TA2000 AC Power Calibrator

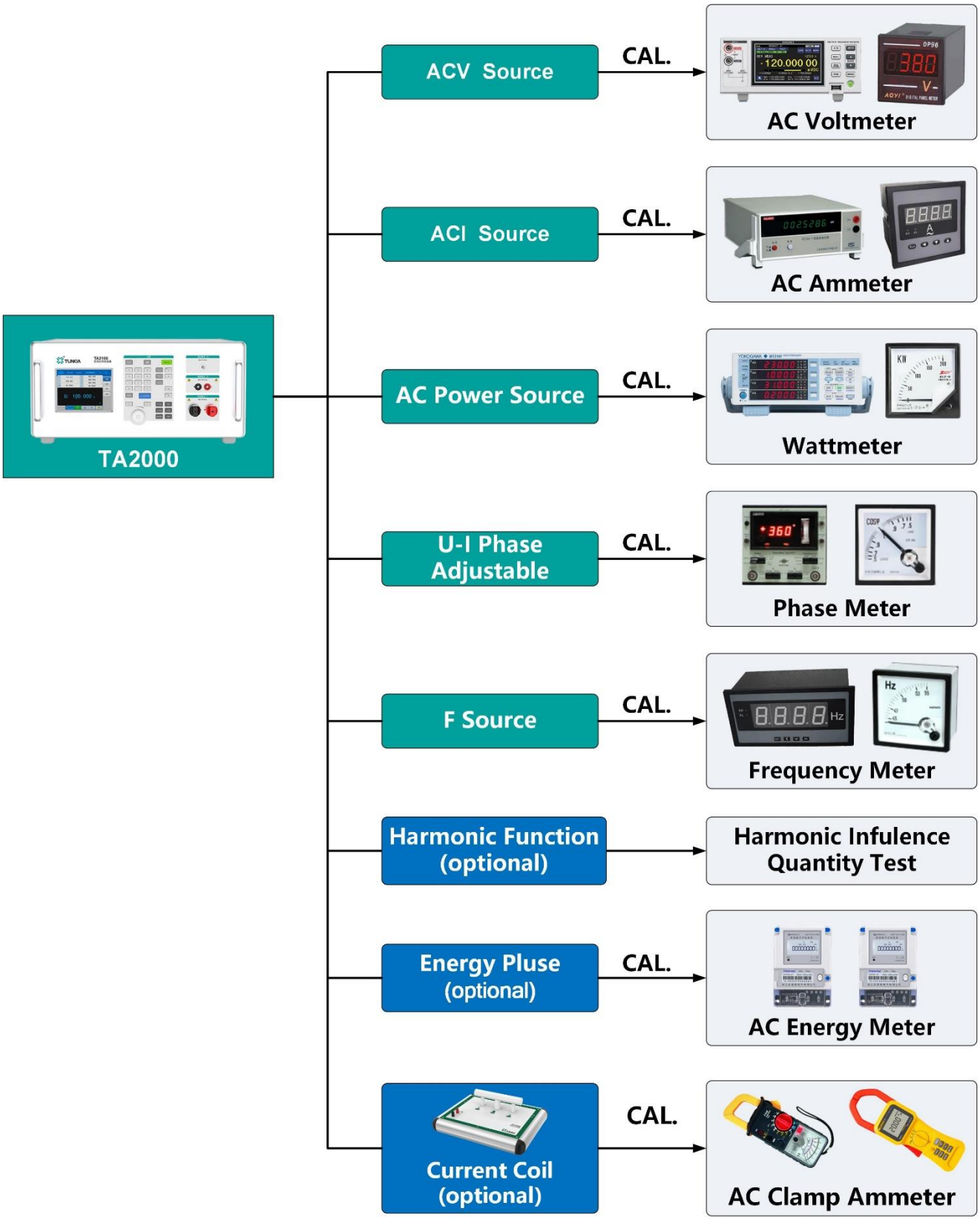
1. Summary

TA2000 is a high precision AC Power source standard with wide range, It's applied for calibrating AC power meters, calibrating AC Voltmeter, calibrating AC Ammeter, calibrating Phase Meter and Frequency Meter. The optional electrical energy function can be used for testing single phase AC energy meter and AC Clamp Ammeter.

