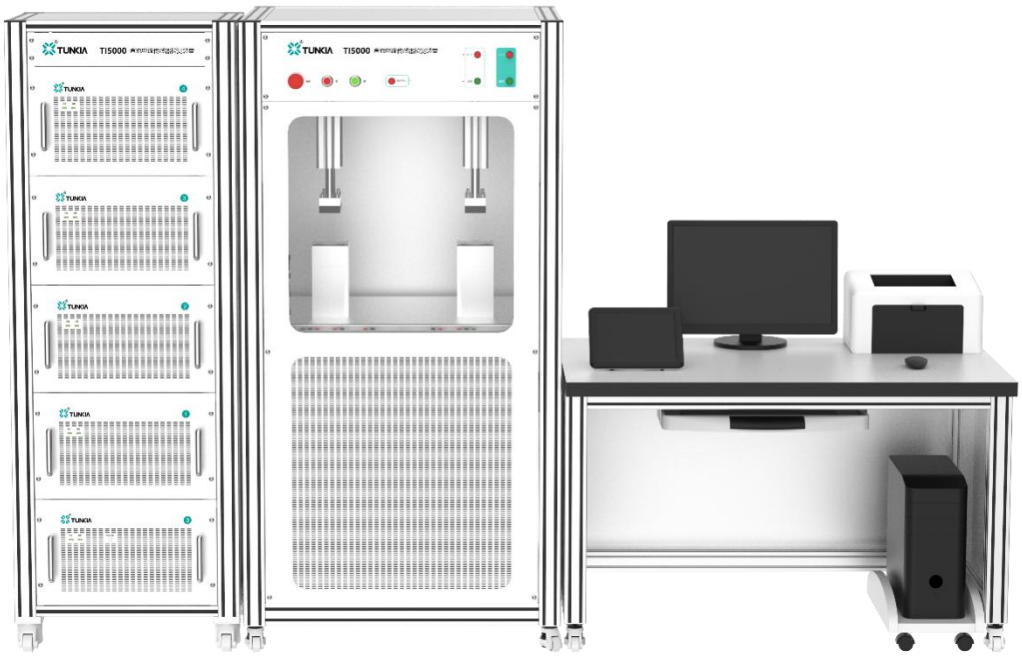
TI5000 DC Current Sensor Testing Device



1.Summary

TI5000 is a multifunctional device for testing the measurement performance of DC current sensors. It consists of a DC high current standard source, a sensor output power measurement module, an auxiliary power supply, a sensor test tooling, a workbench, a computer and special test software. It can be flexibly configured according to user needs, including the output current size and accuracy class, the number of detected sensor units and testing functions, etc.

