

TH0400 Precision Coaxial Current Shunt



1. Summary

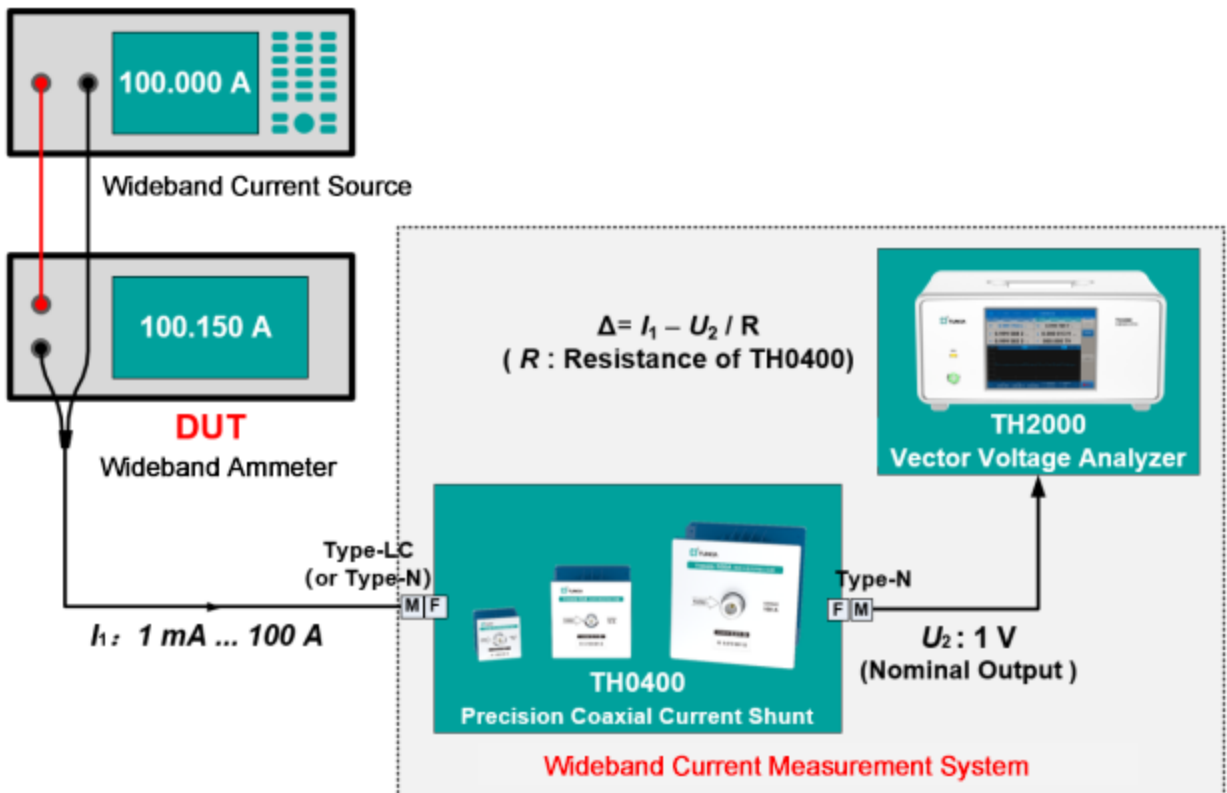
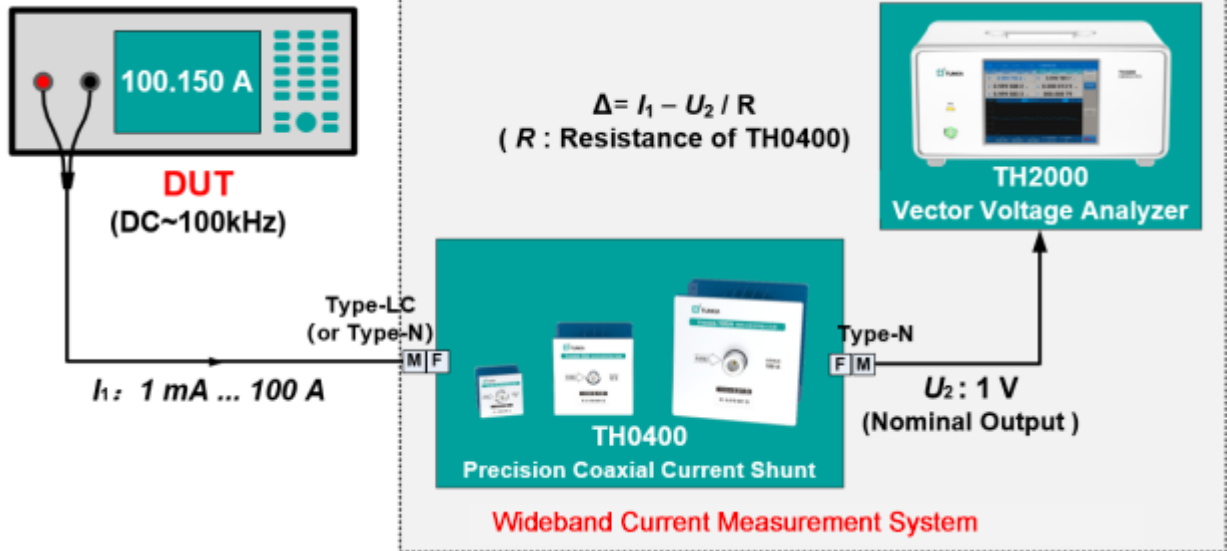
TH0400 is a series of 14 precision coaxial shunt devices of different range. It can convert the nominal input current from 1 mA to 100 A into a small voltage of 1 V to realize wideband current measurement. It is suitable for calibrating wideband current sources, transformers, sensors, etc.

