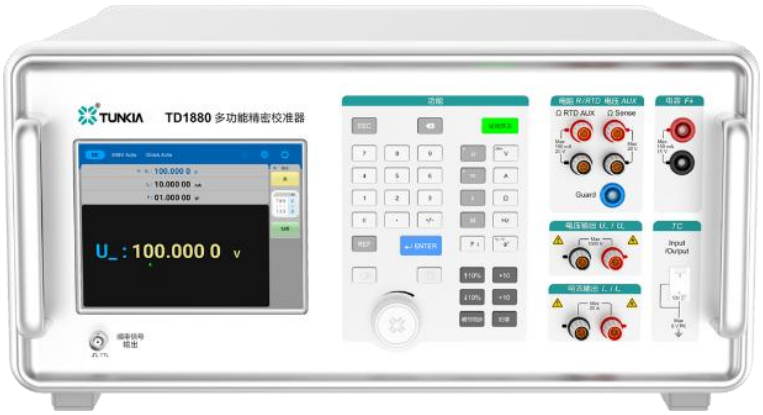
TD1880 Precision Multi-function Calibrator



1. Summary

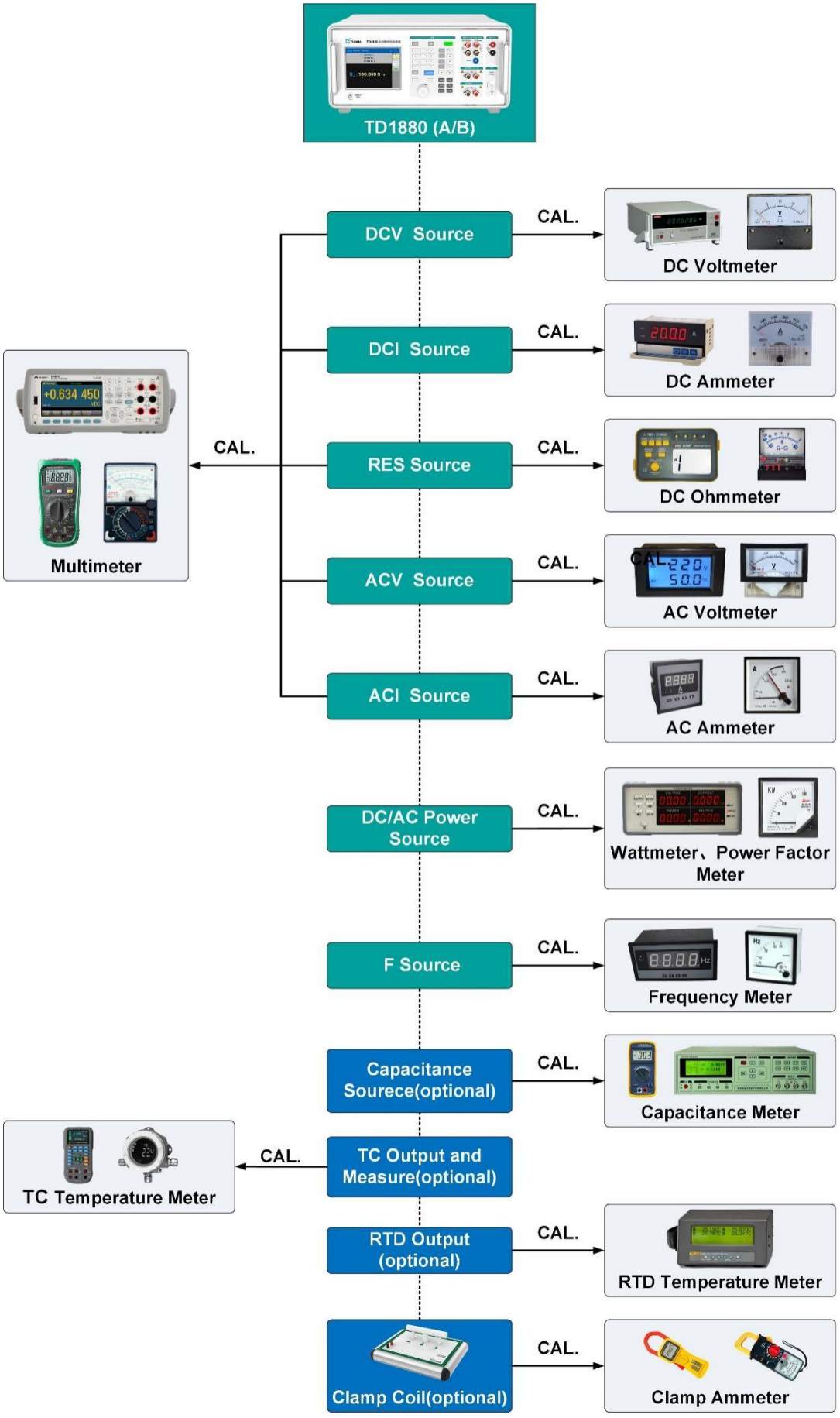
TD1880 is a wide-range, high-precision multifunctional calibrator. The instrument has built-in ultra-precision AC and DC voltage and current sources. It can output DC voltage, DC current, DC power and AC voltage, AC current, AC power, phase, frequency with excellent performance. It also has functions such as simulating resistance, capacitance, thermocouple and thermal resistor, and pulse output. It is a special equipment for calibrating six-and-a-half-digit and below digital multimeters and other precision electrical measuring instruments.

2. Features

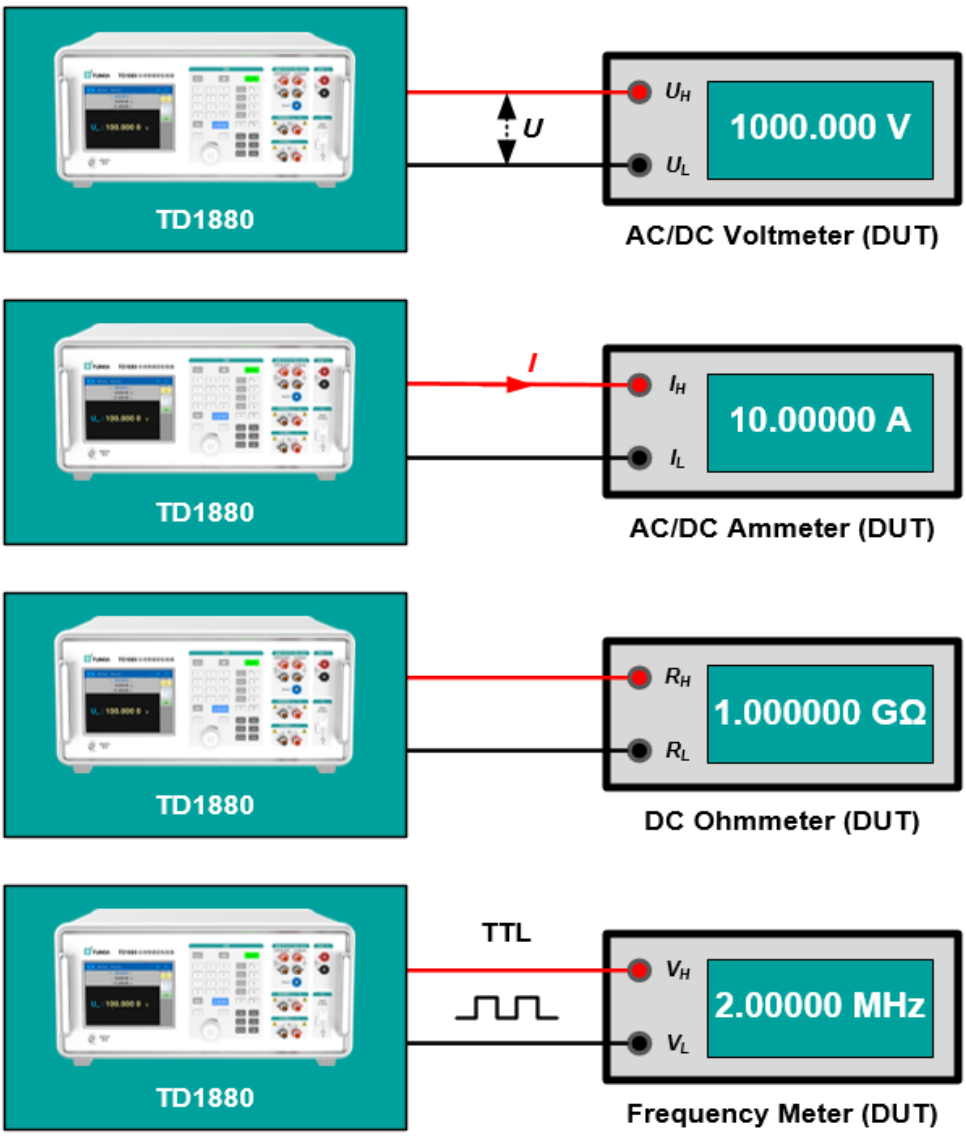
- DC voltage output: ± (0~1020 V)
- DC current output: ±(0 ~ 20.5 A)
- AC voltage output: 1mV ~ 1020 V
- AC current output: 29 μA ~ 20.5 A
- Sine wave frequency: 10 Hz ~ 500 kHz
- Simulated DC resistance: 0 Ω ~ 1100 MΩ, continuously adjustable
- 2 MHz pulse frequency output
- U-I phase adjustment output
- AC/DC power output
- Capacitance output (optional function): 1.1nF ~ 30mF, continuously adjustable
- 8 types of thermocouple output and measurement (optional function)
- 6 types of thermal resistance output (optional function)

