



# HY-PHSSU Series

Special Power Supply For Instantaneous Testing Of Circuit Breakers

Military Quality Power Supply Expert

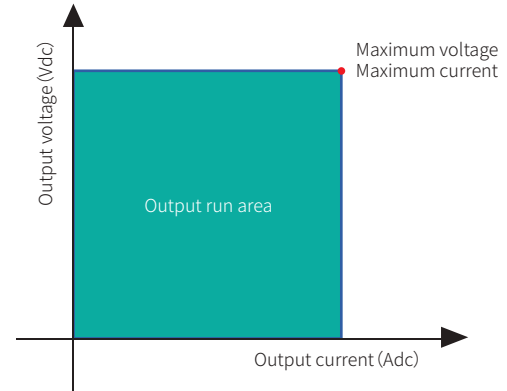


Hangyu Power System (Shanghai) Co., Ltd.

Leading local intelligent manufacturing innovation in China's power supply industry

# HY-PHSSU Series Special Power Supply For Instantaneous Testing Of Circuit Breakers

High performance, High precision, High power density



This series of power supply is specially designed for the transient test of low-voltage electrical appliances, including circuit breaker trip test and fuse fuse test.

## Product Features

- Meet the GBT 14048.1-2012/2020 time constant 10ms test requirements
- 3U model, when the voltage is  $\leq 10V$ , the current can reach 4500A, running 1s
- 3U model, when the voltage is 20V, the current can reach 2000A, running 1s
- Output voltage: 5V, 10V, 20V optional
- The maximum output current of a single machine is 4500A
- Can be more than one machine, the maximum current up to 50kA
- Input standard PFC, power factor up to 0.99
- 16 bits D/A high precision converter, accurate output
- 20 bits A/D high precision converter, more accurate read back

## Application Field

- Circuit breaker trip test
- Fuse break test
- Automotive current sensor transient motion test
- Relay transient motion test
- Low voltage harness transient motion test
- Sensor current test

## Low voltage circuit breaker transient test: trip limit and characteristic test



Circuit breaker is a key component of the power distribution system, it is responsible for the protection of electric system to avoid damage due to overload, short circuit and other fault disrupted work. The key test that the circuit breaker must perform is the instantaneous trip test, which is designed to verify that the circuit breaker will trip instantaneously under fault conditions. In other words, when the circuit breaker detects a fault in the electrical system, it should open within a fraction of a second.

The instantaneous tripping test is carried out by applying fault current to the circuit breaker and measuring the time it takes for the circuit breaker to trip. Fault currents are typically generated using a test device that simulates fault conditions in an electrical system. The test device applies a high current to the circuit breaker, exceeding the rated current of the circuit breaker, measure the time required for the circuit breaker to trip.

# Low Voltage Circuit Breaker Transient Test

Table 1 Power factor and time constant corresponding to test current

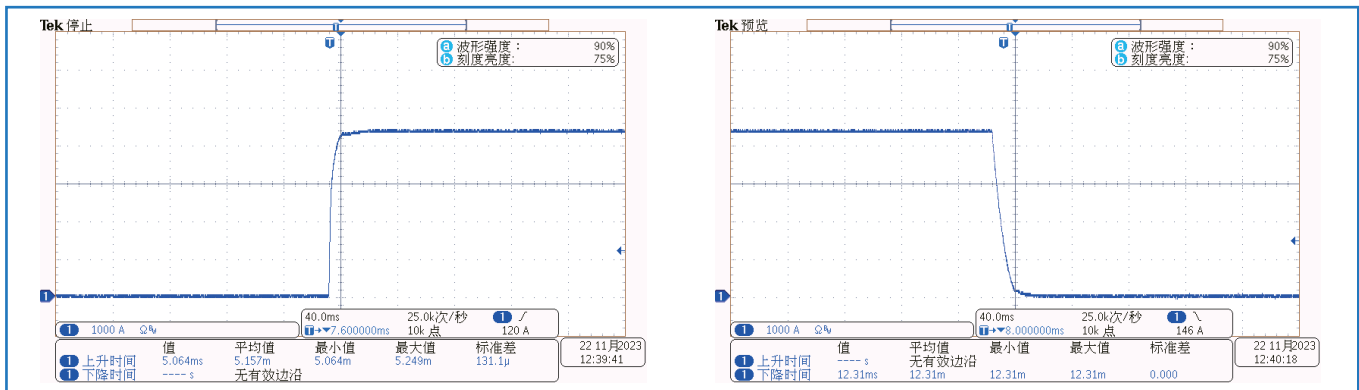
Test Current I kA	Power Factor $\cos\phi$		Time Constant ms			
	Short-Circuit	Operational Performance Capability	Over Duty	Short-Circuit	Operational Performance Capability	Over Duty
$I \leq 3$	0.9	0.8	0.5	5	2	2.5
$3 < I \leq 4.5$	0.8			5		
$4.5 < I \leq 6$	0.7			5		
$6 < I \leq 10$	0.5			5		
$10 < I \leq 20$	0.3			10		
$20 < I \leq 50$	0.25			15		
$50 < I$	0.2			15		