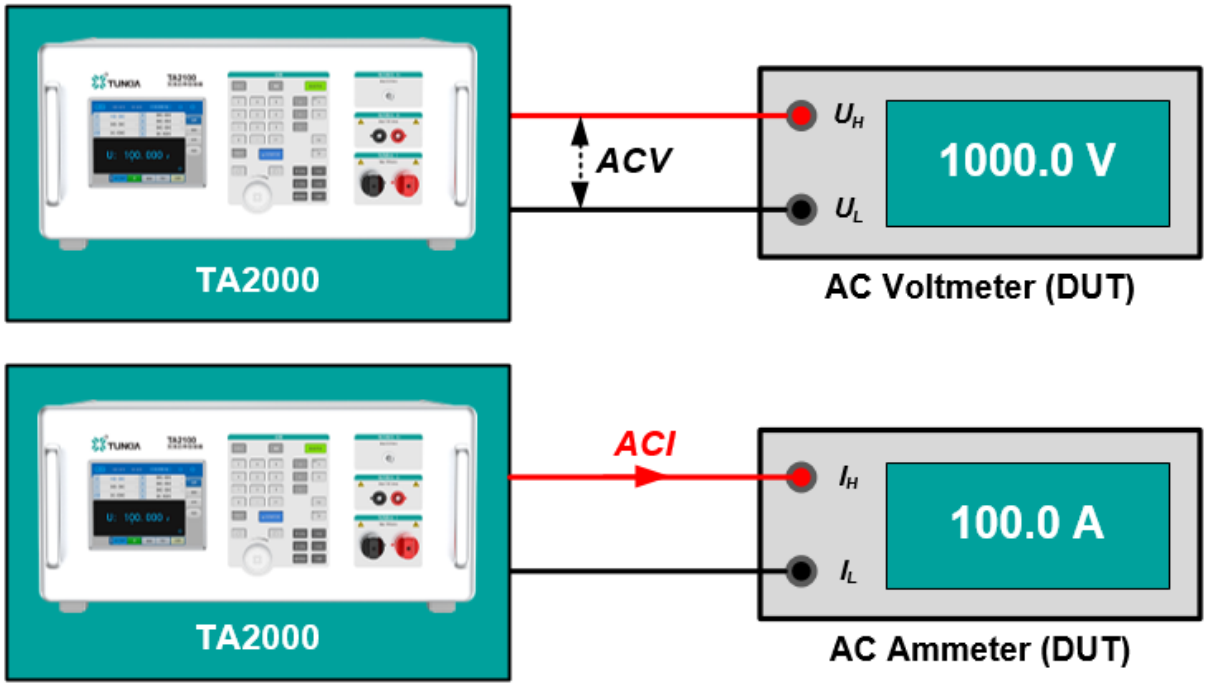
2. Features

- ACV output: 0.3 V ~ 1100 V
- ACI output: 0.3 mA ~ 110 A
- AUX output: 0.5 mV ~ 5.5 V
- F: 40 Hz ~ 70 Hz (1500 Hz is optional)
- Minimum resolution: voltage 10 μV, current 10 nA
- Voltage/Current accuracy: class 0.02/0.05
- Phase accuracy: ±0.01° / ±0.02°
- Adjustment fineness: 0.001%
- Distortion factor: <0.5%
- Harmonic voltage/current output (optional)
- AC energy measurement (optional)

