

TD1300 Precision DC Reference Meter



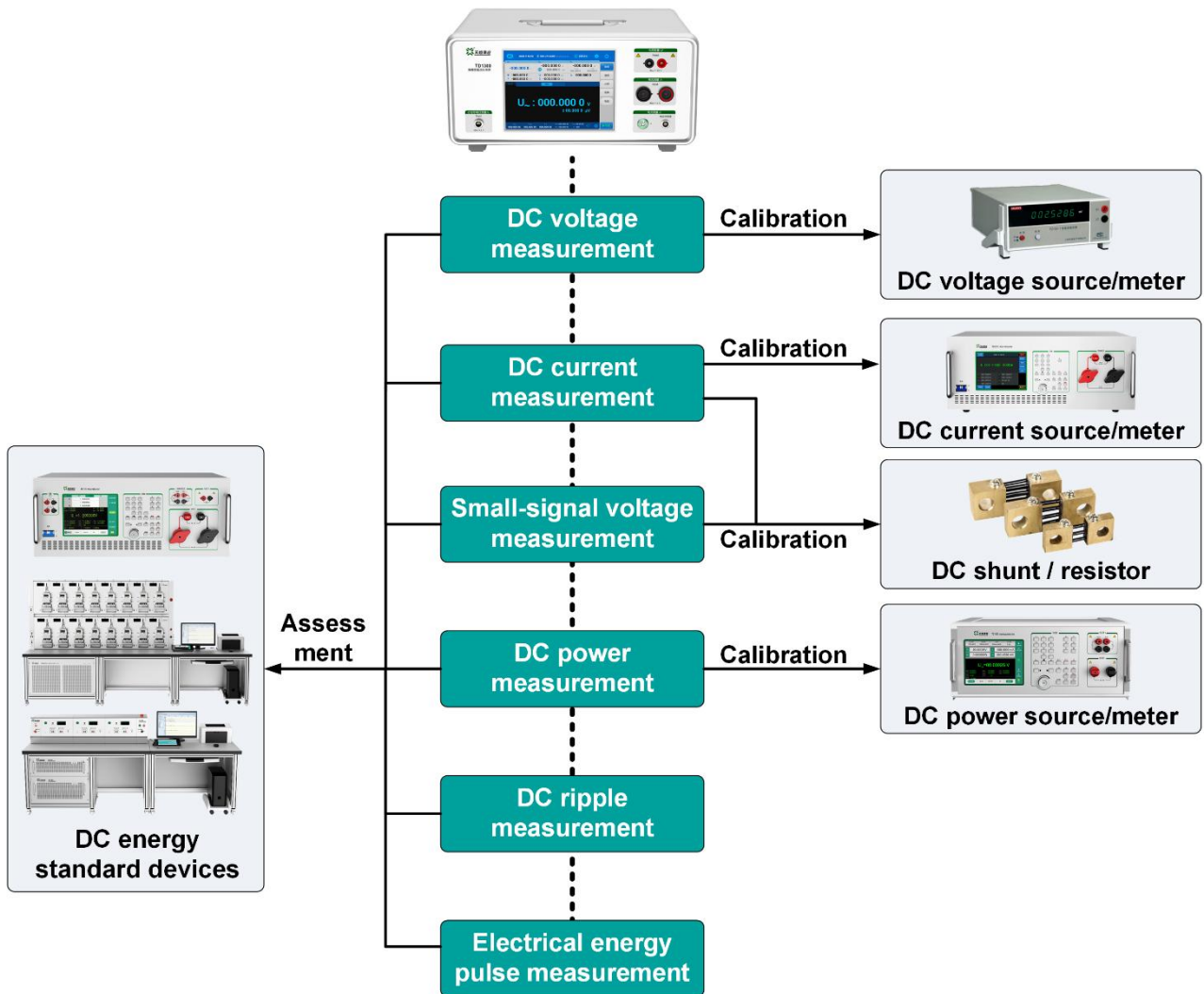
1. Summary

TD1300 is a DC reference meter, which integrates DC reference voltmeter, DC reference ammeter, small-signal voltmeter, DC electric energy measurement, ripple measurement and other functions. It is applicable to calibration of DC current source, DC voltage source, DC power source and assessment of DC electric energy metering device.