2. Features

- Operating frequency: DC ~ 100 kHz
- AC/DC difference: ≤ 30 ppm@53 Hz
- Optimum phase displacement: 5 μ rad
- Nominal output voltage: 1 V (other voltage values can be customized)
- Annual variation: typical value is 5 ppm, maximum value is 18 ppm
- Can withstand the instantaneous current impact
- 1 mA, 10 mA specifications can be equipped with buffer.

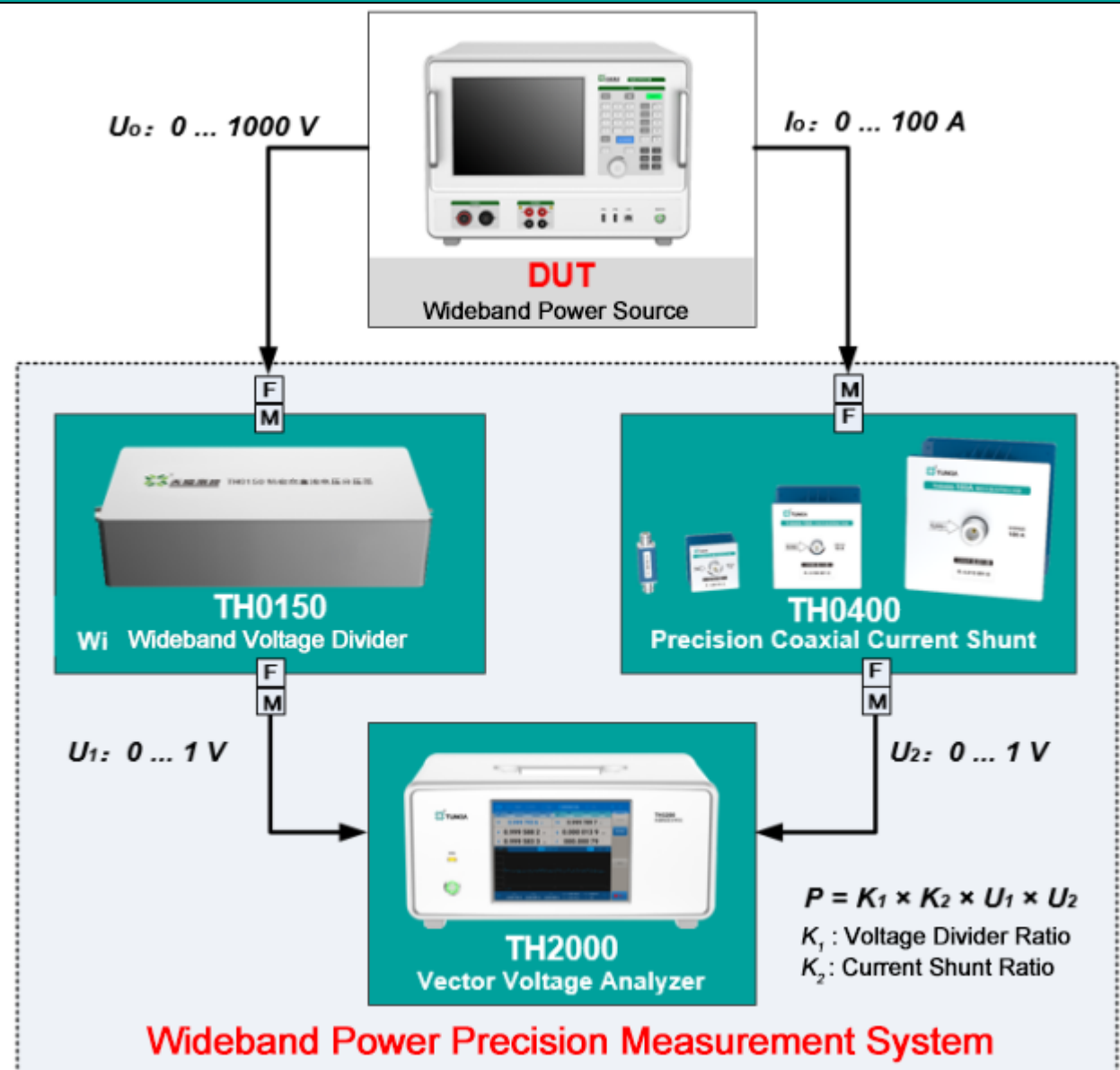