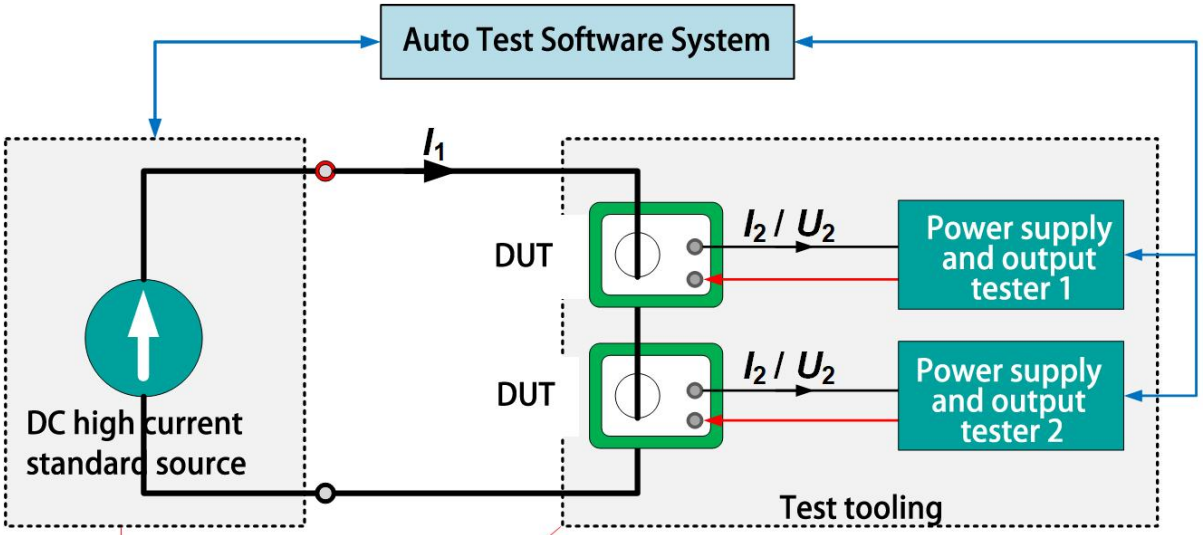
2.Features

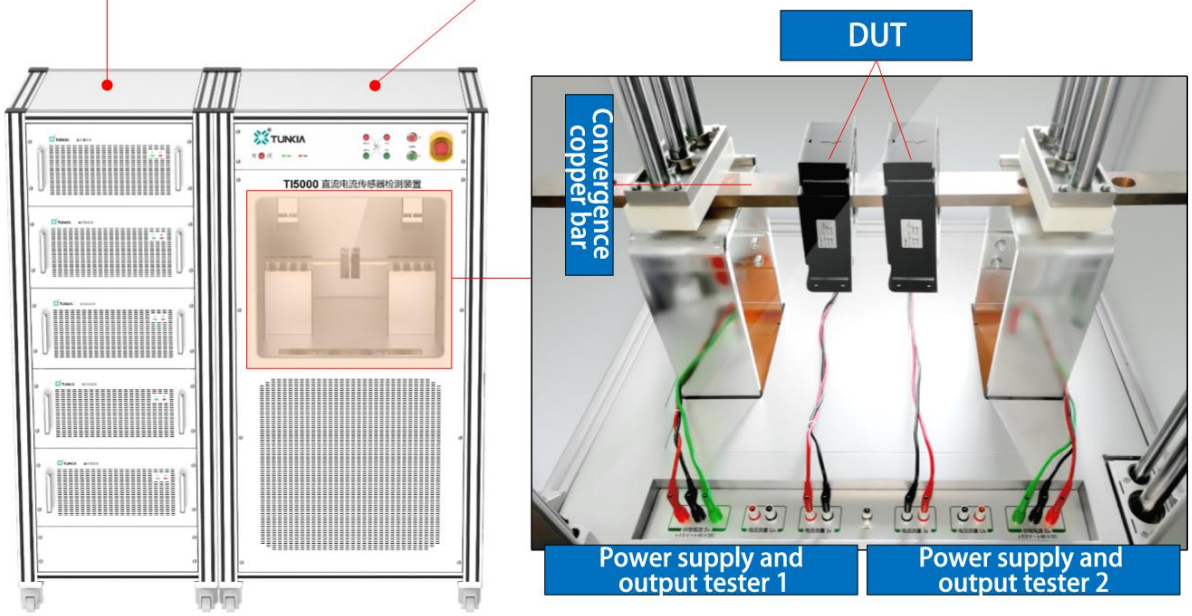
- DC high current standard source: 0.1 A ~ N*k A
- Accuracy: class **0.01**, class **0.02**, class **0.05**
- Typical value of short-term stability is better than 0.003%/min.
- Sensor secondary output power measurement:class **0.005**
- Sensor auxiliary power supply and power consumption measurement.
- Equipped with a mobile measurement and control console for controlling output and display.
- Can detect two sensors at the same time, supporting customization.
- Equipped with high-current pneumatic crimping tooling.
- Sensor bandwidth test (optional).
- Response time test (optional).

3.Application

Current Sensor Test	
Metrology Performance	Basic accuracy error
	Zero point output error
	Full range output error
	Linearity error
	Return difference
	repeatability error
Influence Quantity Performance	Power consumption measurement
	Zero drift
	Thermal zero drift (needs to be equipped with a temperature control box)
	Thermal sensitivity drift (needs to be equipped with a temperature control box)
	Overload capacity
	Power supply voltage impact test
	Load change rate (needs to be equipped with a load box)
Other Performance	Measurement bandwidth (requires high-frequency constant current source)
	Response time (requires pulse current source)

