TD1170 Zinc Oxide Lightning Arrester Tester Calibration Device



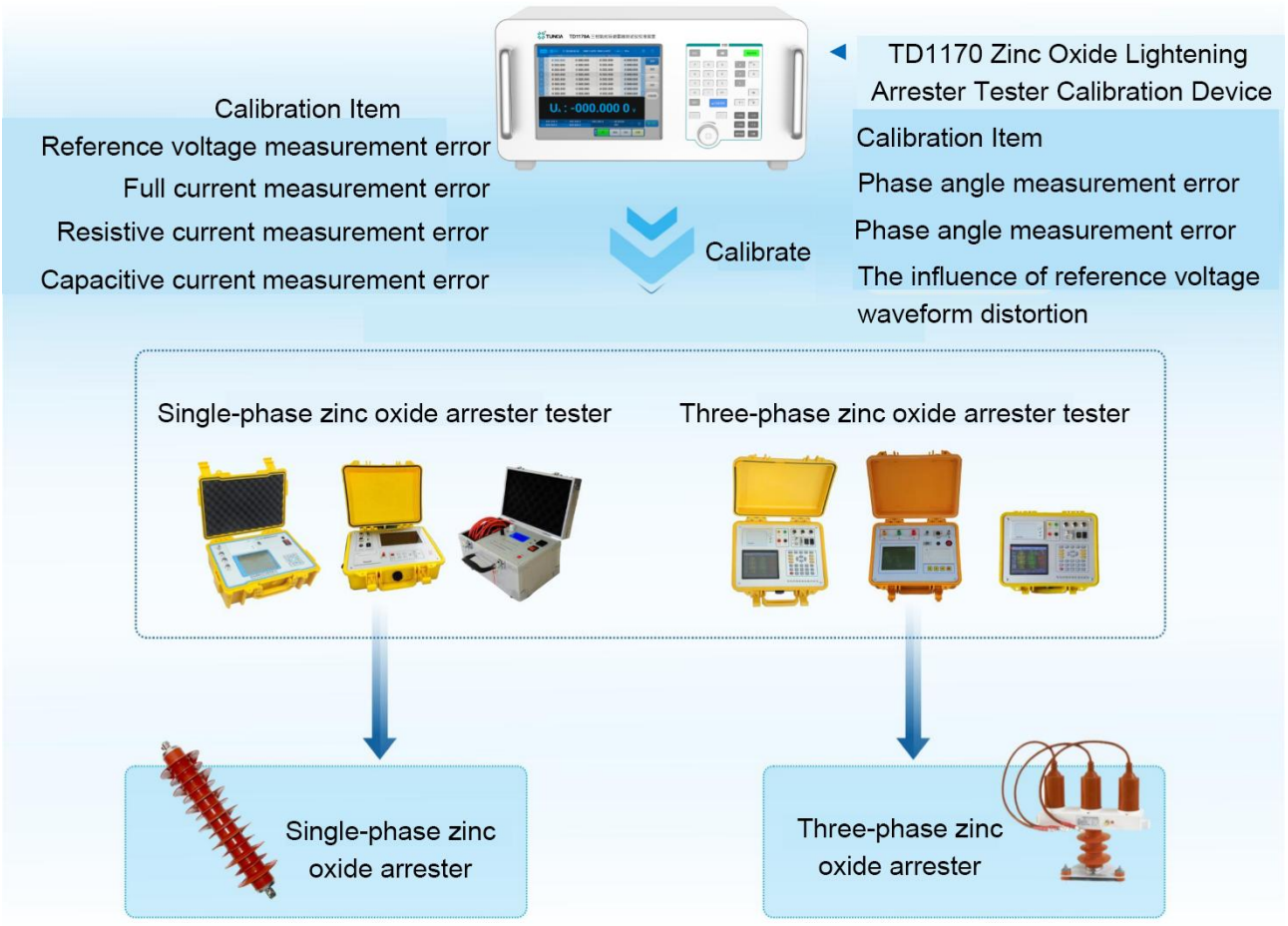
1. Summary

TD1170 is an instrument specially used to calibrate single/three-phase zinc oxide lightning arrester testers. It can complete full current measurement error test, resistive current measurement error test, capacitive current measurement error test, reference voltage measurement error test, active power Measurement error test, reference voltage waveform distortion impact test on measurement error and other test items.