According to the "GB/T14048.2-2020 Low voltage switchgear and control equipment Part 2: Circuit Breakers" standard 8.3.3.2 trip limit and characteristic test requirements:

1. The operation of the **short-circuit release** shall be verified at 80% and 120% of the short-circuit setting current of the release. For AC trials, the test current should have no asymmetric component.  
 For DC test, the test current should be no overshoot when switched on, **and the time constant should be less than 10ms.**  
 When the test current is equal to 80% of the short-circuit setting current, he trip should be no movement, the current duration is:  
 — For the instantaneous release device is 0.2s;  
 — For a definite time tripping device, equal to manufacturers specified time delay of 2 times the time range.  
 When the test current is equal to 120% of the short-circuit setting current, the action of the tripping device should be:  
 — For the instantaneous release device, it should be within 0.2s;  
 — For a definite time tripping device, It should be operated within a time range equal to twice the delay time specified by the manufacturer.

2. The action of the **transient or time-limited overload release** shall be verified at 90% and 110% of the overload setting current of the release. For AC trials, the test current should have no asymmetric component.  
 For DC test, the test current should be no overshoot when switched on, **and the time constant should be less than 10ms.**  
 The verification of the operation of the multipole overload release shall be carried out with a test current simultaneously on all phase poles.  
 When the test current is equal to 90% of the short-circuit setting current, he trip should be no movement, the current duration is:  
 — For the instantaneous release device is 0.2s;  
 — For a definite time trip, time interval is equal to the delay time 2 times specified by the manufacturer.  
 When the test current is equal to 110% of the overload setting current, the release device shall operate:  
 — For the instantaneous release device, it should be within 0.2s;  
 — For a definite time tripping device, It should be performed at intervals equal to 2 times the delay time specified by the manufacturer.  
 For a circuit breaker with a marked neutral pole and an overload release, the test current of this release shall be  $110\% \times 1.2$  of the current setting value.

\*Hangyu Power Supply HY-PHSSU 10-4500 series power supply test diagram is as follows



■ 4500A current rise response time  $\leq 10\text{ms}$

■ 4500A current drop response time  $\leq 20\text{ms}$

From the above, the characteristics of this feature test are:

1. The test current is large, but there is no voltage requirement;
2. Test main circuit power time is short;
3. The number (that is, products) of test products, high frequency of test operation;

Hangyu power low-voltage electrical appliance test solution, with accurate test current, accurate control of power-on time, the best closing phase Angle, overcome the difficulty of circuit breaker transient characteristic experiment in an all-round way to ensure the quality of low-voltage electrical appliances.