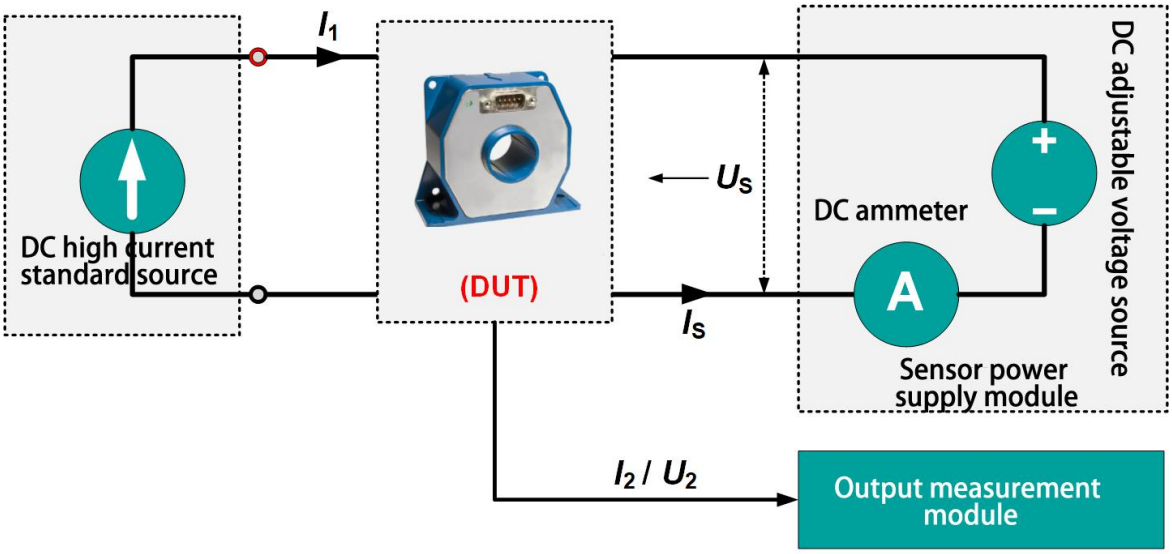
☆ Metrology Performance Test

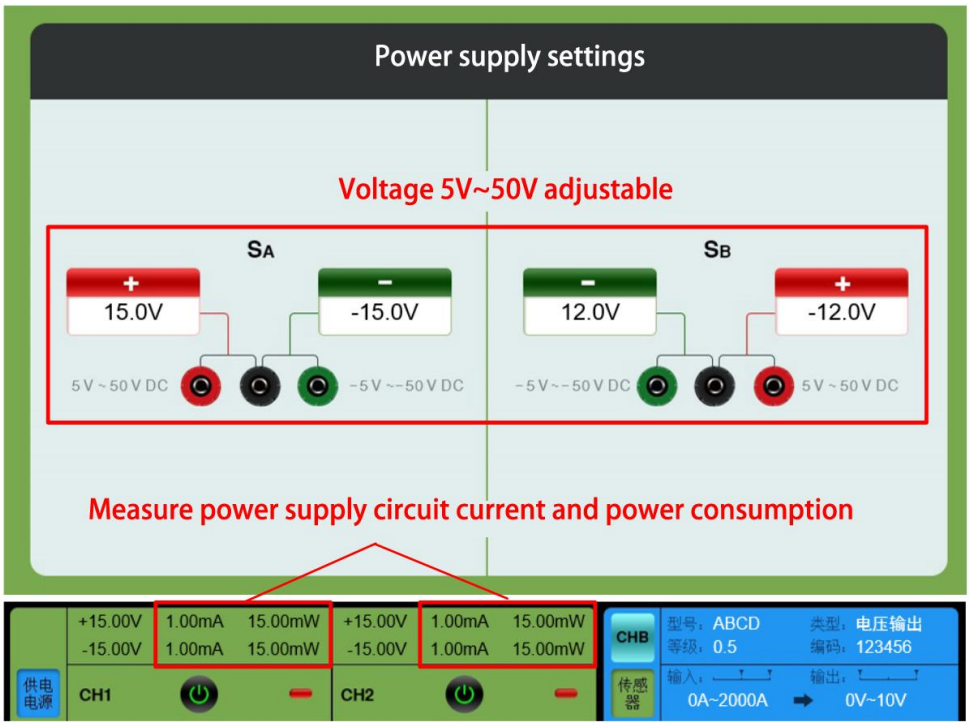




- The direct measurement method (standard source method) is used to test the DC current sensor.
- The standard measuring tool has two sets of built-in power supply and output measuring instruments, supporting simultaneous detection of two current sensors.
- The current loop realizes automatic crimping through pneumatic means, improving testing efficiency.
- Special test software: Users can customize the test plan, including zero point error, full-scale output error, linearity, hysteresis (hysteresis), repeatability error, accuracy, etc., to realize automatic testing of the measurement performance of the current sensor.

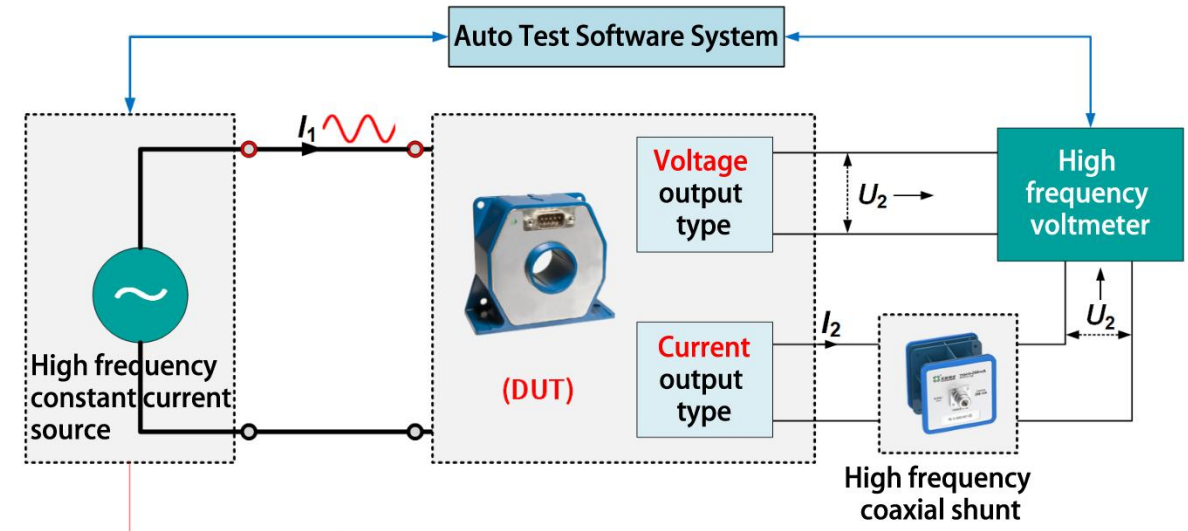
☆ Power Supply Impact Test And Power Consumption Measurement