- Multiple range output modes
- Clamp meter calibration (optional)

3. Application

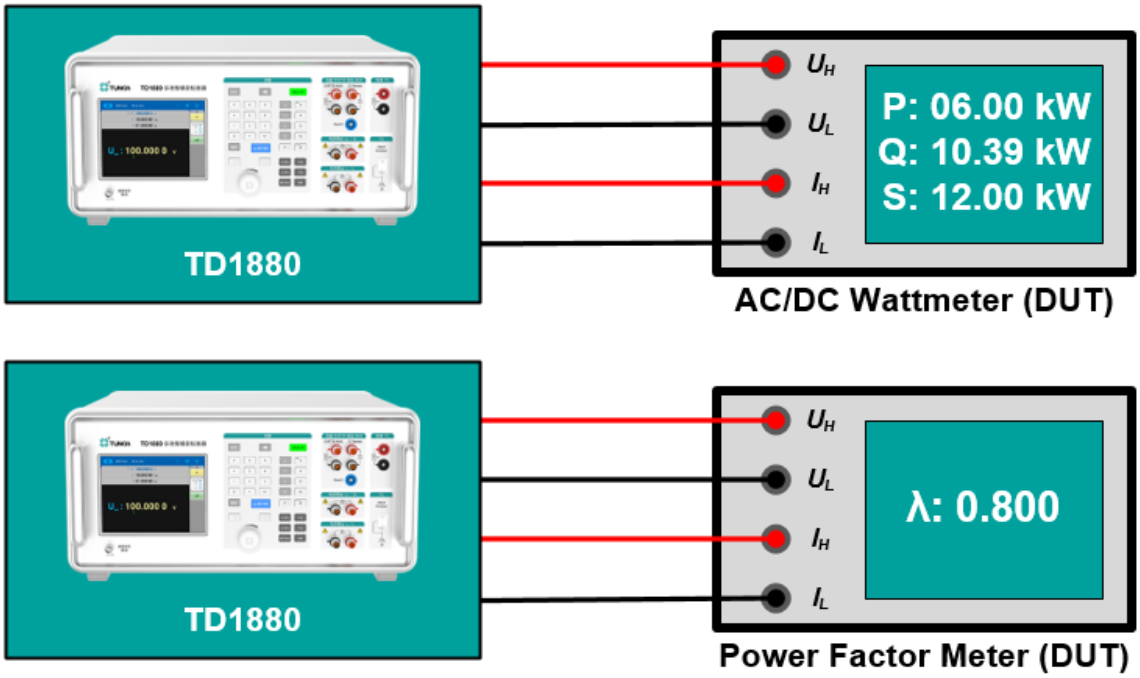


☆ Calibrate AC\DC electrical measuring instruments



- **DCV output**: ±(0 ~ 1020 V)
- **DCI output**: ±(0 ~ 20.5 A)
- **ACV output**: 1 mV~1020 V, 10 Hz ~ 500 kHz
- **ACI output**: 29 μA~ 20.5 A, 10 Hz ~ 30 kHz
- **RES output**: 0 Ω ~ 1100 MΩ, continuously adjustable
- **F output**: 1 Hz ~ 2 MHz
- Suitable for calibrating 6.5-digit and below digital multimeters, class 0.01 and below DC voltmeters and DC resistance meters, class 0.05 and below DC ammeters and AC voltmeters, class 0.1 and below AC ammeters, and class 0.01 and below frequency meters.

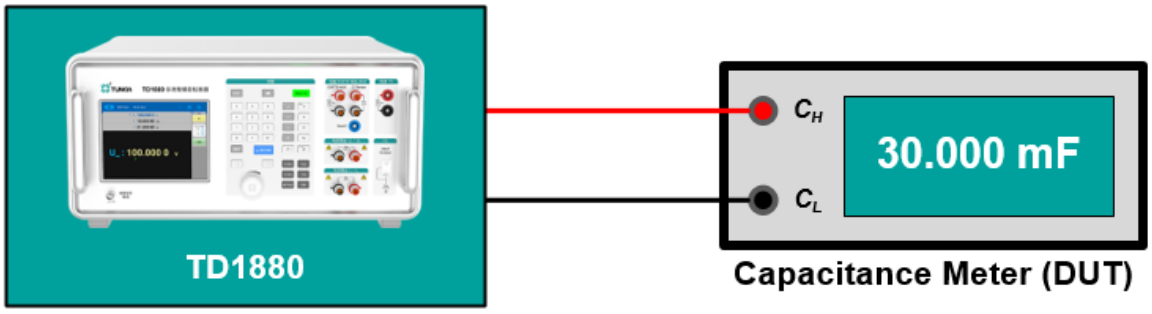
☆ Calibrate AC/DC power meters



- **Application :** The virtual power standard source consists of independent outputs of AC and DC voltage (DCV / ACV) and AC and DC current (DCI / ACI) with adjustable phase, which is suitable for calibrating conventional AC and DC power meters with U-I measurement method.

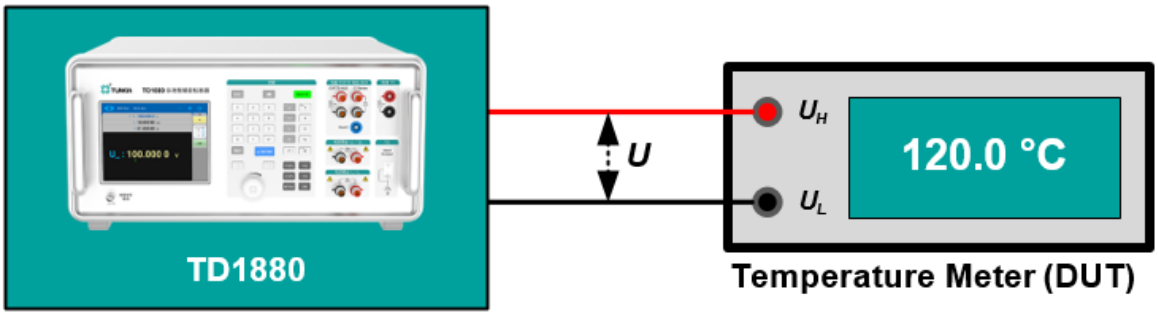
- Suitable for calibrating DC power meters of class 0.05 and below, active power meters of class 0.1 and below, reactive power meters, apparent power meters, power frequency phase meters, power factor meters, and power analyzers.

☆ Calibrate capacitance meters(optional)



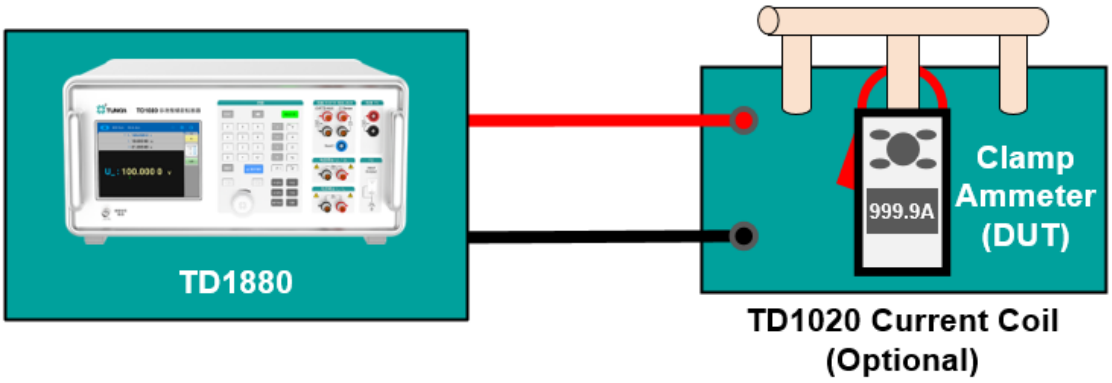
- Capacitance output: 1.1 nF ~ 30 mF, 0 Hz ~ 3 kHz
- Suitable for calibrating capacitance meters and capacitance testers of class 1 and below.