2.Features

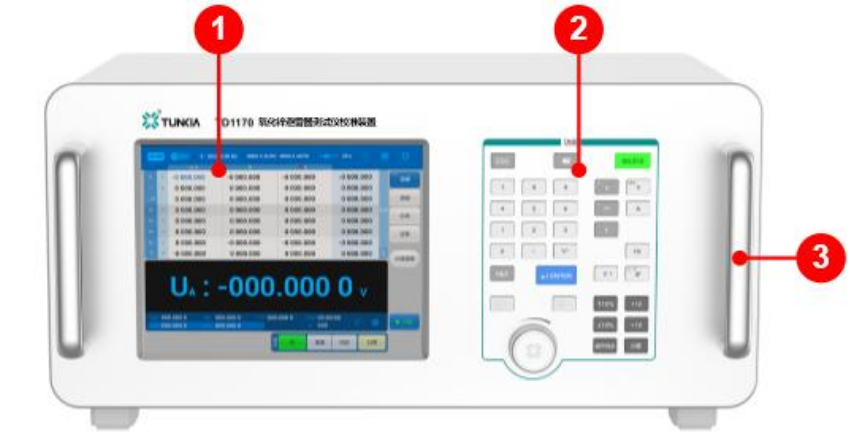
- Built-in three-phase voltage standard source: 10 V ~ 528 V
- Built-in three-phase current standard source: 0.1 mA～120 mA
- Voltage/current accuracy class: class 0.05
- Frequency and phase are adjustable; virtual power output
- Harmonic function: 2nd to 21st, content and phase adjustable
- Resistive/capacitive current flow control is adjustable, full current synthesis simulates lightning arrester failure
- LCD touch screen with digital button
- Communication interfaces: LAN, USB, RS232
- Testing software (optional)

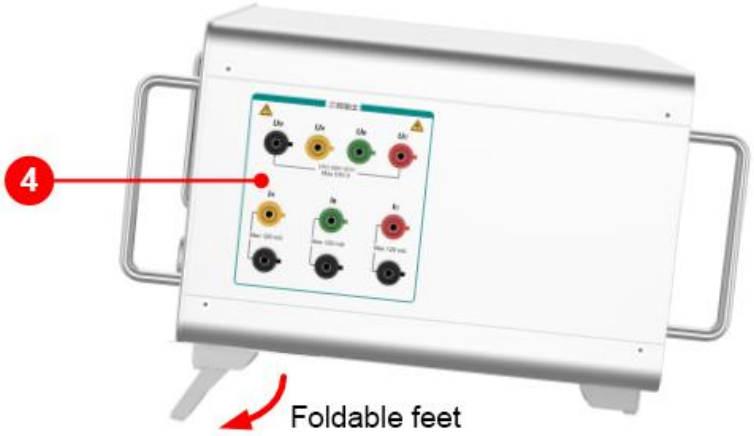
3.Application



4.Appearance

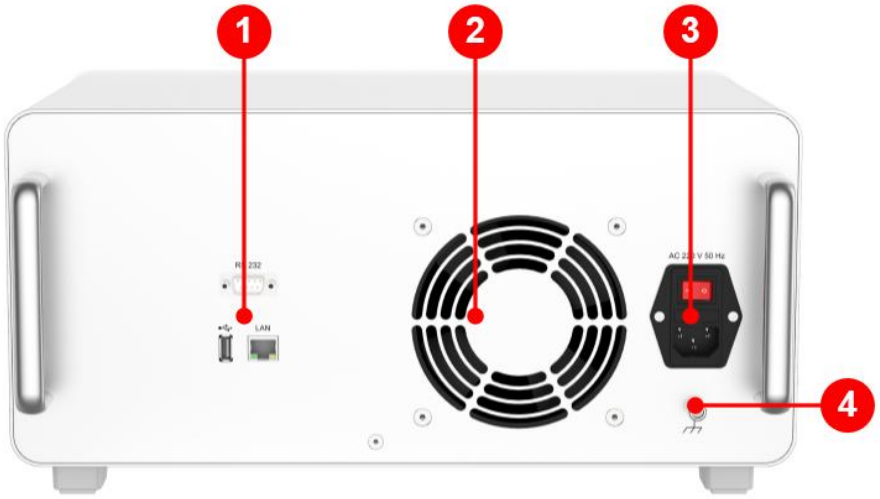
Front Panel





S/N	Function
1	LCD touch color screen.
2	Physical buttons and rotary encoder for easy output and value adjusting.
3	Handle for easy carrying.
4	UA, UB, UC three-phase voltage output terminals, IA, IB, IC three-phase current output terminals