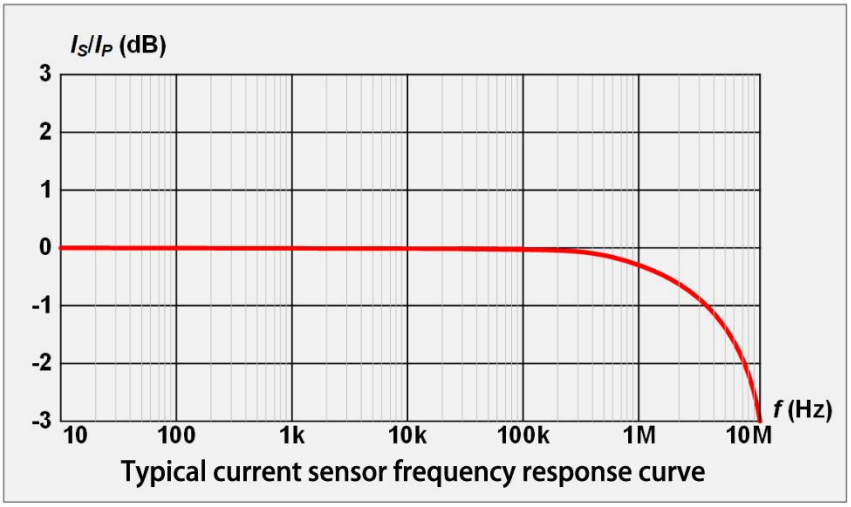




- Built-in DC ±(5.0 V ~ 50.0 V) adjustable power supply can test the power supply impact of the sensor under test.
- A standard ammeter is connected in series to the power supply module loop to measure the no-load or full-load power consumption of the sensor under test.

☆ Sensor Bandwidth Test (Optional)

