



# ELECTROMAGNETIC MEASUREMENT INDUSTRIAL SOLUTIONS



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In view of the continuous updating and upgrading of products, in case of any change in the specifications here, the actual contract shall prevail.

Tunkia Co., Ltd.

# PRODUCT CATALOG —

## 01 METROLOGY CALIBRATION



Digital Meter/Multimeter Calibration	03
High-Precision Digital Meter Traceability	05
Nanovoltmeter Calibration	07
Clamp Meter Calibration and Traceability	09
Resistance Calibration	11
Shunt Calibration	13
Bridge Calibration	15
Safety Instrument Calibration	17
Power Analyzer Calibration	19
Three-Phase Power/Energy Metering	21
Electric Power Quality Calibration	23
Magnetometer Calibration	25
Magnetic Particle Inspection Machine Calibration	27
Welding Machines On-site Calibration	29
Voltage Regulator Power Supply Verification	31
Data Acquisition System Calibration	33

## 02 SENSOR TESTING



Current Sensor Testing	39
Voltage Sensor Testing	39

## 03 EV CHARGING STATION TESTING



EV Charging Station Testing	43
-----------------------------	----

## 04 MAGNETIC MATERIAL TESTING



Soft Magnetic Material Testing	51
Permanent Magnet Material Testing	51
Surface Magnetic Testing	51
Parts/Component Testing	51

## 05 SEMICONDUCTOR TESTING



Integrated Circuit Testing	55
Device testing	55

## 06 DATA ACQUISITION & SYSTEM INTEGRATION



Data Acquisition System	58
Board Card	58

## 07 PRODUCTION LINE AUTOMATIC TESTING



Automated Testing Equipment and Customized Solutions	61
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## LEADER IN ELECTROMAGNETIC MEASUREMENT

### Tunkia Co., Ltd.

TUNKIA Co., Ltd. is a global leader in electrical calibration and magnetic measurement, providing advanced equipment and services to various industries. Specializing in metrological calibration, power grid management, industrial testing, and scientific research, TUNKIA's products excel in complex measurement challenges. Serving over 30,000 users across more than 50 countries, the company is known for its innovative solutions.

Founded in 2006, TUNKIA has been a pioneer in the electromagnetic measurement industry for nearly two decades. It operates a 12,000m<sup>2</sup> R&D center and an 11,000m<sup>2</sup> intelligent factory, employing over 400 people, with 30% dedicated to R&D. The company invests 25% of its annual revenue in innovation, highlighting its technical expertise and robust product development capabilities.

TUNKIA offers three major product series: Scientific Instruments, General Instruments, and Large-scale Equipment. The Scientific Instruments series focuses on high-end instrument domestication and independent control. The General Instruments series provides precision measurement technology for power grids and industrial inspection. The Large-scale Equipment series applies intelligent and automated testing technology to high-end manufacturing industries. Active in domestic and international technical committees, TUNKIA has contributed to 77 standards, including 3 international and 18 national standards. In 2022, it was recognized as the National-Level Specialized, Sophisticated, New and Distinctive "Little Giant," the only company in its field to receive this honor.

Looking ahead, TUNKIA is committed to innovation and collaboration, aiming to create a robust ecosystem for precision testing and quality control instruments.



**R&D Investment**  
25% of annual revenue



**400+ Employees**  
30% working in R&D



**22 Product Series**  
300 Types of Devices



#### MAIN BUSINESS

- Scientific Instruments
- General Instruments
- Large-scale Instruments



# SCIENTIFIC RESEARCH, INNOVATION AND DEVELOPMENT

- National High-tech Enterprise
- National-level Specialized, Sophisticated, New and Distinctive “Little Giant”
- Technology Innovation Center of State Market Regulation Management System



# 77

Participation in standard revision

# 3

International Standards Revision

# 18

National Standards Revision

# 24

Metrological Specifications Revision



International Standards	IEC 61007	Transformers and inductors for use in electronic and telecommunication equipment - Measuring methods and test procedures
International Standards	IEC 63300	Test methods for electrical and magnetic properties of magnetic powder cores
International Standards	IEEE P2960	Guide for Testing Equipment for Direct Current Electrical Energy Meters
National Standard	GB/T 19345.1-2017	Amorphous and nanocrystalline alloys-Part 1: Fe-based amorphous soft magnetic alloy strips
National Standard	GB/T 19346.3-2021	Methods of measurement of amorphous and nanocrystalline alloys-Part 3: AC magnetic properties of Fe-based amorphous strip using a single sheet specimen
National Standard	GB/T 19289-2019	Methods of measurement of resistivity, density and stacking factor of electrical steel strip and sheet
National Standard	GB/T 10129-2019	Methods of measurement of magnetic properties of electrical steel strip and sheet at medium frequencies
National Standard	GB/T 39042-2020	Measurement of the magnetic properties of electrical steels by means of a single sheet tester--H-coil method
National Standard	GB/T 3655-2022	Methods of measurement of the magnetic properties of electrical steel strip and sheet by means of an Epstein frame

# 78

Total patent applications  
(including 1 international patent)



# TUNKIA

## METROLOGY CALIBRATION

TUNKIA is a global leader in high-end electrical meter calibration instruments. Its products and technological applications span nearly all areas of electrical meter calibration. Domestic high-end instruments with accuracy class 0.01 and above hold more than 80% market share in China. The TH1950 High Precision Multi-function Calibrator, as a representative product, offers a Chinese solution for high-precision meter traceability.

# 01

# DIGITAL METERS/ MULTIMETER CALIBRATION



The TD18 series multifunction calibrator, meticulously developed by TUNKIA for multimeter calibration, is a versatile product covering calibration for 3½ to 7½ & 8½ digit multimeters. It also supports analog meters, power meters, frequency meters, capacitance meters, thermocouple temperature meters, resistance temperature detectors, clamp meters, and more. Known for its stability, high precision, and reliability, it represents an ideal device for electrical calibration.

Calibrate **7½ & 8½** DMM



Calibrate **6½** digit and below DMM



Calibrate **5½** digit and below DMM



Calibrate **4½** digit and below DMM



Calibrate **3½** digit DMM



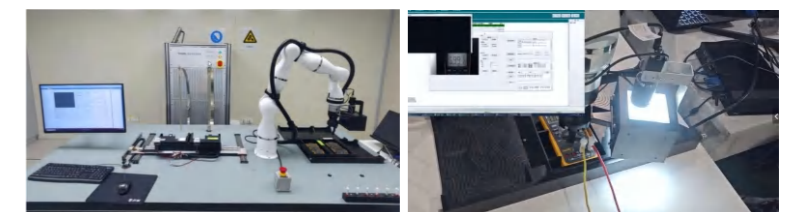
## TD18 Series Specifications

	MODEL	TD1850/TD1855	TD1858/TD1858B	TD1860	TD1870	TD1880	TH1950
Functions	DUT	3½	4½	4½	5½	6½	7½ & 8½
	AC/DC Voltage	★	★	★	★	★	★
	AC/DC Current	★	★	★	★	★	★
	DC Resistance	★	★	★	★	★	★
	AC/DC Power	-/★	—	★	★	★	—
	Pulse Frequency Output	★	★	★	★	★	—
	Transmitter Cal	☆	☆	☆	—	—	—
	Clamp Meter Cal	☆	☆	☆	☆	☆	☆
	Capacitance	—	—	—	—	☆	—
	TC Output/Measurement	—	☆	—	☆	☆	—
	RTD Output	—	—	—	☆	☆	—
	Analog Meter Cal	★	★	★	★	★	★
Remote Adjust Box	☆	—	☆	—	—	—	
Specifications	DCV	1100 V, 500 ppm	+1020, -10.4 V, 110 ppm	±1100 V, 85 ppm	±1020V, 52 ppm	±1020 V, 11 ppm	±1100V, 3.7ppm
	DCI	22 A/33 A, 500 ppm	±10.2 A, 300 ppm	±22 A/±33 A, 150 ppm	±20.5A, 98 ppm	±20.5 A, 87 ppm	±2.2A, 37ppm
	DC Resistance	220 MΩ, 500 ppm	220 MΩ, 500 ppm	220 MΩ, 170 ppm	1100MΩ, 90 ppm	1100 MΩ, 35 ppm	100MΩ, 6.5 ppm
	ACV	1100 V, 500 ppm	1020 V, 500 ppm	1100 V, 500 ppm	1020V, 218 ppm	1020 V, 117 ppm	1100V, 44.5ppm
	ACI	22 A/33 A, 500 ppm	10.4 A, 1000 ppm	22 A/33 A, 500 ppm	20.5A, 427 ppm	20.5 A, 250 ppm	2.2A, 115.5ppm
	Sine Wave Frequency	1100 Hz, 100 ppm	20 kHz, 100 ppm	1500 Hz, 100 ppm	500kHz, 50 ppm	500 kHz, 50 ppm	1MHz, 50 ppm
	LCD Touch Screen	5.6-inch	4.3-inch	7.0-inch	6.4-inch	6.4-inch	5.0-inch
	Weight	about 18 kg	about 9.5kg/14kg	about 25 kg	about 24kg	about 24 kg	—
	Dimension	475*400*190 mm	210*365*266 mm / 560*455*265 mm	450*505*203mm	444*510*205 mm	440*462*206 mm	432*517*222mm

★: Standard function ☆: Optional function —: Not support

## Automatic Calibration


Through integrated multifunctional standard sources and automated mechanical devices, coupled with visual AI recognition systems, TUNKIA can customize handheld multimeter automatic calibration systems for customers. This solution addresses the complex challenges of manual operations and data processing in traditional multimeter testing, significantly enhancing testing efficiency.

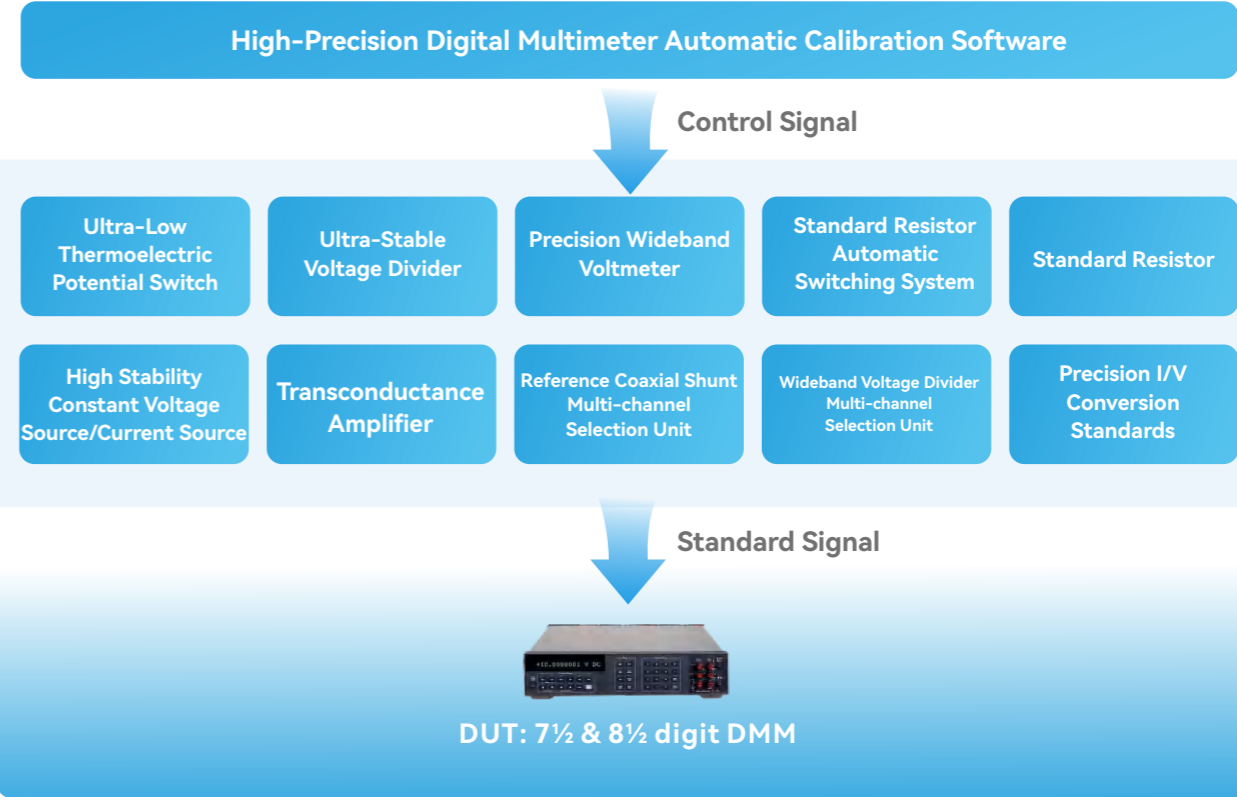


# HIGH-PRECISION DIGITAL METERS TRACEABILITY



High-precision digital multimeters are widely used for precise electrical parameter measurements and traceability transmission in high-end electrical laboratories. Calibration of these devices requires a series of standards and complex combination testing methods. TUNKIA has independently developed corresponding high-level traceable standards, enabling automated calibration of high-precision digital multimeters (7½ & 8½ digits). This enhances China's high-end laboratory traceability technology and automation capabilities.

DUT		TUNKIA Solution	
7½ & 8½ high precision digital multimeters	DCV	TH0100 Advanced DC Voltage Reference	 <p>TH1950 High Precision Multi-function Calibrator</p>
		TH0120 Ultra-stable Voltage Divider	
	ACV	TH0150 Wide Frequency Voltage Divider	
	DCI	TH0320 Reference Resistance Standard/ TH0500 Precision Current Transformer	
		TH0100 Advanced DC Voltage Reference	
	ACI	TA1000 Transconductance Current Standard	
		Th0420 Reference Coaxial Current Shunt	
		TH0196 Precision Wideband Voltmeter	
	R	TH0320 Reference Resistance Standard	
		TH0240 Resistance Multiplexer	



## Automated Calibration Software Interface



# NANOVOLTMETER CALIBRATION



# DUT

- TH1200 is an instrument designed for calibrating nanovoltmeters using a standard source method. It features a built-in high stability voltage reference standard with characteristics such as low noise, high accuracy, high resolution, and low temperature drift.
- With dual output channels, it is well-suited for voltage measurement functions in calibrating nanovoltmeters, DC shunt calibration devices, and small signal voltage measurement in standard DC energy meters.