☆ Calibrate temperature meters(optional)



- Thermocouple (TC) output and measurement types: B, E, J, K, N, R, S, T (8 types in total)
- Thermal resistance (RTD) output types: Pt385-100Ω, Pt385-200Ω, Pt385-500Ω, Pt385-1000Ω, Cu50, Cu100 (6 types in total)
- Applicable to calibrate the corresponding thermocouple temperature meters and thermal resistance temperature meters of the above types.

☆ Calibrate clamp ammeter (optional)



- Users can choose TD1020 current coil (50 turns), pass 20 A AC and DC standard current, and achieve equivalent current output of up to 1000 At, which is suitable for calibrating clamp ammeters or current clamps with lower accuracy of lclass 1 and below.
- If you need to calibrate a clamp ammeter with higher accuracy, you can choose clamp

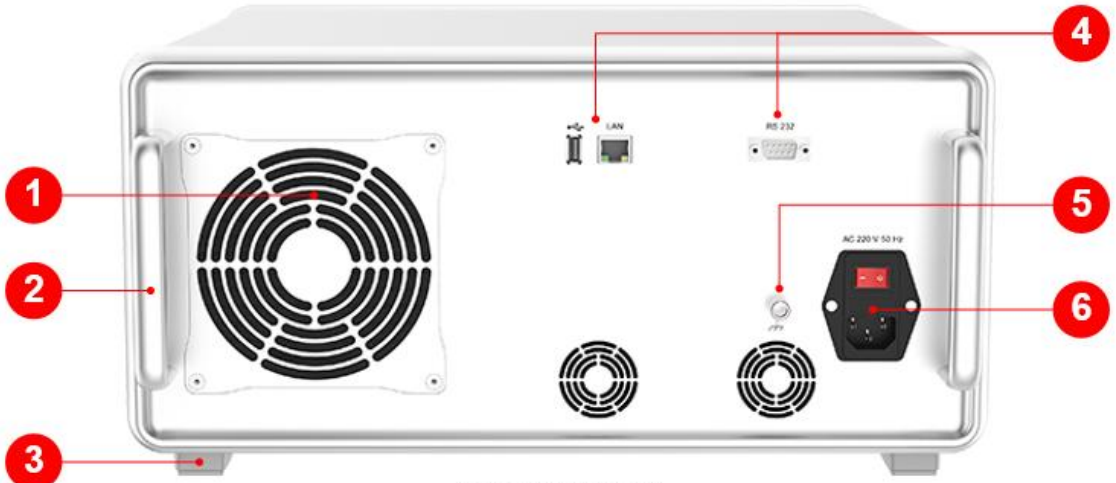
ammeter calibration device products such as TD1050 from Tunkia.

4. Panel Features

☆ Front panel

S/N	Description
1	**LCD touch color screen:** intuitive display of multiple power levels and touch operation greatly improves the usability of the instrument.
2	**Key operation panel:** multiple value input and adjustment modes greatly improve the convenience of instrument operation.
3	**Pulse frequency output terminal:** BNC female.
4	**Common output terminal for resistor/thermal resistor:** Maximum voltage 20 V, maximum current 150 mA.
5	**Capacitor output terminal:** uses protected terminal, maximum voltage 15 V, maximum current 150 mA.
6	**AC and DC voltage output terminals:** low thermal potential terminals made of tellurium copper plated with gold, maximum voltage 1000 V.
7	**Thermocouple output terminal:** dedicated TC test connection socket.
8	**AC and DC current output terminals:** can be connected to Φ4 gun plug or U-shaped plug, supporting a maximum current of 20 A.

☆ Rear/Side Panel



Rear Panel

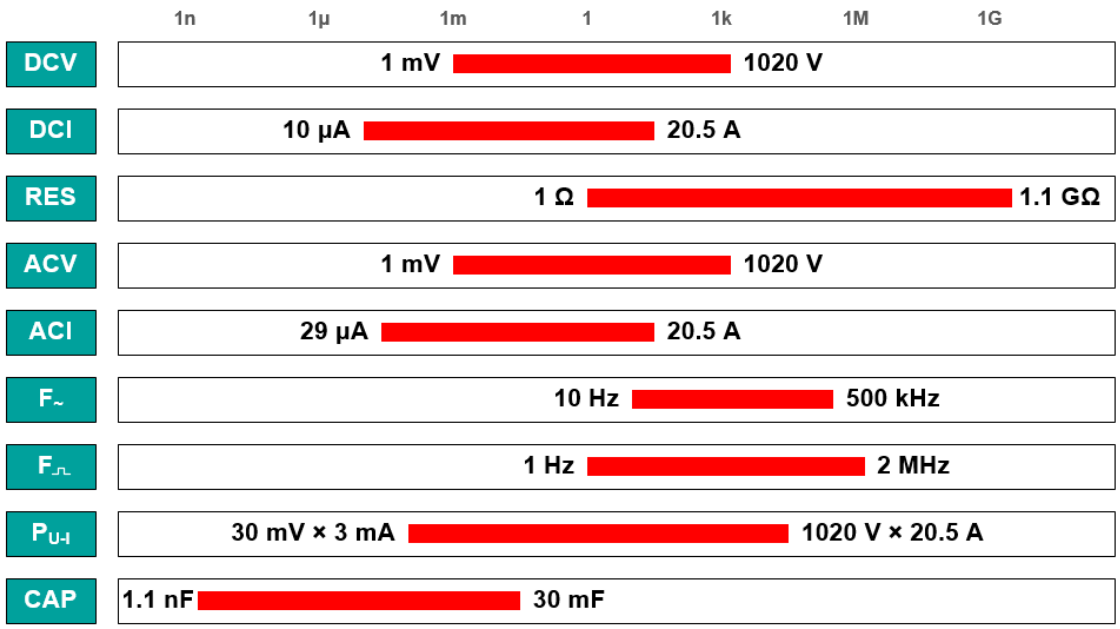
Side Panel

S/N	Description
1	**Instrument heat dissipation port:** Heat is dissipated through the built-in radiator and fan to ensure the stability of the internal temperature of the instrument and improve measurement accuracy.
2	**Handle:** The front and rear panels are each equipped with a pair of handles to facilitate users to move or carry the instrument. They are also used to protect the various connection terminals or interfaces on the front and rear panels of the instrument from being bumped or damaged during movement or transportation.
3	**Foldable rubber feet:** Raise the instrument slightly at an angle to obtain the best operating and reading viewing angle.

4	**Communication interface:** including USB/LAN/RS232, which can be connected to the computer to facilitate the user to program and control the output of the multi-function standard source.
5	**Casing ground interface:** The instrument should be grounded before operation to ensure electrical safety.
6	**Power switch and interface:** rocker switch, AC 220V power input interface with fuse.