3. Applications

☆ Build Wideband Current Measurement System



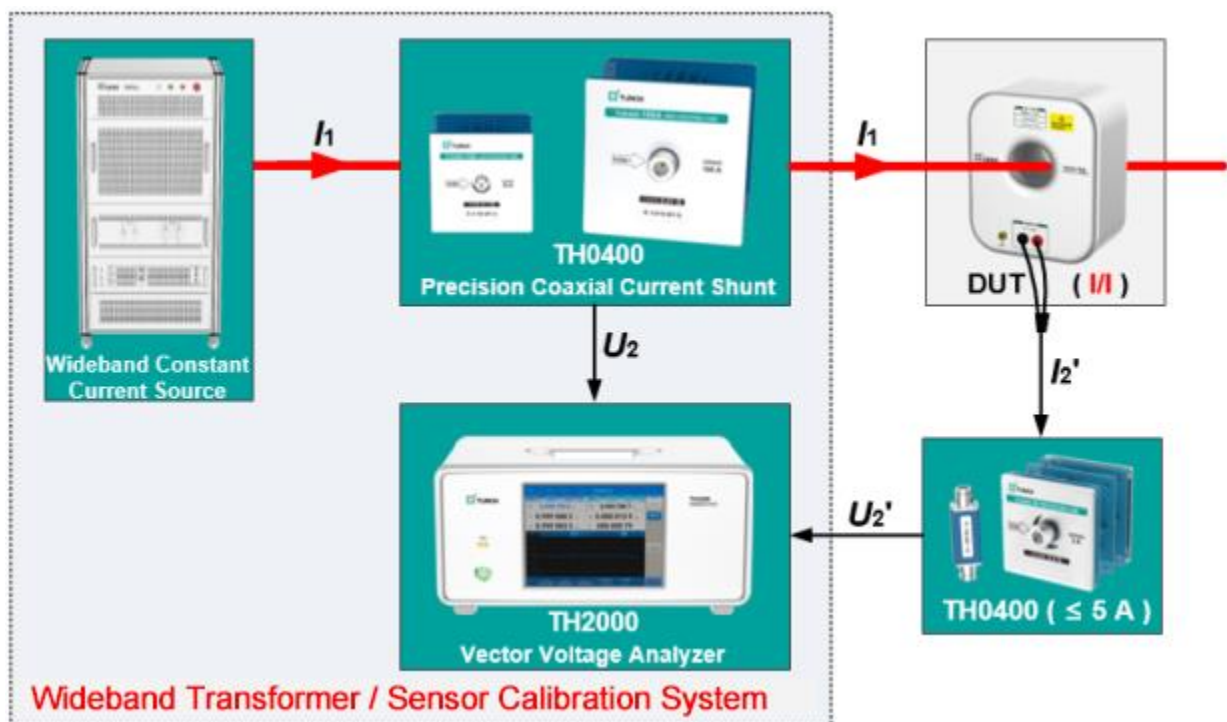
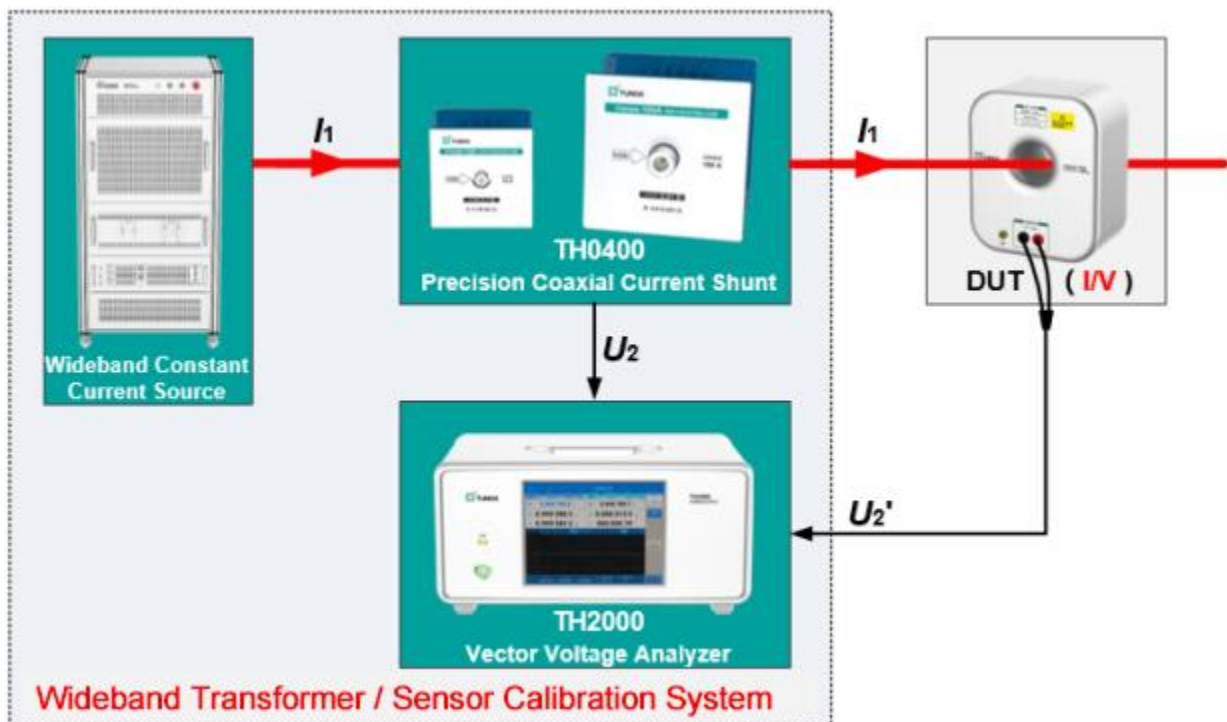
Set up wideband current measurement system with wideband current source and wideband standard voltmeter (such as TH2000 vector voltage analyzer), measure wideband current signal, and calibrate wideband current source and wideband ammeter, etc.