2. Features

- Accuracy : Class 0.01, Class 0.02
- DC voltage measurement: 10 mV ~ 1150 V。
- Direct measurement of DC current: 10 μ A ~ 120 A。
- Support the transducer to expand the current range to 500 A, 1000A or more
- Small signal voltage measurement: 0.1 mV ~ 12 V
- All electric quantity measurements support full-automatic range switching.
- Maximum DC ripple measurement bandwidth: 10 kHz.
- Comprehensive statistics and analysis of the measured electricity
- Standard electric energy pulse input / output
- Communication interface: USB、RS232、LAN。

3. Applications

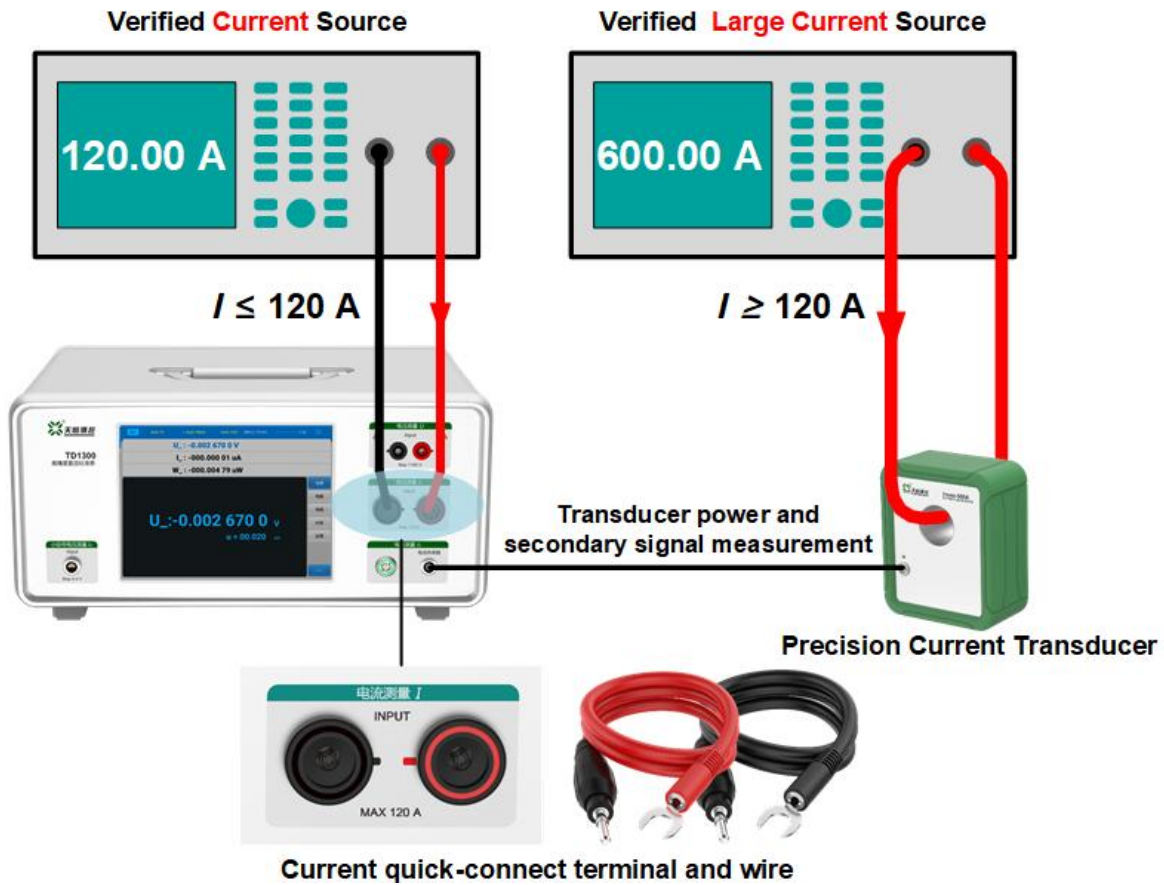


Note: When using TD1300 to calibrate electrical measuring devices or resistors, it is necessary to match the corresponding test power supply.