# Low Voltage Circuit Breaker Transient Test

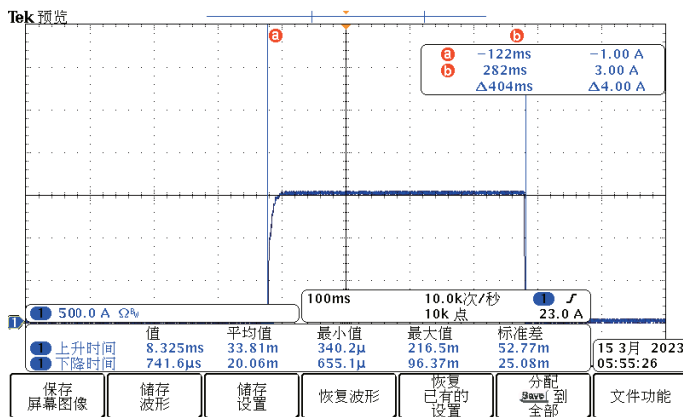
## Low voltage fuse transient test: fuse test



A fuse is also known as a current fuse, and the IEC127 standard defines it as a fuse or fuse. It mainly plays an overload protection role. Circuit is placed in the correct fuse, the fuse will be abnormal in current increases to a certain height and heat, its own fuse to cut off the current, the protection of the safe operation of the circuit.

The fuse test includes:

- 1, the convention fuse: can refer to GB/T 13539 standard 8.4.3.1
- 2, the agreement does not fuse: refer to GB/T 13539 standard 8.4.3.1
- 3, fuse time: can refer to GB/T 31465 standard 5.5
- 4, current cycle impact: can refer to GB/T 31465 standard 5.3



HY-PHSSU 10-1500 model was used to test the low-voltage fuse. The output current quickly rose to the target current value within 10ms, and the current quickly dropped after the low-voltage fuse was blown. The measured waveform is shown in the figure above, and the fusing time of the low-voltage fuse can be observed.

Fusing time: The time required from the time the overcurrent is applied until the current drops below a specified value.

## According To The Different Test Requirements Of Customers, Provide The Display Time Of Corresponding Test Items



For circuit breaker transient test requirements, Added tripping time measurement value display.



For transient fuse testing requirements, Added display of fusing time measurements.

## Product Model Naming Rules

Product series	Output voltage	Output current	Optional function
HY-PHSSU	10	- 4500	- CF

Product model: HY-PHSSU 10-4500-CF  
The output voltage is 0-10V, and the output current is 0-4500A  
Custom features that users choose to purchase

Communication protocol	Standard communication interface	Optional communication interface
Modbus	RS-485	- LAN : Ethernet communication interface
SCPI	RS-232	- CAN : CAN communication interface
	Digital I/O	- GPIB : GPIB communication interface
		- IA : Analog quantity programming and monitoring interface (isolated type)

\* All technical indicators can only be guaranteed when the equipment runs continuously for more than 30 minutes at the specified operating temperature.

# HY-PHSSU Series Selection And Technical Parameters

## HY-PHSSU Series Product Model Selection And Parameters

Special specifications outside the voltage/current/power range in the selection table can be customized

### 500A Series Power Supply Selection

Models	Output voltage	Output current	Output power
HY-PHSSU 5-500	5V	500A	2.5kW
HY-PHSSU 10-500	10V	500A	5kW
HY-PHSSU 20-500	20V	500A	10kW

### 1000A Series Power Supply Selection

Models	Output voltage	Output current	Output power
HY-PHSSU 5-1000	5V	1000A	5kW
HY-PHSSU 10-1000	10V	1000A	10kW
HY-PHSSU 20-1000	20V	1000A	20kW

### 1500A Series Power Supply Selection

Models	Output voltage	Output current	Output power
HY-PHSSU 5-1500	5V	1500A	7.5kW
HY-PHSSU 10-1500	10V	1500A	15kW
HY-PHSSU 20-1500	20V	1500A	30kW

### 3000A Series Power Supply Selection

Models	Output voltage	Output current	Output power
HY-PHSSU 5-3000	5V	3000A	15kW
HY-PHSSU 10-3000	10V	3000A	30kW
HY-PHSSU 20-3000	20V	3000A	60kW

### 4500A Series Power Supply Selection

Models	Output voltage	Output current	Output power
HY-PHSSU 5-4500	5V	4500A	22.5kW
HY-PHSSU 10-4500	10V	4500A	45kW
HY-PHSSU 20-4500	20V	4500A	90kW

