be set within a safe range.	PVD0224	0.01	-3	-3~0.00
			PVD0324	0.01	-3	-3~0.00
			PVD0808	0.01	-3	-3~0.00
			PVD1008	0.01	-3	-3~0.00
			PVD0216	0.01	-2	-2~0.00
			PVD0316	0.01	-2	-2~0.00
			PVD0805	0.01	-2	-2~0.00
			PVD1005	0.01	-2	-2~0.00
			PVD0212	0.01	-1.5	-1.5~0.00
			PVD0312	0.01	-1.5	-1.5~0.00
			PVD0804	0.01	-1.5	-1.5~0.00
			PVD1004	0.01	-1.5	-1.5~0.00

Data	Unit	Explaination and application	Model	Resolution	Initial value	Range
Lower power	KW	The minimum power of the output setting screen can be set, and the user needs to avoid damage to the equipment due to excessive power at the output due to misoperation, where the upper power can be set within a safe range.	PRD4V66	0.01	-20	-20~0.00
			PVD4V66	0.01	-2	-2~0.00
			PRD6V66	0.01	-20	-20~0.00
			PVD6V66	0.01	-2	-2~0.00
			PRD8V66	0.01	-20	-20~0.00
			PVD8V66	0.01	-2	-2~0.00
			PRD4V50	0.01	-15	-15~0.00
			PVD4V50	0.01	-1.5	-1.5~0.00
			PRD6V50	0.01	-15	-15~0.00
			PVD6V50	0.01	-1.5	-1.5~0.00
			PRD8V50	0.01	-15	-15~0.00
			PVD8V50	0.01	-1.5	-1.5~0.00

Voltage limits is shown in Figure 184.

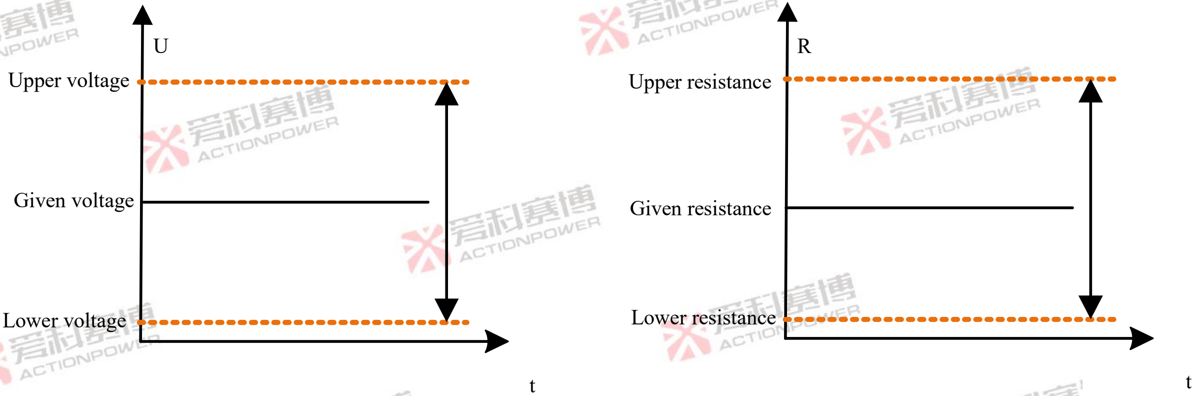


Figure184-voltage limit/resistance limit screen

The current and power limits is shown in Figure 185.

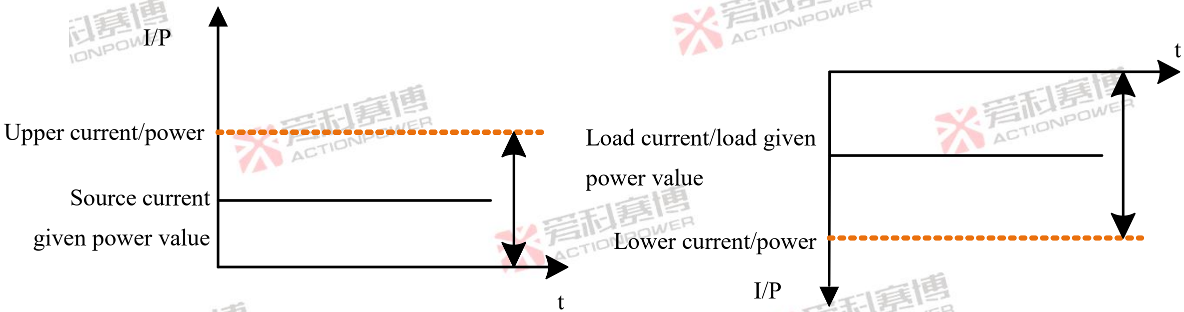


Figure 185-Current and power limits

6.3.4 Protect

This product has dual protection of output terminal and remote sensing terminal. It can not only set the protection value of voltage, current and power at the output port, but also set the upper limit of remote sensing voltage, so as to make the user device and the product safer. The protection setting screen is shown in Figure 186, and the parameters are described in Table 27.

Figure 186-Setting-Protect Screen

Table 27 Protection setting parameter list

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
Sense value	V	Protection value of the difference between the voltage of the remote end and the voltage of the output port. When the user needs to compensate the voltage drop in the line, you can enable remote compensation in 6.4.3 Advance. This product controls the remote voltage to be consistent with the set value through the internal cycle, and controls the maximum voltage that can be compensated by the remote end by setting this parameter.	PRD0518	0.01	10	0.01~10
			PRD0618	0.01	12	0.01~12
			PRD1506	0.01	30	0.01~30
			PRD2006	0.01	40	0.01~40
			PRD0512	0.01	10	0.01~10
			PRD0612	0.01	12	0.01~12
			PRD1504	0.01	30	0.01~30
			PRD2004	0.01	40	0.01~40
			PRD0509	0.01	10	0.01~10
			PRD0609	0.01	12	0.01~12
			PRD1503	0.01	30	0.01~30
			PRD2003	0.01	40	0.01~40

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
Sense protect	V	Protection value of the difference between the voltage of the remote end and the voltage of the output port. When the user needs to compensate the voltage drop in the line, you can enable remote compensation in 6.4.3 Advanced. This product controls the remote voltage to be consistent with the set value through the internal cycle, and controls the maximum voltage that can be compensated by the remote end by setting this parameter.	PVD0518	0.01	10	0.01~10
			PVD0618	0.01	12	0.01~12
			PVD1506	0.01	30	0.01~30
			PVD2006	0.01	40	0.01~40
			PVD0512	0.01	10	0.01~10
			PVD0612	0.01	12	0.01~12
			PVD1504	0.01	30	0.01~30
			PVD2004	0.01	40	0.01~40
			PVD0509	0.01	10	0.01~10
			PVD0609	0.01	12	0.01~12
			PVD1503	0.01	30	0.01~30
			PVD2003	0.01	40	0.01~40

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
Sense protect	V	Protection value of the difference between the voltage of the remote end and the voltage of the output port. When the user needs to compensate the voltage drop in the line, you can enable remote compensation in 6.4.3 Advanced. This product controls the remote voltage to be consistent with the set value through the internal cycle, and controls the maximum voltage that can be compensated by the remote end by setting this parameter.	PRD0224	0.01	4	0.01~4
			PRD0324	0.01	7.2	0.01~7.2
			PRD0808	0.01	16	0.01~16
			PRD1008	0.01	20	0.01~20
			PRD0216	0.01	4	0.01~4
			PRD0316	0.01	7.2	0.01~7.2
			PRD0805	0.01	16	0.01~16
			PRD1005	0.01	20	0.01~20
			PRD0212	0.01	4	0.01~4
			PRD0312	0.01	7.2	0.01~7.2
			PRD0804	0.01	16	0.01~16
			PRD1004	0.01	20	0.01~20