- **Assessment of electric energy metering devices:** TD1300 can be used as a high-level electric energy standard meter to assess verification equipment for DC electrical energy meters and DC electrical energy reference meters. Its DC ripple test function is also applicable to the calibration of DC electric energy device with ripple detection function.
- **Calibrate the electrical measurement standard source:** Direct verification or calibration of DC voltage source, current source, power source, etc.
- **Calibrate electrical measuring instruments:** It can be used as a reference meter to verify or calibrate voltmeter, ammeter, ohmmeter, transmitter, sensor, etc. with a test power supply.

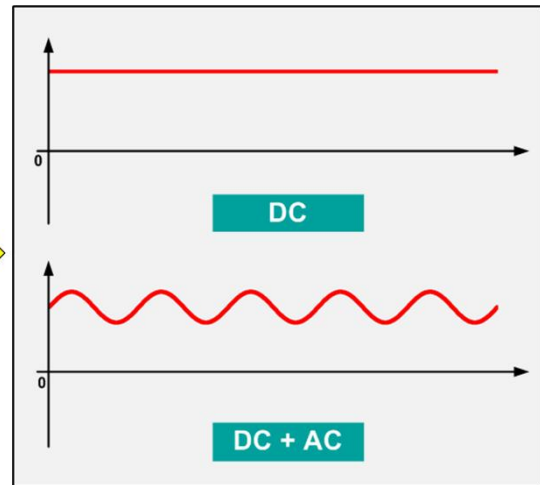
4. Characteristics

☆ Wide range of current measurements



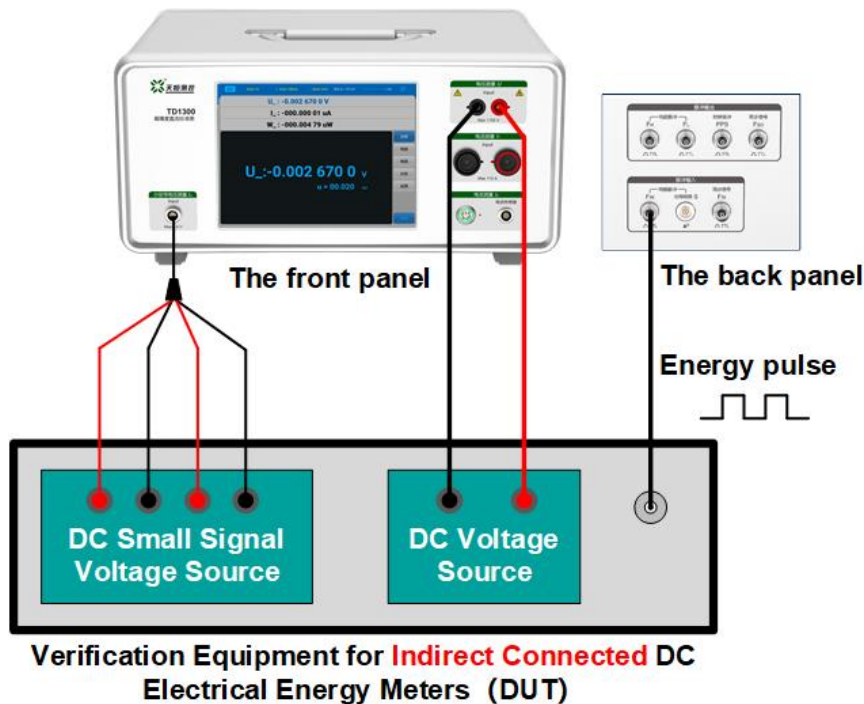
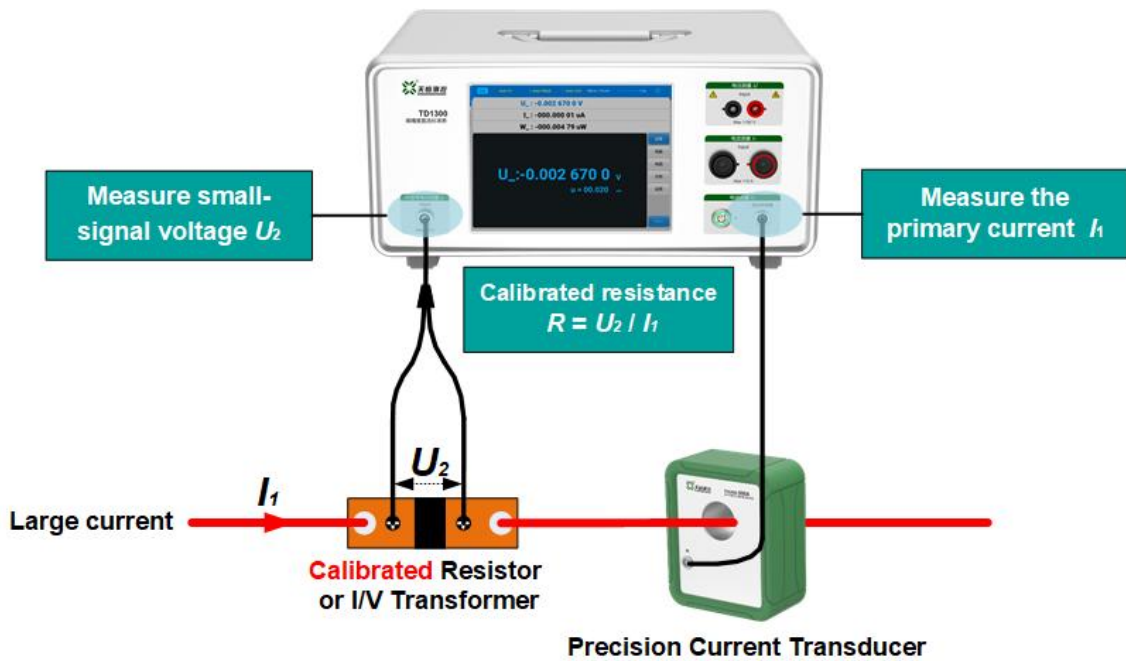