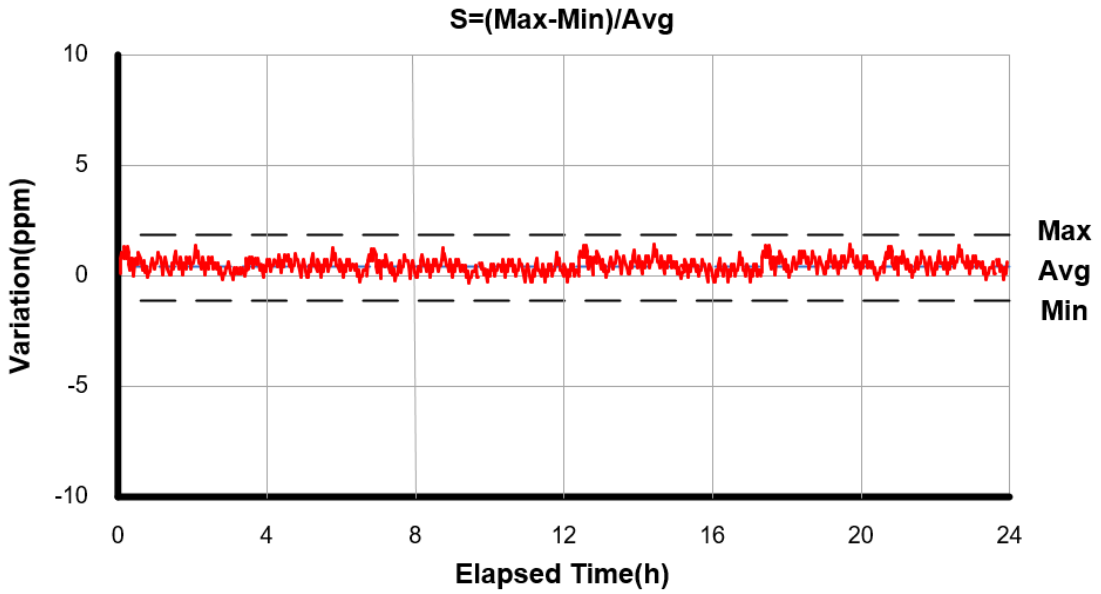
5. Characteristics

☆Wide output range



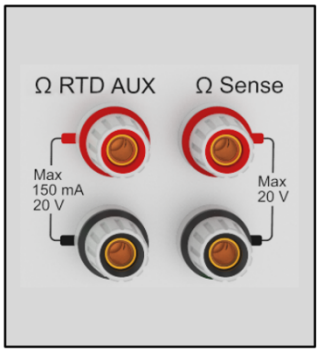
- **Solution Value:** The multifunctional standard source output range of TD1880 covers the working range of electrical measuring instruments such as six-and-a-half-digit digital multimeters and below, and can be directly calibrated using the standard source method.

☆ High stability and accuracy

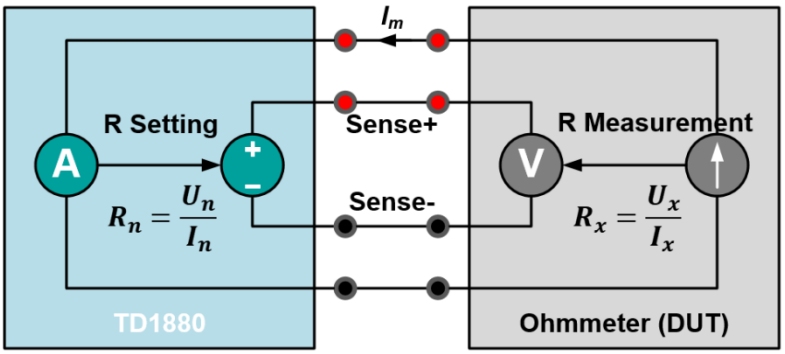


- The power output of TD1880 is extremely stable, with a DC voltage stability of up to 2ppm/24h.

☆ 4-terminals Simulated DC resistance



Figure(a) 4 terminals



Figure(b) Wiring Diagram

- TD1880 has two-wire and four-wire resistance connection modes. When calibrating low-mid-value resistance, the four-wire connection mode can effectively eliminate the measurement error caused by the test lead resistance and improve the measurement accuracy.
- **Solution Advantages:** Compared with the traditional standard physical resistance box, TD1880 uses analog resistance output and has the following advantages:☑ Continuously adjustable, with better adjustment fineness and sensitivity

  ☑ Continuously adjustable, better adjustment fineness, higher sensitivity

  ☑ Smaller size, lighter weight, easier integration

  ☑ No influence of switching error, residual resistance error and contact resistance error.

☆ Safety protection function

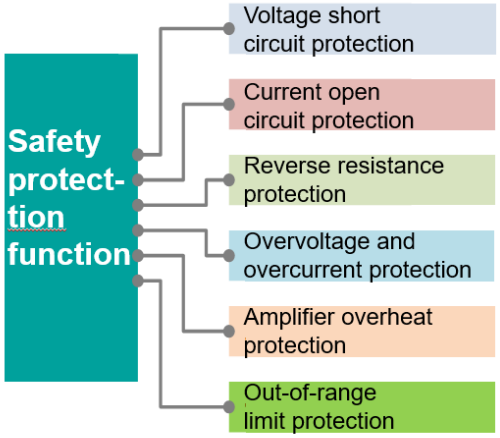
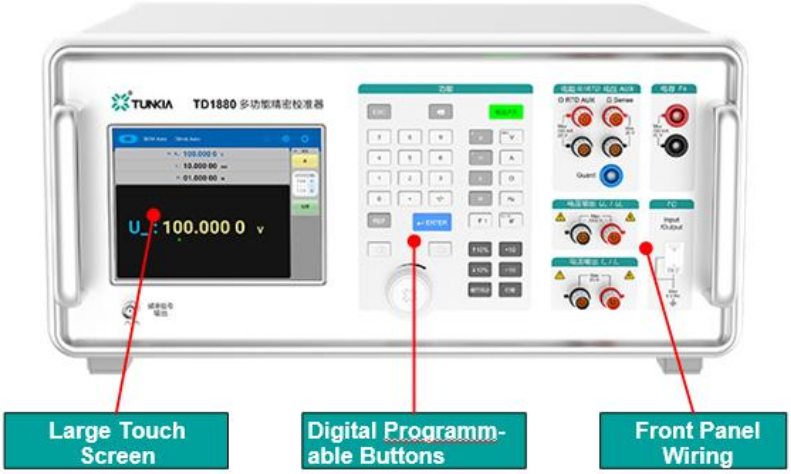


Figure (a) Safety Protection Function

Figure (b) Protection Alarm Prompt Interface

- Accidental voltage or current applied to the output of the multifunction calibrator may cause serious damage to the built-in components of the instrument, resulting in expensive repair costs and a decrease in the use rate of the instrument during the repair period.
- TD1880 has a complete safety circuit protection function. When the self-protection is triggered, the device will alarm and pop up an alarm prompt on the screen interface. After the user checks and confirms and eliminates the fault, it only takes one button to reset the protection to return to normal.

☆ Easy to operate



- **Large-size touch screen:** full color, high screen brightness, clear picture quality, support touch operation, comprehensive functions, simple and fast.
- **Digital programmable buttons:** can realize multiple input methods such as fixed-point output, rotary encoder, and step adjustment, which is convenient and fast to operate.
- **Front panel wiring:** It is convenient for users to replace the current and voltage test leads when checking the meter.
- **Solution value:** This combined operation mode effectively improves the convenience of operation to adapt to diverse application scenarios.

☆ Multiple output\adjustment methods

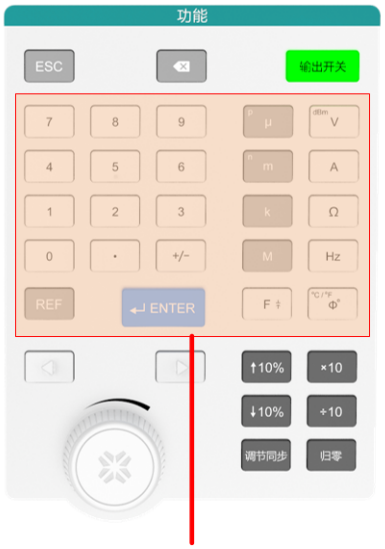
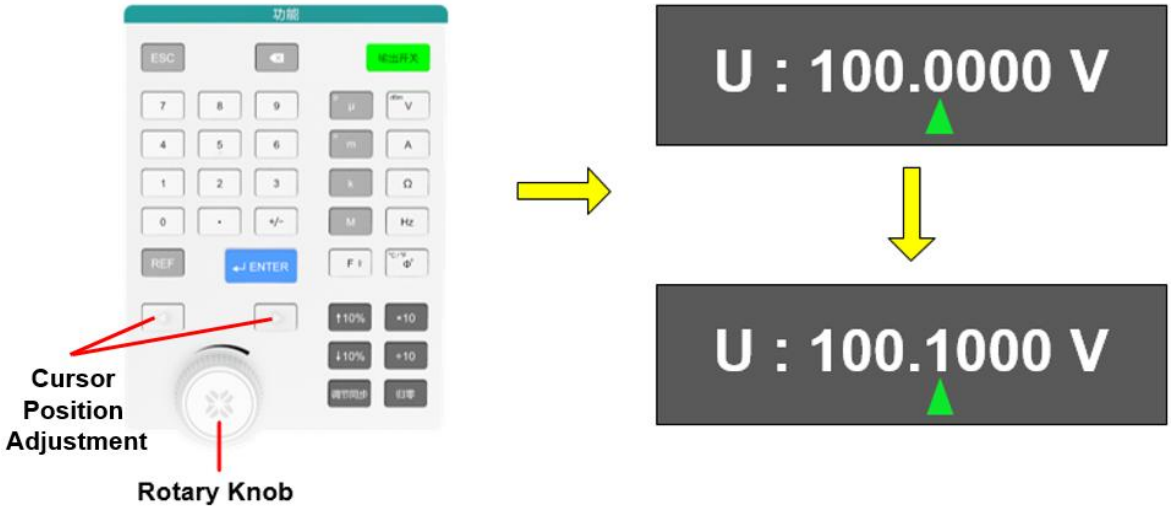