☆ Build Wideband Power/Energy Precision Measurement System



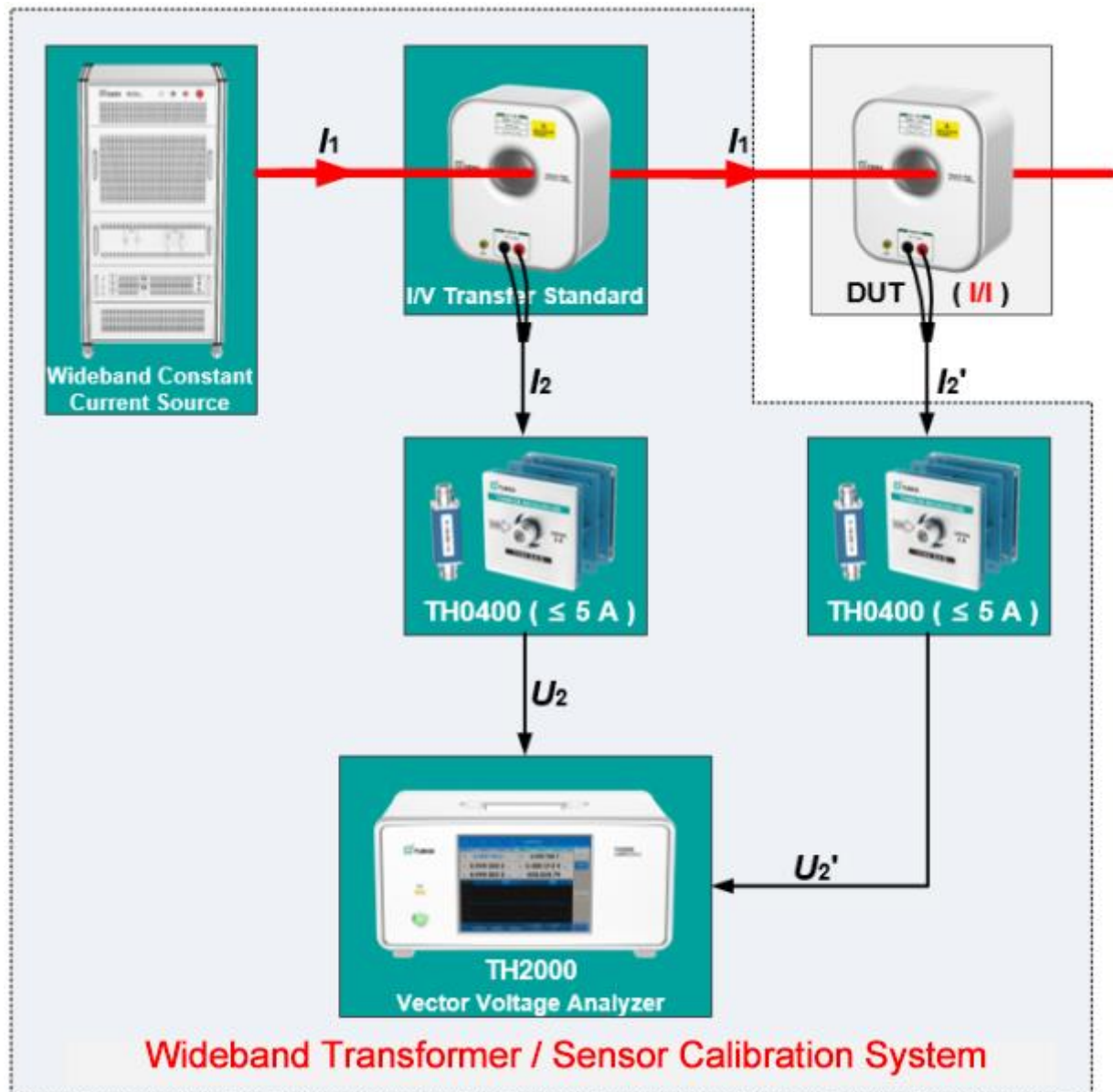
Set up wideband power/energy precision measurement system with wideband I/V conversion standard (such as TH0150 wideband voltage divider) and TH0200 vector voltage analyzer, measure wideband power/energy signal, calibrate wideband power source, wideband power meter, power analyzer and other equipment.

☆ Build Wideband Transformer/Sensor Calibration System



Set up a wideband transformer/sensor measurement system with a wideband constant-current source and a wideband sensor tester (such as TH2000 vector voltage analyzer) to calibrate the tested transformer or sensor with nominal current ≤ 100 A.

☆ Build Wide Frequency Transformer/Sensor Calibration System



For the calibration of transformer/sensor whose nominal current is greater than 100 A, TH0400 is used as the secondary signal I/V converter of the standard and equipment under inspection, and a wideband constant current source and wideband sensor tester (such as TH2000 vector voltage analyzer) are used to build a wideband transformer/sensor measurement system.