Rear Panel



S/N	Function
1	USB, LAN and RS232 communication interfaces are convenient for connecting to computers to set up automatic test systems.
2	Fan, used to dissipate heat from internal components of the device
3	AC 220V power input interface with fuse and switch
4	Ground terminal for equipment protective grounding

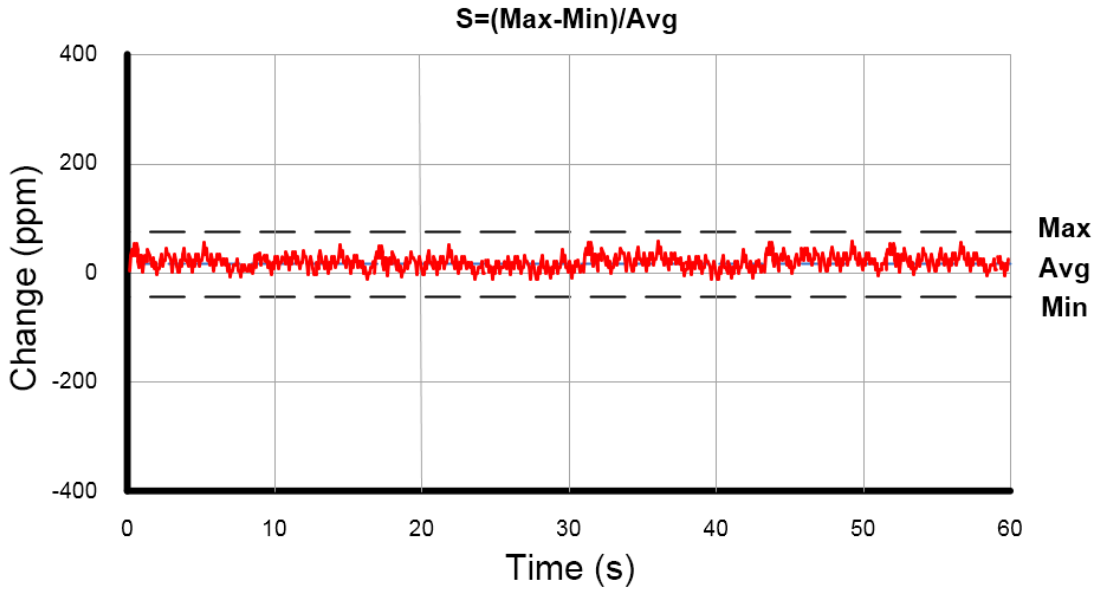
5.Characteristics

Wide range output capability



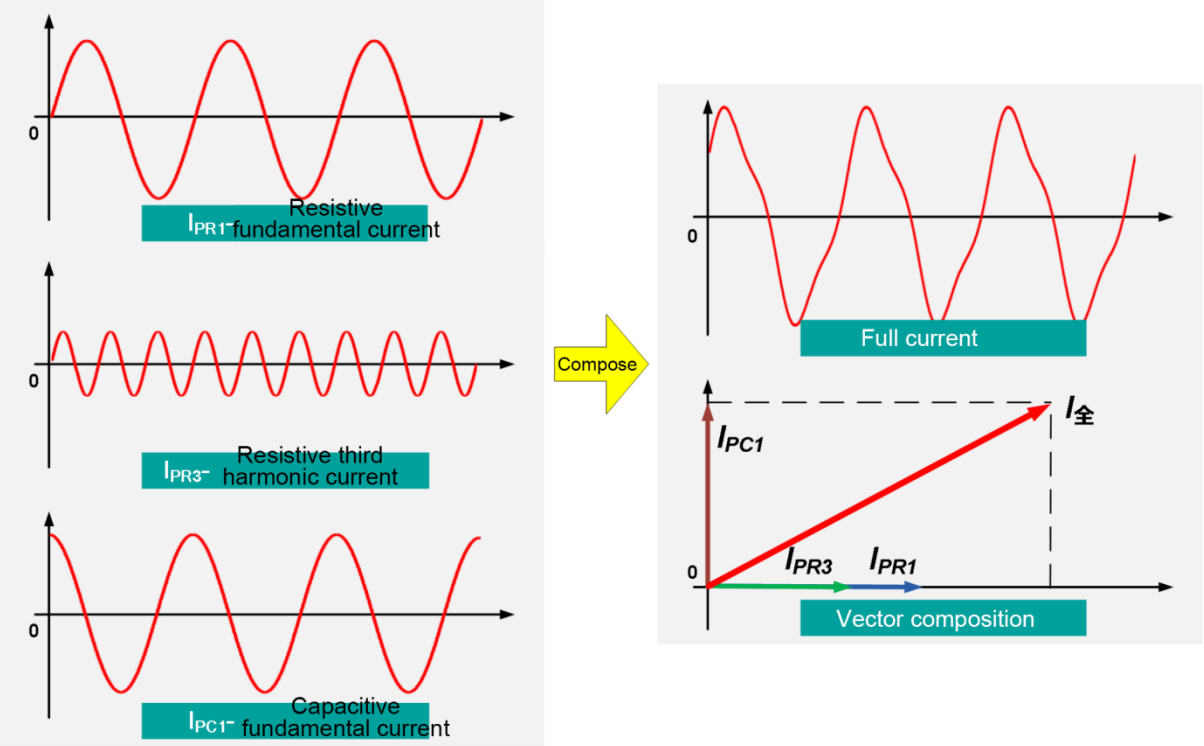
- The wide range of output capabilities can meet the calibration requirements of mainstream single/three-phase zinc oxide lightning arrester testers.