## Features

- Standard Voltage Output:  $\pm (0 \sim 120 \text{ V})$
- Measurement Uncertainty up to 6 ppm @ 10 V
- Typical Stability of mV Output: 1.8 nV/min
- 8-digit display with a minimum resolution of 0.1 nV
- Supports automatic zeroing function to eliminate errors due to internal thermoelectric potential
- Both channels of voltage output connected via low thermoelectric potential terminals
- Equipped with low noise, low thermoelectric potential test leads
- Calibration software (optional)

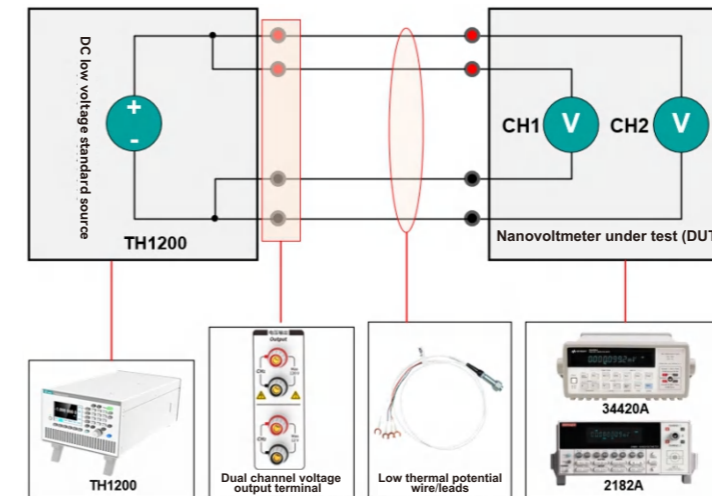


## Specifications

Range	Minimum Resolution	Short-term Stability	Output Accuracy (k=2)			Source Impedance ( $\Omega$ ) Load Current (mA)
		1 min(pk-pk) Tcal $\pm 0.5^\circ\text{C}$	24 hours Tcal $\pm 1^\circ\text{C}$	90 days Tcal $\pm 5^\circ\text{C}$	1 year Tcal $\pm 5^\circ\text{C}$	
ppm*Setting value + ppm*Range						
CH1 / CH2						
1 mV ①	0.1 nV	0.3 + 2.5	7 + 7	10 + 7	12 + 7	$\leq 2 \Omega$
10 mV ①	1 nV	0.3 + 0.7	5 + 1	10 + 1	12 + 1	$\leq 2 \Omega$
100 mV ①	10 nV	0.3 + 0.8	5 + 1	8 + 1	10 + 1	$\leq 2 \Omega$
1 V	100 nV	0.3 + 0.6	3 + 1	5 + 1	7 + 1	$\leq 50 \text{ mA}$
10 V	1 mV	0.3 + 0.4	1 + 0.5	3 + 1	5 + 1	$\leq 50 \text{ mA}$
100 V ②	10 $\mu\text{V}$	0.3 + 0.8	3 + 1.5	5 + 1.5	8 + 1.5	$\leq 10 \text{ mA}$

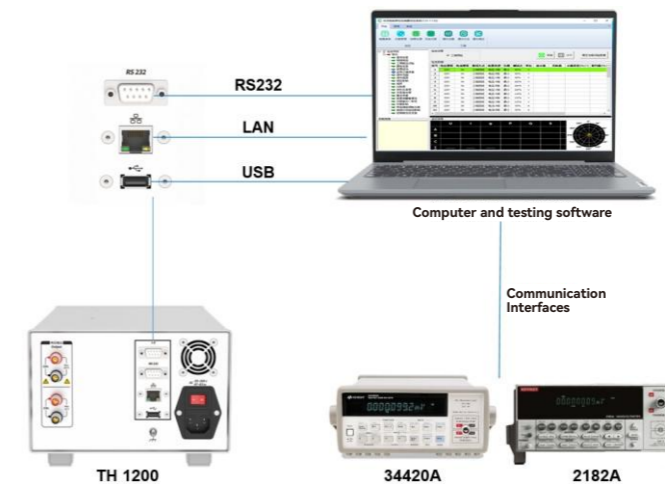
Note: ① For 1 mV, 10 mV, and 100 mV ranges, if zeroing is not performed, the zero output error increases by 100 nV.  
 ② The 100 V range is only supported on CH1 output.

- Range Switching: Manual/Automatic
- Display Digits: 8 decimal places
- Stabilization Time: < 3 s to full uncertainty, range or polarity change +1 s



## Easy Operation

- Supports  $\pm (0 \sim 120 \text{ V})$  voltage output, fully covering the calibration needs of nanovoltmeters.
- Dual-channel voltage output terminals eliminate the need for manual switching during calibration.
- Compatible with original low thermoelectric potential test leads for nanovoltmeters, allowing calibration to be completed with a single connection and fully simulating actual usage scenarios.



## Communication Interface and Automatic Calibration Software

The device is equipped with multiple communication interfaces (RS232, LAN, USB) and the upper computer software is compatible with commonly used nanovoltmeters (34420A / 2182A) on the market. It supports automated calibration of the nanovoltmeters according to calibration standards.




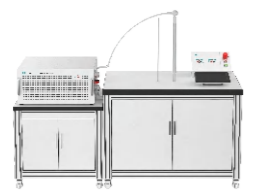




# CLAMP METER CALIBRATION AND TRACEABILITY

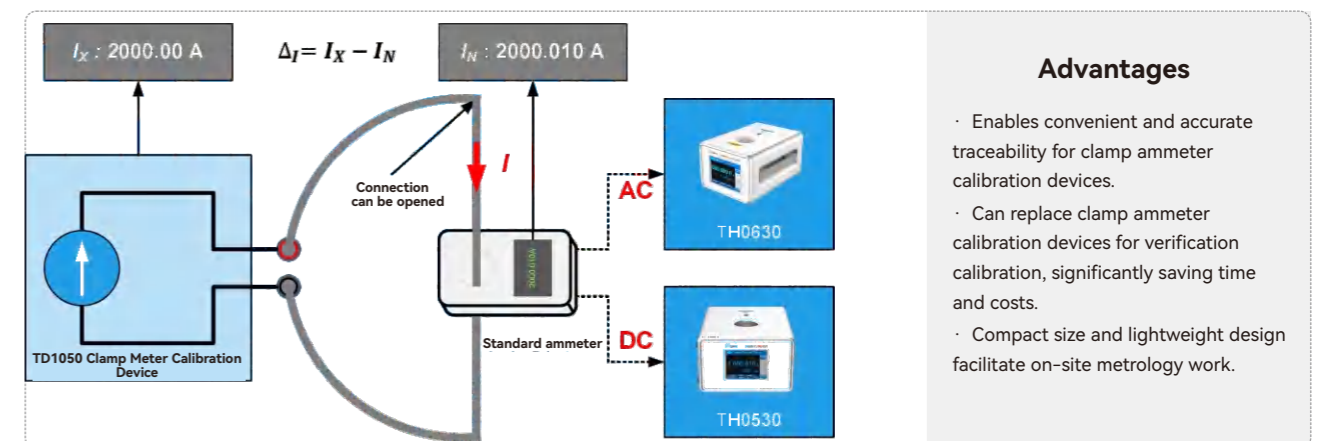




Clamp meters are commonly used in high current testing scenarios and are widely applied in military metrology, power grids, industrial testing, and other fields. Their accuracy is crucial for the technological development and energy management in various industries. TUNKIA participated in drafting JJF 1075-2015 "Calibration Specification for Clamp Ammeters" and has developed a series of calibration solutions for different types of clamp meters. This enables us to provide customers with comprehensive technical and product support.

## TUNKIA Testing Solution

DUT	TUNKIA SOLUTION	SPECIFICATION	APPLICATION
 Medium to high precision clamp meter	 TD1050 Calibration Device for Clamp Meter	<ul style="list-style-type: none"> <li>AC/DC current output (single turn method): 1kA/2kA</li> <li>Supports AC/DC voltage and power output</li> <li>Supports DC resistance output function</li> <li>Class 0.02 / Class 0.05 options available</li> </ul>	<ul style="list-style-type: none"> <li>Class 0.1 / 0.2 AC/DC clamp ammeter</li> <li>Class 0.1 / 0.2 clamp power meter</li> <li>Class 0.2 multifunction clamp meter</li> </ul>
 Medium to low precision clamp meter	 TD1000 Clamp Meters Calibration Device	<ul style="list-style-type: none"> <li>AC current output (single turn method): 1000 A</li> <li>Best accuracy: 0.04%</li> <li>DC current output (equivalent ampere-turn method): 1000 AT</li> <li>Best accuracy: 0.3%</li> <li>Supports AC/DC voltage output, DC resistance output</li> <li>Class 0.05 and 0.1 available</li> </ul>	<ul style="list-style-type: none"> <li>Class 0.2/0.5 AC clamp meter and below</li> <li>Class 1 DC clamp meter and below</li> <li>Class 0.5 multifunction clamp meter and below</li> </ul>
 Low precision clamp meter	 TD18 Series Multifunction Source +TD1020 Current Coil	<ul style="list-style-type: none"> <li>AC/DC current output (equivalent ampere-turn method): 1000 AT</li> <li>Best accuracy: 0.3%</li> <li>Supports AC/DC voltage output, DC resistance output, AC/DC power output</li> </ul>	<ul style="list-style-type: none"> <li>Class 1 AC/DC clamp ammeter and below</li> <li>Class 1 clamp power meter and below</li> <li>Class 1 multifunction clamp meter and below</li> </ul>

## Clamp Ammeter Calibration Device (Single Turn Method) Traceability Solution — High-Precision AC/DC Standard Current Meter



DUT	Product	Specifications
Class 0.02 and below (DC) Class 0.1 and below (AC)	 TH0530 Precision Through-core Ammeter	<ul style="list-style-type: none"> <li>Current ratings available: 1 kA / 2 kA</li> <li>Measurement frequency: DC ~ 1 kHz</li> <li>Accuracy class: 0.005 / 0.01</li> <li>Through-core and direct-in measurement methods</li> <li>Aperture up to <math>\Phi 70</math> mm, suitable for large current conductor insertion</li> <li>Supports analog I/V output mode</li> <li>Excellent portability, supports in-situ metrology</li> </ul>
Class 0.02 and below (AC)	 TH0630 Precision Through-core AC Ammeter	<ul style="list-style-type: none"> <li>Current ratings available: 1 kA / 2 kA</li> <li>Measurement frequency: 40 Hz ~ 400 Hz</li> <li>Accuracy class: 0.005 or 0.01</li> <li>Through-core measurement method</li> <li>Harmonic distortion measurement</li> <li>Excellent portability, supports in-situ metrology</li> </ul>

# RESISTANCE CALIBRATION

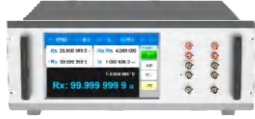


# DUT



TUNKIA possesses ultra-stable resistance standards with accuracies up to  $10^{-8}$  and advanced precision resistance bridge technology. Additionally, TUNKIA employs millisecond-level rapid measurement technology for testing wires, providing comprehensive and precise testing solutions for the research, production, evaluation, and calibration in the resistance industry.

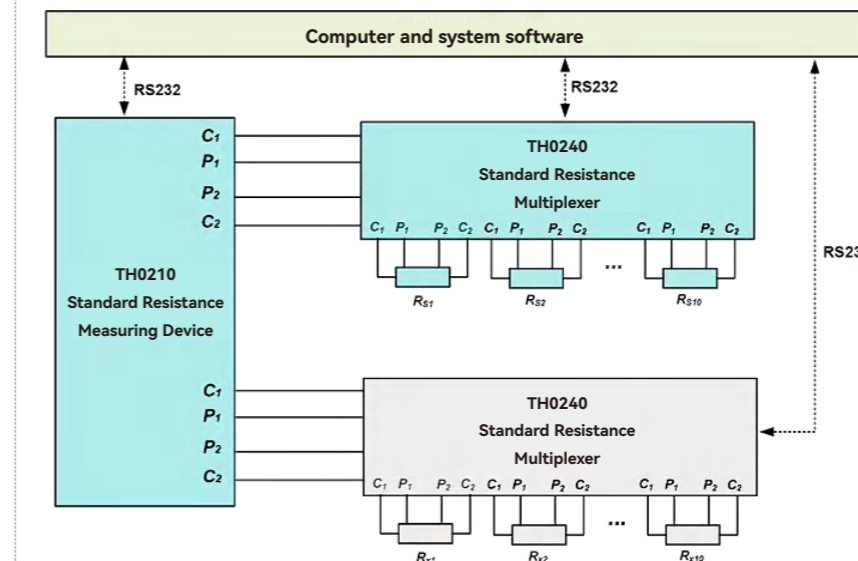
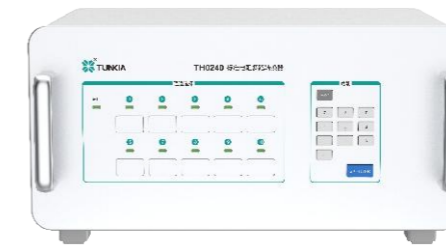
Reference Standard:

JJG 166-2022 Verification Regulation of DC Standard Resistors / JJG 982-2022 Verification Regulation of D. C. Resistance Boxes

DUT	TUNKIA Solution	Specification	Application
Ultra-high precision	 TH0220 Standard Resistance Measuring Device	<ul style="list-style-type: none"> <li>Resistance measurement range: <math>1\ \Omega \sim 100\ \text{k}\Omega</math></li> <li>Best ratio measurement uncertainty: 0.05 ppm</li> </ul>	<ul style="list-style-type: none"> <li>Standard resistance ratio transmission</li> <li>High-precision voltage ratio measurement</li> </ul>
High precision	 TH0210 Standard Resistance Measuring Device	<ul style="list-style-type: none"> <li>Resistance measurement range: <math>1\ \text{m}\Omega \sim 100\ \text{k}\Omega</math></li> <li>Best ratio measurement uncertainty: 0.5 ppm</li> <li>Typical measurement period: approx 4.5 min per measurement</li> </ul>	<ul style="list-style-type: none"> <li>Standard resistance measurement</li> <li>High-precision voltage ratio measurement</li> </ul>
Medium to high precision	 TH0200 Standard Resistance Measuring Device	<ul style="list-style-type: none"> <li>Resistance measurement range: <math>1\ \text{m}\Omega \sim 10\ \text{M}\Omega</math></li> <li>Built-in standard resistor, best measurement uncertainty: 10 ppm</li> <li>Measurement period: 3.5 min (precision) / 30 s (fast)</li> <li>Higher measurement accuracy achievable through external standard resistor</li> </ul>	<ul style="list-style-type: none"> <li>Resistor calibration</li> <li>Resistance box calibration</li> </ul>

The above resistance measuring device can test multiple products at the same time through the TH0240 standard resistance multiplexer, reducing the workload of operators and improving test efficiency.