4. Specifications

4.1 Resistance Specification

Specification	Nominal resistance (Ω)	Initial deviation ^[1] ($\pm\mu\Omega/\Omega$) @ (23 $\pm$ 1) $^{\circ}$ C	Annual Stability ($\pm\mu\Omega/\Omega$)	Temperature coefficient (ppm/K)	Power factor ^[2] ($\pm$ ppm/Rated power)
TH0400-1mA	1000	50	18	2.5	1
TH0400-10mA	100	50	18	2.5	1
TH0400-20mA	50	50	18	2.5	1
TH0400-50mA	20	50	18	2.5	1
TH0400-100mA	10	50	18	2.5	2
TH0400-200mA	5	50	18	2.5	4
TH0400-500mA	2	50	18	2.5	12
TH0400-1A	1	50	18	4.0	25
TH0400-2A	500 m	50	18	4.0	25
TH0400-5A	200 m	50	18	4.0	30
TH0400-10A	100 m	50	18	4.0	60
TH0400-20A	50 m	50	18	4.0	75
TH0400-50A	20 m	50	18	4.5	100
TH0400-100A	10 m	50	18	4.5	100

Note [1]: The initial deviation is the maximum offset of the resistance under DC condition, usually the manufacturer's guaranteed value; Higher precision can be customized according to user requirements, such as 20 $\mu\Omega/\Omega$.

Note [2]: When the coaxial shunt is used to measure DCI, the resistance's own heat will lead to the change of resistance value under different input currents, thus introducing the error. The calculation formula is as follows:

$$\gamma = \text{power coefficient} \times [1 - (\text{current measurement} / \text{nominal current value})^2]$$

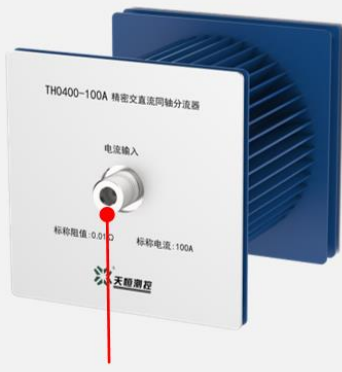
4.2 Current Measurement

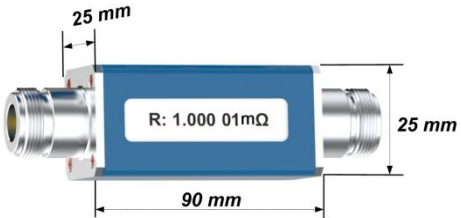
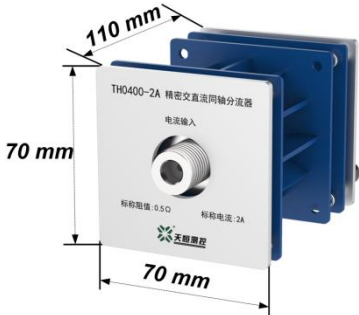
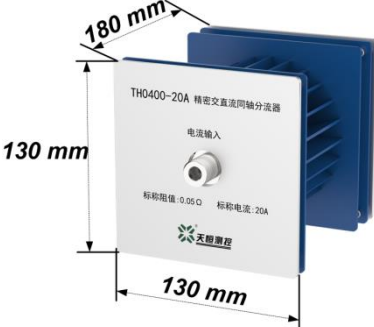
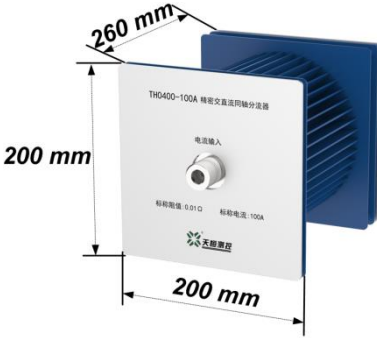
Specification	Primary nominal current (A)	Secondary nominal voltage (V)	AC/DC difference ^[3] (±ppm)			Maximum operating current (A)	Instantaneous current (A, <5 s)
			50 Hz	1 kHz	100 kHz		
TH0400-1mA	1 m	1	25	50	150	2m	3m
TH0400-10mA	10 m	1	20	25	50	20m	150m
TH0400-20mA	20 m	1	20	25	50	40m	250m
TH0400-50mA	50 m	1	20	25	50	100m	500m
TH0400-100mA	100 m	1	20	25	25	200m	1.5
TH0400-200mA	200 m	1	20	25	25	500m	2
TH0400-500mA	500 m	1	20	25	25	1	3
TH0400-1A	1	1	20	25	30	1.5	4
TH0400-2A	2	1	20	30	50	2.5	6
TH0400-5A	5	1	20	30	80	5.5	20
TH0400-10A	10	1	20	30	100	11	30
TH0400-20A	20	1	20	30	100	22	50
TH0400-50A	50	1	30	50	150	55	100
TH0400-100A	100	1	30	50	500	110	200
Note [3]: The measured value of AC current should be calculated according to the following formula, and the unit of the difference between AC and DC is ppm: Ac current measurement value =(voltage measurement value/calibration resistance value)×(1+ AC-DC difference /(1 000 000))							