High Stability Output



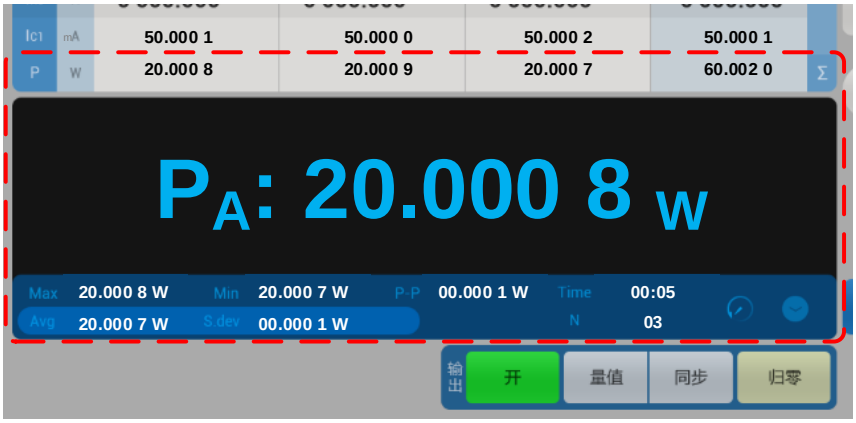
- The standard source output of TD1170 is characterized by high stability. It adopts the design principle of a closed-loop negative feedback system, which can measure and adjust the output power value in real time, ensuring the real-time stability of the output and enabling high repeatability measurements for a long time. Its AC voltage/current output has a typical stability of up to 0.01%/min.

Full Current Vector Synthesis



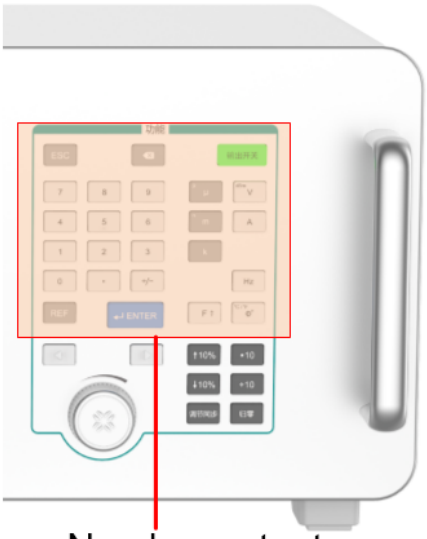
- TD1170 can separately set the resistive fundamental current (IPR1), the resistive third harmonic current (IPR3), the capacitive fundamental current (IPC1) and the vector synthesized full current, and its phase and amplitude are programmable and adjustable.
- Full current output vector synthesis formula: $I=I_{PR1}\cdot sin\omega t + I_{PR3}\cdot sin(3\omega t+\pi) + I_{PC1}\cdot sin(\omega t+\pi/2)$

Power Test



- TD1170 adopts side panel wiring method to independently output AC voltage and AC current.
- The three-phase voltage and current are independently output and the phase is adjustable to form a virtual power standard source, which is used to detect the power indication error of the tester.