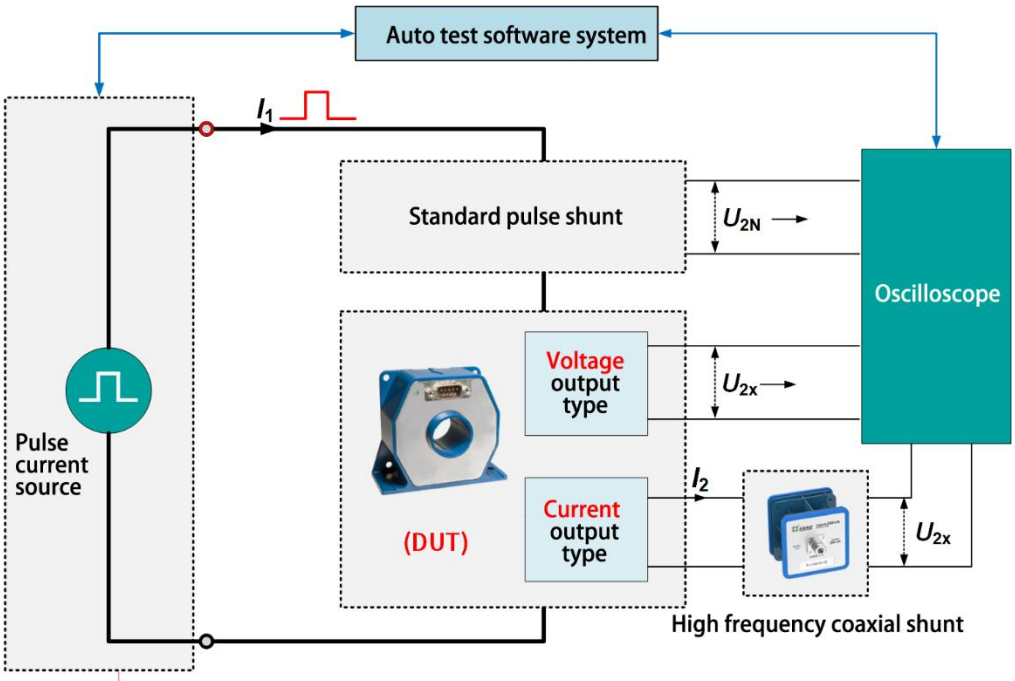


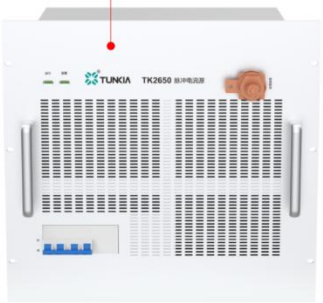


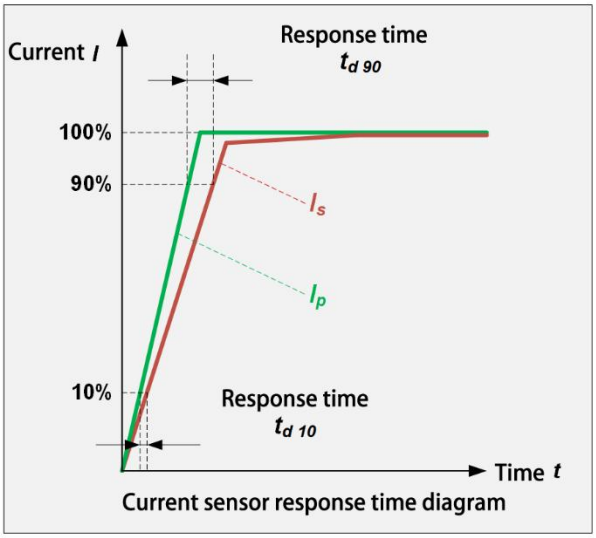
Typical current sensor frequency response curve

- Optional high-frequency constant current source of 1 mA ~ 10 A, DC ~ 1 MHz and high-frequency voltmeter can be used to measure the frequency response bandwidth of the sensor.
- Note: The high-frequency voltmeter can choose a six-and-a-half-digit digital multimeter with a measuring frequency of 300 kHz or an eight-and-a-half-digit digital multimeter with a measuring frequency of 1 MHz.
- If the sensor being tested is a current output type, a high-frequency coaxial shunt needs to be connected for I/V conversion.
- Note: The sensor bandwidth test defaults to a single sensor unit. If multiple sensors are measured at the same time, it needs to be customized.

☆ Sensor Response Time Test (Optional)



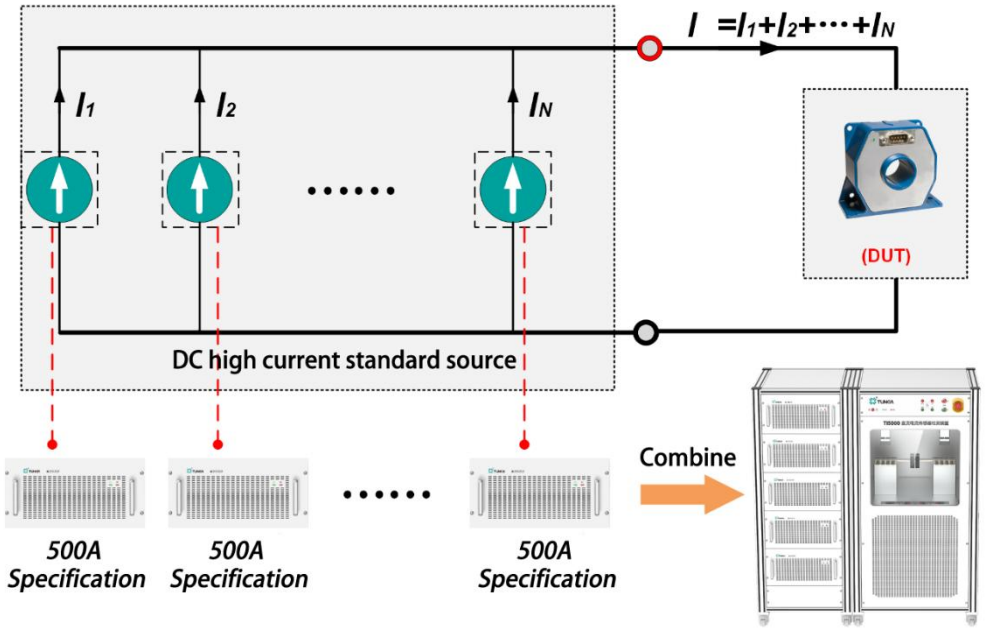




- Optional equipment such as a pulse current source with a peak value of 500 A and a di/dt of 50 A/μs, a standard pulse shunt, and an oscilloscope can be used to measure the sensor response time by comparing the rise time of the standard signal and the sensor output signal.
- If the sensor being tested is a current output type, a high-frequency coaxial shunt needs to be connected for I/V conversion.
- Note: The sensor response time test defaults to a single epitope. If multiple sensors are measured at the same time, it needs to be customized.