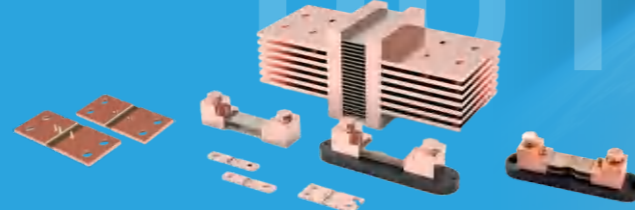
## TH0240 Standard Resistance Multiplexer



- Number of channels: 10
- Connection terminals: Tellurium copper terminals
- Thermal potential:  $< 50\ \text{nV}$
- Maximum carrying/switching current:  $3\ \text{A @}30\ \text{V(DC)}$
- Contact resistance:  $< 0.05\ \text{n}\Omega$

- Establish a fully automated resistance test system to improve test efficiency.
- Reduce the impact of thermal potential caused by plugging and unplugging wires to improve measurement accuracy.



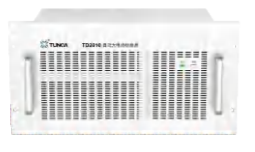
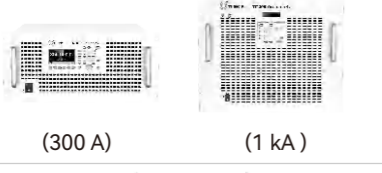

# SHUNT CALIBRATION



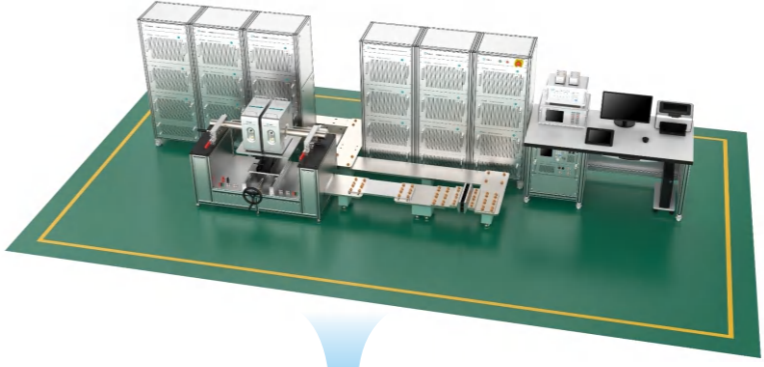
Shunts are widely used in aerospace, industrial production, new energy, and electronics. Their calibration relies on high-precision DC high-current sources.

TUNKIA has developed a series of high-precision, ultra-stable shunt calibration devices capable of outputting currents up to 15 kA or more with an accuracy of up to 15 ppm. These devices include standard source and precision bridge methods, covering calibration from low to high accuracy shunts for mainstream applications, achieving international advanced levels.

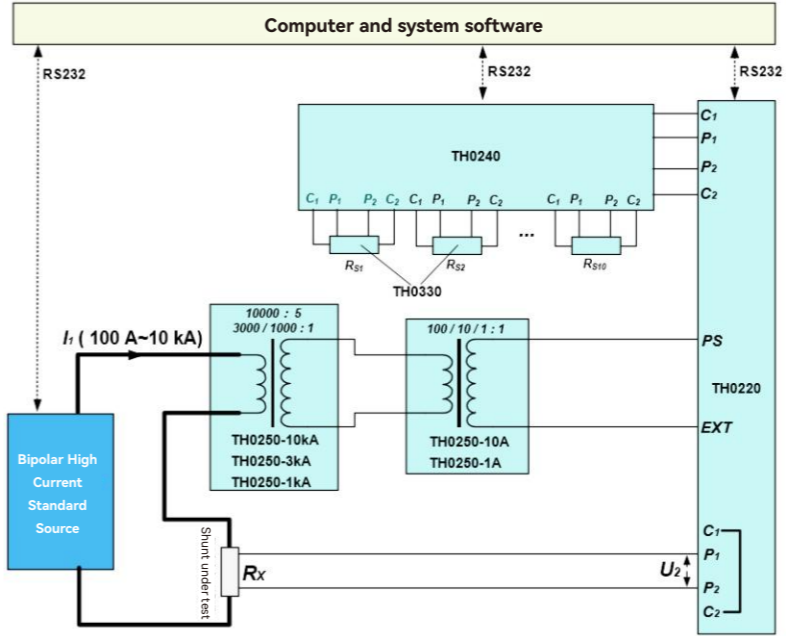
## 标准源方案

Product	Pic	Current Output Range	Maximum Load	Accuracy
TD1540 DC Shunt Calibration Device		0.5 A ~ 600 A	3.5 V	Class 0.02/0.05 (Resistance measurement)
TD2100 DC Shunt Calibration Device		0.5 A ~ 600 A	3.5 V	Class 0.02/0.05 (Resistance measurement)
TD2010 DC High Current Standard Source		Maximum 15 kA	3.5 V	Class 0.01 /0.02 /0.05 (Current output)
TI2000 DC High Current Standard Source	 (300 A) (1 kA)	10 kA and above	3 V	Class 0.02 /0.05 (Current output)
TI2100 High Stability DC High Current Standard Source		10 kA and above	10 V	Class 0.01 (Current output)

TH1100 DC High Current Shunt and Sensor Calibration System (Bipolar)



Schematic diagram of precision bridge method for calibrating DC shunt ( $I_1 \geq 100A$ )



- TH1100 DC High Current Shunt and Sensor Calibration System utilizes a bipolar current source, capable of fully automated control to output  $\pm(0.1 \text{ mA} \sim 10 \text{ kA})$  with high precision, stability, and a wide range of DC currents.
- The TH1100 is designed for calibrating DC shunts with resistance values from  $0.1 \mu\Omega$  to  $1 \text{ k}\Omega$ , standard resistors, with a maximum uncertainty of 0.02 ppm (1:1) for resistance ratio measurements. It is also suitable for calibrating high-precision current sensors. This system provides reliable technical assurance for establishing high-precision current and resistance measurement systems in advanced metrology laboratories.
- The system's functionalities and automation level are at the forefront of the industry.




# ELECTRICAL BRIDGE CALIBRATION



Resistance bridges (including single and double arm bridges) are widely used in aerospace, scientific research, power electronics, and industrial production for resistance measurement applications such as standard resistance ratio transmission, model tuning, and electrical device development. TUNKIA has developed a series of bridge calibration solutions using simulated resistors/standard resistors as standards, providing various measurement methods for bridge calibration across different industries.





## Reference Standard:

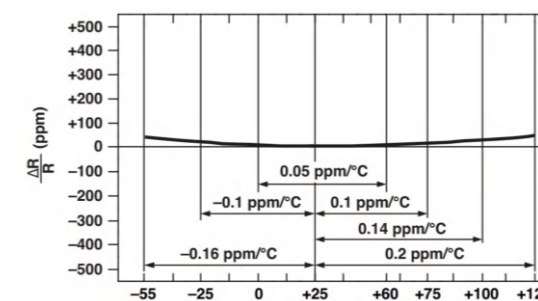
JJG 125-2004 Verification Regulation of D.C. Bridges / JJG 837-2003 Verification Regulation of D.C. Low Resistance Meters

DUT	TUNKIA Solution	Specification	Application
Ultra-high precision	 TH0360 High Precision DC Resistance Meter Calibrator	<ul style="list-style-type: none"> <li>Resistance simulation range: 0 ~ 1.1 GΩ</li> <li>Best measurement uncertainty: 20 ppm</li> </ul>	<ul style="list-style-type: none"> <li>Calibration of class 0.01 or below single-arm bridges</li> <li>Calibration of class 0.01 or below DC resistance meters</li> <li>Calibration of 6.5-digit digital multimeters</li> <li>Calibration of class 0.01 or below DC current sources</li> <li>Calibration of class 0.01 or below temperature bridges</li> </ul>
High precision	 TH0350 DC Bridges Calibrator	<ul style="list-style-type: none"> <li>Resistance simulation range: 100 μΩ ~ 11 MΩ</li> <li>Best measurement uncertainty: 50 ppm</li> </ul>	<ul style="list-style-type: none"> <li>Calibration of class 0.02 or below single and double arm bridges</li> <li>Calibration of class 0.02 or below DC resistance meters</li> <li>Calibration of class 0.02 or below temperature bridges</li> </ul>
Medium to high precision	 TD1470 Single and Double Bridge Calibration Device	<ul style="list-style-type: none"> <li>Resistance simulation range: 100 μΩ ~ 11 MΩ</li> <li>Best measurement uncertainty: 100 ppm</li> </ul>	<ul style="list-style-type: none"> <li>Calibration of class 0.05 or below single and double arm bridges</li> <li>Calibration of class 0.05 or below DC resistance meters</li> <li>Calibration of class 0.05 or below temperature bridges</li> </ul>

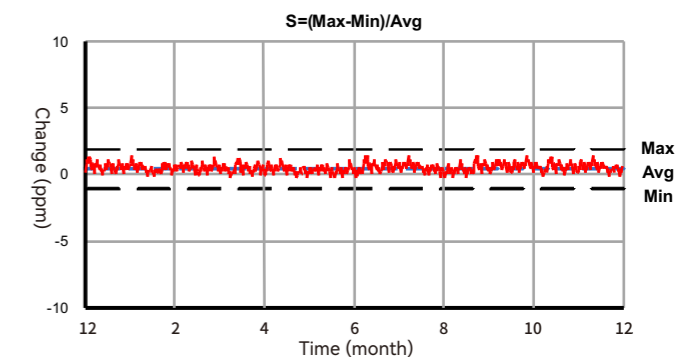
## TUNKIA-Standard Resistor Product System

TUNKIA possesses ultra-stable resistance standards with accuracies up to 10<sup>-8</sup> and advanced precision resistance bridge technology. Additionally, TUNKIA employs millisecond-level rapid measurement technology for testing lines, providing comprehensive and precise testing solutions for the research, production, evaluation, and calibration in the resistance industry.

Product	Pic	Resistance Range	Annual Stability (±ppm)	Temperature Coefficient (±ppm/K)	Power Coefficient (±ppm/Power)
TH0340 AC Resistance Standard		1Ω, 10Ω, 100Ω, 1kΩ, 10kΩ	0.05	$\alpha_{23}:\pm 0.05$ $\beta:\pm 0.005$	0.05
TH0330 Ultra-stable Resistance Standard		1Ω, 10Ω, 25Ω, 100Ω, 1kΩ, 10kΩ	0.2	0.05	1
TH0320 Reference Resistance Standard		1 Ω ~ 10 MΩ	1~3	0.2	10
TH0310 Resistance Standard		1 mΩ ~ 100 MΩ	5~10	1	10



TH0330 Temperature Coefficient Distribution Chart



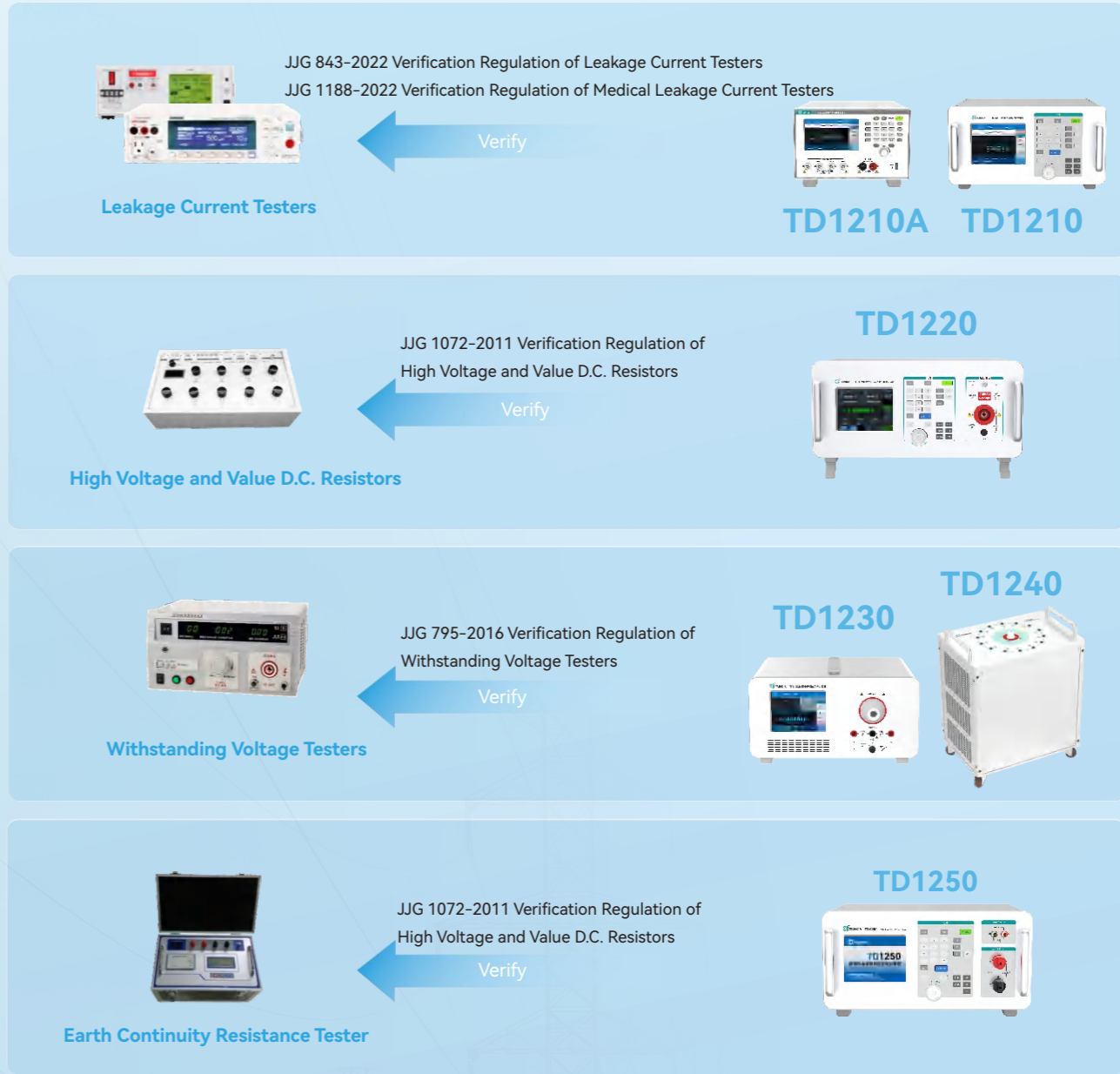
TH0320 Annual Stability Diagram

# SAFETY INSTRUMENT CALIBRATION



TUNKIA's safety instruments calibration equipment meets the integration requirements of various standards in compliance testing procedures. It features excellent characteristics such as high precision, portability, ease of use, and reliability, providing an efficient evaluation solution for safety instruments. This effectively ensures the integrity of safety product systems and maintains electrical safety in production and daily life.