## 500A Product Model And Technical Parameters

Models	HY-PHSSU 5-500	HY-PHSSU 10-500	HY-PHSSU 20-500
Rated Output Voltage	5V	10V	20V
Rated Output Current	500A	500A	500A
Rated Output Power	2.5kW	5kW	10kW
Efficiency	84%	84%	91%
<b>Constant Current Mode (CC Mode)</b>			
Output Range Can Be Set	0- Rated output value		
Input Adjustment Rate	0.01% of rated output current (AC input 220 V ± 15%, constant load)		
Load Adjustment Rate	0.05% of rated output current (no-load to full load, constant input voltage)		
Ripple Effective Value rms (3Hz-300kHz)	≤ 0.5% of rated output current		
Current Rise Response Time	Meet the GBT 14048.1-2012/2020 time constant 10ms test requirements		
<b>Model And Size</b>			
Model And Size	2U model: 430(W) * 500(D) * 88(H) mm		
Weight	15kg		
<b>Input Power Supply</b>			
Frequency	47 Hz - 63 Hz		
Connection Mode	Single-phase two-wire + ground, 220 V ± 15%		
Power Factor (Typical Value)	0.99(Single-phase input)		



Official wechat: hypower-cn



## Contact us

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Hangyu Power System (Shanghai) Co., Ltd.

Mobile/Whatsapp:+8613801800699

Fax:+86-21-67285228-8009

Email:sales@hangyupower.com

neo@hangyupower.com

Address: Block B, Building 11, No. 1698 Minyi Road, Songjiang District, Shanghai

Web:www.hangyupower.com

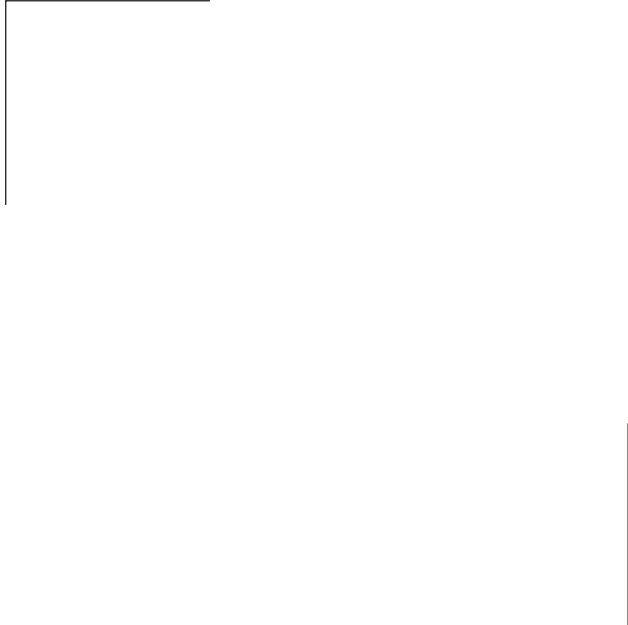
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Programmable DC Power Supply Product Catalog, version 08.00, April 2024

All technical data and instructions are based on the actual product

If there is any change, Hangyu Power has the final interpretation right

Authorized distributor:





# HY-PHSSU Series Technical Parameters

## 1000A-1500A Product Model And Technical Parameters

Models	HY-PHSSU 5-1000	HY-PHSSU 10-1000	HY-PHSSU 20-1000	HY-PHSSU 5-1500	HY-PHSSU 10-1500	HY-PHSSU 20-1500
Rated Output Voltage	5V	10V	20V	5V	10V	20V
Rated Output Current	1000A	1000A	1000A	1500A	1500A	1500A
Rated Output Power	5kW	10kW	20kW	7.5kW	15kW	30kW
Efficiency	88%	88%	88%	89%	89%	89%
<b>Constant Current Mode (CC Mode)</b>						
Output Range Can Be Set	0- Rated output value					
Input Adjustment Rate	0.1% of the rated output current (AC input 220 V ± 15%, constant load)		0.1% of the rated output current (AC input 380 V ± 15%, constant load)			
Load Adjustment Rate	0.1% of rated output current (no-load to full load, constant input voltage)					
Ripple Effective Value rms (3Hz-300kHz)	≤ 0.5% of rated output current					
Current Rise Response Time	Meet the GBT 14048.1-2012/2020 time constant 10ms test requirements					
<b>Model And Size</b>						
Model And Size	2U model: 430(W) * 500(D) * 88(H) mm		3U model: 482.6(W) * 660(D) * 133(H) mm			
Weight	15kg/2U		35kg/3U			
<b>Input Power Supply</b>						
Frequency	47 Hz - 63 Hz					
Connection Mode	Single-phase two-wire + ground, 220 V ± 15%		Three-phase three-wire + ground wire, 380 V ± 15% (-3P standard configuration model)			
Power Factor (Typical Value)	0.99(Single-phase input)		0.94(Three-phase input)			