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
Sense protect	V	Protection value of the difference between the voltage of the remote end and the voltage of the output port. When the user needs to compensate the voltage drop in the line, you can enable remote compensation in 6.4.3 Advanced. This product controls the remote voltage to be consistent with the set value through the internal cycle, and controls the maximum voltage that can be compensated by the remote end by setting this parameter.	PVD0224	0.01	4	0.01~4
			PVD0324	0.01	7.2	0.01~7.2
			PVD0808	0.01	16	0.01~16
			PVD1008	0.01	20	0.01~20
			PVD0216	0.01	4	0.01~4
			PVD0316	0.01	7.2	0.01~7.2
			PVD0805	0.01	16	0.01~16
			PVD1005	0.01	20	0.01~20
			PVD0212	0.01	4	0.01~4
			PVD0312	0.01	7.2	0.01~7.2
			PVD0804	0.01	16	0.01~16
			PVD1004	0.01	20	0.01~20

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
Sense protect	V	Protection value of the difference between the voltage of the remote end and the voltage of the output port. When the user needs to compensate the voltage drop in the line, you can enable remote compensation in 6.4.3 Advanced. This product controls the remote voltage to be consistent with the set value through the internal cycle, and controls the maximum voltage that can be compensated by the remote end by setting this parameter.	PRD4V66	0.01	40	0.01~40
			PVD4V66	0.01	40	0.01~40
			PRD6V66	0.01	60	0.01~60
			PVD6V66	0.01	60	0.01~60
			PRD8V66	0.01	80	0.01~80
			PVD8V66	0.01	80	0.01~80
			PRD4V50	0.01	40	0.01~40
			PVD4V50	0.01	40	0.01~40
			PRD6V50	0.01	60	0.01~60
			PVD6V50	0.01	60	0.01~60
			PRD8V50	0.01	80	0.01~80
			PVD8V50	0.01	80	0.01~80

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OVP	V	Remote voltage protection value: Maximum voltage of the remote end to be protected. You can set this parameter.	PRD0518	0.01	550	0.01~550
			PRD0618	0.01	660	0.01~660
			PRD1506	0.01	1650	0.01~1650
			PRD2006	0.01	2000	0.01~2000
			PRD0512	0.01	550	0.01~550
			PRD0612	0.01	660	0.01~660
			PRD1504	0.01	1650	0.01~1650
			PRD2004	0.01	2000	0.01~2000
			PRD0509	0.01	550	0.01~550
			PRD0609	0.01	660	0.01~660
			PRD1503	0.01	1650	0.01~1650
			PRD2003	0.01	2000	0.01~2000

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OVP	V	Remote voltage protection value: Maximum voltage of the remote end to be protected. You can set this parameter.	PVD0518	0.01	550	0.01~550
			PVD0618	0.01	660	0.01~660
			PVD1506	0.01	1650	0.01~1650
			PVD2006	0.01	2000	0.01~2000
			PVD0512	0.01	550	0.01~550
			PVD0612	0.01	660	0.01~660
			PVD1504	0.01	1650	0.01~1650
			PVD2004	0.01	2000	0.01~2000
			PVD0509	0.01	550	0.01~550
			PVD0609	0.01	660	0.01~660
			PVD1503	0.01	1650	0.01~1650
			PVD2003	0.01	2000	0.01~2000

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OVP	V	Remote voltage protection value: Maximum voltage of the remote end to be protected. You can set this parameter.	PRD0224	0.01	220	0.01~220
			PRD0324	0.01	396	0.01~396
			PRD0808	0.01	880	0.01~880
			PRD1008	0.01	1100	0.01~1100
			PRD0216	0.01	220	0.01~220
			PRD0316	0.01	396	0.01~396
			PRD0805	0.01	880	0.01~880
			PRD1005	0.01	1100	0.01~1100
			PRD0212	0.01	220	0.01~220
			PRD0312	0.01	396	0.01~396
			PRD0804	0.01	880	0.01~880
			PRD1004	0.01	1100	0.01~1100

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OVP	V	Remote voltage protection value: Maximum voltage of the remote end to be protected. You can set this parameter.	PVD0224	0.01	220	0.01~220
			PVD0324	0.01	396	0.01~396
			PVD0808	0.01	880	0.01~880
			PVD1008	0.01	1100	0.01~1100
			PVD0216	0.01	220	0.01~220
			PVD0316	0.01	396	0.01~396
			PVD0805	0.01	880	0.01~880
			PVD1005	0.01	1100	0.01~1100
			PVD0212	0.01	220	0.01~220
			PVD0312	0.01	396	0.01~396
			PVD0804	0.01	880	0.01~880
			PVD1004	0.01	1100	0.01~1100

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OVP	V	Remote voltage protection value: Maximum voltage of the remote end to be protected. You can set this parameter.	PRD4V66	0.01	44	0.01~44
			PVD4V66	0.01	44	0.01~44
			PRD6V66	0.01	66	0.01~66
			PVD6V66	0.01	66	0.01~66
			PRD8V66	0.01	88	0.01~88
			PVD8V66	0.01	88	0.01~88
			PRD4V50	0.01	44	0.01~44
			PVD4V50	0.01	44	0.01~44
			PRD6V50	0.01	66	0.01~66
			PVD6V50	0.01	66	0.01~66
			PRD8V50	0.01	88	0.01~88
			PVD8V50	0.01	88	0.01~88

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OVP	V	Overvoltage protection threshold. Maximum voltage of the output terminal to be protected. You can set this parameter.	PRD0518	0.01	550	0.01~550
			PRD0618	0.01	660	0.01~660
			PRD1506	0.01	1650	0.01~1650
			PRD2006	0.01	2000	0.01~2000
			PRD0512	0.01	550	0.01~550
			PRD0612	0.01	660	0.01~660
			PRD1504	0.01	1650	0.01~1650
			PRD2004	0.01	2000	0.01~2000
			PRD0509	0.01	550	0.01~550
			PRD0609	0.01	660	0.01~660
			PRD1503	0.01	1650	0.01~1650
			PRD2003	0.01	2000	0.01~2000

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OVP	V	Overvoltage protection threshold. Maximum voltage of the output terminal to be protected. You can set this parameter.	PVD0518	0.01	550	0.01~550
			PVD0618	0.01	660	0.01~660
			PVD1506	0.01	1650	0.01~1650
			PVD2006	0.01	2000	0.01~2000
			PVD0512	0.01	550	0.01~550
			PVD0612	0.01	660	0.01~660
			PVD1504	0.01	1650	0.01~1650
			PVD2004	0.01	2000	0.01~2000
			PVD0509	0.01	550	0.01~550
			PVD0609	0.01	660	0.01~660
			PVD1503	0.01	1650	0.01~1650
			PVD2003	0.01	2000	0.01~2000

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OVP	V	Overvoltage protection threshold. Maximum voltage of the output terminal to be protected. You can set this parameter.	PRD0224	0.01	220	0.01~220
			PRD0324	0.01	396	0.01~396
			PRD0808	0.01	880	0.01~880
			PRD1008	0.01	1100	0.01~1100
			PRD0216	0.01	220	0.01~220
			PRD0316	0.01	396	0.01~396
			PRD0805	0.01	880	0.01~880
			PRD1005	0.01	1100	0.01~1100
			PRD0212	0.01	220	0.01~220
			PRD0312	0.01	396	0.01~396
			PRD0804	0.01	880	0.01~880
			PRD1004	0.01	1100	0.01~1100