## Application



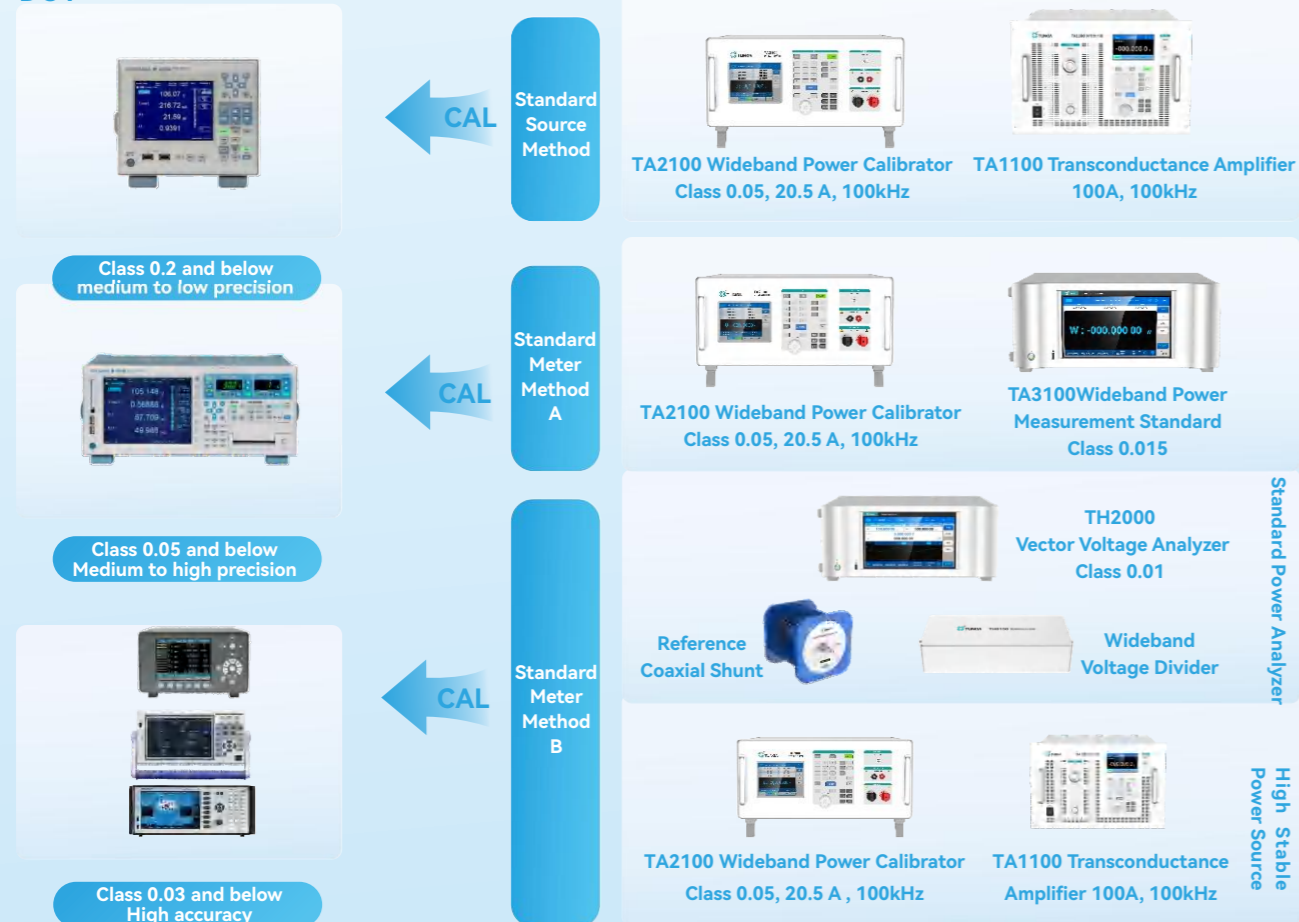
# POWER ANALYZER CALIBRATION



The power analyzer can realize power measurement and related analysis calculations within a wide frequency band and at full power factor. It is widely used in aerospace, ships, magnetic materials and other fields. TUNKIA has developed a series of calibration schemes, with the best power measurement uncertainty reaching 0.01%. It can cover the mainstream DUTs on the market.

## TUNKIA Calibration Solution System

### DUT



## Product

Type	Pic	Model	Name	Specification
Power Source		TA2100	Wideband Power Calibrator	Voltage output: 0.3 V ~ 1020 V Current output: 0.5 mA ~ 20.5 A AUX output: 2.5 mV ~ 5.5 V Working frequency: DC, 5 Hz ~ 100 kHz Power accuracy: class 0.05
		TA1100	Transconductance Amplifier	Working frequency: DC ~ 100 kHz Maximum output current: 100 A Maximum compliance voltage: 7 Vrms @ AC, 7 V @ DC Accuracy: class 0.05
Power Analyzer		TA3100	Wideband Power Measurement Standard	Voltage measurement: 0.3 V ~ 1020 V Current measurement: 1 mA ~ 20.5 A AUX measurement: 2.5 mV ~ 6 V Working frequency: DC, 10 Hz ~ 100 kHz Power accuracy: class 0.015
Power Analyzer (Standard Meter Method B)		TH0420	Reference Coaxial Shunt	Primary nominal current: 0.1 A ~ 500 A Secondary nominal voltage: 1 V / 0.5 V Working frequency: DC ~ 100 kHz Annual variation: better than 16 ppm Power coefficient: 10 ppm@100A specification
		TH0150	Wideband Voltage Divider	Primary nominal voltage: 10 V ~ 1 kV Secondary nominal voltage: 1 V Working frequency: DC ~ 100 kHz Ratio measurement uncertainty: 20 ppm
		TH2000	Vector Voltage Analyzer	Dual-channel voltage measurement: 0.5 mV ~ 6 V Working frequency: DC ~ 100 kHz Ratio measurement uncertainty: 20 ppm Phase-optimal measurement uncertainty: 0.000 5°(8μrad)

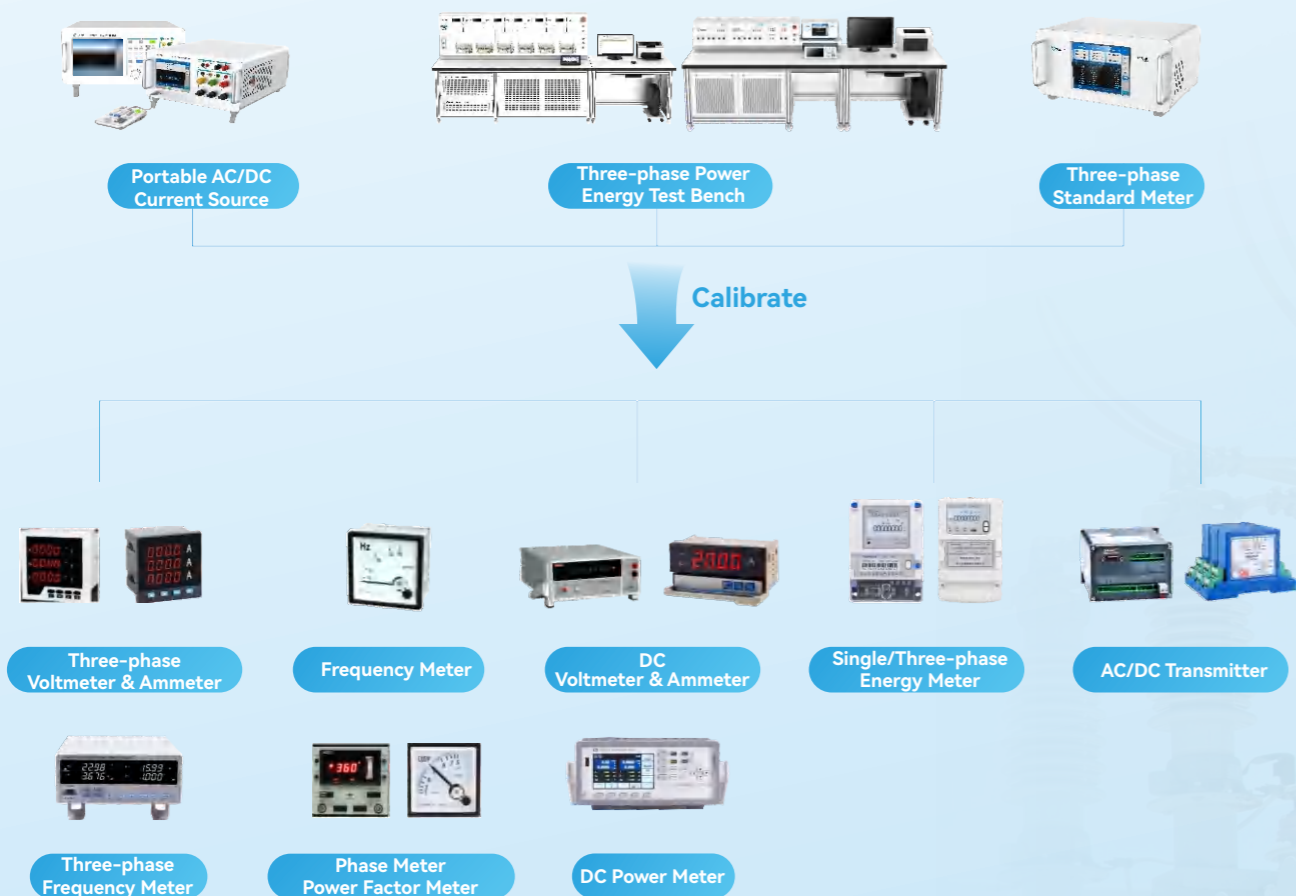
# THREE-PHASE POWER/ ENERGY CALIBRATION

# DUT



Based on complex electrical scenarios, integrating precise output and measurement technologies for single-phase/three-phase electrical parameters, we provide traceability solutions for power system single-phase/three-phase power and energy measurement equipment. This supports comprehensive and professional metrology for electrical measurement devices, serving the promotion and expansion of smart grids and intelligent power grids.

## Three-phase Power/Energy Measurement



## Product

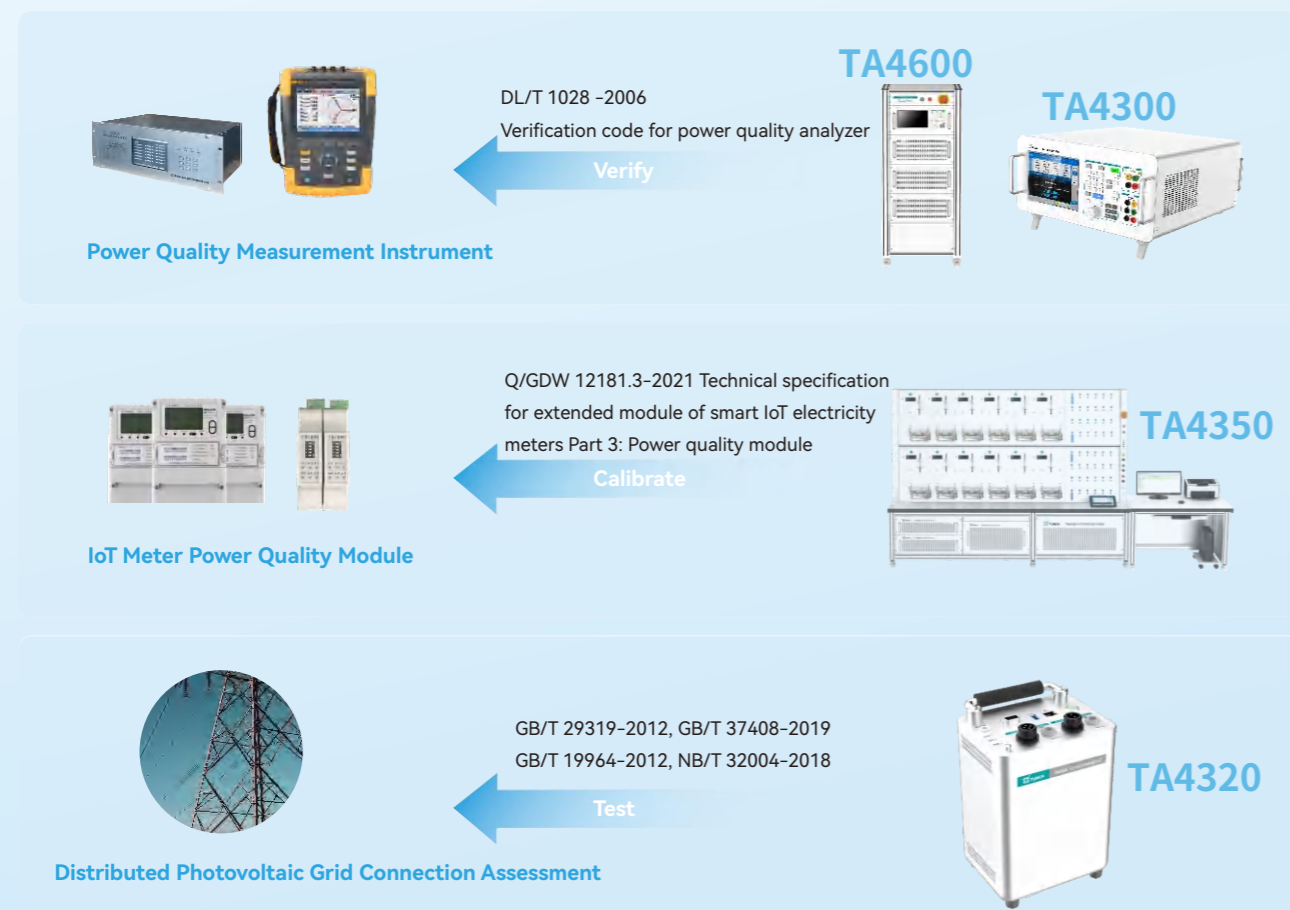
Type	Model	Name	Specification	DUT
Portable AC/DC Source AC/DC Voltage	TD4530	Portable Tester for Three-phase and DC Meters	Three-phase power output	Single-phase three-phase AC/DC measuring instrument Transmitter Energy meter (basic error)
			DC power output	
	TD4100	Portable Tester for Three-phase and DC Meters	Three-phase power measurement	
			Optional power/transmitter	
Three-phase Power Energy Test Bench	TD4200	Testing Device for Three-phase and DC Meters	Class 0.05/ class 0.02 available	
			Three-phase power output	Single-phase three-phase AC/DC measuring instrument Transmitter Energy meter (basic error)
			DC power output	
			Standard meter available	
	Optional power/transmitter			
	Class 0.02/class 0.01 available			
TD3600	Three-phase Energy Meters Verification Device	Three-phase power/energy output	Single-phase three-phase energy meter	
		Standard meter available		
Three-phase Standard Meter	TD3300	Three-phase Multi-function Standard Meter	Class 0.05/class 0.02 available	Single-phase and three-phase energy meter calibration device Single/three-phase power source/meter
			Three-phase power/energy measurement	
	TD3310	Three-phase Multi-function Standard Meter	Three-phase power/energy measurement	
			Class 0.01	