## 3000A-4500A Product Model And Technical Parameters

Models	HY-PHSSU 5-3000	HY-PHSSU 5-4500	HY-PHSSU 10-3000	HY-PHSSU 10-4500	HY-PHSSU 20-3000	HY-PHSSU 20-4500
Rated Output Voltage	5V	5V	10V	10V	20V	20V
Rated Output Current	3000A	4500A	3000A	4500A	3000A	4500A
Rated Output Power	15kW	22.5kW	30kW	45kW	60kW	90kW
Efficiency	88%	88%	88%	88%	88%	88%
<b>Constant Current Mode (CC Mode)</b>						
Output Range Can Be Set	0- Rated output value					
Input Adjustment Rate	0.1% of rated output current (AC input 380 V ± 15%, constant load)					
Load Adjustment Rate	0.1% of rated output current (no-load to full load, constant input voltage)					
Ripple Effective Value rms (3Hz-300kHz)	≤ 0.5% of rated output current					
Current Rise Response Time	Meet the GBT 14048.1-2012/2020 time constant 10ms test requirements					
<b>Model And Size</b>						
Model And Size	3U model: 482.6(W) * 660(D) * 133(H) mm				8U model: 482.6(W) * 660(D) * 373.2(H) mm	
Weight	35kg				50kg	
<b>Input Power Supply</b>						
Frequency	47 Hz - 63 Hz					
Connection Mode	Three-phase three-wire + ground wire, 380 V ± 15% (-3P standard configuration model)					
Power Factor (Typical Value)	0.94(Three-phase input)					

# HY-PHSSU Series Technical Parameters

## Programming And Readback Accuracy & Resolution

Voltage Output Programming Accuracy	0.05% of the rated output voltage, measured at the telemetry point
Current Output Programming Accuracy	0.1% of the output current + 0.05% of the rated output current (in constant current programming mode, the readback and monitoring accuracy do not include the influence of heating drift and load temperature change rate)
Voltage Setting Resolution	0.001V
Current setting resolution	0.001A ( $\leq 60A$ ), 0.01A ( $\leq 600A$ ), 0.1A ( $600A < I \leq 6000A$ ), 1A ( $> 6000A$ )
Voltage Output Read-Back Accuracy	0.05% of the rated output voltage
Current Output Read-Back Accuracy	0.1% of the output current + 0.05% of the rated output current (in constant current programming mode, the readback and monitoring accuracy do not include the influence of heating drift and load temperature change rate)
Voltage Read Back Resolution	0.00001 V ( $\leq 10V$ ), 0.0001 V ( $\leq 100V$ )
Current Read Back Resolution	0.00001 A ( $\leq 10A$ ), 0.0001 A ( $\leq 100A$ ), 0.001 A ( $100A < I \leq 1000A$ ), 0.01 A ( $I > 1000A$ )

## Stability & Temperature Coefficient

Temperature Drift	U: 0.05%    I: 0.05% (After 30 minutes of power on at a certain input voltage and load ambient temperature, 8 hours)
Temperature Coefficient	U: 200ppm/°C    I: 300ppm/°C (30 minutes after power on)

## Protection Function

Protection Function	Output over voltage protection, over current protection, over temperature protection, over power protection
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## Environmental Condition