Figure (a) Keypad

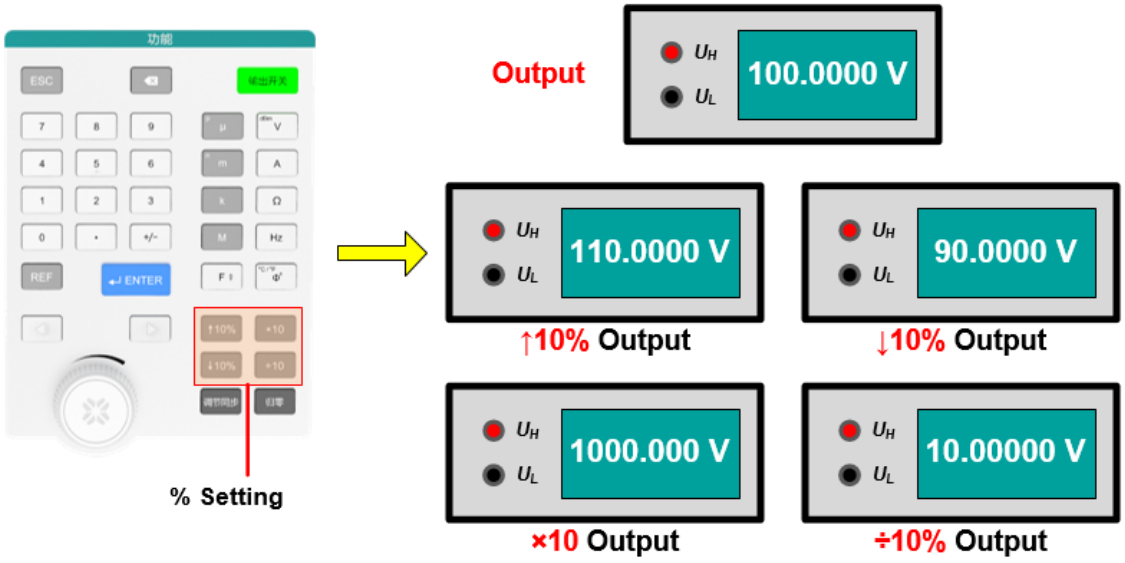
Figure (b) Touch Screen Output

- The instrument has a "**fixed-point output**" mode. You can directly set the required output value by pressing the digital buttons on the console or clicking the touch screen. The instrument will automatically switch to the optimal range output, making it very convenient to calibrate digital instruments.
- Especially when setting the AC power output, you can directly input the voltage and current amplitude, frequency and phase angle at the same time (as shown in Figure b above), which is very convenient to use.

☆ Multiple output/adjustment methods

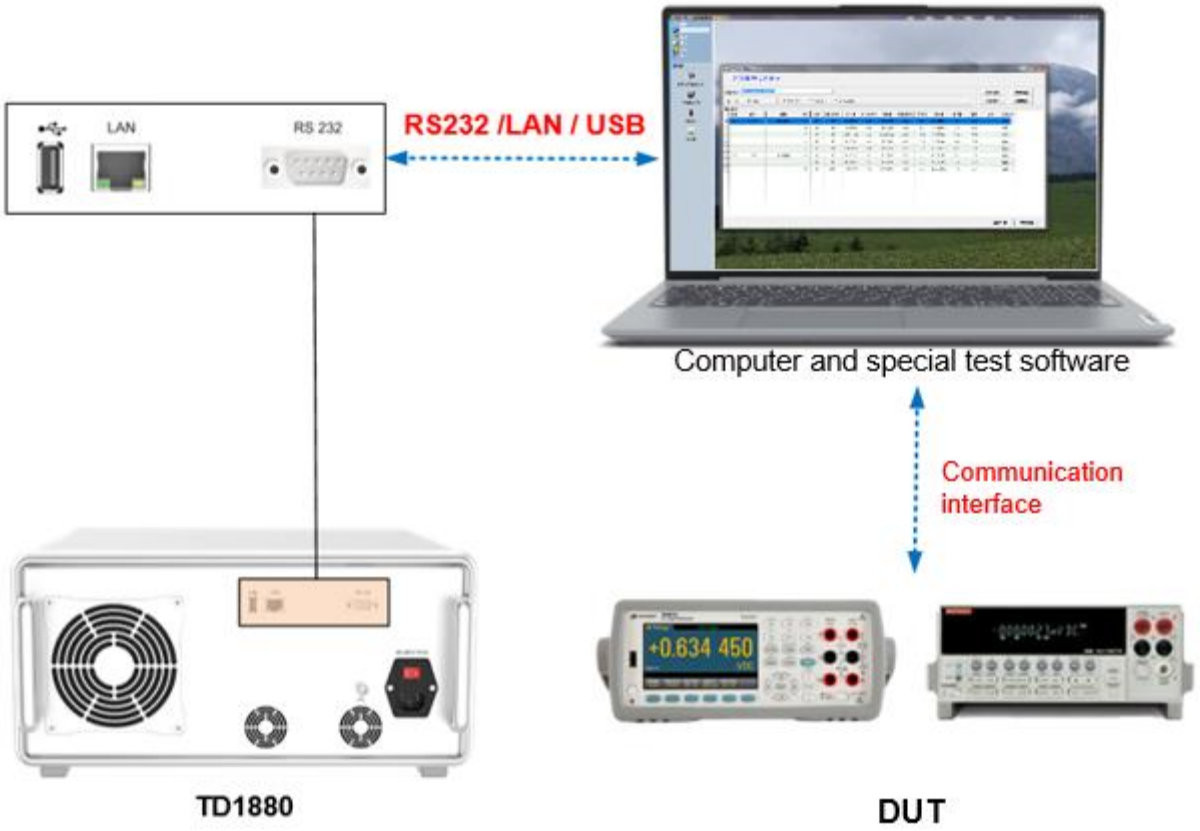


- The instrument is equipped with a "**Rotary Knob**" on the front panel. Click the left and right arrow keys to adjust the cursor position, and then rotate clockwise or counterclockwise to increase or decrease



- Use the key ↑10%、↓10%、×10、÷10 on the front panel, can realize the adjustment of the quantity value, and can also be used to perform the relevant test of linearity.

☆ Special test software (optional)



- The workload of calibration of digital meters and analog meters is huge, especially for digital multimeters. There are many items that need to be calibrated and the measurement standards involved are also relatively complicated. The traditional method of manual measurement has a large human interference factor, the reliability of the calibration results is not high enough, and the efficiency of calibration is low.
- Users can choose the dedicated calibration software independently developed by TUNKIA. The software protocol library is compatible with various specifications of the tested instruments, supports full-automatic or semi-automatic calibration of the tested equipment, raw data recording, analysis, management and customized template report export. Compared with traditional manual calibration, it has obvious advantages, effectively solves the various inconveniences of manual calibration, and significantly improves work efficiency.

  (Note: During full-automatic calibration, the tested equipment should have communication functions and open communication protocols to enable data reading)
- The software functions can be customized according to customer needs, and subsequent

software upgrades to add new procedure testing requirements are supported.

6. Specifications

6.1 DC Voltage Output

Range	Resolution	Measurement Uncertainty (k=2) (T_{cal}±5°C) ppm*output + μV		Stability (T_{cal}±1°C) ppm*output + μV	Max Load[Source internal resistance]
		90 days	1 year	24 hours	
0~330.0000 mV	100 nV	15 + 1.5	20 + 1.5	3 + 1	[60 Ω]
0~3.300000 V	1 μV	8 + 3	10 + 3	2 + 1.5	20 mA
0~33.00000 V	10 μV	10 + 30	12 + 30	2 + 10	15 mA
30.0000 V~330.0000 V	100 μV	15 + 200	18 + 200	2.5 + 100	10 mA
100.000 V~1020.000 V	1 mV	15 + 2000	18 + 2000	3 + 300	10 mA

- Manual or automatic range switch.
- Short-circuit and overload protection.