- **Direct current measurement:** Use a pair of quick connect terminals to directly measure 10 μA ~120 A wide range DC current.
- **Current conversion measurement:** The instrument is equipped with a special measuring interface for the transducer, which can simultaneously supply power to the transducer and measure its secondary signal. It can be connected to a precision current transducer (such as TH0540) to expand the current range to 500 A, 1 kA or even greater. The primary current of the measured transducer can be directly displayed by setting the ratio of the current transducer on the instrument.

☆ DC comprehensive measurement



- The instrument supports DC, DC ripple and other measurement modes, the DC ripple measurement bandwidth is up to 10 kHz.
- DC ripple measurement function is very suitable for verifying the verification device of electric energy meter with ripple output function.

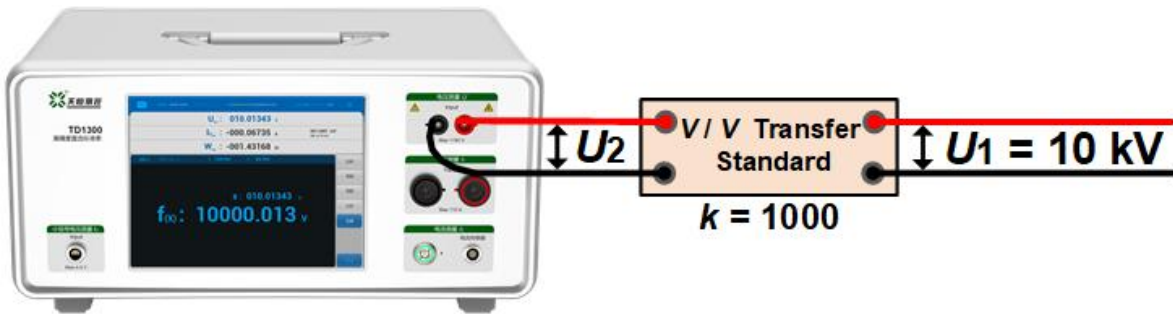
☆ Precise small signal voltage measurement