Environment	Indoor use; Installation overvoltage class: II; Pollution level: P2; Class II equipment
Operating Ambient Temperature	0°C to 45°C
Storage Ambient Temperature	-20°C to 65°C,
Working Ambient Humidity	20%-90% RH, no dew formation, continuous operation
Storage Environment Humidity	10% - 95% RH, no dew formation
Altitude	Above 2000 meters above sea level, every 100 meters up, the power will be reduced by 2%, or reduce the maximum working ambient temperature by 1°C per 100 meters; When not in operation, the altitude can reach 12,000 meters
Cooling	Forced air cooling, intelligent speed regulating fan, front/side air inlet, rear air outlet
Noise	$\leq 65dB(A)$ , use 1 m to weighted measurement

## Control Panel

Display	4/7 inch LCD display, touch screen
Control Function	Digital key input, multi-stage shuttle knob adjustment (outer ring coarse adjustment/inner ring fine adjustment), output ON/OFF switch, Lock keyboard and touch lock, Reset Restart status indicator (Shift/Local/Remote/Alarm/Lock/Output)
Programming Function	Step, Ladder, Gradient

## Size And Weight

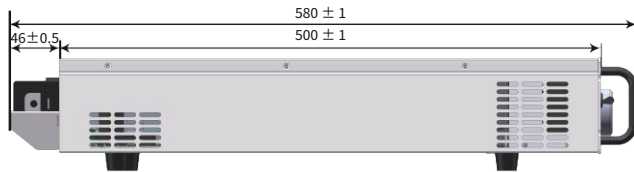
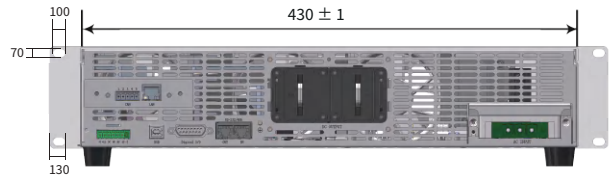
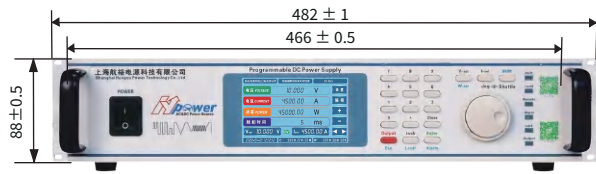
Note: See page P112 for more information on appearance and display

Size	2U model: 430(W) * 500(D) * 88(H) mm 3U model: 450(W) * 660(D) * 133(H) mm 8U model: 482.6(W) * 660(D) * 373.2(H) mm
Weight	15kg/2U ; 35kg/3U ; 85kg/8U
Colour	RAL 7035

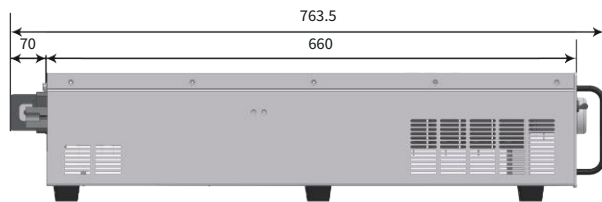
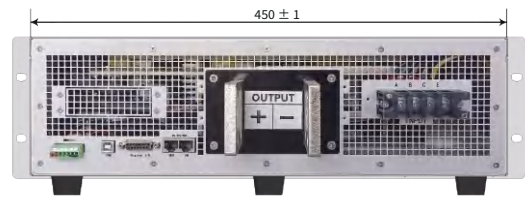
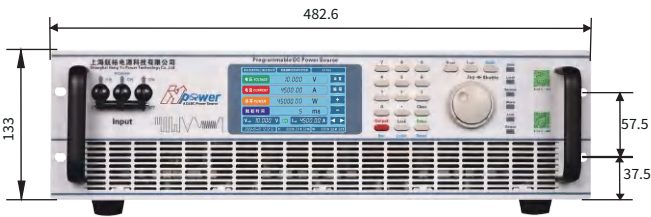