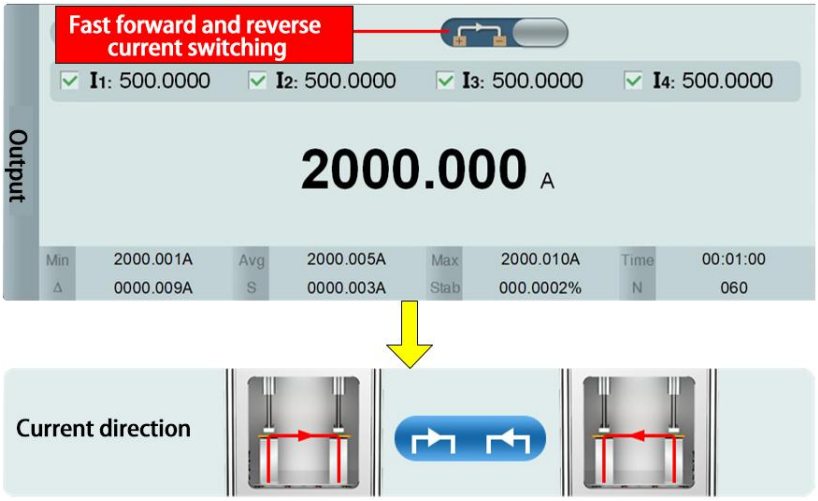
4. Features

☆ Current Module Combined Output



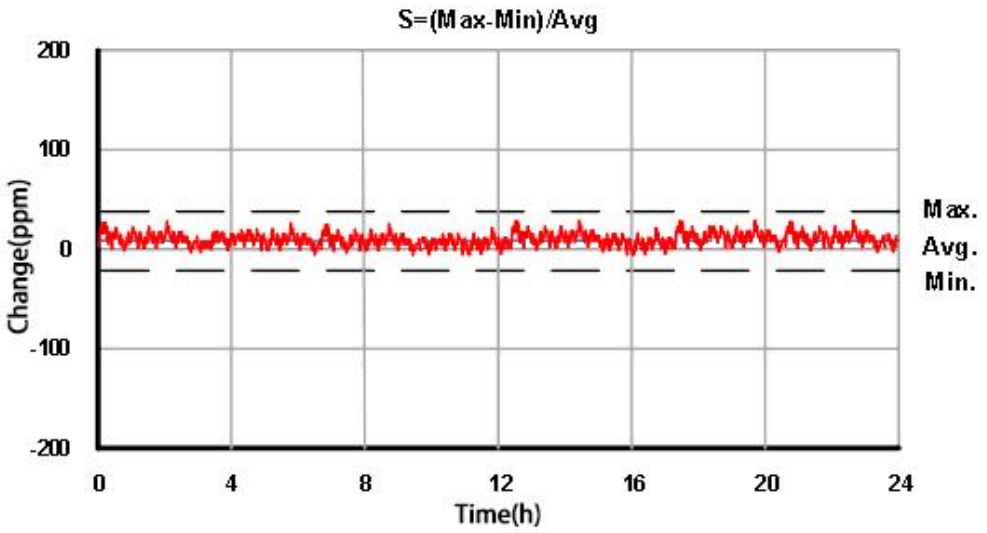
- The current source adopts a modular design, and multiple modules can be connected in parallel to achieve large current output, up to 20 kA.

☆Current Supports Program-Controlled Commutation



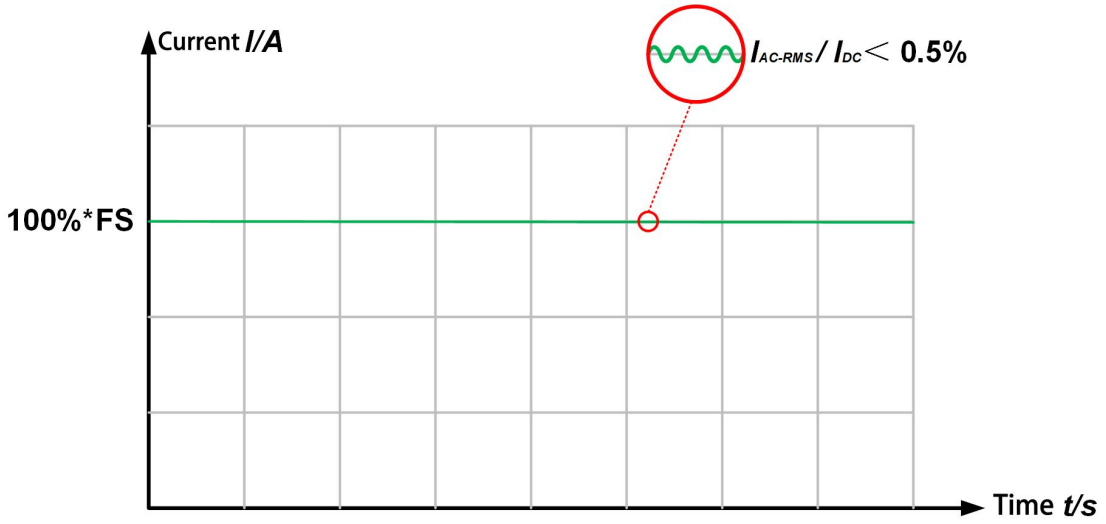
- The device has a programmable switching output function in the positive and negative directions of current, which is convenient for detecting the negative polarity characteristics of the current sensor.