- It has a small signal voltage measurement function of $\pm (0.1\text{ mV} \sim 12\text{ V})$, is equipped with ultra-low thermal potential terminals and test wires, and can withstand the overload signal of $\pm 100\text{ V}$ peak voltage at most.

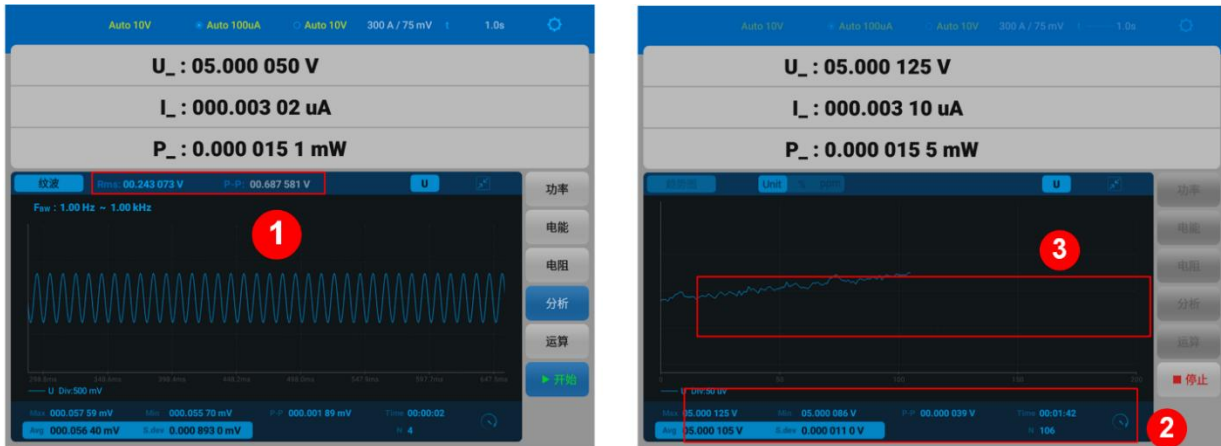
- **Application Scenario 1:** It can be used to calibrate shunt or other I/V transformer with stable large current sources and precision current transducer.
- **Application Scenario 2:** With precision voltage measurement function, it can be used to assess the verification equipment for indirect connected DC electrical energy meters.




☆ Power calculation function



- The instrument has the function of power calculation. Users can connect voltage divider, shunt, transformer and other range extenders externally, set the ratio k and offset b , measure the secondary output signal x of the range extenders, and then calculate the actual value of the primary power to be measured according to the function $f(x)=kx+b$.

☆ DC ripple, data statistics and analysis function



S/N	Function declaration
	With DC ripple measurement function, it can measure ripple content in the range of 1 Hz~10 kHz. It can display ripple waveform in real time, and measure RMS and P-P of ripple.
	Data statistics and analysis: Calculate the maximum (Max), minimum (Min), peak to peak (P-P), average (Avg), standard deviation (S.dev), divergence (Div), etc. of the measured electricity.
	Power trend chart test: During the test cycle, draw the curve of power change with time in real time.