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OVP	V	Overvoltage protection threshold. Maximum voltage of the output terminal to be protected. You can set this parameter.	PVD0224	0.01	220	0.01~220
			PVD0324	0.01	396	0.01~396
			PVD0808	0.01	880	0.01~880
			PVD1008	0.01	1100	0.01~1100
			PVD0216	0.01	220	0.01~220
			PVD0316	0.01	396	0.01~396
			PVD0805	0.01	880	0.01~880
			PVD1005	0.01	1100	0.01~1100
			PVD0212	0.01	220	0.01~220
			PVD0312	0.01	396	0.01~396
			PVD0804	0.01	880	0.01~880
			PVD1004	0.01	1100	0.01~1100

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OVP	V	Overvoltage protection threshold. Maximum voltage of the output terminal to be protected. You can set this parameter.	PRD4V66	0.01	44	0.01~44
			PVD4V66	0.01	44	0.01~44
			PRD6V66	0.01	66	0.01~66
			PVD6V66	0.01	66	0.01~66
			PRD8V66	0.01	88	0.01~88
			PVD8V66	0.01	88	0.01~88
			PRD4V50	0.01	44	0.01~44
			PVD4V50	0.01	44	0.01~44
			PRD6V50	0.01	66	0.01~66
			PVD6V50	0.01	66	0.01~66
			PRD8V50	0.01	88	0.01~88
			PVD8V50	0.01	88	0.01~88

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OCP	A	Overcurrent protection threshold. Maximum output current to be protected. You can set this parameter.	PRD0518	0.01	198	0.01~198
			PRD0618	0.01	198	0.01~198
			PRD1506	0.01	66	0.01~66
			PRD2006	0.01	66	0.01~66
			PRD0512	0.01	132	0.01~132
			PRD0612	0.01	132	0.01~132
			PRD1504	0.01	44	0.01~44
			PRD2004	0.01	44	0.01~44
			PRD0509	0.01	99	0.01~99
			PRD0609	0.01	99	0.01~99
			PRD1503	0.01	33	0.01~33
			PRD2003	0.01	33	0.01~33

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OCP	A	Overcurrent protection threshold. Maximum output current to be protected. You can set this parameter.	PVD0518	0.01	198	0.01~198
			PVD0618	0.01	198	0.01~198
			PVD1506	0.01	66	0.01~66
			PVD2006	0.01	66	0.01~66
			PVD0512	0.01	132	0.01~132
			PVD0612	0.01	132	0.01~132
			PVD1504	0.01	44	0.01~44
			PVD2004	0.01	44	0.01~44
			PVD0509	0.01	99	0.01~99
			PVD0609	0.01	99	0.01~99
			PVD1503	0.01	33	0.01~33
			PVD2003	0.01	33	0.01~33

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OCP	A	Overcurrent protection threshold. Maximum output current to be protected. You can set this parameter.	PRD0224	0.01	264	0.01~264
			PRD0324	0.01	264	0.01~264
			PRD0808	0.01	88	0.01~88
			PRD1008	0.01	88	0.01~88
			PRD0216	0.01	176	0.01~176
			PRD0316	0.01	176	0.01~176
			PRD0805	0.01	59.4	0.01~59.4
			PRD1005	0.01	59.4	0.01~59.4
			PRD0212	0.01	132	0.01~132
			PRD0312	0.01	132	0.01~132
			PRD0804	0.01	44	0.01~44
			PRD1004	0.01	44	0.01~44

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OCP	A	Overcurrent protection threshold. Maximum output current to be protected. You can set this parameter.	PVD0224	0.01	264	0.01~264
			PVD0324	0.01	264	0.01~264
			PVD0808	0.01	88	0.01~88
			PVD1008	0.01	88	0.01~88
			PVD0216	0.01	176	0.01~176
			PVD0316	0.01	176	0.01~176
			PVD0805	0.01	59.4	0.01~59.4
			PVD1005	0.01	59.4	0.01~59.4
			PVD0212	0.01	132	0.01~132
			PVD0312	0.01	132	0.01~132
			PVD0804	0.01	44	0.01~44
			PVD1004	0.01	44	0.01~44

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OCP	A	Overcurrent protection threshold. Maximum output current to be protected. You can set this parameter.	PRD4V66	0.01	733.7	0.01~733.7
			PVD4V66	0.01	733.7	0.01~733.7
			PRD6V66	0.01	733.7	0.01~733.7
			PVD6V66	0.01	733.7	0.01~733.7
			PRD8V66	0.01	733.7	0.01~733.7
			PVD8V66	0.01	733.7	0.01~733.7
			PRD4V50	0.01	550	0.01~550
			PVD4V50	0.01	550	0.01~550
			PRD6V50	0.01	550	0.01~550
			PVD6V50	0.01	550	0.01~550
			PRD8V50	0.01	550	0.01~550
			PVD8V50	0.01	550	0.01~550

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OPP	KW	Overpower protection threshold. The maximum power of the output end needs to be protected. You can set this parameter.	PRD0518	0.01	33	0.01~33
			PRD0618	0.01	33	0.01~33
			PRD1506	0.01	33	0.01~33
			PRD2006	0.01	33	0.01~33
			PRD0512	0.01	22	0.01~22
			PRD0612	0.01	22	0.01~22
			PRD1504	0.01	22	0.01~22
			PRD2004	0.01	22	0.01~22
			PRD0509	0.01	16.5	0.01~16.5
			PRD0609	0.01	16.5	0.01~16.5
			PRD1503	0.01	16.5	0.01~16.5
			PRD2003	0.01	16.5	0.01~16.5

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OPP	KW	Overpower protection threshold. The maximum power of the output end needs to be protected. You can set this parameter.	PVD0518	0.01	33	0.01~33
			PVD0618	0.01	33	0.01~33
			PVD1506	0.01	33	0.01~33
			PVD2006	0.01	33	0.01~33
			PVD0512	0.01	22	0.01~22
			PVD0612	0.01	22	0.01~22
			PVD1504	0.01	22	0.01~22
			PVD2004	0.01	22	0.01~22
			PVD0509	0.01	16.5	0.01~16.5
			PVD0609	0.01	16.5	0.01~16.5
			PVD1503	0.01	16.5	0.01~16.5
			PVD2003	0.01	16.5	0.01~16.5

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OPP	KW	Overpower protection threshold. The maximum power of the output end needs to be protected. You can set this parameter.	PRD0224	0.01	33	0.01~33
			PRD0324	0.01	33	0.01~33
			PRD0808	0.01	33	0.01~33
			PRD1008	0.01	33	0.01~33
			PRD0216	0.01	22	0.01~22
			PRD0316	0.01	22	0.01~22
			PRD0805	0.01	22	0.01~22
			PRD1005	0.01	22	0.01~22
			PRD0212	0.01	16.5	0.01~16.5
			PRD0312	0.01	16.5	0.01~16.5
			PRD0804	0.01	16.5	0.01~16.5
			PRD1004	0.01	16.5	0.01~16.5

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OPP	KW	Overpower protection threshold. The maximum power of the output end needs to be protected. You can set this parameter.	PVD0224	0.01	33	0.01~33
			PVD0324	0.01	33	0.01~33
			PVD0808	0.01	33	0.01~33
			PVD1008	0.01	33	0.01~33
			PVD0216	0.01	22	0.01~22
			PVD0316	0.01	22	0.01~22
			PVD0805	0.01	22	0.01~22
			PVD1005	0.01	22	0.01~22
			PVD0212	0.01	16.5	0.01~16.5
			PVD0312	0.01	16.5	0.01~16.5
			PVD0804	0.01	16.5	0.01~16.5
			PVD1004	0.01	16.5	0.01~16.5

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
OPP	KW	Overpower protection threshold. The maximum power of the output end needs to be protected. You can set this parameter.	PRD4V66	0.01	22	0.01~22
			PVD4V66	0.01	22	0.01~22
			PRD6V66	0.01	22	0.01~22
			PVD6V66	0.01	22	0.01~22
			PRD8V66	0.01	22	0.01~22
			PVD8V66	0.01	22	0.01~22
			PRD4V50	0.01	16.5	0.01~16.5
			PVD4V50	0.01	16.5	0.01~16.5
			PRD6V50	0.01	16.5	0.01~16.5
			PVD6V50	0.01	16.5	0.01~16.5
			PRD8V50	0.01	16.5	0.01~16.5
			PVD8V50	0.01	16.5	0.01~16.5

Note: Please refer to 3.5 Technical Specifications for the rated voltage/current/power of this product.