6.2 DC Current Output

Range	Resolution	Measurement Uncertainty (k=2) (T_{cal}±5°C) ppm*output + μA		Compliance Voltage (V)	Max Inductive Load
		90 days	1 year		
0~330.0000 μA	100 pA	80 + 0.02	100 + 0.02	11 V	400 μH
0~3.300000 mA	1 nA	65 + 0.03	80 + 0.03	11 V	
0~33.00000 mA	10 nA	60 + 0.25	80 + 0.25	9 V	
0~330.0000 mA	100 nA	60 + 2	80 + 2	7 V	
0~1.100000 A	1 μA	80 + 20	100 + 20	6 V	
1.000000 A~3.300000 A	1 μA	120 + 50	150 + 50	6 V	
3.00000 A~20.50000 A	10 μA	280 + 300	350 + 300	4 V	

- Manual or automatic range switch.
- Open-circuit and overload protection.
- Supports continuous and long-term output of current under full range.

6.3 Resistance

Range	Resolution	Measurement Uncertainty (k=2) (T_{cal}±5°C) ppm*output + Ω		Allowable Current
		90 days	1 year	
0 Ω~11.00000 Ω	10 μΩ	32 + 0.008	40 + 0.01	1 mA~150 mA
10.00000 Ω~33.00000 Ω	10 μΩ	24 + 0.012	30 + 0.015	1 mA~150 mA
30.0000 Ω~110.0000 Ω	100 μΩ	20 + 0.012	25 + 0.015	1 mA~80 mA
100.0000 Ω~330.0000 Ω	100 μΩ	20 + 0.016	25 + 0.02	1 mA~40 mA
0.300000 kΩ~1.100000 kΩ	1 mΩ	20 + 0.016	25 + 0.02	1 mA~20 mA
1.000000 kΩ~3.300000 kΩ	1 mΩ	20 + 0.16	25 + 0.1	0.1 mA~6 mA
3.00000 kΩ~11.00000 kΩ	10 mΩ	20 + 0.16	25 + 0.2	0.1 mA~2 mA
10.00000 kΩ~33.00000 kΩ	10 mΩ	22 + 0.8	28 + 1	10 μA~0.6 mA
30.0000 kΩ~110.0000 kΩ	100 mΩ	22 + 0.8	28 + 1	10 μA~0.2 mA
100.0000 kΩ~330.0000 kΩ	100 mΩ	25 + 8	32 + 10	1 μA~60 μA
0.300000 MΩ~1.100000 MΩ	1 Ω	25 + 8	32 + 10	1 μA~20 μA
1.000000 MΩ~3.300000 MΩ	1 Ω	40 + 120	60 + 150	0.25 μA~6 μA
3.00000 MΩ~11.00000 MΩ	10 Ω	104 + 200	130 + 250	0.25 μA~2 μA
10.00000 MΩ~33.00000 MΩ	10 Ω	200 + 2500	250 + 2500	25 nA~600 nA
30.0000 MΩ~110.0000 MΩ	100 Ω	400 + 3000	500 + 3000	25 nA~200 nA
100.0000 MΩ~330.0000 MΩ	100 Ω	2400 + 100000	3000 + 100000	2.5 nA~60 nA
300.000 MΩ~1100.000 MΩ	1 kΩ	11000 + 480000	14000 + 480000	1 nA~20 nA
Note[1]: Output is continuously adjustable.				

- Manual or automatic range switch.
- Over-current and reverse connection protection.

6.4 AC Voltage (Sine Wave)

Range	Frequency (Hz)	Measurement Uncertainty (k=2) (T_{cal}±5°C) ppm*output + μV		Resolution	Max Load [Source internal resistance]
		90 days	1 year		
1.00000 mV~ 33.00000 mV	10≤F≤45	600 + 6	800 + 6	10 nV	[10 Ω]
	45<F≤10k	100 + 6	120 + 6		
	10k<F≤20k	160 + 6	200 + 6		
	20k<F≤50k	800 + 6	1000 + 6		
	50k<F≤100k	2800 + 12	3500 + 12		
	100k<F≤500k	6000 + 50	8000 + 50		
30.0000 mV~ 330.0000 mV	10≤F≤45	250 + 8	300 + 8	100 nV	[60 Ω]
	45<F≤10k	112 + 8	140 + 8		
	10k<F≤20k	130 + 8	160 + 8		
	20k<F≤50k	280 + 8	350 + 8		
	50k<F≤100k	600 + 20	750 + 20		
	100k<F≤500k	1600 + 70	2000 + 70		
0.300000 V~ 3.300000 V	10≤F≤45	250 + 50	300 + 50	1 μV	20 mA
	45<F≤10k	80 + 50	100 + 50		
	10k<F≤20k	150 + 50	180 + 50		
	20k<F≤50k	240 + 50	300 + 50		
	50k<F≤100k	550 + 100	700 + 100		
	100k<F≤500k	2000 + 600	2400 + 600		
3.00000 V~ 33.00000 V	10≤F≤45	160 + 650	200 + 650	10 μV	15 mA
	45<F≤10k	80 + 500	100 + 500		
	10k<F≤20k	160 + 500	200 + 500		
	20k<F≤50k	280 + 500	350 + 500		
	50k<F≤100k	350 + 1500	550 + 1500		
30.0000 V~ 330.0000 V	45≤F≤1k	80 + 2000	100 + 2000	100 μV	30 mA [1]
	1k<F≤10k	80 + 6000	100 + 6000		

	10k<F≤20k	160 + 6000	200 + 6000		
	20k<F≤50k	240 + 6000	300 + 6000		
	50k<F≤100k	1200 + 50000	1500 + 50000		
300.000 V~ 1020.000 V	45≤F≤1k	100 + 10000	120 + 10000	1 mV	8 mA [2]
	1k<F≤5k	120 + 10000	150 + 10000		
	5k<F≤10k	160 + 10000	200 + 10000		
Note[1]: When the output frequency is ≤3kHz, the maximum load is 30 mA; when the output frequency is >3kHz, the maximum load is 5 mA. Note[2]: When the output frequency is ≤3kHz, the maximum load is 8 mA; when the output frequency is >3kHz, the maximum load is 3 mA.					

- Range switching: manual shifting, automatic shifting
- Protection function: short circuit protection, overload protection

6.5 AC Current (Sine Wave)

Range	Frequency (Hz)	Measurement Uncertainty (k=2) (T_{cal}±5°C) %* output + μA		Resolution	Compliance Voltage (rms)	Max Inductive Load (μH)
		90 days	1 year			
29.0000 μA~ 330.0000 μA	10≤F≤20	0.08 + 0.1	0.1 + 0.1	0.1 nA	7 V	200
	20<F≤45	0.04 + 0.1	0.05 + 0.1			
	45<F≤1k	0.024 + 0.1	0.03 + 0.1			
	1k<F≤5k	0.08 + 0.1	0.1 + 0.1			
	5k<F≤10k	0.16 + 0.2	0.2 + 0.2			
	10k<F≤30k	0.64 + 0.4	0.8 + 0.4			
0.300000 mA~ 3.300000 mA	10≤F≤20	0.04 + 1.5	0.05 + 1.5	1 nA	7 V	200
	20<F≤45	0.028 + 0.1	0.035 + 0.1			
	45<F≤1k	0.024 + 0.1	0.03 + 0.1			
	1k<F≤5k	0.024 + 0.2	0.03 + 0.2			
	5k<F≤10k	0.024 + 0.5	0.03 + 0.5			
	10k<F≤30k	0.16 + 0.6	0.2 + 0.6			
3.00000 mA~ 33.00000 mA	10≤F≤20	0.04 + 2	0.05 + 2	10 nA	7 V	50
	20<F≤45	0.02 + 2	0.025 + 2			
	45<F≤1k	0.016 + 2	0.02 + 2			
	1k<F≤5k	0.016 + 3	0.02 + 3			
	5k<F≤10k	0.04 + 5	0.05 + 5			
	10k<F≤30k	0.16 + 6	0.2 + 6			
30.0000 mA~ 330.0000 mA	10≤F≤20	0.04 + 20	0.05 + 20	100 nA	5 V	50
	20<F≤45	0.02 + 20	0.025 + 20			
	45<F≤1k	0.012 + 30	0.015 + 30			
	1k<F≤5k	0.016 + 30	0.02 + 30			
	5k<F≤10k	0.016 + 100	0.02 + 100			
	10k<F≤30k	0.08 + 500	0.1 + 500			

0.100000 A~ 1.100000 A	10≤F≤20	0.04 + 100	0.05 + 100	1 μA	5 V	2.5
	20<F≤45	0.024 + 50	0.03 + 50			
	45<F≤1k	0.016 + 50	0.02 + 50			
	1k<F≤5k	0.016 + 100	0.02 + 100			
	5k<F≤10k	0.04 + 500	0.05 + 500			
1.000000 A~ 3.300000 A	10≤F≤20	0.04 + 100	0.05 + 100	1 μA	4 V	2.5
	20<F≤45	0.024 + 100	0.03 + 100			
	45<F≤1k	0.016 + 100	0.02 + 100			
	1k<F≤5k	0.032 + 100	0.04 + 100			
	5k<F≤10k	0.04 + 900	0.05 + 900			
3.00000 A~ 20.50000 A	45≤F≤100	0.024 + 1000	0.03 + 1000	10 μA	3 V	1
	100<F≤1k	0.032 + 1000	0.04 + 1000			
	1k<F≤5k	0.048 + 2000	0.06 + 2000			

- Manual or automatic range switch.
- Open-circuit and overload protection.
- Supports continuous and long-term output of current under full range.