☆ High Stability Of Current Source



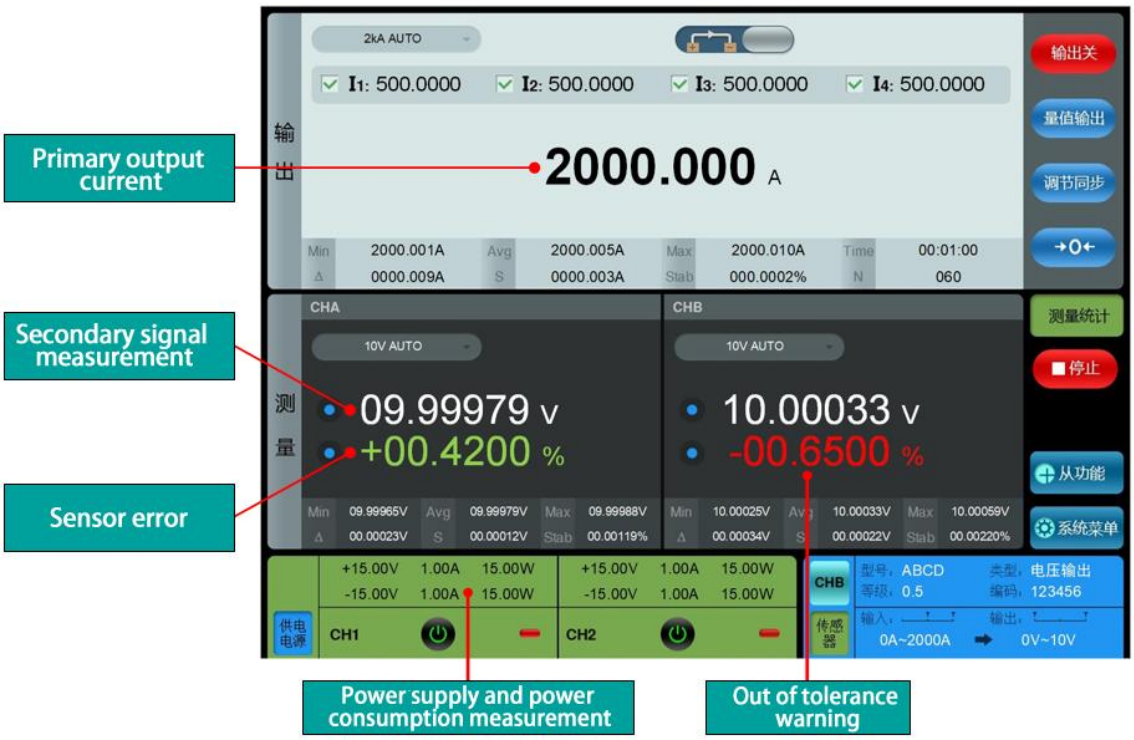
- Typical values of short-term stability: 0.003% (class 0.01), 0.005% (class 0.02), 0.01% (class 0.05).
- It can effectively ensure good repeatability and consistency in batch testing of industrial products.

☆ Low Ripple Content



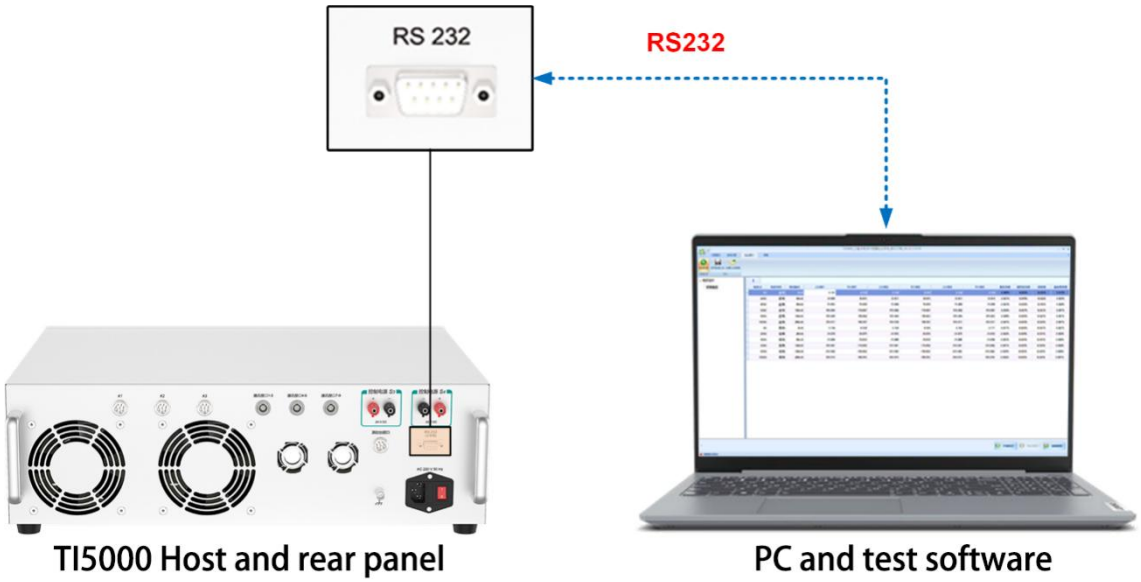
- The ripple content of the current source is less than 0.5%, which can effectively reduce noise interference and ensure the accuracy of test results;
- At the same time, it can avoid surge voltage or current caused by strong ripples to ensure safe operation of the equipment.

☆ Direct Display Of Sensor Measurement Errors



- Advantages of the solution: The mobile measurement and control console interface of the device can display the primary current output value, secondary signal measurement value, and directly display the basic error of the sensor being tested and other measurement results to improve testing efficiency.