Multiple Value Output Methods

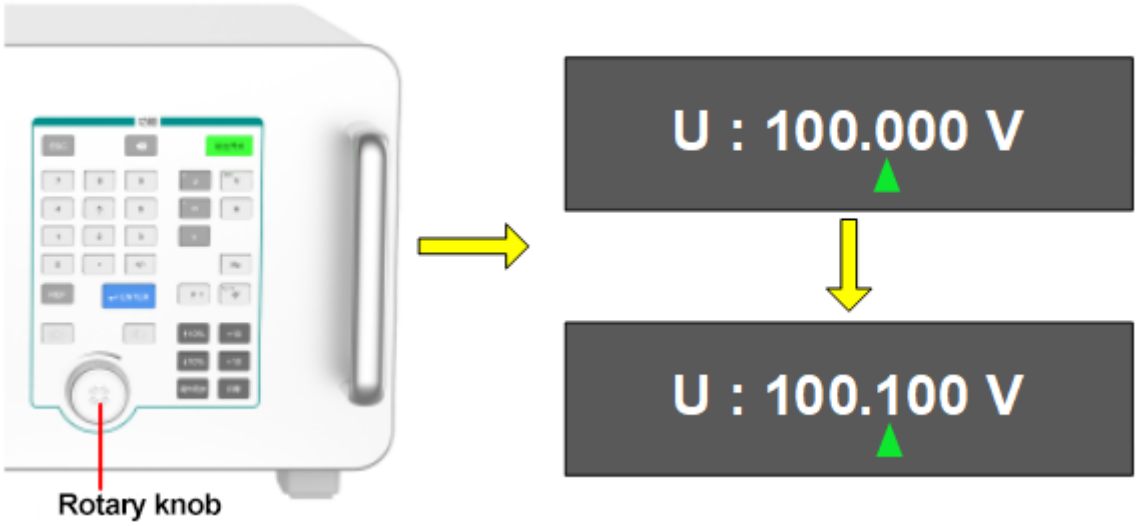


Number output



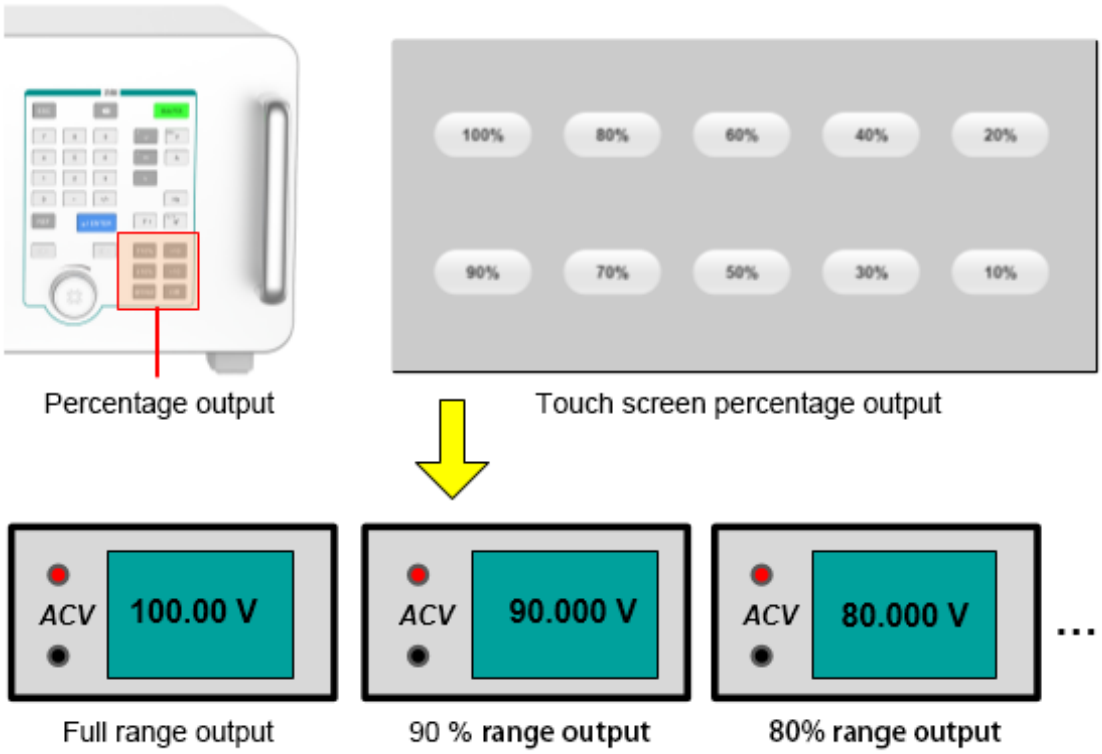
Touch screen output

- Fixed-point output: Directly set the required output value through the digital buttons on the front panel or click on the touch screen, and the instrument will automatically switch to the best range output.
- Especially when setting the power, just input the voltage value, current value and frequency directly.
- When setting three-phase power, it supports three-phase unified adjustment or separate phase adjustment.



- Rotary knob: The value output can be increased or decreased by rotating clockwise or counterclockwise.

Multiple Value Output Methods



- When calibrating the instrument under test, it is usually necessary to select calibration points according to the proportion of each range of the instrument under test.
- Users can easily select the calibration point of the meter under inspection through the "percentage output button" on the panel of the instrument or the "percentage calibration point" on the touch screen.

Harmonic loading function



S/N	Function
1	Sets the amplitude of the selected harmonic, either as an absolute value of the voltage or current harmonic, or as a percentage of the fundamental.
2	Sets the phase of the selected harmonic (relative to the fundamental).
3	The instrument has the output function of the 2nd to 21st harmonics. The embedded software is equipped with a user-defined "harmonic parameter setting" interface. The user can set the required harmonics according to the test requirements.
4	It has an oscilloscope function to observe the AC power waveforms of each phase after loading harmonics.
5	The spectrum of each harmonic is visually displayed in the form of a histogram (the fundamental wave is 100%).

Analysis Function





S/N	Function
1	Displays the amplitude and phase of each phase voltage/current (based on UA).
2	Click **CH** for menu, and the user can choose the power level to be displayed or hidden.
3	The phasor diagram displays the voltage and current of each phase.。
4	Multiple electric parameter display: U_A, U_B, U_C: A / B / C phase voltage; I_A, I_B, I_C: A / B / C phase current; $\angle UI_A$, $\angle UI_B$, $\angle UI_B$: phase angle between A/B/C phase voltage and current; I_{RA}, I_{RB}, I_{RC}: resistive current of A/B/C phase;
5	Max: maximum value, Min: minimum value, P-P: maximum value-minimum value, Avg: average, S.dev: standard deviation S.dev/Avg: The ratio of the standard deviation to the average is the stability. ppm or % display can be switched.