6.6 Sine Wave Frequency

Range [1]	Resolution	Measurement Uncertainty (k=2) (T_{cal}±5°C)
10.00000 Hz ≤ F ≤ 99.99999 Hz	10 μHz	0.005%
100.0000 Hz ≤ F ≤ 999.9999 Hz	0.1 mHz	0.005%
1.000000 kHz ≤ F ≤ 9.999999 kHz	1 mHz	0.005%
10.00000 kHz ≤ F ≤ 99.99999 kHz	10 mHz	0.005%
100.0000 kHz ≤ F ≤ 500.0000 kHz	0.1 Hz	0.005%
Note [1]: Output mode: AC voltage or AC current		

6.7 DC Power

Period	Current Range / Voltage Range	Measurement Uncertainty (k=2) (T_{cal}±5°C) %* power output[1][2]		
		3 mA ~ 300 mA	300 mA ~ 3 A	3 A ~ 20.5 A
90 days	30 mV ~ 1020 V	0.016	0.018	0.039
1 year	30 mV ~ 1020 V	0.018	0.021	0.046

Note [1]: DC power output range (virtual load):0 ~ 20.91 kW.

Note [2]: For more accurate technical indicators of DC power, please refer to the calculation formula: $U_W = \sqrt{{U_U}^2 + {U_I}^2}$, U_U is the voltage measurement uncertainty, U_I the current measurement uncertainty.

6.8 AC Power (45 Hz~65 Hz、λ=1)

Period	Current Range / Voltage Range	Measurement Uncertainty (k=2) %* power output[1][2]		
		3 mA ~ 300 mA	300 mA ~ 3 A	3 A ~ 20.5 A
90 days	30 mV ~ 330 mV	0.119	0.051	0.069
	330 mV ~ 1020 V	0.115	0.041	0.064
1 year	30 mV ~ 330 mV	0.122	0.055	0.076
	330 mV ~ 1020 V	0.118	0.046	0.069

Note [1]: AC power output range (virtual load): 0.09 mW ~ 20.91 kW

Note [2]: For more accurate technical indicators of AC power under other power factors, please refer to the calculation formula: $U_P = \sqrt{{U_U}^2 + {U_I}^2 + {U_\lambda}^2}$, U_U is the voltage measurement uncertainty, U_I is the current measurement uncertainty, U_λ is the uncertainty caused by power factor.

6.9 Phase and Power Factor

Frequency (Hz)	Voltage Range (U)	Current Range (I)	Phase Range [1] (φ)	Power Factor Range [2] (λ)
DC	0~±1020 V	0~±20.5 V	—	—
10~45	30 mV~33 V	3 mA~3.3 A	0.000°~359.999°	-1~0~1
45~1k	30 mV~1020 V	3 mA~20.5 A	0.000°~359.999°	-1~0~1
1k~5k	3 V~1020 V	30 mA~3.3 A	0.000°~359.999°	-1~0~1
5k~10k	3 V~1020 V	30 mA~3.3 A	0.000°~359.999°	-1~0~1
10k~30k	3 V~330 V	30 mA~330 mA	0.000°~359.999°	-1~0~1

Note[1]: Phase resolution: 0.001°

Note[2]: Power factor resolution: 0.000 01

Phase		Measurement Uncertainty (k=2) (T_{cal}±5℃)					
		10~65Hz	65~500Hz	500~1kHz	1k~5kHz	5k~10kHz	10k~30kHz
φ		0.1°	0.2°	0.5°	2°	5°	8°
Phase (φ)	Factor (λ)	Power measurement uncertainty component caused by phase uncertainty[3]					
		10~65Hz	65~500Hz	500~1kHz	1k~5kHz	5k~10kHz	10k~30kHz
0°	1.00000	0.000%	0.001%	0.004%	0.061%	0.381%	0.973%
10°	0.98481	0.031%	0.062%	0.158%	0.676%	1.917%	3.427%
20°	0.93969	0.064%	0.128%	0.321%	1.331%	3.553%	6.039%
30°	0.86603	0.101%	0.202%	0.508%	2.076%	5.412%	9.008%
40°	0.76604	0.147%	0.294%	0.736%	2.989%	7.694%	12.651%
50°	0.64279	0.208%	0.417%	1.044%	4.220%	10.767%	17.559%
60°	0.50000	0.302%	0.605%	1.515%	6.106%	15.476%	25.079%
70°	0.34202	0.480%	0.960%	2.041%	9.649%	24.326%	39.211%
80°	0.17365	0.990%	1.980%	4.953%	19.853%	49.809%	79.902%
90°	0.00000	—	—	—	—	—	—

Note [3]: Calculation formula: $U_\lambda = [1 - \cos(\varphi + \Delta\varphi)/\cos\varphi] \times 100\%$

6.10 Pulse Frequency

Range [1]	Resolution	Measurement Uncertainty (k=2) (T_{cal} ±5℃) ppm*RD + μHz	Jitter
1.000000 Hz ≤ F ≤ 9.999999 Hz	1 μHz	20 + 20	<2 ns
10.00000 Hz ≤ F ≤ 99.99999 Hz	10 μHz		
100.0000 Hz ≤ F ≤ 999.9999 Hz	0.1 mHz		
1.000000 kHz ≤ F ≤ 9.999999 kHz	1 mHz		
10.00000 kHz ≤ F ≤ 99.99999 kHz	10 mHz		
100.0000 kHz ≤ F ≤ 999.9999 kHz	0.1 Hz		
1.000000 MHz ≤ F ≤ 2.000000 MHz	1 Hz		
Note[1]: Output type: TTL level			

6.11 Capacitance(optional)

Range	Measurement Uncertainty (k=2) (T_{cal}±5℃) %*output + floor		Resolution	Allowable Operating Frequency Or Charge And Discharge Rate
	90 days	1 year		
1.100 0 nF~3.299 9 nF	0.4 + 0.04 nF	0.5 + 0.04 nF	0.1 pF	10 Hz~3 kHz
3.300 0 nF~10.999 9 nF	0.2 + 0.04 nF	0.25 + 0.04 nF	0.1 pF	10 Hz~1 kHz
11.000 0 nF~32.999 9 nF	0.2 + 0.4 nF	0.25 + 0.4 nF	0.1 pF	10 Hz~1 kHz
33.000 nF~109.999 nF	0.2 + 0.4 nF	0.25 + 0.4 nF	1 pF	10 Hz~1 kHz
110.000 nF~329.999 nF	0.2 + 0.3 nF	0.25 + 0.3 nF	1 pF	10 Hz~1 kHz
0.330 00 μF~1.099 99 μF	0.2 + 1 nF	0.25 + 1 nF	10 pF	10 Hz~600 Hz
1.100 00 μF~3.299 99 μF	0.2 + 3 nF	0.25 + 3 nF	10 pF	10 Hz~300 Hz
3.300 0 μF~10.999 9 μF	0.2 + 10 nF	0.25 + 10 nF	100 pF	10 Hz~150 Hz
11.000 μF~32.999 9 μF	0.32 + 30 nF	0.40 + 30 nF	100 pF	10 Hz~120 Hz
33.000 μF~109.999 μF	0.36 + 100 nF	0.45 + 100 nF	1 nF	10 Hz~80 Hz
110.000 μF~329.999 μF	0.36 + 300 nF	0.45 + 300 nF	1 nF	0 Hz~50 Hz
0.330 00 mF~1.099 99 mF	0.36 + 1 μF	0.45 + 1 μF	10 nF	0 Hz~20 Hz
1.100 00 mF~3.299 99 mF	0.36 + 3 μF	0.45 + 3 μF	10 nF	0 Hz~6 Hz
3.300 0 mF~10.999 9 mF	0.36 + 10 μF	0.45 + 10 μF	100 nF	0 Hz~2 Hz
11.000 0 mF~30.000 0 mF	0.6 + 30 μF	0.75 + 30 μF	100 nF	0 Hz~0.6 Hz
Note[1]: Output is continuously adjustable.				