4.3 Phase Displacement

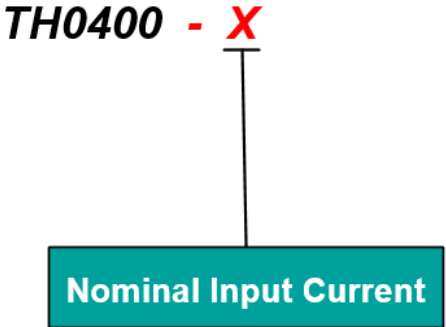
Specification	Phase Displacement ($\pm\mu\text{rad}$)					
	53 Hz	400 Hz	1 kHz	10 kHz	50 kHz	100 kHz
TH0400-1mA	10	10	15	100	500	1000
TH0400-10mA	5	5	10	100	400	800
TH0400-20mA	5	5	10	100	400	800
TH0400-50mA	5	5	10	100	400	800
TH0400-100mA	5	5	10	60	300	500
TH0400-200mA	5	5	10	60	300	500
TH0400-500mA	5	5	10	60	300	500
TH0400-1A	5	5	10	60	300	500
TH0400-2A	10	10	15	110	500	1000
TH0400-5A	10	15	25	200	1000	2000
TH0400-10A	10	20	40	300	1500	3000
TH0400-20A	10	25	50	400	2000	4000
TH0400-50A	10	30	65	500	2500	5000
TH0400-100A	20	40	80	600	3000	6000

5. General Specifications

Power supply	—
Temperature performance	Operating temperature: 13 °C ~ 33 °C; Calibration temperature: 18°C~28°C; Storage temperature: 5 °C to 45 °C Note: When stored in a harsh temperature environment, the resistance value may change temporarily and be restored to the original resistance value within the following 30 days.
Humidity performance	Operating humidity: <50% R·H Storage humidity : (15%~80%) R·H, no condensation
Connection mode	Input connection: 1 mA~20 A specifications using Type-N female plug; Type-LC female plug for 50 A and 100 A specification;  Type-N female plug  Type-LC female plug Output connection: All specifications use Type-N female plugs.

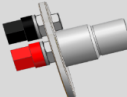
Specification	Size (mm) (W * D * H) (excluding terminals)	Weight (kg)	Size chart
TH0400-1mA TH0400-10mA TH0400-20mA TH0400-50mA	90 × 25 × 25	0.1	
TH0400-100mA TH0400-200mA TH0400-500mA TH0400-1A TH0400-2A TH0400-5A	110 × 70 × 70	0.2	
TH0400-10A TH0400-20A	180 × 130 × 130	1	
TH0400-50A TH0400-100A	260 × 200 × 200	2.5	

6. Ordering Information

 TH0400 - X Nominal Input Current	Specification	Nominal current
	TH0400-1mA	1 mA
	TH0400-10mA	10 mA
	TH0400-20mA	20 mA
	TH0400-50mA	50 mA
	TH0400-100mA	100 mA
	TH0400-200mA	200 mA
	TH0400-500mA	500 mA
	TH0400-1A	1 A
	TH0400-2A	2 A
	TH0400-5A	5 A
	TH0400-10A	10 A
	TH0400-20A	20 A
	TH0400-50A	50 A
	TH0400-100A	100 A

7. Accessories

7.1 Accessory List

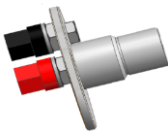
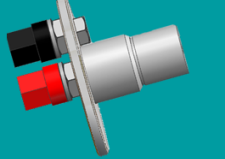
S/N	Pic	Name	Specification	Qty	Remark
1		Adapter	LC male-LC male, 100 A	1	Optional
2		Adapter	LC male-N female, 20 A	1	Optional
3		Current Connection Cable	N male-N male	2	Optional
4		Adapter	N male-terminal block	2	Optional
5		Adapter	LC male-terminal block	1	Optional
6		High-Current T-Connector	LC male connector, 100 A	1	Optional
7		Low Current T-Connector	N female connector, 20 A	1	Optional
8		Adapter	N male-BNC female	2	Optional
9		Voltage Test Lead	BNC male-BNC male	2	Optional
10		Adapter	BNC male-dual banana	2	Optional
11		Adapter	BNC female-BNC female	2	Optional
12		Voltage Test Lead	N male-N male	2	Optional
13		Precision Wideband Buffer	100kHz, N female input - N male output	1	Optional