5. Specifications

5.1 DC Voltage Measurement

Range	Resolution	Accuracy (k=2) (ppm of reading + ppm of range) ^[1]		Temperature Coefficient @ (15~30)°C (ppm of reading + ppm of range)/°C	
		Class 0.02	Class 0.01	Class 0.02	Class 0.01
100 mV	0.1 μV	80 + 6 μ	50 + 5 μV	3 + 0.5 μV	3.5 + 1.5 μV
300 mV	0.1 μV	60 + 8 μ	30 + 6 μV	3 + 0.6 μV	3 + 0.6 μV
1 V	1 μV	60 + 40	30 + 20	2.5 + 1	2.5 + 1
3 V	1 μV	60 + 40	30 + 20	2.5 + 1	2.5 + 1
10 V	10 μV	60 + 40	30 + 20	2.5 + 0.5	2.5 + 0.5
30 V	10 μV	60 + 40	30 + 20	2.5 + 1	2.5 + 1
100 V	100 μV	60 + 40	30 + 20	2.5 + 1	2.5 + 1
300 V	100 μV	60 + 40	30 + 20	3.5 + 1.5	3.5 + 1.5
1000 V	1 mV	60 + 40	30 + 20	3.5 + 1.5	3.5 + 1.5

Note [1] : (ppm = parts per million) (e.g., 10ppm = 0.001%).

- Measuring range: ±(10 mV~1150 V), 7-bit display, Manual/automatic range switching
- Input impedance: 1 MΩ

5.2 DC Small Signal Voltage Measurement

Range	Resolution	Accuracy (k=2) (ppm of reading + ppm of range)		Temperature Coefficient @ (15~30)°C (ppm of reading + ppm of range)/°C	
		0.02	0.01	0.02	0.01
1 mV	1 nV	80 + 0.4 μ	40 + 0.2 μV	5 + 0.04 μV	4 + 0.02 μV
10 mV	10 nV	80 + 1 μ	40 + 0.5 μV	5 + 0.1 μV	3 + 0.05 μV
100 mV	100 nV	80 + 20	40 + 10	5 + 2.0	3 + 1.0
1 V	1 μV	80 + 20	40 + 10	5 + 1.0	2 + 0.5
10 V	10 μV	80 + 20	40 + 10	5 + 1.0	2 + 0.5

- Measuring range: $\pm(0.1 \text{ mV} \sim 12 \text{ V})$, 7-bit display, Manual/automatic range switching
- Input impedance: $>1 \text{ G}\Omega$, Input protection: $\pm 100 \text{ V}_{\text{pk}}$.

5.3 DC Current Measurement

Range	Resolution	Accuracy (k=2) (ppm of reading + ppm of range)		Temperature Coefficient @ (15~30)°C (ppm of reading + ppm of range)/°C	
		0.02	0.01	0.02	0.01
100 μA	0.1 nA	100 + 10 nA	50 + 5 nA	5 + 1 nA	3 + 0.5 nA
300 μA	0.1 nA	100 + 25 nA	50 + 15 nA	5 + 2 nA	3 + 1.5 nA
1 mA	1 nA	60 + 40	30 + 20	5 + 1.5	2.5 + 1
3 mA	1 nA	60 + 40	30 + 20	5 + 1.5	2.5 + 1
10 mA	10 nA	60 + 40	30 + 20	5 + 1.5	2.5 + 1
30 mA	10 nA	60 + 40	30 + 20	5 + 1.5	2.5 + 1
100 mA	100 nA	60 + 40	30 + 20	5 + 1.5	2.5 + 1
300 mA	100 nA	60 + 40	30 + 20	5 + 1.5	2.5 + 1
1 A	1 μA	60 + 40	30 + 20	5 + 1.5	2.5 + 1
3 A	1 μA	60 + 40	30 + 20	5 + 1.5	2.5 + 1
10 A	10 μA	60 + 40	30 + 20	5 + 1.5	2.5 + 1
30 A	10 μA	60 + 40	30 + 20	5 + 1.5	2.5 + 1
100 A	100 μA	60 + 40	30 + 20	5 + 1.5	2.5 + 1
200 A ^[2]	100 μA	60 + 40	30 + 20	6 + 2.5	3.5 + 1.5
500 A ^[2]	100 μA	60 + 40	30 + 20	6 + 2.5	3.5 + 1.5

Note [2]: 200 A and 500 A range current are options, and a current transducer such as TH0540 must be selected to expand the range.