# HY-PHS Series Appearance

2U model size: 430(W) \* 500(D) \* 88(H) mm

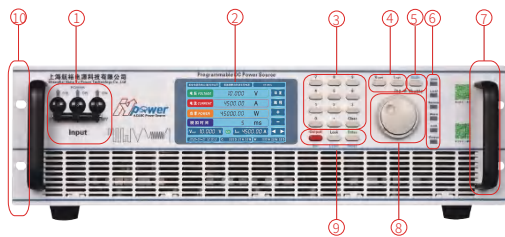


3U model size: 482.6(W) \* 660(D) \* 133(H) mm

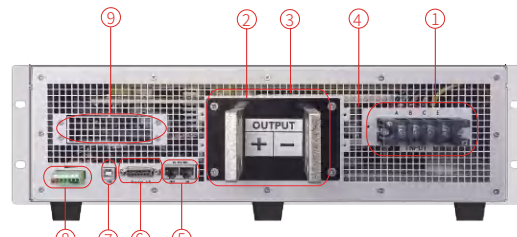


# HY-PHS Series Control Panel And Display

## Control Panel

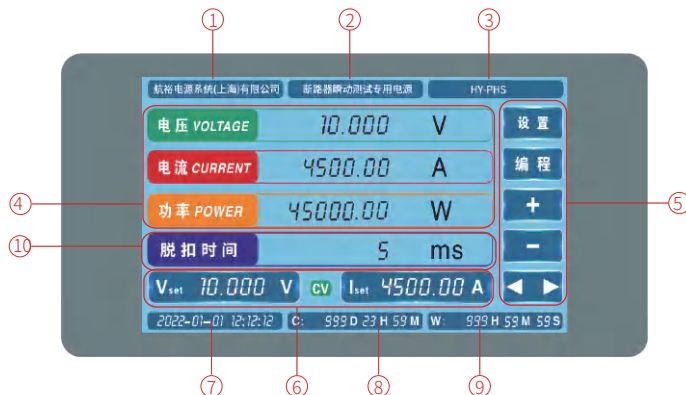


- ① Power input circuit breaker
- ② LCD Display (4-inch, touch screen)
- ③ Number input keyboard
- ④ Voltage/current/power setting key
- ⑤ Shift Function reset key
- ⑥ Status
- ⑦ Chassis handle
- ⑧ Multi stage shuttle adjustment knob (inner circle fine adjustment/outer circle coarse adjustment)
- ⑨ Lock, Enter confirmation, Esc exit Local, Restart Output ON/OFF switch
- ⑩ 19 Inch standard rack mounting holes



- ① AC Input terminal
- ② Output copper bar
- ③ DC Output terminal protective cover
- ④ Heat dissipation air outlet
- ⑤ RS-485 & RS-232 Communication interface
- ⑥ Digital I/O Communication interface
- ⑦ USB Communication interface (Optional)
- ⑧ Remote compensation measurement terminal
- ⑨ Purchase communication interface (choose one out of three)  
 LAN&CAN Communication interface  
 GPIB Communication interface  
 Analog programming and monitoring interface

## Display Interface



- ① Manufacturer's name
- ② Product name
- ③ Product series
- ④ Voltage/current/power read back display area
- ⑤ Function setting area
- ⑥ Voltage/Current Setting&CV/CC Status
- ⑦ TIME
- ⑧ Accumulated running time
- ⑨ This run time
- ⑩ Tripping time measurement display function

\*All technical indicators can only be guaranteed when the equipment runs continuously for more than 30 minutes at the specified operating temperature.

# Cooperative Clients (Partial)

## Aerospace & Defense Military Industry Research Institute



CASC



CASIC



AVIC



AECC



CETC



CSSC



CSIC

CASC 800 ( Shanghai Aerospace Precision Machinery Research Institute	AVIC 603 ( AVIC Xi 'an Aircraft Design and Research Institute)	CETC 14 ( Nanjing Institute of Electronic Technology)
CASC 801 ( Shanghai Institute of Space Propulsion)	AVIC 613 ( Luoyang Electro-Optical Equipment Research Institute of Aviation Industry Corporation of China	CETC 21 ( Shanghai Micromotor Research Institute)
CASC 803 ( Shanghai Aerospace Control Technology Institute)	AVIC 615 ( Aeronautical Radio Electronics Research Institute of China)	CETC 23 ( Shanghai Transmission Line Research Institute )
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CASIC 206 (Beijing Machinery and Equipment Research Institute)	AECC 606 (Shenyang Engine Research Institute )	CSIC 719 (Wuhan Second Ship Design Institute)
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	Institute of Modern Physics, Chinese Academy of Sciences	