6.3.5 Event

This product is designed with event recording function, which can monitor the specific situation occurring during operation, so as to facilitate users to observe and understand the working condition of the equipment. The event Settings are shown in Figure 187 and the functions are shown in Table 28.

Figure 187-Settings-Event Screen

Table 28 Event setting function

Parameter	Unit	Explaination and application	Model	Resolution	Initial value	Ranges
NO.	\	Current event number/Total number of events. 1/10 Meaning: 1 indicates the current event Settings page numbered 1, 10 indicates the total number of events is 10.	ALL	\	1	\
Source	\	Display as 0- none, 1- voltage, 2- current, 3- power, 4- temperature. The trigger source Settings are shown in Figure 189. When you need to monitor the status of voltage, current, power, and temperature, you can select the corresponding trigger source to	ALL	\	0	\

		trigger events.				
Threshold	%	For the percentage of the trigger source rating, see 3.5 Technical Specifications for the rated voltage of each model, and 100℃ for the rated temperature. You can set the triggering condition by setting the triggering threshold.	ALL	0.01	0	0~Rating
Time	s	The time when an event is triggered after the trigger threshold is exceeded. Users can set this parameter to control the speed at which events are triggered.	ALL	0.001	0	0~9999
Action	\	Warn: The product can run normally after warning, and the word "Event X" will flash in the status display screen. When an event occurs, you can set the action mode to warning only when you need warning.	ALL	\	Warning	\
		Alarm: After alarm, the output end of the product will be closed and the word "Event X" will flash in the status display screen. When an event occurs and the user needs to alarm and close the output terminal, the action mode can be set as alarm.	ALL			
		Record: The product can run normally when events are recorded. You need to click Start Record on the 6.5.1 Log Record screen. When an event occurs, you only need to record the event in a log. You can set the action mode to record.记	ALL			
Side	\	When the voltage, current, power, or temperature upward exceeds the trigger threshold, an event is triggered. When an event is triggered, the user needs to set the direction of the alarm to upward. When the voltage, current, power, or temperature downward exceeds the trigger threshold, an event is triggered. An event is triggered when the user exceeds the trigger threshold. You need to set the threshold direction to downward.	ALL		Upward	

Clear	\	Clear the current numbered event status. The power/reset key also has the function of clear event. The user can click this button to clear the event status and clear the event status in the status display screen.	ALL	\	\	\
Above/Below	\	Above and below means pages and are used to select the event number	ALL	\	\	\

The event triggering diagram is shown in Figure 188. Set the trigger source as 1- voltage, trigger threshold as 25%, rated voltage as 2000V, threshold direction as upward, and trigger time as 1s. Figure 188 shows the description of event trigger parameters. Event 1 in the following figure takes less than 1s to trigger, so the event cannot be triggered. Event 2 meets event triggering requirements.

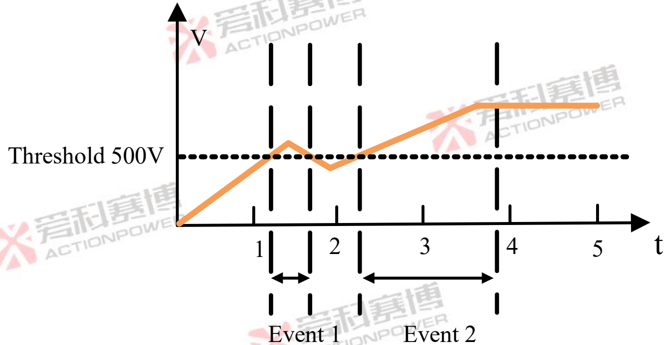


Figure 188-Event Triggering

Source Settings: Click Source setting and the numeric keyboard pops up. You can set the range of trigger sources to be 0~4. After setting 0, "0-none" is displayed on the screen for selecting trigger sources; after setting 1, "1-voltage" is displayed on the screen for selecting trigger sources; after setting 2, "2-current" is displayed on the screen for selecting trigger sources; after setting 3, "3-power" is displayed on the screen for selecting trigger sources. After setting 4, 4-Temperature is displayed on the source selection screen. The source setting diagram is shown in Figure 189.

Figure 189-Source Settings

6.4 Config

The conifg functions are shown in Figure 190 for configuring functions that are not numeric classes. This product can not only communicate with user devices through LAN, USB, but also carry out remote interaction through Anyport. When this product is connected to different user devices, it needs to be configured in the conifg menu. At the same time, the user can configure the data format of the output display screen, configure the Trigger, self-start and parallel functions.

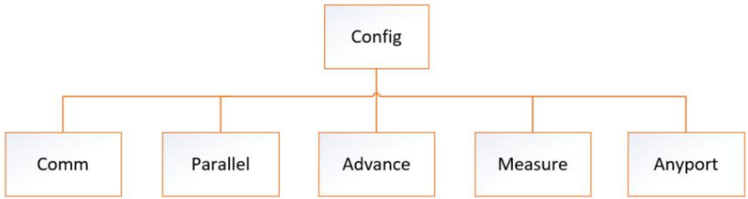


Figure 190- Config Tree

6.4.1 Communication

This product can select local/remote communication mode switching control, and supports LAN, USB, and Magic-Bus components to communicate with user devices. In the conifg of communication function, you can choose to give the control of the product to different ports to achieve local/remote control.

Figure 191-Communication-Settings Screen

The communication screen is shown in Figure 191. The meanings of the parameters are as follows:

Communication port: The communication port can select the control mode of the product. When the local lock is off, the control right can be switched between the local state and the remote state, facilitating the user to switch the communication between remote devices.

① Screen: Display screen local control;

② Lan: Ethernet remote control;

③ USB: USB remote control;

④ MagicBus: The MagicBus contains the 485 communication port, CAN communication port, and external extension Lan port. To enable the Magic-Bus component, you need to install the Magic-Bus component.

Address: Number of the device, not the parallel address. This address needs to be set in Modbus. The default value is 1. The value ranges from 0 to 127.

Lock: Locks the local control permission and prevents other ports from gaining control. Local locks can only be enabled in Screen control mode, after which remote communication cannot be set.

Figure 192-Config-Communication-Lan Screen

When selecting Lan port control, you need to set network parameters, as shown in Figure 192.

The meanings of the parameters are as follows:

Communication protocol: The LAN port of the product supports SCPI and Modbus-TCP.

IP Address: The IP address type is IPv4.

Port: The default port number is 502.

USB ports support SCPI and Modbus-RTU communication protocols. When USB port control is selected, the corresponding communication protocol needs to be configured, as shown in Figure 193.

Figure 193-Config-Communication-USB Screen

6.4.2 Parallel

⚠	Connect the positive and negative DC output copper bars of the parallel device to each other when expanding the parallel device in parallel. Choose the wire diameter according to the maximum current, and use the shortest wire as possible.