3. Application

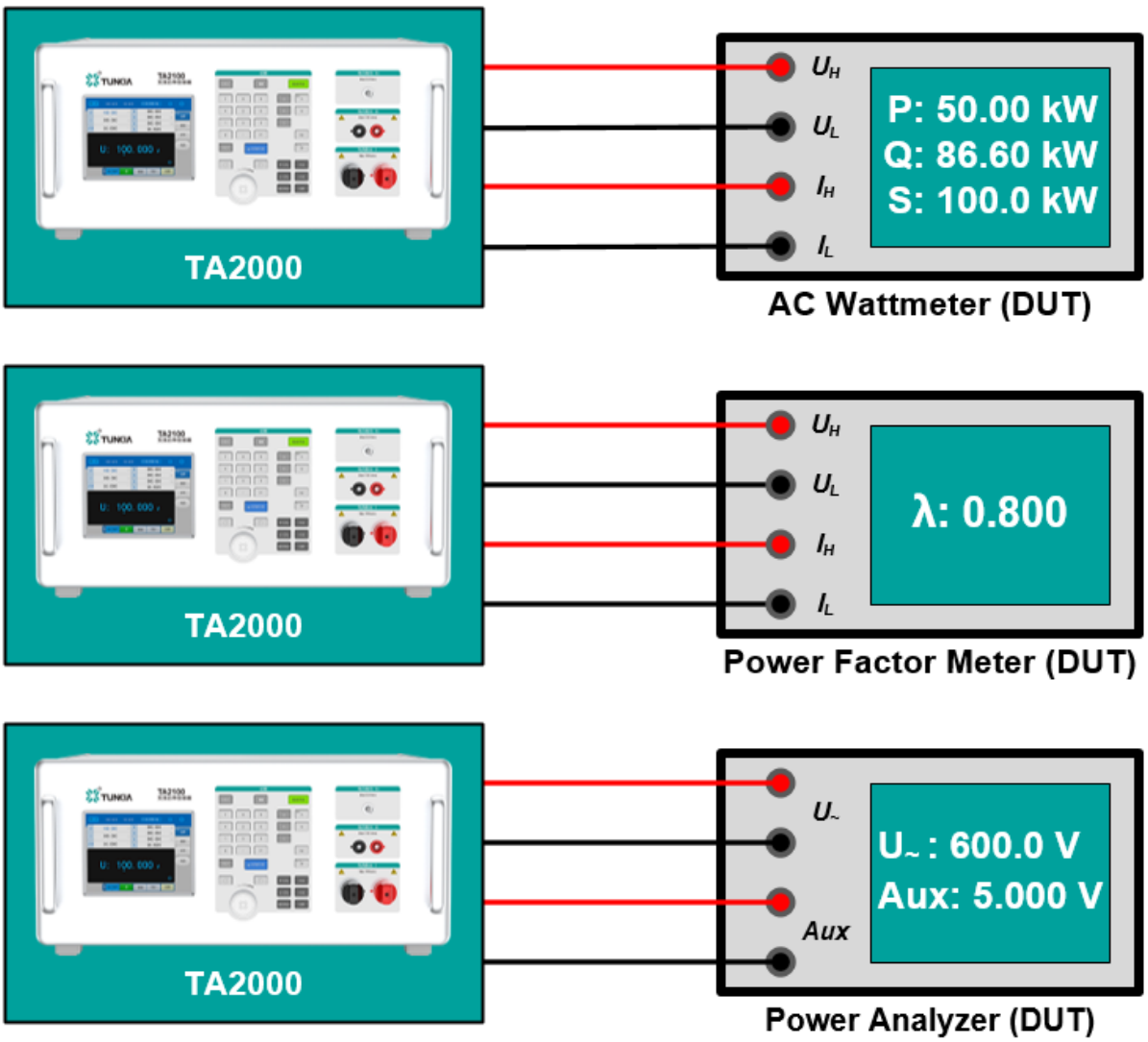


☆ Calibrate AC electrical meter



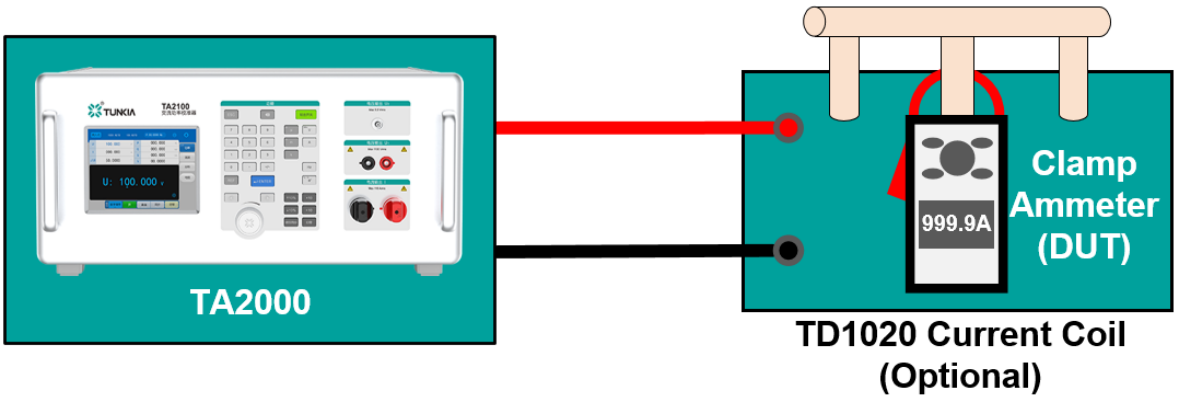
- **ACV** output: 0.3 V ~ 1100V@40 Hz ~ 70 Hz, 300 V@1.5 kHz
- **ACI** output: 0.3 mA ~ 100 A @40 Hz ~ 70 Hz, 50 A@1.5 kHz
- Application for calibrating AC voltage/current meter
- Standard is 70 Hz, 1.5 kHz is optional.

☆ Calibrate AC power meter



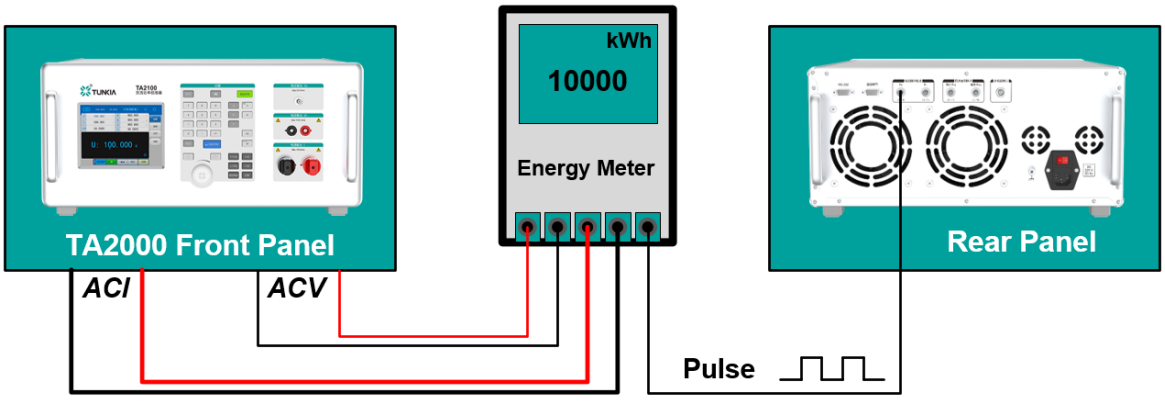
- **Application 1:** Output a virtual standard power source through AC current and voltage source, it's applied for calibrating conventional AC power meter.
- **Application 2:** Output a virtual standard power source through AC small-signal voltage and AC voltage source, it's applied for calibrating AC power meter with current transducer.
- Calibrate active power meter, reactive power meter, volt-ampere meter, power frequency phase meter, power factor meter, power analyzer, etc.

☆ Calibrate AC clamp ammeter (optional)



- Equivalent to 1000AT current through input 20A current to the 50T Coil, which is suitable for calibrating DC clamp meters.