## Scientific Research & Third Party Quality Inspection Agency



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Institute of Urban Environment (Xiamen)



Electrotechnical Research Institute (Beijing)

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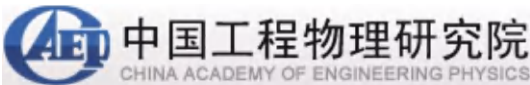
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中國地震局

地殼應力研究所

The Institute of Geostatical Dynamics



長春市產品質量監督檢驗院

Changchun product quality supervision and inspection institute



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Xi'an Supervision & Inspection Institute of Product Quality



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## The Chinese People's Liberation Army

South Sea Fleet  
 East China Sea Fleet  
 North Sea Fleet  
 Navy Factory 701 / Factory 702  
 4724 Factory (Shanghai Haiying Machinery Factory)  
 Unit 95861 (Air First Base)  
 5720 Factory of the People's Liberation Army of China

## Commercial Aviation



Guangzhou Aircraft Maintenance Engineering Co., LTD



Rockwell Collins



Beijing Aircraft Maintenance Engineering Co., LTD

## Military Academies & Local Universities



National University of Defense Technology



Aerospace Engineering University



Army Engineering University



Air Force Engineering University



Naval University of Engineering



Dalian Naval Academy



Naval Aviation University



Beihang University



Beijing Institute of Technology



Harbin Institute of Technology



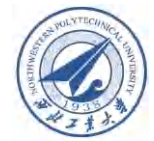
Harbin Engineering University



Nanjing University of Aeronautics and Astronautics



Nanjing University of Science and Technology



Northwestern Polytechnical University



University of Science and Technology of China



Tsinghua University



Peking University



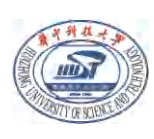
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Beijing University of Technology



Shanghai Maritime University



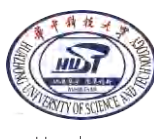
Dalian University of Technology



Dalian Maritime University



South China University of Technology



Huazhong University of Science and Technology



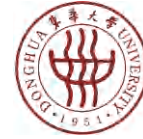
Xi'an Electronic Technology



Xi'an Jiaotong University



Sichuan University



Donghua University



North China Institute of Aerospace Engineering



Fudan University



Xiamen University



North China Electric Power University



Changchun Institute of Technology



Xiangtan University



Zhejiang University of Technology



Xi'an University of Technology



University of Electronic Science and Technology of China

# Cooperative Clients (Partial)

## Power Semiconductor Customer

 Changchun National Science	 Electrical industry	 China Resources Microelectronics	 Shanghai Huinengtai Semiconductor	 Yuexin Technology	 Wishing to create technology	 Group core microelectronics
 Hangzhou Zhongsi	 Feishide	 Suzhou Lianxun Instrument	 Weiyujia Semiconductor	 Shanghai Zhanxin Semiconductor	 Chengxin Technology	 Zhuoxinda Technology

## Enterprise In The Field Of Automotive Electronics

 CATARC	 CAERI	 BMW	 China FAW Group Corporation	 Hong Qi Automobile	 SAIC Motor	 Saic Volkswagen
 Tesla Inc.	 Weilai	 Xiaomi Automobile	 BYD	 Valeo	 polary	 Lantu Automobile
 GEELY Automobile	 Huichuan	 HAOMO.AI	 Shanghai Tongmin	 Ningde Age	 Human Horizons	 Hezhong New Energy

## High-Tech R&D Enterprise

 Huawei	 FARATRONIC	 Panasonic	 EPCOS	 TYCO	 Weidmuller	 Honeywell
 Nader	 SIEMENS	 ABB	 Schneider	 NOSRK	 HONGFA	 EOPLE
 FLUKE	 Philips	 Gree	 Guilin Rubber Machinery Factory	 CASCO	 CRRCC	 US PI
 HILTI	 BOSCH	 Linde	 NARI-TECHNOLOGY	 Shanghai Electric	 New Thunder Energy	 Silan