This product supports parallel expansion of multiple machines. Parallel conifg can be divided into columns and rows. To configure columns in parallel, you need to set columns in parallel to masters and rows in parallel to single servers on the Conifg-Parallel screen of masters. On the Config-parallel screen of slave servers, set columns in parallel to slave servers and rows in parallel to single servers. For the optical fiber connection mode in parallel, see Figure 194 Column Parallel Optical Fiber Connection. For the config - parallel screen in parallel, see Figure 195 Column Parallel Master Config-Parallel Screen and Figure 196 Column Parallel Slave Config-Parallel Screen.

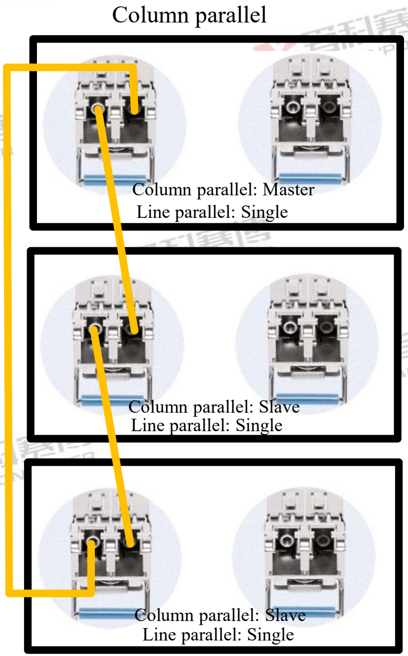


Figure 194-Column Parallel Optical Fiber Connection

Figure 195-Column Parallel Master Config-Parallel Screen

Figure 196-Column Parallel Slave Config-Parallel Screen

In the row parallel conifg, you need to set the row parallel to the master and the column parallel to the single machine on the Config-parallel screen. In the slave conifg-parallel screen, you need to set the row parallel to the slave and the column parallel to the single machine. For the parallel optical fiber connection, see Figure 197 Line Column Parallel Optical Fiber Connection . For the parallel config - parallel screen, see Figure 198 Line Parallel Master Conifg-Parallel Screen and Figure 199 Line Parallel Slave Config-Parallel Screen.

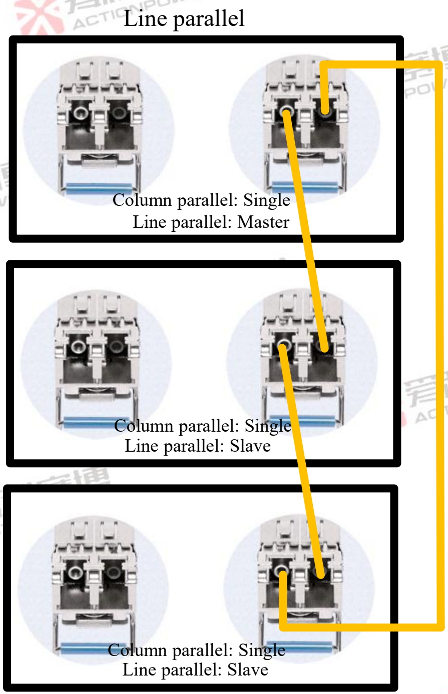


Figure 197-Line Column Parallel Optical Fiber Connection

Figure 198-Line Parallel Master Config-Parallel Screen

Figure 199-Line Parallel Slave Config-Parallel Screen

Due to the single-direction parallel is limited by the communication rate, the product can be separated by row and column directions in parallel conifg to maximize the capacity. Figure 200 shows the Config-Parallel screen.

Figure 200-Config-Paralleling Screen

For parallel conifg, you can refer to Figure 201 for optical fiber connection and screen Settings. Arrows indicate the control direction. The products in the upper left corner control other products in a unified manner.

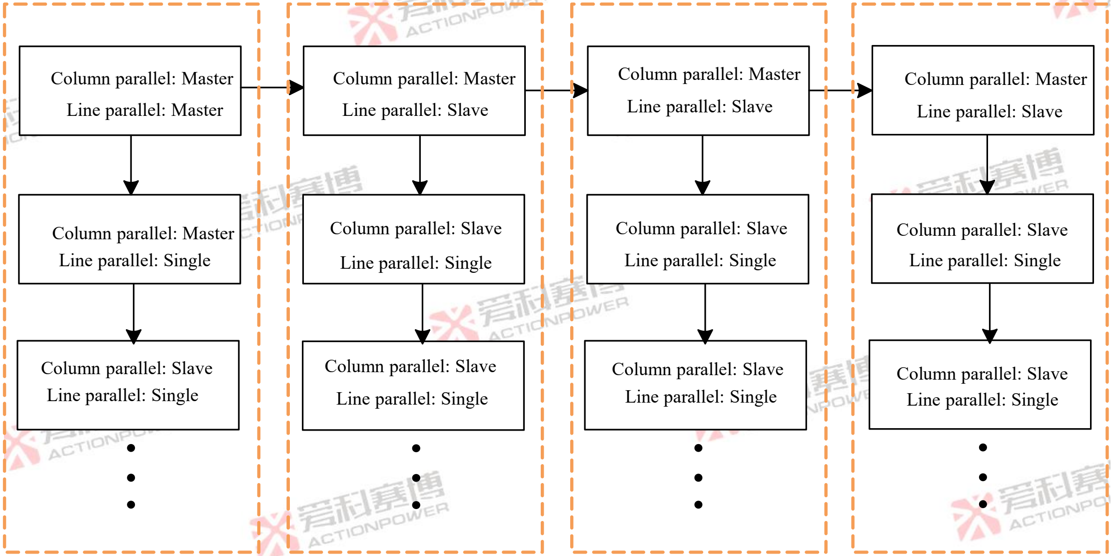


Figure 201 - Parallel Conifg

Parallel redundancy: During the operation of this product, some slave machines are protected by non-output or AC terminals. If parallel redundancy is enabled, the rest of the product can continue to operate and actively distribute current. If parallel redundancy is disabled, the rest of the product will close the output terminals.

6.4.3 Advance

The advance conifg is designed for some special features. The trigger function is shown in Figure 202.

Figure 202-Conifg-Advance-Trigger Screen

The functions of each parameter are as follows:

Trigger in: Trigger is the waveform output switch after the function is loaded. There are two types of trigger input: internal and external. The internal trigger is triggered by the trigger button on the function screen, while the external trigger means that the Anyport screen is triggered by an external set. You need to enable the trigger function on the Anyport input conifg screen.

Trigger out: After the trigger function is set in the Anyport output screen, the product will send out pulse signals in the Anyport output port when the function waveform is output. Therefore, it is necessary to enable the trigger function in the Anyport output conifg screen. The example diagram of single, single step and single cycle is shown in Figure 203.

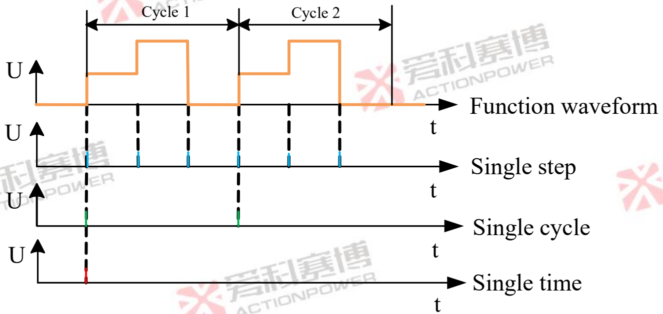


Figure 203 - Trigger Out

Trigger delay: refers to the delay time when the product receives the trigger input signal to the output waveform.

A variety of additional functions can be configured in the extension screen, as shown in Figure 204.

Figure 204-Conifg-Advance-Extend Screen

The functions of each parameter are as follows:

Auto run: In manual mode, when the AC circuit breaker is closed, press the power/reset button to start up; The automatic mode is that when the AC circuit breaker is closed, the product will start up automatically after powering on, which is convenient for users to integrate the product into the ATE automatic test system and realize one-button start.