☆ Special Test Software (Optional)



- DC current sensors have many detection items, including zero output error, basic error, linearity error, hysteresis, repeatability error, etc.
- Users can choose special testing software and refer to relevant procedures and specifications for sensor testing. Users can customize testing plans (including testing items and testing points, etc.), store, read, edit and manage the tested sensor product library. After automatic testing is completed, users can Test report export.
- Software functions can be customized according to customer needs and subsequent software upgrades can be supported.

5. Specifications

5.1 DC Current Standard Source

Current Range	1 A, 2 A, 5 A, 10 A, 20 A, 50 A, 100 A, 200 A, 500 A….N kA (optional)		
Output Range	(10%~120%)*RG, using relay program-controlled commutation		
Accuracy	Class 0.01	Class 0.02	Class 0.05
Short Term Stability (%*RG/min)	0.003	0.005	0.01
Measurement Uncertainty (k=2) (%*RD+%*RG) [1]	0.006 + 0.004	0.012 + 0.008	0.03 + 0.02
Display Digits	7-digit decimal	7-digit decimal	6-digit decimal
Adjust Fineness	0.001%*RG	0.002%*RG	0.002%*RG
Maximum Load Voltage	3.5 V		
Ripple Coefficient	≤ 0.5%		
Setup Time	≤ 3 s		
Adjustment Method	Adjust the output current value through mobile measurement and control console and host computer software		
Protective Function	Open circuit protection, overload protection, overheating protection		
Note	[1]: RD is the reading, RG is the range, the same below.		

5.2 Power Supply And Output Measuring Instrument

Sensor Secondary Signal Measurement	Voltage measurement range	100 mV, 1 V, 10 V, manual or automatic shifting
	Voltage measurement scope	± (10mV~12V)
	Current measurement range	10 mA, 100 mA, 1 A, manual or automatic shifting
	Current measurement scope	±(1 mA ~ 1.1 A)
	Measurement uncertainty (k=2)	0.003%*RD + 0.002%*RG
	display digits	7-digit decimal
	Temperature Coefficient	5 ppm/°C @ (0°C~40°C)
Sensor Power Supply	Supply voltage	DC ±(5.0 V~50.0 V) adjustable
	Maximum load capacity	1A
	Measurement uncertainty (k=2)	Voltage/Current: 0.2%, Power: 0.5%
	Protective function	Short circuit protection, overload protection, overheating protection
	AC power supply (customized)	AC 220 V power supply can be added according to user needs
Note	Sensor units can be customized according to user needs	

5.3 High Frequency Constant Current Source (optional)

Current Output Range	1mA~10.5A
Frequency Range	DC, 10 Hz ~ 1 MHz
Short Term Stability	DC: 0.005%/min
Measurement Uncertainty (k=2)	AC: 0.01%/min @ 10 kHz, 0.05%/min @ 100kHz, 0.1%/min@1MHz
Max Load Voltage	DC: 0.02%
Application	AC: 0.08% @ 10 kHz, 0.5% @ 100 kHz

5.4 Pulse Current Source (optional)

Current Output Range	500A
Pulse type	Unipolar pulse
Measurement Uncertainty (k=2)	0.5%
Pulse Width	1 ms ~ 100 ms, adjustment step 0.1 ms
Rise/fall Rate	>50 A/μs
Max Load Voltage	9 Vpk
Application	Current sensor response time test

5.5 High Frequency Coaxial Shunt (optional)

Nominal Input Current	Two specifications: 100 mA and 1 A
Nominal Output Voltage	1 V
Measurement Frequency Range	DC~1MHz
Resistance Annual Stability	18 ppm
AC/DC Difference	20 ppm @ 50 Hz, 25 ppm @ 100 kHz
Phase Difference	5 μrad @ 50 Hz, 500 μrad @ 100 kHz
Application	Convert secondary current signals from Type I/I sensors to voltage for bandwidth or response time testing

6. General Specification

Power Supply	Three-phase five-wire, AC (380±38) V, (50±2) Hz
Maximum Power Consumption	Maximum power consumption is 4 kVA per 500 A current source
Preheat Time	30 minutes
Working Environment	Temperature: 0°C ~ 40°C Humidity: 20%R·H ~ 85%R·H, no condensing. Others: No electromagnetic field interference
Storage Environment	Temperature: -20°C ~ 70°C Humidity: 10%R·H ~ 95%R·H, no condensing.
Communication Interface	RS232×1

7. Ordering Information

TI5000 – □ □ □ □

Accuracy	
Code	Note
100	Class 0.01
200	Class 0.02
500	Class 0.05

Max Current	
Code	Note
500A	500 A
1kA	1 kA
1.5kA	1.5 kA
⋮	⋮
NkA	N*kA

Bandwidth Test	
Code	Note
/	——
B	√

Response Time Test	
Code	Note
/	——
R	√

E.g: TI5000-200-2kA means the accuracy of the device is class 0.02, max current 2kA, does not have the function of sensor test and response time test.