6.12 Thermocouple Output And Measurement (Optional)

Type	Output Range °C		Measurement Uncertainty (k=2) (T_{cal}±5°C) °C	
	min	max	90days	1year
B	410	600	0.30	0.35
	600	900	0.30	0.31
	900	1800	0.26	0.30
E	-200	0	0.10	0.11
	0	600	0.07	0.08
	600	1000	0.09	0.10
J	-200	-100	0.12	0.13
	-100	750	0.09	0.09
	750	1200	0.10	0.10
K	-200	-100	0.15	0.20
	-100	1000	0.10	0.10
	1000	1370	0.12	0.12
N	-200	-100	0.20	0.25
	-100	400	0.12	0.12
	400	1300	0.10	0.12
R	-50	50	0.30	0.40
	50	300	0.28	0.32
	300	1000	0.22	0.23
	1000	1750	0.25	0.25
S	-50	50	0.30	0.40
	50	300	0.31	0.34
	300	1000	0.24	0.24
	1000	1750	0.22	0.23
T	-200	100	0.17	0.25
	-100	0	0.08	0.11
	0	400	0.08	0.08

Note [1]: Resolution: 0.01 °C

Note [2]: Output source internal resistance: 10 Ω

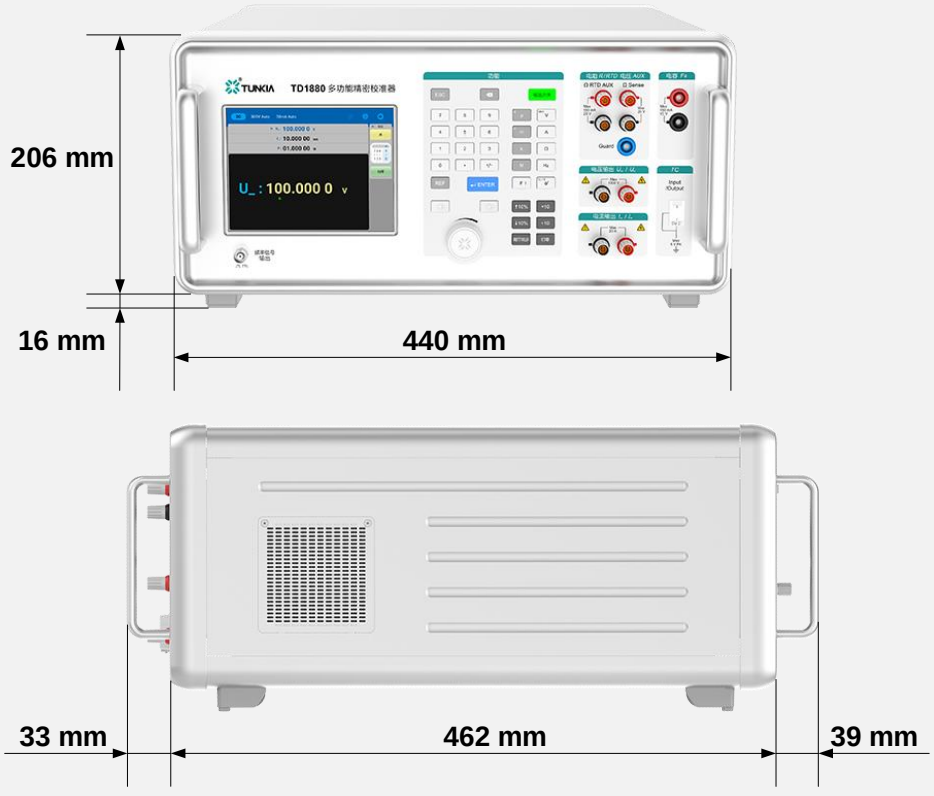
Note [3]: Does not include thermocouple error

Note [4]: When using external compensation, S, R, B, K, N, E, J, T conform to the ITS-90 international temperature standard.

6.13 RTD Output(optional)

Type	Output Range °C		Measurement Uncertainty (k=2) (T_{cal}±5°C) °C	
	Min	Max	90 days	1 year
Pt385, 100 Ω	-200	0	0.05	0.05
	0	300	0.08	0.08
	300	850	0.12	0.12
Pt385, 200 Ω	-200	250	0.04	0.04
	250	630	0.10	0.15
Pt385, 500 Ω	-200	-30	0.36	0.40
	-30	630	0.10	0.11
Pt385, 1000 Ω	-200	0	0.027	0.03
	0	300	0.054	0.06
	300	600	0.063	0.07
Cu50	-50	150	0.09	0.09
Cu100	-50	150	0.045	0.045
[1] Resolution: 0.001 °C				

7. General Specifications

Maximum power consumption	500 VA
Warm up time	Twice the time since last warmed up, to a maximum of 30 minutes.
Temperature performance	Operating temperature: 0°C ~ 50°C Calibration temperature: 15°C ~ 35°C Storage temperature: -20°C ~ 50°C
Humidity performance	Operating humidity: <80% @ 30°C, <70% @ 40°C, <40% @ 50°C Storage humidity: <95%, No condensation
Communication interface	RS232×1, USB×1, LAN×1
Dimensions	440 mm(W)× 462 mm (D) × 206 mm (H) , Handles and feets excluded.
	
Weight	About 24 kg

8. Ordering Information

TD1880X

Note	
X = A	Basic
X = B	Standard

Function	TD1880A	TD1880B
AC/DC voltage output (U)	★	★
AC/DC current output (I)	★	★
Simulated resistance output (R)	★	★
AC/DC power output (P)	★	★
Pulse frequency output ($F_{⎍}$)	★	★
Analog capacitive output (C)	—	★
Analog thermocouple output and measurement (TC)	—	★
Analog resistance thermal output (RTD)	—	★

9. Accessory List

S/N	Pic	Name	Specification	Qty	Remark
1		Voltage Test Leads	1.5m / 2.1mm² / Φ4-Φ4 safety banana plug	Red 2 Black 2	Standard accessory
2		20A Current Test Lead	1.5m / 6mm² / Φ4-Φ4 safety banana plug	Red 1 Black 1	Standard accessory
3		Current Shorting Wire	0.18m / 1.6mm2 / Φ4-Φ4 safety banana plug	Red 1 Black 1	Standard accessory
4		Low Thermal EMF Voltage Test Leads	0.6m, Φ8 thin blade terminal	1	Standard accessory
5		High Resistance Test Leads	6-in-1	1	Standard accessory

S/N	Pic	Name	Specification	Qty	Remark
6		Alligator Clips	Full sheath / Φ4 jack	Red 2 Black 2	Standard accessory
7		Pin Adapter	Φ2*18mm / Φ4 jack	Red 2 Black 2	Standard accessory
8		U-shaped Blade Terminal	Φ8 blade terminal / Φ4 jack	Red 3 Black 3	Standard accessory
9		Frequency Test Leads	BNC male to alligator clip	1	Standard accessory
10		Power Cable	AC 220V, 10A	1	Standard accessory
11		Packing Box	Pelican	1	Standard accessory

S/N	Pic	Name	Specification	Qty	Remark
1		Thermocouple Test Leads	0.6m, TC head to Φ4 blade terminal	1	Thermocouple output function option

Note: If the user specifies the function selection in the order contract, the corresponding accessories will be shipped by default.

For example: TD1880-B has a thermocouple output function and the delivery list includes a thermocouple test lead.

S/N	Pic	Name	Specification	Qty	Remark
1		Current Coil	20 A / 50 T	1	Clamp meter calibration options
2		Current Test Leads	1.5m / 16mm^2 / Φ12-Φ12 blade terminal	Red 1 Black 1`	
3		Calibration software	Card USB	1	Software options
4		Communication Line	1.8m / USB to RS232 (DB9 female)	1	

Note: The above accessories need to be purchased separately and must be specified in the order contract.