Auto ouput: After this function is enabled, the output terminal is directly started after the product is powered on.

Note: After automatic operation is enabled, pay attention to the danger and use with caution.

Preload: After this function is enabled, when the output terminal is connected to a non-energy memory device, the output terminal can be closed and quickly discharged with a constant current.

Remote sense: After this function is enabled, the device compensates for the voltage drop in the line connecting the product to the user's device.

Res.: After the Res. is enabled, the internal resistance setting bar will appear in the output setting screen.

The sampling screen is shown in Figure 205. On this screen, the sampling rate of data in the output setting screen can be set. sps represents the sampling times per second. For example, the higher the sampling rate of sinusoidal wave, the smoother the sinusoidal wave will be. However, it is normal for the sampling rate to be too high, because noise will be sampled, the data in the output display screen will jump.

Figure 205-Conifg-Advance-Sampling Screen

6.4.4 Measure

The measurement conifg is used to set the data format and type of the output display. The conifg-measure screen is shown in Figure 206.

Figure 206-Conifg-measure screen

The functions of each data are as follows:

Resolution: Configure the number of display bits for output display screen data. AUTO indicates that the region can display the max number of digits, where $4_{1/2}$ means that the highest bit of the data only shows 0 or 1, and the last four digits can display 0-9, such as 12.919, 0.1859.

Refresh Rate: The refresh rate of output display data. SPS means 1 refresh per second.

Meas.select: Select the t data of the fourth row of the display screen of the display output. The high accuracy of capacity and energy display helps energy memory equipment to accurately measure.

Res.: Display the internal resistance value of this product.

Capacity: Shows the accumulation of the product of current and time, in A· H.

Energy: shows the accumulation of the product of power and time, in KW· H.

Clear: Manually clear capacity and energy data. The capacity and energy data of this product will also be automatically cleared after power failure.

After the measure display selects the internal resistance, capacity and energy, the output display screen will display the corresponding data information, and the internal resistance, capacity, and energy selection display screen is shown in Figure 207.

Figure 207-Res., capacity, energy selection display screen

6.4.5 Anyport

Anyport is a multi-function screen, used in the centralized control system, convenient for users to remotely control and quickly monitor the working status of this product, through the following operations to achieve the corresponding functions.

6.4.5.1 Anyport input

Anyport input function: control the working status of this product through the external input signal, and the conifg-Anyport-input screen is shown in Figure 208.

Figure 208-Conifg-anyport-input screen

Table 29-Anyport enter the function sheet

data	data selection	Explaination and application
Port	1/6	Number of current ports/total ports. 1 in 1/6 means that the current port is 1, and 6 means that the total number of ports is 6.
Polarity	Positive	Input high or float enable input port function. The high level range is 3V-10V and the pulse width needs to be >50μs.
	Negative	Input low or ground enables input port function. The low level range is <1V and the pulse width needs to be >50μs.
Function	/	The input screen is not enabled.
	Analog En	Externally given enable master switch. When the user needs to use the analog external given function to set the product patameters, he can enter the high level through the input port and open the external enable function in this screen, and then enable the analog external given function. The given relationship between external enablement and simulated external is

data	data selection	Explaination and application
		shown in Figure 209. (Polarity is positive)
	Trigger	Trigger function. The user needs to control the function trigger through an external signal, and needs to set the trigger input to external in the "Advance-Trigger" screen. When the input port input is high, the product trigger function is controlled. (Polarity is positive)
	Inter Lock	The product triggers inter lock protection. When the user needs to simulate the chain fault externally, the product can be controlled at a high level at the input port to generate chain protection and turn off the output, and only after reset can it return to normal. (Polarity is positive)
	Output	Controls whether the product output is turned on or off. When the user needs to control the product output on or off externally, the product output can be turned on at a high level control at the input port input (polarity is positive)
	Reset	Control product reset. When the user needs to control the product reset externally, the product reset can be controlled when the input port input is high. (Polarity is positive)
	E-top	Control the emergency shutdown of the product output. When the user needs to control the emergency shutdown of the product output externally, the emergency shutdown of the product output can be controlled at the input port input high level. (Polarity is positive)

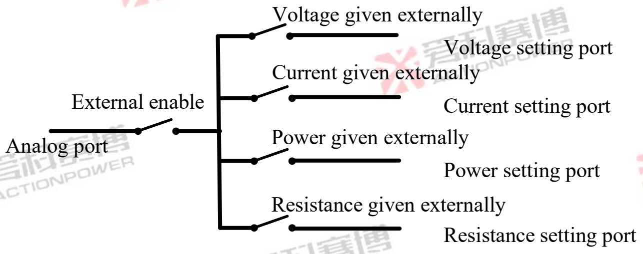


Figure 209-The relationship between external enable and analog external given diagram

6.4.5.2 **Anyport Output**

The Anyport output function is convenient to indicate the status information of this product, the Conifg-anyport-output screen is shown in Figure 210, and the Anyport output function table is shown in Table 30.

Figure 210-Conifg-anyport-output screen

Table 30-Anyport output feature table

data items	data selection	Explaination and application
Port	1/6	Number of current ports/total ports. 1 in 1/6 means that the current port is 1, and 6 means that the total number of ports is 6.
Polarity	Positive	The output high level enables the output port function. The high amplitude is determined by the external voltage.
	Negative	Output low enables output port function. The low amplitude is 0V.
Function	/	/
	Inter Lock	Output protection signal. When the user needs to output the chain protection signal, the chain function can be enabled, and the output port output high level when the chain protection of this product appears. (Polarity is positive)
	Trigger	The function functions trigger the output signal. When the user needs the trigger signal of the function function, the trigger function can be enabled, and after configuring the trigger output setting, see 6.4.3 Advance, and the output port of the trigger function output is high. (Polarity is positive) Pulse width:40μs~50μs。
	Runn statu	Output operating status signal. When the user needs to monitor the operating status externally, the operating status function can be enabled, and the port output is high when the output is up. (Polarity is positive)
	CV	CV status signal. When the user needs to monitor the CV status externally, the CV status function can be enabled and the port output high when in CV mode. (Polarity is positive)
	Err.state	Output protection signal. When the user needs to output a protection signal, the protection status function can be enabled, and the port output high level when the product is protected. (Polarity is positive)
	Voltage Prog	Voltage externally given signal. The user needs to indicate that when the voltage given mode is external, the voltage indication function can be enabled, and the output port output high when the voltage is enabled for the external given function. (Polarity is positive)
	Current Prog	Current externally given signal. The user needs to indicate that when the current is given as external, the enable current indication function, and when the current is enabled externally given the function, the output port outputs a high level. (Polarity is positive)
	GPIO	Universal high and low level signals. When the user needs GPIO to control external devices, the GPIO function can be enabled to control the output port output high and low level signals by setting the polarity.

6.4.5.3 **Anyport analog**

The Anyport analog function can be externally set by enabling voltage, current, power and resistance in the external enable state, and the value of the output setting screen of this product can be set remotely, and the external enable state is shown in 6.4.5.1Anyport input. Conifg - Anyport - The analog screen is shown in Figure 211.

Figure 211-Conifg-anyport-analog screen

The functions of each data are as follows:

Voltage:When enabled, the voltage can be set by giving a voltage externally to the Anyport screen.

Current:When enabled, the voltage can be set by giving a current externally to the Anyport screen.

Power:When enabled, the voltage can be set by giving a power externally to the Anyport screen.

Res.:When enabled, the voltage can be set by giving a resistance externally to the Anyport screen.