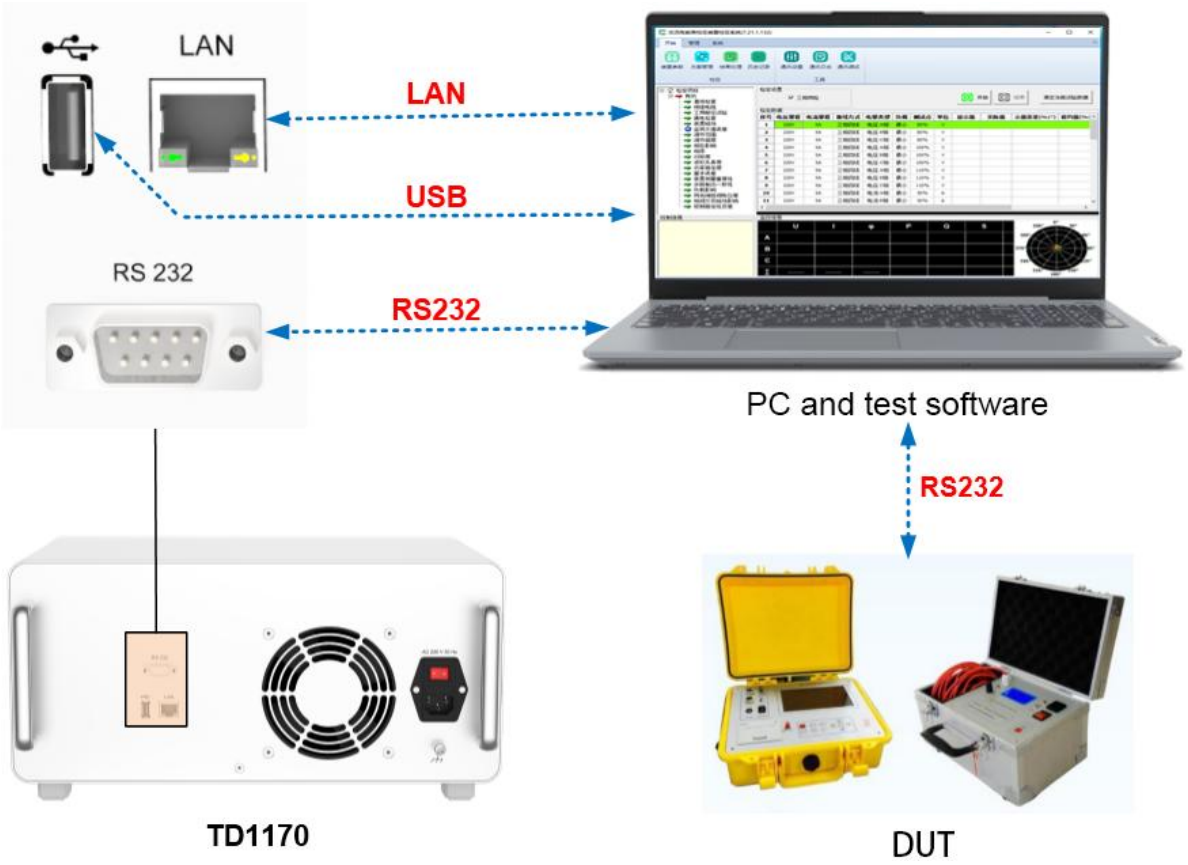
Calculating Function





S/N	Function
1	Multiple electric parameter display: U_A, U_B, U_C: A / B / C phase voltage; I_A, I_B, I_C: A / B / C phase current; $\angle UI_A$, $\angle UI_B$, $\angle UI_B$: Phase angle between A/B/C phase voltage and current; I_{RA}, I_{RB}, I_{Rc}: Resistive current of A/B/C phase; P_A, P_B, P_c: Power of phase A/B/C.
2	Switch to set the electric power proportional formula kx+b or N1/N2 ratio.
3	Click on a certain value in the "Multiple electric parameter display" area to enlarge the calculated value and display it. E.g. f(UA) is UA multiplied by the proportion value.

Test Software



- Optional automated calibration software is suitable for various single/three-phase zinc oxide arrester testing instruments.
- Supports fully automatic or semi-automatic calibration of the inspected equipment, raw data recording, analysis, management and customized template report export.
- *(During fully automatic calibration, the equipment under inspection should have communication functions and open communication protocols to enable data reading.)
- Software functions can be customized according to customer needs and software upgrades are supported.
- The communication protocol and control command set are open, allowing users to develop their own control systems or set up automatic test systems.

6. Specification

6.1 AC Electric Parameter Output

AC Electrical Parameter	Range	Resolution	Short-term Stability (%/min)	Measurement Uncertainty (k=2) (ppm*RD+ppm*RG)[1]
Voltage	60 V	1 mV	0.01	300 + 200
	120 V	10 mV	0.01	300 + 200
	240 V	10 mV	0.01	300 + 200
	480 V[2]	10 mV	0.01	300 + 200
Current	200 μA	0.01 μA	0.01	300 + 200
	500 μA	0.01 μA	0.01	300 + 200
	1 mA	0.1 μA	0.01	300 + 200
	2 mA	0.1 μA	0.01	300 + 200
	5 mA	0.1 μA	0.01	300 + 200
	10 mA	1 μA	0.01	300 + 200
	20 mA	1 μA	0.01	300 + 200
	50 mA	1 μA	0.01	300 + 200
	100 mA[3]	10 μA	0.01	300 + 200
Power	Combination of AC voltage value and AC current value, measurement uncertainty (k=2): 0.1%*FS			
Note [1]: RD is the reading value, RG is the range value; [2]: 480 V is the phase voltage; Note [3]: 100 mA range is optional.				