- Direct measurement range: $\pm (10 \mu\text{A} \sim 120 \text{ A})$, directly input through a pair of female sockets
- The upper limit of the current can be extended to 240 A or 600 A by matching the sensor.
- 7-bit display, Manual/automatic range switching

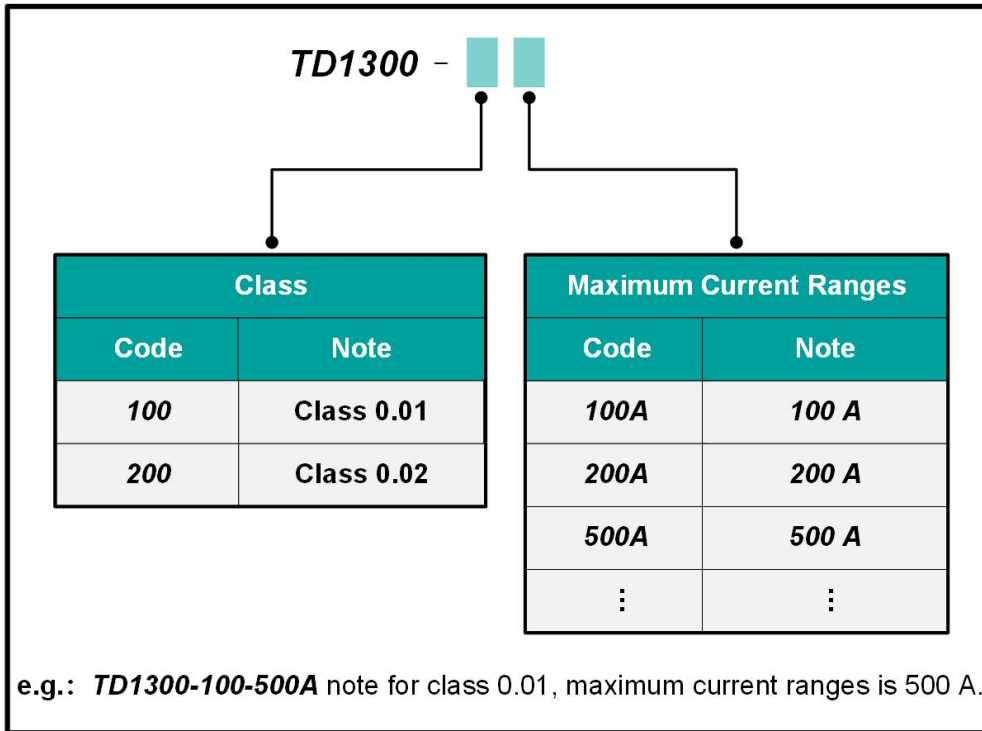
5.4 DC Ripple Measurement

Frequency Band Range	1 Hz~10 kHz
Accuracy (k=2)	0.05%*RG, Valid values

5.5 Power/Electric Energy Measurement

DC Power/Electric Energy	Measuring Range	Combination of DC voltage and DC current
	Accuracy	Accuracy of DC voltage+ Accuracy of DC current (or small signal voltage)
Electric Energy Pulse	Standard Electric Energy Pulse Input	Directly receive the photoelectric pulse of electric energy of the tested meter
	Standard Electric Energy Pulse Output	Signal amplitude is 5V, TTL level FH=60 kHz × Power value ÷ voltage range value ÷ current range value FL=60 kHz × Power value ÷ voltage range value ÷ current range value ÷ 10000
	Electric Energy Error Display	Automatic display, resolution 0.001%

6. Ordering Information



7. General Specifications

Power Supply	AC (220 \pm 22) V, (50 \pm 2) Hz, Maximum power consumption: 100 VA
Temperature	Working temperature: 15°C~35°C;
Performance	Storage temperature: -10°C~50°C
Humidity	Working humidity: < 80% @ 30°C, < 70% @ 40°C, < 40% @ 50°C
Performance	Storage humidity: (20%~80%) R·H, No condensation
Interface	RS232、RJ45