# POWER QUALITY CALIBRATION

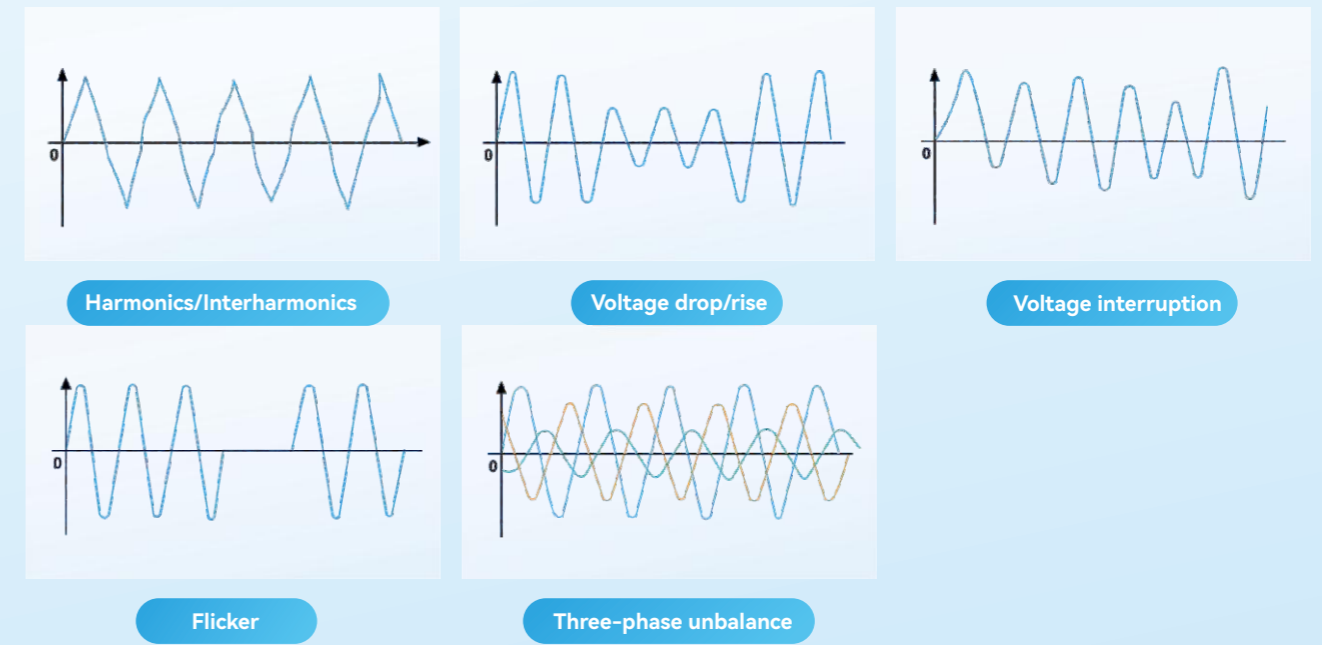


The simulation and analysis of complex power quality waveforms meet the precise calibration needs of various types of power quality instruments. Featuring powerful functionality, high precision, ease of use, and excellent reliability, it is an ideal standard device for the precise calibration of power quality instruments. It strongly supports the establishment of general traceability systems for power quality, assisting in the analysis and evaluation of grid supply quality.

## Application



## Power Quality Waveform Simulation



## Products

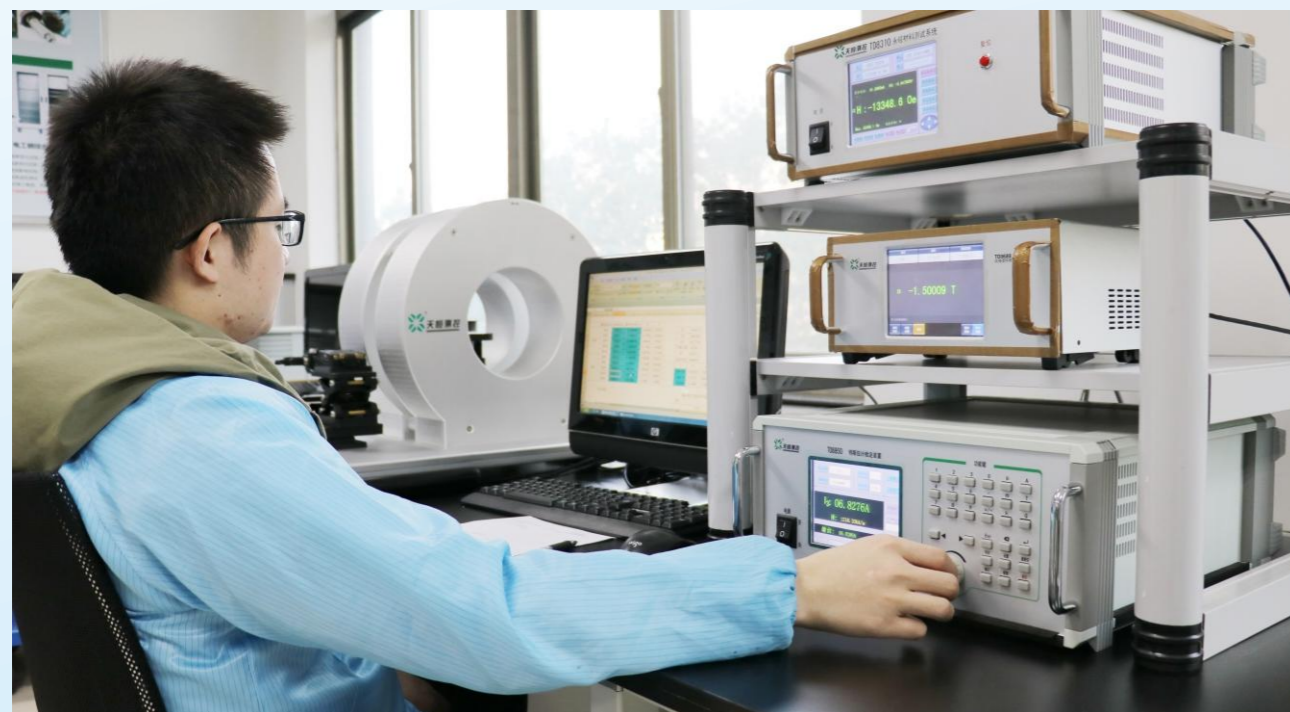
Type	Model	Name	Feature	DUT
Portable Standard Source	TA4300	Power quality calibrator (class 0.05)	Three-phase power output	Power quality monitor, power quality analyzer
	TA4600	Power quality power standard source (class 0.005)	Power quality waveform simulation	
Standard Source Platform	TD4350	Three-phase AC/DC meter calibration device	Three-phase power output	IoT meter power quality base meter + module
			Power quality waveform simulation	
			Module digital signal output	
Standard Meter	TA4320	Distributed photovoltaic grid-connected quality analyzer	Three-phase power measurement	On-site testing of distributed photovoltaic system grid connection
			Power quality waveform analysis	
			Flexible control function	



# MAGNETOMETER CALIBRATION



TUNKIA has developed a series of magnetic measurement standards tailored for national and provincial metrology institutes, calibration companies, and others. These standards cover calibration and traceability for devices such as magnetometers, flux meters, and magnetic field detectors. Our precise magnetic measurement capabilities support advancements in biomedicine, geological exploration, aerospace, and other high-standard fields, contributing to the development of new industrialization efforts.



## Products

DUT	Type	Calibration Specifications	Calibration Items	TUNKIA Products
	Calibration solution for magnetometers of 0.2% and below  Calibration range: 2 mT ~ 3 T	JJF 1832-2020 Calibration Specification of (1 mT~2.5 T) Magnetometers	<ul style="list-style-type: none"> <li>Magnetic flux density indication error</li> <li>Probe forward and reverse indication difference</li> <li>Zero drift</li> <li>Rise and fall variation</li> </ul>	TM9000 Magnetometer Calibration Device 
	Calibration solution for precision magnetometers of 0.05% and below  Calibration range: 2 mT ~ 3 T	JJF 1832-2020 Calibration Specification of (1 mT~2.5 T) Magnetometers	<ul style="list-style-type: none"> <li>Magnetic flux density indication error</li> <li>Probe forward and reverse indication difference</li> <li>Zero drift</li> <li>Rise and fall variation (pointer type)</li> </ul>	TM9100 Precision Magnetometer Calibration Device 
	Calibration solution for Alternating Magnetometer	JJG 1049-2009 Verification Regulation of Alternating Tesla-Meter for Weak Magnetic Field	<ul style="list-style-type: none"> <li>Indication error</li> <li>Stability</li> </ul>	TM9200 Alternating Magnetometer Calibration Device 
	Calibration solution for weak field fluxgate magnetometer	JJF 1519-2015 Calibration Specification for Fluxgate Magnetometer	Magnetic induction strength, noise, zero bias, time drift, temperature drift, orthogonality	TM9300 Fluxgate Magnetometer Calibration Device 
	0.2% / 0.5% / 1% / 2%	JJF 1905-2021 Calibration Specification for Magnetic Flux Meters	<ul style="list-style-type: none"> <li>Zero drift</li> <li>Magnetic flux indication error</li> </ul>	TM7900 Precision Volt-second Generator for Flux Meter Calibration 
				TM7970 Mutual Inductance Magnetic Flux Calibrator 

### Standard Magnetic Field Test Device



Composed of precision DC current standard source, Helmholtz coils, and a Tesla meter.

- This magnetic field test device can be used in scenarios requiring a standard magnetic field, such as calibrating magnetic sensors and magnetic measuring instruments.
- It is also suitable for universities and research institutes for magnetic measurement teaching experiments, compensation and simulation of the Earth's magnetic field, magnetic environment simulation, assessment of magnetic shielding effects, simulation of electromagnetic interference, research on biological magnetic fields, and study of material magnetic properties.

# MAGNETIC PARTICLE INSPECTION EQUIPMENT CALIBRATION



TUNKIA's magnetic particle inspection calibration device meets the requirements for high current testing with high precision, good portability, strong usability, and excellent reliability. It is suitable for on-site calibration work and is an efficient evaluation tool for magnetic particle inspection instruments, ensuring high-quality production activities.

## Application



TT2400 is an AC/DC high current measuring instrument. The main unit can use external fiber optic sensors to measure the operating current of equipment such as magnetic particle inspection machines without disconnecting the current wires during calibration. It features fast measurement speed and easy operation. Reference standard: JJF 1273-2011 **Calibration Specification for Magnetic Particle Flaw Detectors**

## Feature

- Optical fiber sensor current measurement (optional): 100 A ~ 10 kA (1 kA / 5 kA / 10 kA available).
- Measurement frequency: DC, 40 Hz ~ 1 kHz.
- Voltage/current accuracy: Class 0.5 / Class 0.2.
- Supports circumferential or longitudinal high current calibration.
- Simultaneously measure the output time of the operating current of the DUT.
- Real-time current display hold function.
- Main unit powered by lithium battery, with remaining power display.
- Built-in USB for battery charging and data communication.
- Compact, lightweight, and well-protected instrument.

## Specifications

Optical Fiber Sensor Measurement	Current measurement range	100 A ~ 10 kA (1 kA / 5 kA / 10 kA available)
	Display digits	Five decimal digits
	Frequency	DC, 40 Hz ~ 1 kHz
Time Measurement	Measurement uncertainty(k=2)	0.3%*RD+0.2%*RG
	Time measurement range	0.1 s ~ 999 s
	Measurement uncertainty(k=2)	0.5%*RD

Note: RD is the reading value, RG is the range value

## General Specification

Power Supply	Rechargeable lithium battery powered
Max power Consumption	30 VA
Temperature Performance	Working temperature: 0°C~45°C; Storage temperature: -20°C~70°C
Humidity Performance	Working humidity: < 80% @ 30°C, < 70% @ 40°C, < 40% @ 50°C Storage humidity: (20% ~ 80%) R·H, no condensation
Altitude	< 3000 m
Communication Interface	Micro USB

# WELDING MACHINE ON-SITE CALIBRATION



TUNKIA's on-site calibration equipment for welding machines meets the calibration requirements for arc welding power supplies. It is highly portable, easy to use, and reliable, making it ideal for quick on-site calibration work and ensuring high-quality arc welding products.

## TUNKIA SOLUTION



Common Solution

(Covering most current specifications of arc welding machines from 0 ~ 500A/1kA/2kA/3kA)



All-in-one solution

(Covering most current specifications of arc welding machines from 0 ~ 500A/1kA/2kA/3kA)

CAL



AC welding machine



Manual DC welding machine





Co2 gas shielded welding machine

APPLICATION

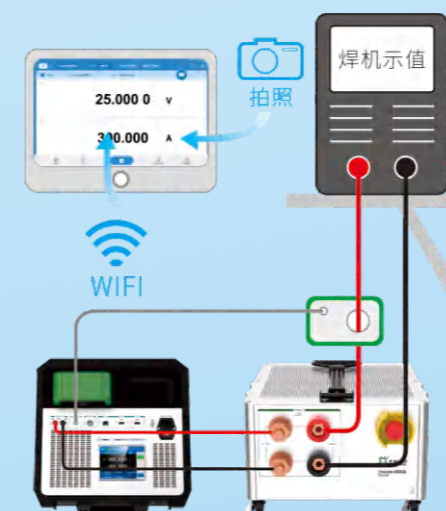


Industrial Manufacturing

## Specification

Solution	TK6500 Electric Welding Machine AC-DC Power Calibrator	TK6700 Comprehensive Parameter Calibrator for Arc Welding Machines
Picture		
Movement	Portable case	Trolley, roller hauling
Current Measurement Method	Through-core current measurement	Wired current measurement
Current Measurement Range	0 ~ 500A/1kA/2kA/3kA	0 ~ 500A/1kA
Load	External TK6400 Configure quantity according to current range	Built-in 500A load, can be equipped with another TK6400 to meet 1kA measurement needs

## Wireless Tablet (optional)



- Optional tablet, which can communicate with TK6500 host in real time via WIFI. Users can take photos of the indication of the inspected welding machine with the tablet to record the value.
- Support tablet computer APP to graphically display multiple parameters such as measured waveform, harmonic spectrum, trend change chart, etc.
- Built-in memory, test data of the DUT can be quickly saved on site.
- After calibration, the original data can be exported to the computer through the USB flash drive for sorting and analysis.