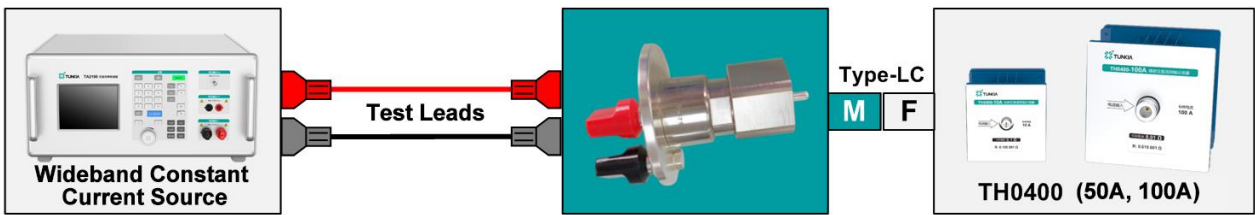
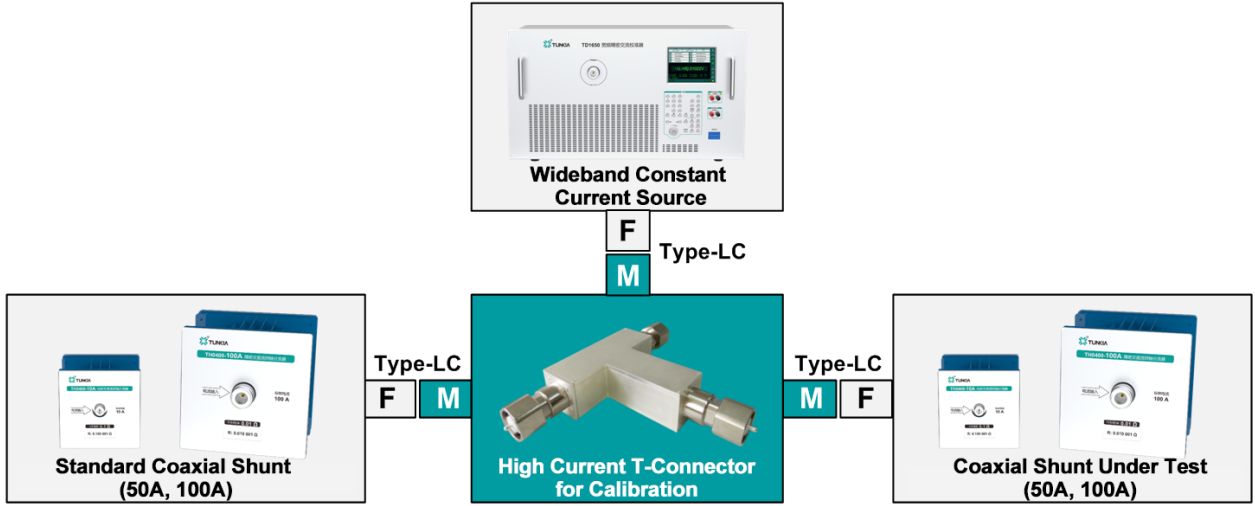
S/N	Pic	Name	Specification	Qty	Remark
14		Adapter	N female-N female	2	Optional
15		Voltage test lead	BNC male-dual banana plug	2	Optional
16		Adapter	BNC male-dual banana	2	Optional
17		Packing box	Portable storage box	1	Optional

Note: The above is the quantity included in the complete set of accessories, users can also purchase them separately. The ordering information must be specified in the contract.

7.2 Accessory Application

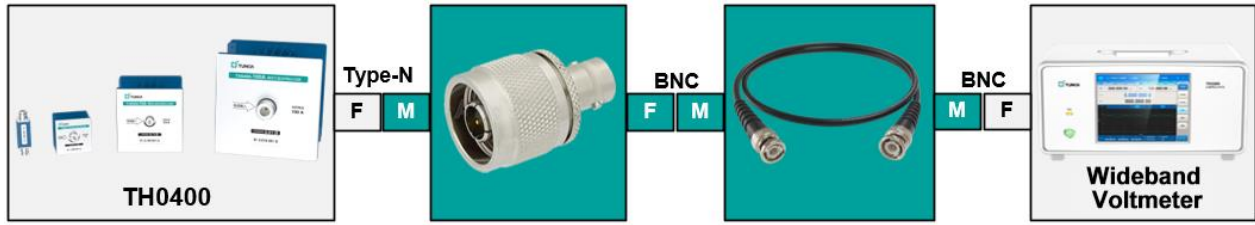
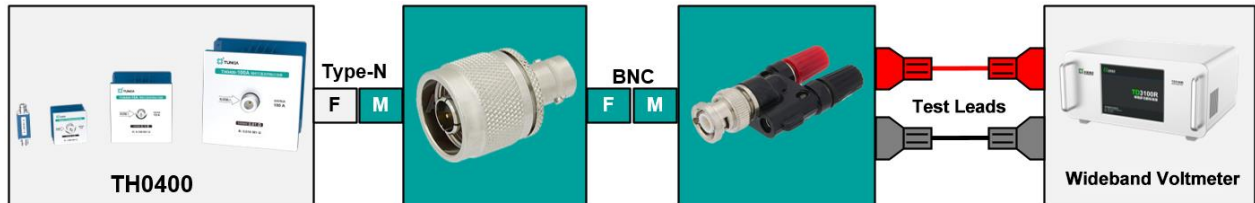
7.2.1 Current Input Terminal

Name and Picture	Qty	Application
 LC Male-LC Male	1	As a current connector, it is used to connect a wideband current source with LC female output to the TH0400 (50A, 100A specifications) with LC female input. The application diagram is shown below.
 Wideband Constant Current Source Type-LC F M  Type-LC M F  TH0400 (50A, 100A)		
 LC Male-N Female Adapter	1	As a current connector, it is used to connect a wideband current source with LC female output to the TH0400 (20A and below specifications) with N-type female input. The application diagram is shown below.
 N Male-N Male Current Input Cable	2	
 Wideband Constant Current Source Type-LC F M  Type-N F M  Type-N M F  TH0400 (≤ 20 A)		
 N Male-Terminal Block Adapter	2	As a current connector, it is used to connect a wideband current source with conventional wiring terminals to the TH0400 (20A and below specifications) with N-type female input. The application diagram is shown below.
 Wideband Constant Current Source Test Leads  Type-N M F  TH0400 (≤ 20 A)		

Name and Picture	Qty	Application
 LC Male-Terminal Block Adapter	1	As a current connector, it is used to connect a wideband current source with conventional wiring terminals to the TH0400 (50A and 100A specifications) with LC female input. The application diagram is shown below.
		