Range:The rated range of externally given analog and output analog is set, and can be selected from 5V or 10V.The rated ranges correspond to the ratings of voltage/current/power/internal resistance of this product. Example: When the 10V range is selected, when the voltage is given 0-10V externally, the corresponding output setting voltage is 0-2000V. The table of analogue correspondence for a given quantum is shown in Table 31.

Table 31-Analog table corresponding to given range

Anolog given range	External given analog range	External given settings object	Output settings value
5V	0~5V	voltage	0~Rated voltage
		current	0~Rated current
		power	0~Rated power
		resistance	0~Rated resistance
10V	0~10V	voltage	0~Rated voltage
		current	0~Rated current
		power	0~Rated power
		resistance	0~Rated resistance
Anolog given range	Output analog range	The output analog corresponds to the output quantity	Output settings value
5V	0~5V	voltage	0~Rated voltage
		current	0~Rated current
10V	0~10V	voltage	0~Rated voltage
		current	0~Rated current

6.5 Memory

The memory function has log and storage functions, and log can record operating patameters, status and other information. Storage can be accessed in the internal memory of this product or external external USB memory device, the memory function is shown in Figure 212.

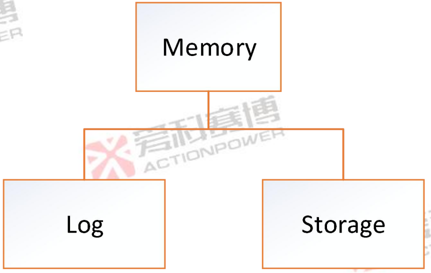


Figure 212-Tree view of memory functions

6.5.1 Log

Log can record information such as operating patameters and status in an external USB memory device, and the sample rate, number of records, and recording method can be set in the Figure 213 screen.

Figure 213-Memory-log screen

The functions of each parameter are as follows:

Sample Rate: The sampling record rate, SPS means that one log is recorded per second.

Count: The max number of logs that can be recorded is 9999999.

Mode: The log mode, including event trigger and immediate trigger. Event triggering: After pressing Start, this product triggers log when the event is triggered. To trigger an event, set the trigger conditions on the Settings - Events page, see Events 6.3.5 for details. Trigger immediately: This product triggers log immediately after pressing the start button.

Event: After clicking the event button, the product automatically records the event to an external USB memory device.

Note:

After plugging in the external USB memory device, the "Event" button lights up.

The supported formats for external USB memory devices are FAT32, exFAT.

Log files only support the US CSV format.

File naming rules: file name prefix + file sequence number + group sequence number, such as "LOG" + "001" + "001".

File splitting rule: The number of logs recorded in a file is divided into 50,000.

The format of the log content is shown in Figure 214. See Table 32 for details.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	PRD2006	1020010003																	
2	Uset (V)	Vactual (V)	Isource (A)	Iload (A)	Iactual (A)	Psource (kW)	Pload (kW)	Pactual (kW)	Eactual (kWh)	Qactual (Ah)	Rsource (ohm)	Rload (ohm)	Ractual (ohm)	Rmode	Output	Mode	Error	Event	Time
3	500	45.24097	30	30	1.51825	11.98229	11.98229	0.068687	0.032132	0.656251	N/A	N/A	N/A	OFF	OFF	CV	0x0000	0x0000	00:00.0
4	500	44.33328	30	30	1.502991	11.98229	11.98229	0.066632	0.032151	0.656683	N/A	N/A	N/A	OFF	OFF	CV	0x0000	0x0000	00:01.0
5	500	45.81362	30	30	1.567841	11.98229	11.98229	0.071828	0.032171	0.657115	N/A	N/A	N/A	OFF	OFF	CV	0x0000	0x0000	00:02.0
6	500	44.58043	30	30	1.522064	11.98229	11.98229	0.067854	0.03219	0.657547	N/A	N/A	N/A	OFF	OFF	CV	0x0000	0x0000	00:03.0
7	500	45.40236	30	30	1.51062	11.98229	11.98229	0.068585	0.03221	0.657979	N/A	N/A	N/A	OFF	OFF	CV	0x0000	0x0000	00:04.0

Figure 214-Log csv format

Table 32-Log Information Legend

Parameter	Explaination	Parameter	Explaination
PRD2006	PRD mode	Qactual(Ah)	Capacity display value
1020010003	Device serial number	Rsource(ohm)	Source internal resistance setpoint
Uset(V)	Voltage setpoint	Rload(ohm)	On-load internal resistance setpoint
Uactual(V)	Actual voltage value	Ractual(ohm)	The internal resistance shows the value
Isource(A)	Source current setpoint	Rmode	Internal resistance mode output status
Iload(A)	Load current setpoint	Output	Output status at the output
Iactual(A)	Actual current value	Mode	Working mode status
Psource(kW)	Source power setpoint	Error	Protection code
Pload(kW)	Load power setpoint	Event	The event number
Pactual(kW)	Actual power value	Time	Record the time
Eactual(kWh)	Actual energy value		

6.5.2 Storage

This product has data automatic memory function, and user patameters or communication patameters can also be saved in the internal memory of the product or external external USB memory devices, as shown in Figure 215 and Figure 216. The current user patameters or communication patameters can be paged up and down by turning up and down the page arrows "". When the data is selected, it will be displayed in "No." The checkbox is displayed under the display, indicating that it has switched to the current No.

Figure 215-Memory-storage-user screen

Figure 216-Memory-storage-comm screen

The function patameters are as follows:

User s: setting patameters and Anyport conifg patameters.。

Comm: Communication conifg patameters.

Save: patameters can be saved to the internal memory of this product.

Load: Internal save patameters can be load to patameters.

Reset: Reset all user patameters and communication patameters. After pressing the reset button under the user data screen, a pop-up window will appear "Factory reset?" , if you select "OK", the pop-up window displays "Resetting, do not operate the power", and all user patameters and communication patameters will be reset after completion.

After inserting the external USB memory device, click the USB button in the memory-storage-user data screen , and the screen is shown in Figure 217. On this screen, you can export user patameters to an external USB memory device, or import patameters from an external USB memory device to the internal memory of this product. The naming convention for saved files is file name suffix (uppercase) + ordinal number to automatically name the file, such as LIST0001 COMM0002. The file extensions are shown in Table 33.

Figure 217-Memory-storage-user -USB screen

Table 33-File extension table

Storage content		Access file extensions
User	User patameters	.usua
	Communication patameters	.comm
Program	LIST program	.list
	WAVE program	.wave
	Advance program	.adva
	STEP program	.step
	Arbitrary wave program	.anyw
Curves data		.cust

6.6 System

System functions, as shown in Figure 218. The system function can mainly set the interactive information of the screen, view the device information, and the system function provides customers with calibration function, which is convenient for users to solve the output voltage or current may deviate from the set value due to long-term operation.

Figure 218-System tree

6.6.1 Screen

The display screen of this product can be customized, you can set the language, screen brightness, screen saver, screen sound, and time, as shown in Figure 219-Figure 222.