# STABILIZED POWER SUPPLY VERIFICATION



The portable DC stabilized power supply calibration device consists of modules for DC voltage measurement, DC current measurement, oscilloscope, and clock measurement. TUNKIA equipment can be used to measure the voltage and current settings and indications of DC stabilized power supplies, as well as parameters such as voltage adjustment rate, load adjustment rate, short-term stability, ripple, and load transient recovery time.

## Feature

- DCV measurement: 0.1V ~ 1100V, class 0.01.
- DCI measurement: 1 mA ~ 22A (can be expanded through current sensor), class 0.01.
- Oscilloscope module bandwidth 20 MHz.
- Designed with security protection function.
- Support user login and permission operation, manual test process, export and save test report, set device parameters, data query and call, create and call test configuration information.
- With electronic load, voltage regulator and other equipment, it can complete the full project verification of DC regulated power supply.
- Equipped with packaging box, easy to carry, very suitable for on-site testing.



(Appearance diagram, please refer to the actual product)

## DC Voltage Measurement

Voltage Range	Resolution	Measurement Uncertainty (k=2) (ppm*RD+ppm*RG) <sup>①</sup>	Temperature Coefficient @ (15~30)°C (ppm*RD+ppm*RG)/°C
1 V	1 μV	60 + 40	2.5 + 1
10 V	10 μV	60 + 40	2.5 + 0.5
100 V	100 μV	60 + 40	2.5 + 1
1000 V	1 mV	60 + 40	3.5 + 1.5

Note ①: RD is the reading value, RG is the range value

## DC Current Measurement





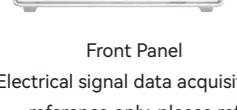
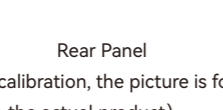
Range[1]	Resolution	Measurement Uncertainty (k=2) (ppm*RD+ppm*RG)[2]	Temperature Coefficient @ (15~30)°C (ppm*RD+ppm*RG)/°C
10 mA	10 nA	60 + 40	5 + 1.5
100 mA	100 nA	60 + 40	5 + 1.5
10 A	10 μA	60 + 40	5 + 1.5
20 A	10 μA	60 + 40	5 + 1.5

Note [1]: The range can be extended to 100A/200A/500A/1kA through a current extender  
[2]: RD is the reading value, RG is the range value

# DATA ACQUISITION SYSTEM CALIBRATION



Data acquisition instruments are widely used in industries such as aerospace, power grids, and industrial testing, including wind tunnel tests in aircraft development and environmental temperature and humidity tests. They feature multiple signal types, numerous channels, long calibration cycles, and complex manual operations. TUNKIA has developed a series of data acquisition calibration solutions to address these industry challenges, effectively improving calibration efficiency and reducing workload for operators.

Standards	Specifications
  Front Panel      Rear Panel (Strain test calibration, the picture is for reference only, please refer to the actual product)	Strain simulation range: 0 ~ 105 $\mu\epsilon$ Operating frequency range: 0 ~ 50 kHz Accuracy: class 0.01 Number of channels: Support 4*4 (strain) channels Wiring method: 4W (strain) Configure interface converter to support DB9 connector, 8-core cable, LAN and other interfaces Automatic operation can be achieved through the host computer
  Front Panel      Rear Panel (Electrical signal data acquisition calibration, the picture is for reference only, please refer to the actual product)	DCV: 0 ~ 1020 V, annual best measurement uncertainty (k=2): 10 ppm+3 $\mu\text{V}$ @3V range DCI: 0 ~ 20.5 A, annual best measurement uncertainty (k=2): 80 ppm+2 $\mu\text{A}$ @300mA range ACV: 0 ~ 1020 V, annual best measurement uncertainty: 100 ppm + 500 $\mu\text{V}$ @ 45Hz-10kHz, 30V range ACI: 0 ~ 20.5 A, annual best measurement uncertainty: 0.015% +30 $\mu\text{A}$ @45Hz-10kHz, 300mA range R: 0 ~ 1.1 G $\Omega$ , annual best measurement uncertainty (k=2): 25 ppm+0.1 $\Omega$ @10k $\Omega$ range Configure matrix switch to support multi-channel simultaneous testing and scanning testing
  Front Panel      Rear Panel (Thermal signal calibration, the picture is for reference only, please refer to the actual product)	Matrix switch thermal potential: $\leq 0.2 \mu\text{V}$ Configure the host computer software to integrate the control standard source, matrix switch, and realize automated testing Built-in signal generator, can output precise electrical signals Thermocouple analog output: B, E, K, J, N, R, S, T Thermal resistor analog output: Pt100, Pt200, Pt500, Pt1000, Cu50, Cu100 Low current output: 0 ~ 20 mA Equipped with 6*8 channel matrix switch, it can realize multi-channel parallel testing, and each channel can be flexibly selected Matrix switch thermal potential: $\leq 0.2 \mu\text{V}$ Configure the host computer software to realize automated testing

## Strain Tester Calibration Device

This instrument is a high-precision, wide-range strain gauge tester calibration device. It can simulate equivalent strain variables through precise voltage ratio output, making it highly suitable for the calibration of strain gauges and improving calibration efficiency.

Reference Standard: JJG 623-2005 [Verification Regulation of Resistance Strain Gauge Indicators](#)



### Interface Conversion

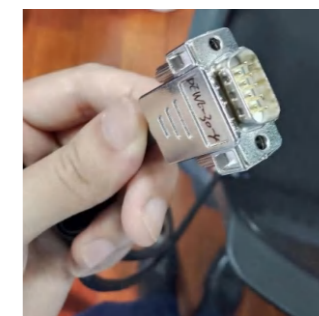
Different strain gauges have different interface types. According to previous market research, strain gauge interfaces include DB9 (DEWE, DEWESOFT), 8-core cable (HBM), and LAN (HBM). To meet different interface requirements, an interface converter is required. The preliminary design of its functional structure is shown below:



Interfaces:



8-core Cable Row



DB-9

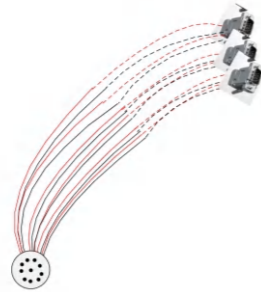
## Electrical Signal Data Acquisition System Calibration Device

This instrument is a high-precision electrical signal data acquisition instrument calibration system. It can realize flexible selection of multiple channels through matrix switches. It is very suitable for calibration of electrical signal data acquisition instruments such as AC and DC voltage, AC and DC current, resistance, frequency, etc.



### Interface Conversion

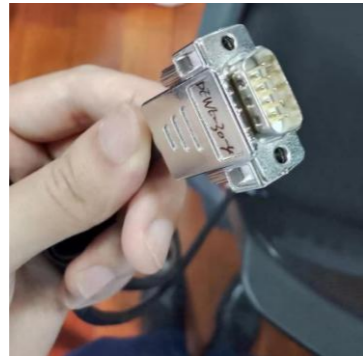
Different data loggers have different interface types. According to previous market research, data logger interface types include DB9 (DEWE), DEWESOFT, 8-core busbar (HBM), and DB78 (514). To meet different interface requirements, an interface converter is required. The functional structure is initially designed as follows (taking LEMO-DB9 as an example):



### Interfaces:



8-core Cable Row



DB-9



DB-78



## Thermal Data Acquisition System Calibration Device

This instrument is a high-precision thermal signal data acquisition instrument calibration device, which consists of a signal output standard and a matrix switch. The matrix switch can realize flexible selection of 6\*8 channels. It is very suitable for calibration of signal data acquisition devices such as thermocouples, thermal resistors, and small currents.

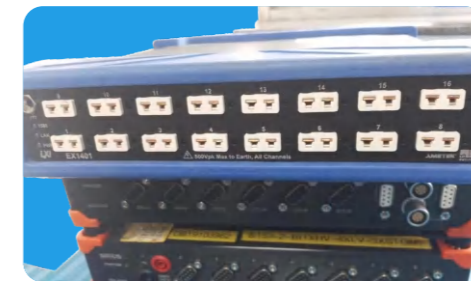


### Interface Conversion

Different signal interfaces have different forms. According to the previous market research, the interface forms include metal plug type (thermocouple) and banana head type (thermal resistor). In order to meet the needs of different interfaces, an interface converter is required. The preliminary design of its functional structure is as follows:

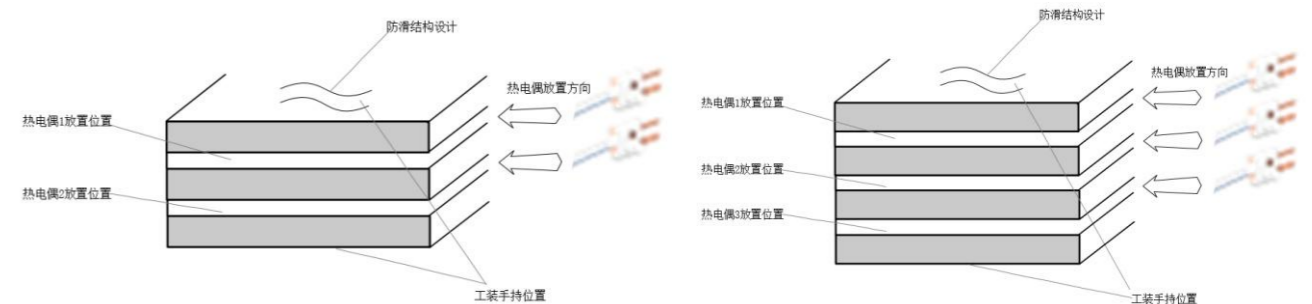


The pictures of the DUT on site are as follows:



Considering the heavy operation of on-site thermocouple wiring, it is planned to develop a thermocouple wiring tool that can plug and unplug two/three thermocouples at the same time. The design diagram is as follows:

- Note: ① This diagram is only for illustration, and the specific design needs to be determined according to the size of the DUT;  
② The tooling structure can be flexibly configured according to different DUT.



Schematic diagram of double-layer thermocouple structure clamping fixture

Schematic diagram of three-layer thermocouple structure clamping fixture

# TUNKIA

## SENSOR TESTING

Sensors are detection devices that can sense the information being measured and can transform the sensed information into electrical signals or other required forms of information output according to certain rules to meet the requirements of information transmission, processing, storage, display, recording and control.

Its application field is very wide and has long penetrated into many industries in industrial production, such as new energy vehicles, rail transportation, photovoltaic energy storage, low-voltage electrical appliances, space development, ocean exploration, medical diagnosis, etc.

# 02



# SENSOR TESTING SOLUTIONS



## Current Sensor Detection



Current Sensors/Shunts

Limit, precision and stability, all three can be achieved at the same time



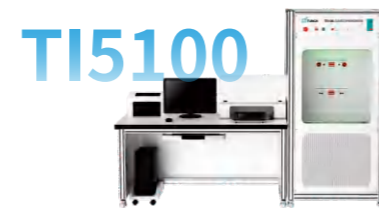
Product	Model	Specification
DC Detection	TI5000 DC Current Sensor Testing Device	Class 0.01/0.02/0.05, N*500A, short-term stability 0.003%/min, suitable for batch testing.
AC DC Detection	TI5300 AC and DC Current Sensor Testing Device	DC current output: $\pm(60 \text{ mA} \sim 120 \text{ A})$ , class 0.01; AC current output: $60 \text{ mA} \sim 120 \text{ A}$ , class 0.02.
High Current Detection	TI2000 DC High Current Standard Source (optional)	Class 0.02/0.05, maximum 1000 A, short-term stability 0.005%/h, suitable for batch testing.
	TI2100 High Stability DC High Current Source Standard(optional)	Class 0.01, N*1.5 kA, short-term stability 0.003%/FS, suitable for batch testing.
	TD2010 DC High Current Standard Source (optional)	Class 0.01/0.02/0.05, maximum 15 kA, typical peak stability 15 ppm, variance stability 6 ppm.
Small Signal Current Detection	TD1500 High-precision DC Testing System (optional)	Class 0.01/0.02/0.05, $1 \mu\text{A} \sim 120 \text{ A}$ , benchtop.

## Voltage Sensor Detection



Voltage Sensor

Modular design, expandable functions



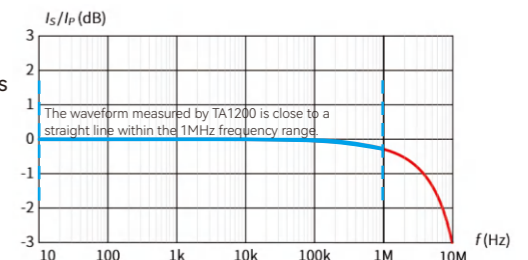
Product	Model	Specification
DC Voltage Sensor	TI5100 DC High Voltage Sensor Testing Device	Class 0.02/0.05, 10N~NkV, short-term stability 0.01%/min.

# RESPONSE

## Frequency Response

### Bandwidth Detection -3dB Bandwidth

The effective bandwidth of a circuit or system refers to the frequency point when the gain is -3dB. The -3dB frequency point is the half-power point. As can be seen from the figure on the right, within the 1MHz frequency range, TA1200 can output a stable and reliable high-frequency current signal to measure the frequency response bandwidth characteristics of the sensor.

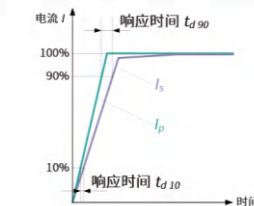
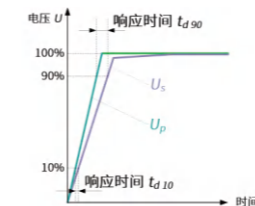


Product	Model	Specification
High Frequency Constant Current Source	TA1200 High Frequency Transconductance Amplifier	Wideband current output: $1 \text{ mA} \sim 10.5 \text{ A}$ , DC & $10 \text{ Hz} \sim 1 \text{ MHz}$ Short-term stability: 0.1%/min@1MHZ
	TA1100 Transconductance Amplifier	Wideband current output: $0.2 \text{ mA} \sim 100 \text{ A}$ , DC~100kHz Short-term stability up to 0.004%

## Time Response Detection

Voltage:  $dU/dt$  rate up to  $200 \text{ V}/\mu\text{s}$

Current:  $dI/dt$  rate  $50 \text{ V}/\mu\text{s}$  (up to  $100 \text{ A}/\mu\text{s}$ )



Product	Model	Specification
Pulse Voltage Source	TK2600 Pulse Voltage Source	Pulse voltage output: $200 \text{ V} \sim 2 \text{ kV}$ , rise time $\leq 10 \mu\text{s}$ , pulse width $1 \text{ ms} \sim 100 \text{ ms}$
Pulse Current Source	TK2650 Pulse Current Source	Pulse current output: $500 \text{ A}$ , rise time $\leq 10 \mu\text{s}$ , pulse width $1 \text{ ms} \sim 100 \text{ ms}$



# TUNKIA

## EV CHARGING FACILITY TESTING

With the rapid development of the domestic new energy and electric vehicle industries, TUNKIA has also developed a series of advanced original definition instruments. This has formed a comprehensive system covering on-site metrology verification, acceptance and operation, onboard testing, full-performance evaluation, traceable calibration, and supercharging facility testing solutions. In terms of completeness of product offerings, technical performance, market share, and user reputation, TUNKIA leads internationally.