 High Current T-Connector for Calibration	1	As a current connector, it is used to connect the wideband current source, standard coaxial shunts with a nominal current of 50A or 100A, and the coaxial shunt under test in series for the calibration of coaxial shunts. The application diagram is shown below.
		

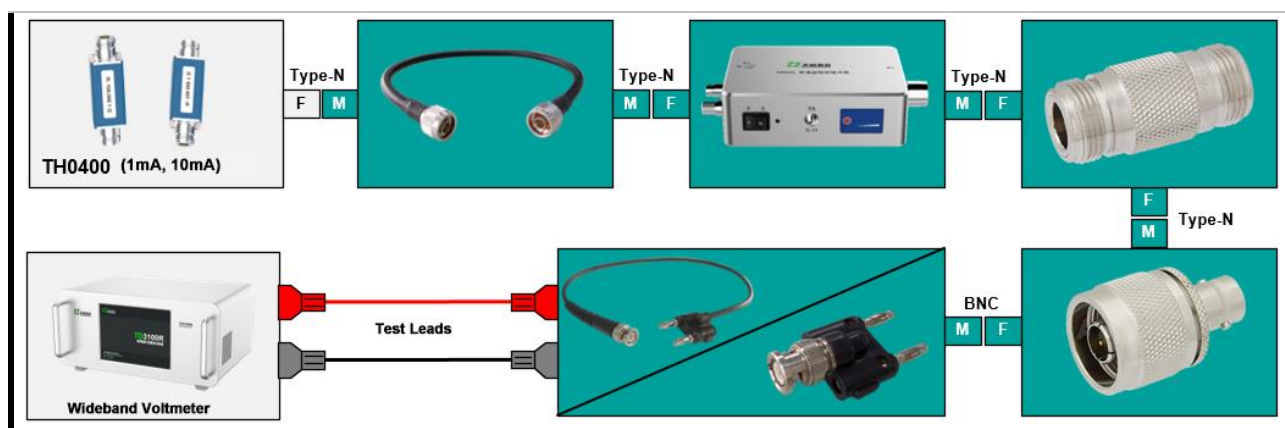
Name and Picture	Qty	Application
 Low Current T-Connector for Calibration	1	As a current connector, it is used to connect the wideband current source, standard coaxial shunts with a nominal current $\leq 20\text{A}$, and the coaxial shunt under test in series for the calibration of coaxial shunts. The application diagram is shown below.
 Wideband Constant Current Source Test Leads  N Male-Adapter for Wiring Terminal Type-N M F  Low Current T-Connector for Calibration F M Type-N  N Male-N Male Current Input Line M F Type-N  Coaxial Shunt Under Test ($\leq 20\text{ A}$)  Standard Coaxial Shunt ($\leq 20\text{ A}$) F M Type-N  N Male-N Male Current Input Line M F Type-N		

7.2.2 Voltage Output Terminal

Name and Picture	Qty	Application
 N Male - BNC Female Adapter	2	As a voltage measurement connector, it is used to connect the output of the TH0400 to a wideband voltmeter with a BNC female input. The application diagram is shown below.
 BNC Male-BNC Male Connecting Cable	2	
		
 BNC Male - Dual Banana Socket	2	As a voltage measurement connector, it is used to connect BNC female connectors to gun plugs or banana plugs. The application diagram is shown below.
		
 BNC Female-BNC Female Adapter	2	It connects BNC male connectors to BNC male connectors and can be used as an adapter to extend the cable. The application diagram is shown below.



Name and Picture	Qty	Application
 N Male-N Male Voltage Test Lead	2	As a voltage measurement connector, it is used to connect the output terminal of TH0400 to the input terminal of TH0600. The application diagram is shown below.
 TH0470 Precision Wideband Buffer	1	It can convert high-impedance signals into low-impedance outputs. It is commonly used for the voltage output terminals of coaxial shunt resistors with higher resistance values, such as 1mA or 10mA. The application diagram is shown below.
 N Female-N Female Adapter	2	Used to connect N male connectors to N male connectors. The application diagram is shown below.
 BNC Male-Dual Banana Plug Test Leads	2	As a voltage connector, it is used in conjunction with an N-male to BNC-female adapter to connect the output terminal of TH0400 to the voltage input terminal (banana plug type) of a wideband voltmeter. The application diagram is shown below.
 BNC Male-Dual Banana Plug	2	



7.2.3 Other Accessory

Picture	Name	Qty	Description
	Special portable storage box	1	TH0400 special portable storage and transportation box is waterproof and dustproof, highly impact-resistant and reliable; it can accommodate a full set of coaxial shunts, making it convenient for users to use and transport.
 TH0400 full set packing diagram			