Figure 219-System-screen-language screen

Figure 220-System-screen-display screen

Figure 221-System-screen-sound screen

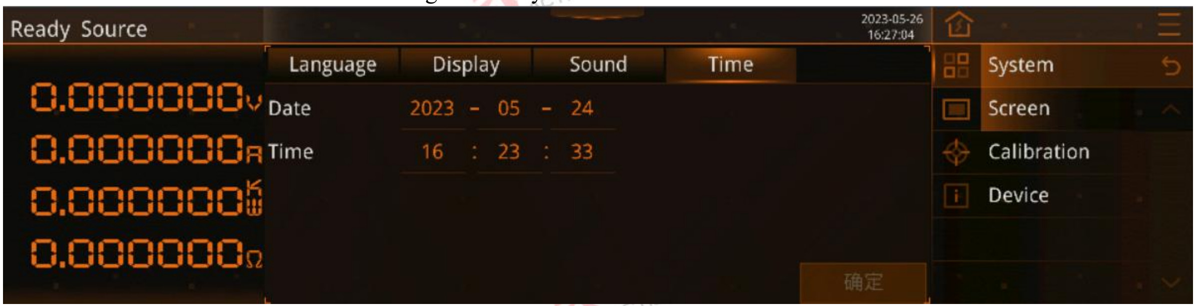


Figure 222-System-screen-time screen

6.6.2 Calibration

After a long period of operation of this product, the output voltage or current may deviate from the set value. When the deviation does not exceed ±5%, the user can calibrate by himself through the calibration function, if the deviation exceeds ±5%, contact the customer for calibration. Before entering the calibration screen, you need to enter the password "1996", as shown in Figure 223. And then entering the calibration screen, Figure 224 is shown.

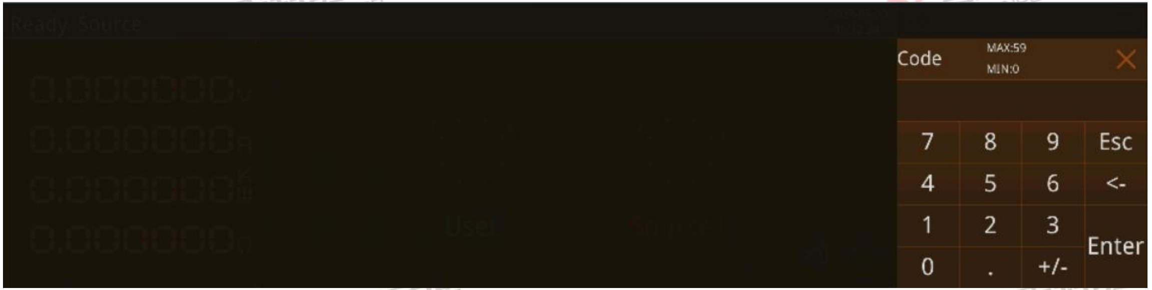


Figure 223-Calibrate password input screen

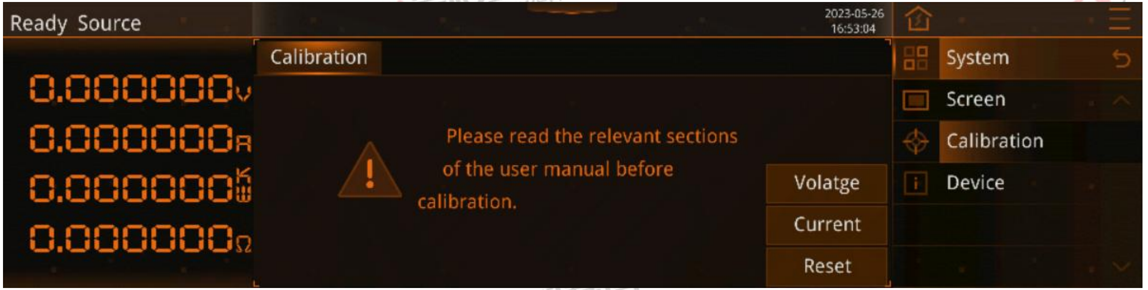


Figure 224-System-calibration screen

Calibration must be performed in standby mode as follows:

Voltage:

The product does not need external load, and all protection patameters are set to the max value, see 6.3.4 protection. Click the voltage calibration button, and a pop-up window will prompt "Press the OUT button to start calibration". Press the output button, the screen displays "Calibrate, do not operate the power", wait for the calibration operation to complete, the screen will display "Calibration completed/calibration failed".

Current:

The PRD requires an external bidirectional DC source (current must be greater than the rated current of the calibrated PRD model), and the external DC source voltage is set to each model according to the calibrated PRD model as shown in Table 34:

Table 34-External DC source voltages for different models

250V	100V	200V	50V	20V

PRD1506 PVD1506 PRD1503 PVD1503 PRD1504 PVD1504 PRD2006 PVD2006 PRD2004 PVD2004 PRD2003 PVD2003	PRD0618 PVD0618 PRD0612 PVD0612 PRD0609 PVD0609 PRD0518 PVD0518 PRD0512 PVD0512 PRD0509 PVD0509	PRD0808 PVD0808 PRD0805 PVD0805 PRD0804 PVD0804 PRD1008 PVD1008 PRD1005 PVD1005 PRD1004 PVD1004	PRD0224 PVD0224 PRD0216 PVD0216 PRD0212 PVD0212 PRD0324 PVD0324 PRD0316 PVD0316 PRD0312 PVD0312	PRD4V66 PVD4V66 PRD6V66 PVD6V66 PRD4V50 PVD4V50 PRD6V50 PVD6V50 PRD8V66 PVD8V66 PRD8V50 PVD8V50

Set all protection patameters of PRD to the max value, see 6.3.4 Protection. Click the current calibration button, and a pop-up window will prompt "Press the OUT button to start calibration". Press the output button again, the screen displays "Calibration, do not operate the power", wait for the calibration operation to complete, the screen will display "Calibration completed or calibration failed".

Reset :

After the reset calibration button is pressed, the screen pop-up prompts "Reset calibration". After pressing the OK button, a pop-up window prompts "Calibrate, do not operate the power supply"; Wait for the calibration operation to complete, and "Reset complete or Reset failed" will be displayed on the screen. When complete, return to the initial state before calibration.

6.6.3 Device

In the About device screen, you can view the device information, software version information, and information about MagicBox components.Among them, the device information can view the product model, hardware version, serial number of the machine, the number of boots and the running time, the number of boots of this product after leaving the factory should not exceed 1 time, and the min recording unit of the operating time is 0.5 hours, as shown in Figure 225-Figure 227.

Figure 225-System- device-device screen

Figure 226-System- device-software ver. screen

Figure 227-System- device-magicbox screen

Version revision history

Date	Version	Revision
July 2021	V1.0	complete manual
August 2021	V1.1	update
		- Added 20kW specifications and related parameter information to the full text.
		- Chapter 4.14 Modified the wiring diagram of the parallel machine.
		- Chapter 6.2.3 Modified the SAS home screen.
December 2021	V1.2	update
		- Optimized the text description of some contents.
		- Added PRD0518, PRD0512, PRD0509 models to the manual.
		- Chapter 3.5 Modified the technical parameters of Table 1 and modify the power curve.
		- Chapter 3.6 Added parallel kits to the table of names and quantities attached to Table 2.
		- Chapter 4.3.1 Added the power-temperature curve and the power-input voltage graph.
		- Chapter 4.11 Modified Figure 24 remote compensation connection schematic.
		- Chapter 4.14 Modified Figure 25 Parallel Fiber Connection Diagram.
		- Chapter 5.3.1 Modified Table 3Anyport interface function table to add Anyport output port external high level schematic.
		- Chapter 6.2.4 Added amplitude-frequency characteristic curve.

- Chapter 6.3.3 Modified the upper and lower current limits in the Table 14 Limit Function Table.
- Chapter 6.4.2 Added detailed conifg instructions for column parallel and row parallel in parallel.
- Chapter 6.4.5 Modified Table 17 Anyport Input Function Table, Table 18 Anyport Output function Table 19 simulates some of the text descriptions in the table corresponding to a given range.

May 2022 V1. 3 update

- Added watermark to the full text.
- Revised part of the format and revised the table of contents.

September 2022 V 2.0 update

- Added model specifications, modified some graphs.
- Added BatSim battery anolog function.
- Adjusted font size, update table of contents.