# 03

# EV CHARGERS TESTING



## On-site Metrology Verification Solution for Electric Vehicle Charging Facilities



Application	Type	Model	Name	Specification	Feature
Metrology Verification	Metrology Verification for off-board Chargers	TK4850A	Off-board Charger Verification Device	DC 1000 V / 250 A, class 0.05	Unattended, vehicle as load
		TK4850B	Off-board Charger Verification Device	DC 1000 V / 250 A, class 0.05	Built-in cable, vehicle as load
		TK4850C	Off-board Charger Verification Device	DC 1000 V / 250 A, class 0.05	Equipped with waterproof box, vehicle as load
		TK4850D	Off-board Charger Verification Device	DC 1000 V / 250 A, class 0.05	Equipped with waterproof box, vehicle as load/resistance load
		TK4850E	Off-board Charger Verification Device	DC 1000V / 250A, class 0.05, built-in 8kW load	Built-in load/vehicle as load/resistance load
	Metrology Verification for AC Chargers	TK4860A	AC EV Charger Verification Device	AC three-phase 380 V / 72 A, class 0.05	Unattended, vehicle as load
		TK4860B	AC EV Charger Verification Device	AC three-phase 380 V / 72 A, class 0.05	Built-in cable, vehicle as load
		TK4860C	AC EV Charger Verification Device	AC three-phase 380 V / 72 A, class 0.05	Equipped with waterproof box, vehicle as load
		TK4860D	AC EV Charger Verification Device	AC three-phase 380 V / 72 A, class 0.05	Equipped with waterproof box, vehicle as load/resistance load
		TK4860E-S	AC EV Charger Verification Device	AC single-phase 220 V / 36 A, class 0.05, built-in 8 kW load	Supports single-phase charger testing only, Built-in load/vehicle as load/resistance load
TK4860E-T	AC EV Charger Verification Device	AC three-phase 380 V / 72 A, class 0.05, built-in 8kW load	Supports single-phase/three-phase charger testing, Built-in load/vehicle as load/resistance load		
On-site Verification/Acceptance	Portable	TD1320	Portable Tester for DC EV Chargers	DC 1150 V / 300 A, class 0.1 / 0.05	Metrology verification, interoperability testing, communication protocol conformance testing
		TD1330	Portable Tester for AC EV Chargers	AC 3-phase 300 V / 78 A, class 0.1 / 0.05	Metrology verification, interoperability testing
Vehicle-mounted Verification/Testing	Vehicle-mounted Comprehensive Testing	TK403A	Mobile Comprehensive Testing System for AC/DC Chargers	120 kW / 180 kW, available for V 80 and Transit	Metrological verification, factory inspection, arrival inspection
		TK408A	Mobile Verification System for AC/DC Chargers (DC*1, AC*1)	Metrological, 120 kW / 180 kW, available for V 80 and Transit	Metrological verification, support simultaneous testing of one DC charger and one AC charger
	Vehicle-mounted Metrological Verification	TK408B	Mobile Testing System for AC/DC Chargers (DC*2, AC*1)	Metrological, 180 kW, available for V 80 and Transit	Metrological verification, support simultaneous testing of two DC chargers and one AC charger
		TK408C	Mobile Testing System for AC/DC Chargers (DC*2, AC*2)	Metrological, 180 kW, available for V 80 and Transit	Metrological verification, support simultaneous testing of two DC chargers and two AC chargers
Load	On-site Load	TK4710	DC Adjustable Resistive Load	20 kW / 30 kW / 60 kW	20 kW/30 kW for on-site metrology verification, 60 kW can be used for on-site acceptance
		TK4720	AC Adjustable Resistive Load	Single-phase 9 kW/Three-phase 45 kW	On-site metrology verification/acceptance
		TK4730	AC DC Portable Resistive Load	AC&DC 5 kW /AC&DC 10 kW	On-site metrology verification
	Car Load	TK4740	AC DC Integrated Adjustable Resistive Load	DC 120 kW / 180 kW, AC 3-phase 45 kW	On-board load

Note: For vehicle-mounted verification/testing solutions, DC\*1 AC\*1 means the device support testing one DC charger and one AC charger at the same time, and so on.

## Load for EV Chargers Verification


Load for On-site Verification of EV Chargers								
Model	TK4710		TK4720		TK4730		TK4740 AC DC Integrated Adjustable Resistive Load	
	DC Adjustable Resistive Load		AC Adjustable Resistive Load		AC DC Portable Resistive Load			
Picture								
Rated Power	DC 20 kW	DC 30 kW	DC 60 kW	Single-phase 9 kW	Three-phase 45 kW	AC and DC 5 kW	AC and DC 10 kW	DC 120 kW / 180 kW AC 45 kW
Max Voltage	DC 750 V	DC 1000 V	DC 750 V / 1000 V 可选	AC 264 V	AC 264 V	DC 750 V AC 264 V	DC 750 V AC 264 V	DC 750 V AC 264 V
Max Current	DC 40 A	DC 60 A	DC 120 A	AC 39.5 A	AC 75 A	—	—	DC 192 A / 256 A AC 80 A
Power Expansion	—	Support	Support	—	—	—	—	—
Weights	22 kg	35 kg	66 kg	Approx 20 kg	Approx 54 kg	Approx 15 kg	Approx 18 kg	—
Matching Equipment	TK4850 Series/TD1320		TK4860 Series / TD1330		TK4850 / TK4860 Series		TK408 / TK403A Testing Vehicle	

## On-site Comprehensive Testing Solution

EV Charger On-site Testing Solution			
Model	TD1320	TD1330	
Picture			
Specification	Accuracy	Class 0.05 , class 0.1	Class 0.05, class 0.1
	Measurement range	DC 1150 V / 300 A	AC 300 V / 78 A
Load	Resistive load	Used with TK4710 DC Resistive Load	Used with TK4720 AC Resistive Load
	EV as load	—	—
Verification Items	Metrology verification	★	★
	Communication protocol consistency	★	—
	Interoperability	★	★
	On-site acceptance	★	★
Other Functions	Ripple measurement	★	—
	Harmonic measurement	—	★
	Temperature measurement	★	★
	GPS clock	★	★
Automatic control	Notebook + PC software		
Power Supply	Mains power, built-in lithium battery, power supply from the gun head		

Note: ★ standard function, ☆ optional function, — not support

## Vehicle-mounted Testing Solution

TK408/TK403 Series EV Chargers Vehicle-Mounted Testing Solution				
Model	TK408A	TK408B	TK408C	TK403A
Picture				
Feature	Metrological(DC*1, AC*1)	Metrological(DC*2, AC*1)	Metrological(DC*2, AC*2)	DC*1, AC*1
Vehicle	Maxus V80	☆	☆	☆
	Transit	☆	☆	☆
Load	Rated Power	DC 120kW/180kW available, AC 45kW, resistive load		
	Power Distribution	—	DC load supports	DC and AC load support
Vehicle Modification	Battery capacity	10 kWh	10 kWh	10 kWh
	Cooling system	★	★	★
	Independent AC	★	★	★
Accessory	Oscilloscope	—	—	—
	Insulation resistance tester	★	★	★
	AC withstand voltage tester	—	—	—
	Handheld bluetooth thermohygrometer	★	★	★
PC and software	★	★	★	★
Verification	Metrology verification	Metrology verification (supports simultaneous testing of two DC chargers)	Metrology verification (supports simultaneous testing of two DC or AC chargers)	Metrological verification Factory inspection On-site acceptance

Note: ★ standard function, ☆ optional function, — not support

### TD1320/TD1330 Application



#### Product advantages

- Flexible load configuration, multiple load cascades can support full power testing
- Supports mandatory verification, on-site acceptance inspection and operation and maintenance inspection, with comprehensive detection capabilities
- Supports AC input, built-in lithium battery and gun head power supply modes, which can ensure long-term reliable operation on site

### TK408, TK403A Application



#### Product Advantages

- Built-in AC/DC Calibrator and Full Power Load: Capable of completing various verification and acceptance projects.
- Easy Operation: High testing efficiency with automated testing software.
- Testing Vehicle for flexible transportation.
- Independent Cooling and Air Conditioning Systems: High comfort.

## On-site Testing Special Solution

TK4850 Off-board Charger Verification Device					
Model	TK4850A	TK4850B	TK4850C	TK4850D	TK4850E
Picture					
Feature	Waterproof, dustproof and anti-theft	Built-in cable Handhel	Built-in calbe Waterproof case		Load integration Portable pull rod and rollers
Specifi-cation	Accuracy	Class 0.05 and class 0.1 available			
	Range	DCV : 200 V ~ 1000 V; DCI : 1 A ~ 250 A			
Load	EV as load	★	★	★	★
	Resistive load	—	—	—	★
	Load point	Real-time changes with new energy vehicle charging			Adjustable load point when using resistive load
Function	Single range	★	★	★	★
	ms-level cumulative power refresh	★	★	★	★
	Tesla charger test	★	★	★	★
Power supply	Gun head	★	★	★	★
	Lithium battery	★	★	★	★
	Main power	★	★	★	★
Clock Function	★	★	★	★	★
Bluetooth Thermohyrometer	☆	☆	☆	☆	☆
Automatic Control	Unmanned operation	Tablet			
Communication	4G+Alibaba Cloud	wifi / Bluetooth / 4G			
Application	Remote supervision	On-site metrology verification			

Note: ★ standard function, ☆ optional function, — not support

TK4860 AC EV Chargers Testing Device					
Model	TK4860A	TK4860B	TK4860C	TK4860D	TK4860E-S (Single-phase) TK4860E-T (Three-phase)
Picture					
Feature	Waterproof, dustproof and anti-theft	Built-in cable Handhel	Built-in calbe Waterproof case		Load integration Portable pull rod and rollers
Specifi-cation	Accuracy	Class 0.05, class 0.1			
	Range	Three-phase voltage: 220 V ± 20 % Three-phase current: 0.5 A ~ 70 A			
Load	EV as load	★	★	★	★
	Resistive load	—	—	—	★
	Load point	Real-time changes with new energy vehicle charging			Adjustable load point when using resistive load
Function	Single range	★	★	★	★
	ms-level cumulative power refresh	★	★	★	★
	Tesla charger test	★	★	★	—
Power Supply	Gun head	★	★	★	★
	Lithium battery	★	★	★	★
	Main power	★	★	★	★
Clock Function	★	★	★	★	★
Bluetooth Thermohyrometer	☆	☆	☆	☆	☆
Automatic Control	Unmanned operation	Tablet			
Communication	4G+Alibaba Cloud	wifi / Bluetooth / 4G			
Application	Remote supervision	On-site metrology verification			

Note: ★ standard function, ☆ optional function, — not support

### TK4850 (B/C/D) , TK4860 (B/C/D) Application

**Product Advantages**

- Dynamic Power Measurement Capability: Uses a vehicle as the load, closely simulating actual charging scenarios.
- No Need to Carry Resistive Load: Equipped with built-in calibration cable, ensuring high testing efficiency.
- Supports Tesla Charging Pile Verification.
- Tablet Operation: Supports remote data transmission, facilitating integration with smart metering labs and other remote management systems.

### TK4850E, TK4860E Application

**Product Advantages**

- Built-in Small Load: High testing efficiency with a single device capable of performing on-site charging pile verification.
- Expandable Load Support: Models TK4850E and TK4860E-T (three-phase) support large load expansion and can use electric vehicles as the load.
- Tablet Operation: Supports remote data transmission.



# TUNKIA

## MAGNETIC MATERIAL TESTING

TUNKIA provides comprehensive testing solutions for magnetic materials manufacturers and their downstream users, including permanent magnets, AC soft magnetic, DC soft magnetic, surface magnetic field, magnetic flux, and magnetic moment testing. Typical magnetic performance test results directly analyze the performance of devices such as transformers, motors, inductors, and filters, offering complete solutions for the entire magnetic materials industry chain in research and development, performance optimization, quality control, and applications.

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# 04

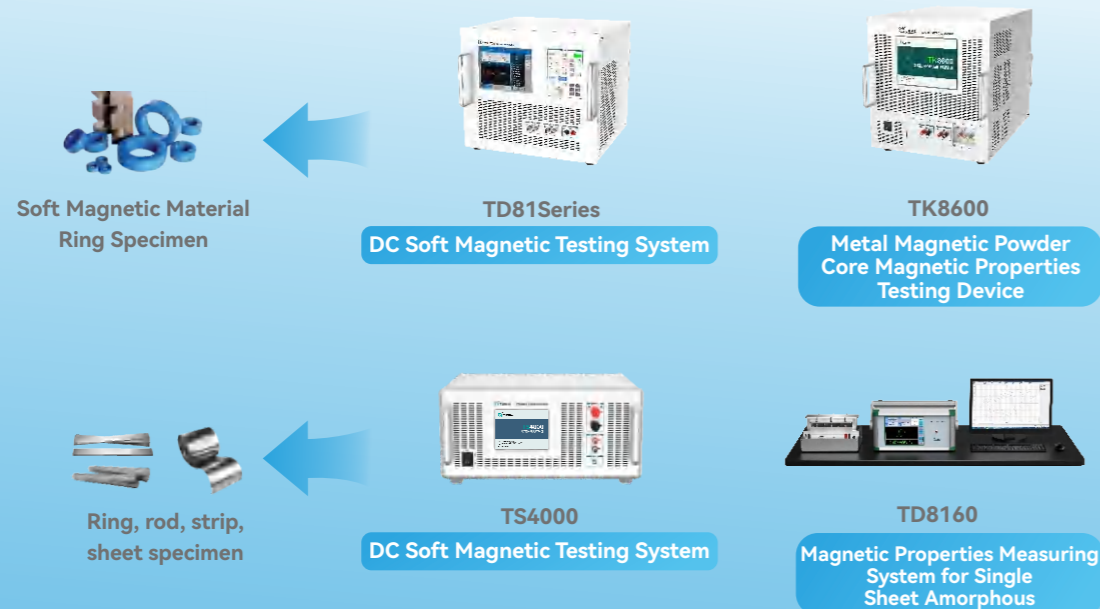
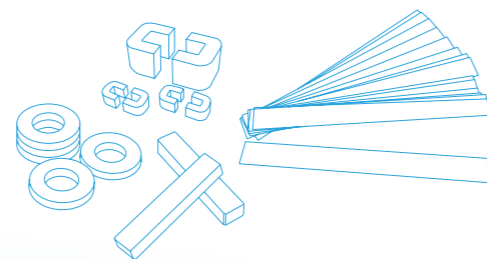
# MAGNETIC MATERIAL TESTING SOLUTIONS



## Soft Magnetic Material Testing

Magnetization occurs with coercivity ( $H_c$ ) not exceeding 1000 A/m, defining materials as soft magnetic materials. Typical soft magnetic materials achieve maximum magnetization with minimal external magnetic field, characterized by low coercive force and high magnetic permeability.