- Voltage output range: 10 V ~ 528 V
- Current output range: 0.1 mA ~ 120mA, display mode: peak (pk), effective value (rms).
- Voltage and current distortion: ≤0.2%;
- Full current output vector synthesis: $I=I_{PR1}*\sin\omega t + I_{PR3}*\sin(3\omega t +\pi) + I_{PC1}*\sin(\omega t +\pi/2)$

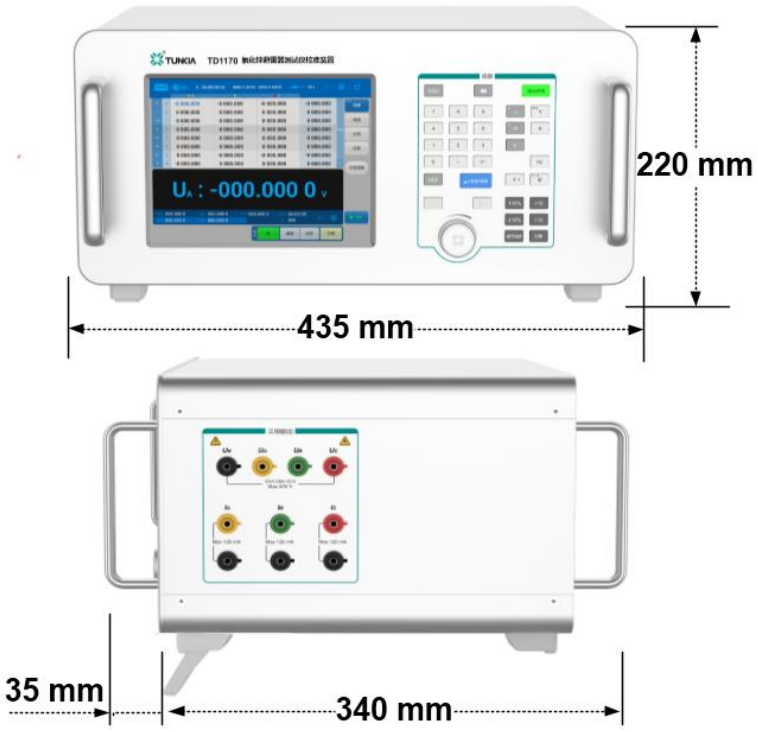
  (Note: I_{PR1}:, I_{PR3}:, I_{PC1} are all adjustable)

6.2 Frequency/Phase/Harmonics

Frequency	Frequency range: 45 Hz ~ 65 Hz; adjustment fineness: 0.001 Hz; measurement uncertainty: 0.01 Hz
Harmonic	2nd to 21st harmonics, amplitude: 0 to 50%
Phase	Phase output: 0.01°~359.99°, phase uncertainty: 0.05°

7. General Specification

Power Supply	AC (220 ± 22) V，(50 ± 2) Hz
Preheat Time	30 minutes
Temperature Performance	Working temperature: 0°C~45°C; Storage temperature: -20°C~70°C
Humidity Performance	Operating humidity: < 80% @ 30°C, < 70% @ 40°C, < 40% @ 50°C Storage humidity: (20%~80%) R·H, no condensation
Altitude	< 3000 m
Weight	About 10 kg
Communication Interface	RS232
Size	435 mm(W) × 375 mm(D) × 220 mm(H)


220 mm
435 mm
35 mm
340 mm

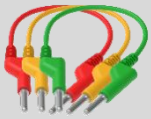
8. Ordering Information

TD1170 – [ ]

Max Current Range	
Code	Note
50mA	50 mA
100mA	100 mA

E.g. TD1170-100mA means the max current range of the decive is 100mA.

9. Accessory List

S/N	Pic	Name	Specification	Quantity	Note
1		Current Shorting Cable	0.18m,1.6 mm^2,Φ4 Plug	Red 1 Green 1 Yellow 1	Standard Accessory
2		Voltage Test Cable	3m / 1.6mm^2 / Φ4-Φ4 Plug	Red 1 Green 1 Yellow 1 Black 1	Standard Accessory
3		Current Test Cable	3m / 2.1mm^2 / Φ4-Φ4 Plug	Red 1 Green 1 Yellow 1 Black 3	Standard Accessory
4		Alligator Clips	Φ4 Jack	Red 2 Black 2	Standard Accessory
5		Communication Cable	USB to RS232	1	Standard Accessory
10		Power Cable	AC 220V, 10A	1	Standard Accessory

S/N	Pic	Name	Specification	Quantity	Note
11		Glass Fuse	F8A, 250V	3	Standard Accessory
12		Packing Box	Aluminum alloy box	1	Standard Accessory