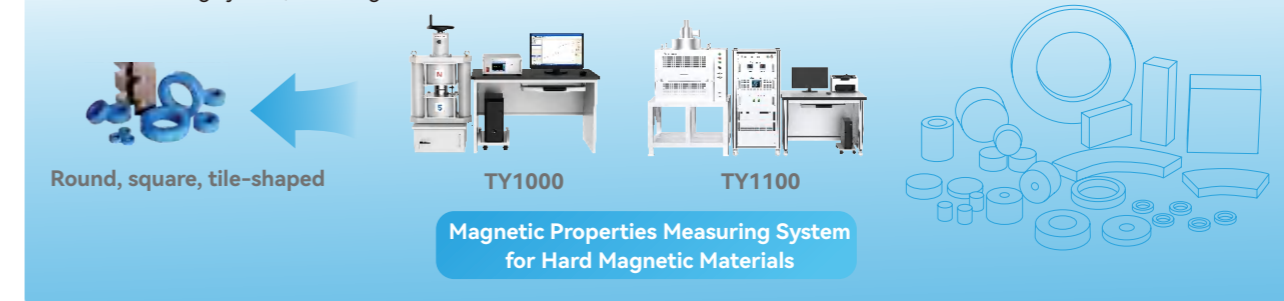
Soft magnetic materials are easily magnetized and demagnetized, widely used in electrical and electronic devices. The most common applications include iron-silicon alloys (silicon steel) and various soft ferrites.



## Permanent Magnet Material Testing

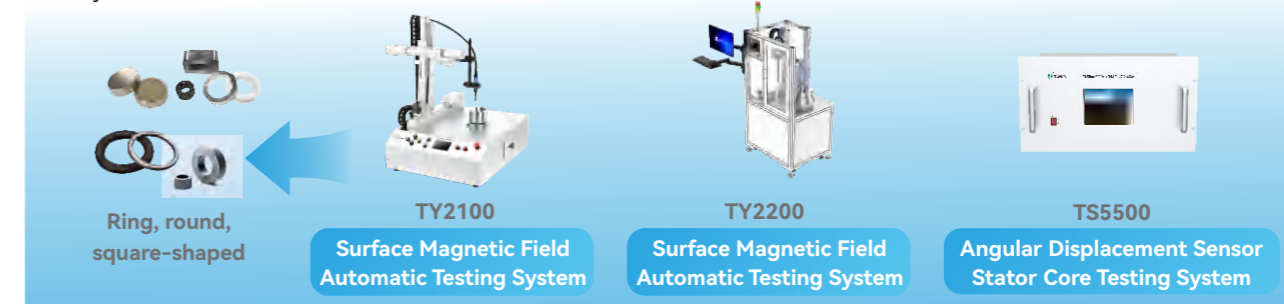
Permanent magnetic materials refer to materials that maintain constant magnetism once magnetized. They have a wide hysteresis loop, high coercivity, and high remanence. In practical applications, permanent magnetic materials often operate in the deeply saturated state and in the demagnetization section of the second quadrant of the hysteresis loop after magnetization.

TUNKIA's permanent magnet measurement products include three main types: magnetometer, surface magnetic distribution testing system, and magnetic moment tester.



## Component/Parts Testing

Through the use of Tesla meters (Gauss meters), fluxgate magnetometers, fluxmeters and other instruments, we can achieve accurate measurement of constant and alternating magnetic fields, quickly complete magnetic field measurements of components, assist in monitoring magnetic field data, improve the utilization rate of magnetic field resources, and use precision magnetic measurement technology to build new quality productivity for the manufacturing industry.



# TUNKIA

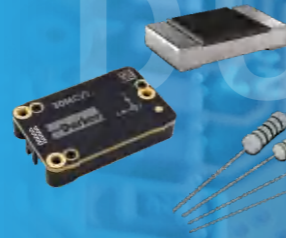
## SEMICONDUCTOR TESTING

Semiconductor testing is the key to improving the yield of semiconductor production lines and the performance of circuit module products. TUNKIA's high-precision standard electrical source meter and targeted integration solutions can be widely used in operating mode testing, characteristic testing, electrical testing, aging testing and other scenarios of components and modules such as resistors, power devices, and high-precision IF conversion modules.

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# 05

# INTEGRATED CIRCUIT TESTING, COMPONENT TESTING



TUNKIA has developed specialized scientific instruments for resistor manufacturers and downstream users. These instruments can test key performance indicators such as short-term overload, long-term lifespan, power factor analysis, and thermoelectric potential. They provide new methods for resistor R&D, testing, inspection, and evaluation, assisting industries such as defense, military, industrial instrumentation, and sensor manufacturing in establishing comprehensive performance assessment systems for resistors.

## Integrated Circuit Testing



IF conversion circuit

### TH1000 Ultra-stable Precision Current Source

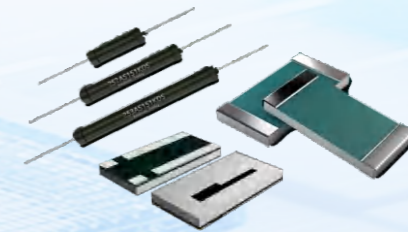
- Best uncertainty is  $\pm 15 \mu\text{A/A}$
- DC current standard source:  $\pm(0\sim 110 \text{ mA})$
- Maximum load voltage of constant current output is  $10 \text{ V}$
- Bipolar source directly generates positive and negative current through the circuit
- Rise time typical value  $<10 \text{ ms}$ , settling time typical value  $<20 \text{ ms}$
- Constant current output output ripple factor is less than  $0.001\%$  ( $<5 \text{ kHz}$ )

## Component Testing

- Annual Stability
- Temperature Coefficient
- Power Coefficient
- Thermoelectric Potential
- Overload
- 24 Service Life

### TH0260-L Precision Resistance Analyzer

- Maximum output current:  $100 \text{ A}$ , maximum test voltage:  $20 \text{ V}$
- Measurement range:  $100 \mu\Omega \sim 10 \text{ k}\Omega$  (wider range customizable)
- Typical resistance measurement uncertainty:  $3 \text{ ppm}$
- Supports short-term overload, long-term life, power coefficient, thermal potential and other tests



### TH0260-H Precision Resistance Analyzer

- Maximum test current:  $100 \text{ mA}$ , maximum output voltage:  $1000 \text{ V}$
- Measurement range:  $100 \Omega \sim 1 \text{ G}\Omega$  (wider range customizable)
- Typical resistance measurement uncertainty:  $3 \text{ ppm}$
- Supports short-term overload, long-term life, power coefficient, thermal potential and other tests





# TUNKIA

## DATA ACQUISITION & SYSTEM INTEGRATION

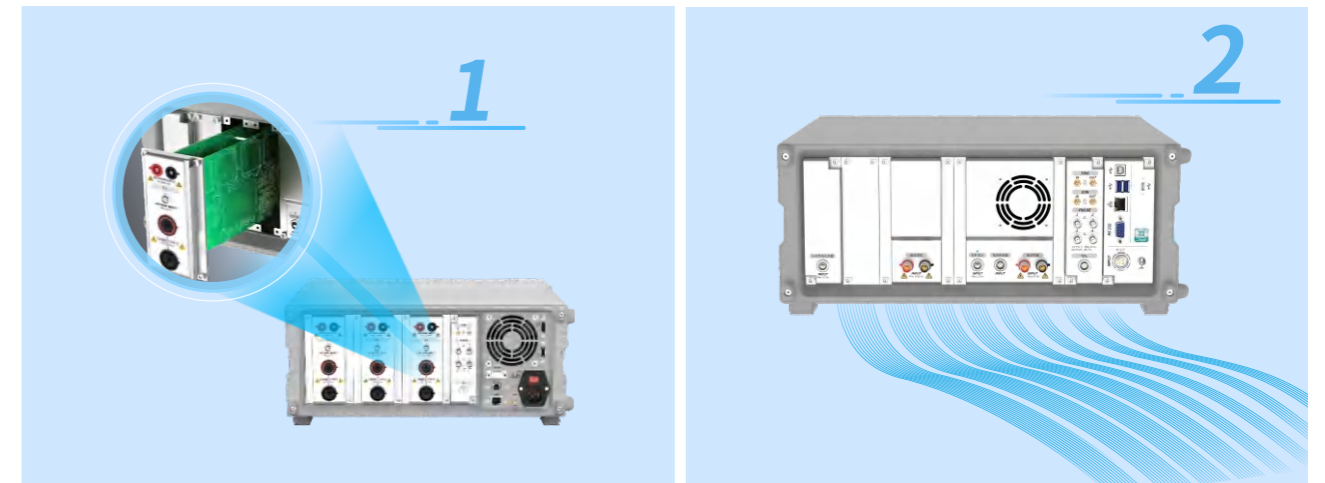
A data acquisition system is a tool for automatically collecting information from sensors and other analog and digital units under test. It is widely used in aerospace, defense manufacturing, and industrial measurement. Based on years of experience in the electromagnetic measurement field, TUNKIA will develop data acquisition systems specifically for aerospace, etc.

TUNKIA's data acquisition system ensures synchronous testing of 16 to thousands of channels, featuring high isolation, high bandwidth, flexible distributed testing, and continuous data storage.

# 06

### ① Data Acquisition and Board Cards

Compared to traditional laboratory measurement techniques, data acquisition devices and board-based structures have the advantages of numerous channels, flexible testing methods, modularization and easy maintenance. TUNKIA has developed board-based structure modules based on custom bus design, suitable for various complex testing scenarios. They are currently used in instruments such as the three-phase standard meter (TA3100), DC standard power meter (TH1300), and vector voltage analyzer (TH2000). The corresponding boards or data acquisition devices can be customized according to user requirements.



# TUNKIA

## PRODUCTION LINE AUTOMATIC TESTING

TUNKIA has mature solutions in the field of electrical steel automation testing and sensor automation testing, which solves the problems of quality control, grade selection, process improvement, and full performance testing of sensors in silicon steel production. Meanwhile, it has rich experience in the field of digital meter automation testing and functional module automation testing, and can provide complete customized solutions according to customer needs.

# 07

# AUTOMATED TESTING EQUIPMENT AND CUSTOMIZED SOLUTIONS



## Automated Testing Solution for Electrical Steel

TUNKIA provides comprehensive electrical steel automation testing solutions for large steel mills, motor and transformer manufacturers, including testing solutions for electrical steel magnetic properties, coating properties, stacking properties, magnetostriction, reflex characteristics, coating adhesion, etc., and combines intelligent and big data automated testing systems to improve the testing efficiency of electrical steel production lines and help promote the intelligent development of the industry.



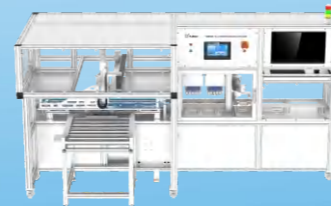
**TS3300** Electrical Steel Magnetostriction Measurement Device



**TS1780** Stacking Factor Measuring System for Electrical Steel Sheets

Electrical Steel Sheet Magnetic Properties Automatic Measurement System

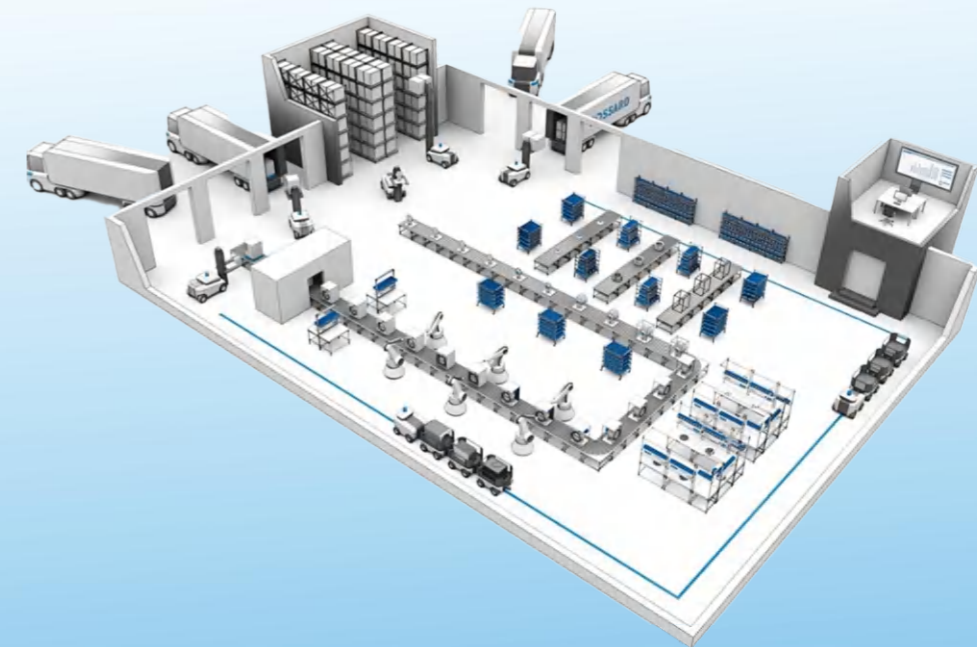
# TS3200



**TS1710** Surface Insulation Resistance Automatic Measuring System for Electrical Steel

## Automated Testing Solution for Sensors

The current sensor automated testing solution is a fully automatic testing system for current sensor calibration and calibration with high automation, high reliability, high efficiency, traceability and easy maintenance. It is compatible with automatic loading, fixture locking, automatic connection of detection tooling, electrical performance inspection, unloading and other functions.



**Automatic**

Automatic loading and unloading/ wiring/ testing



**Safety**

Transparent shielding enclosure, Safety indicator light, smart lock



**Current Source**

Single range, 0.5s settling time Bipolar design



**Customizable**

Supports customized solutions based on the type of sensor under test