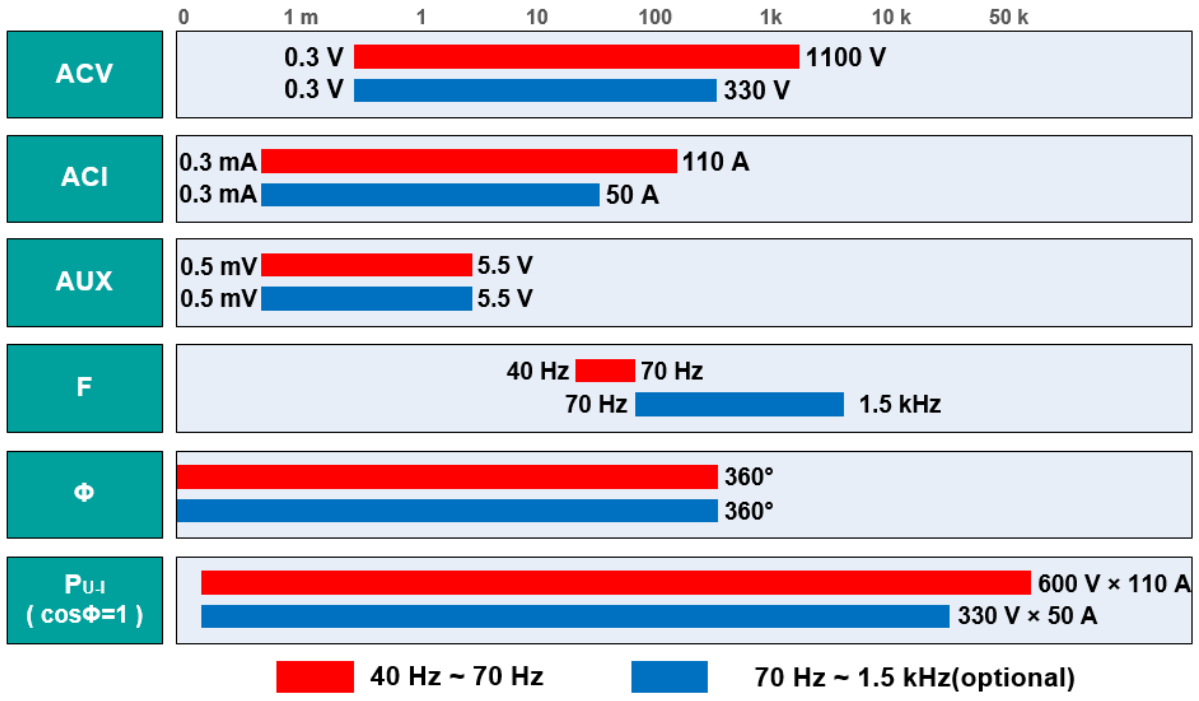
☆ Detect Singe-phase energy meter (optional)



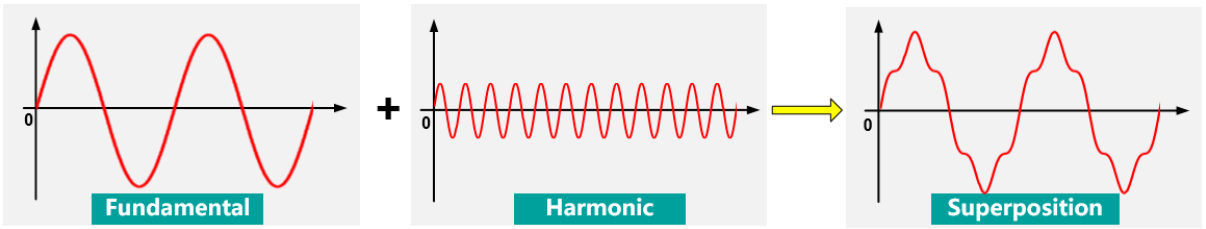
- Detect single-phase energy meter.

4. Characteristics

☆ Wide output range



☆ Harmonic output (optional)



- 2nd ~31th harmonic @ 50 Hz.

☆ Multiple output\adjustment methods

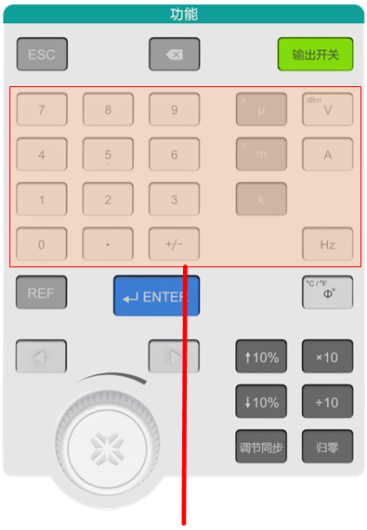


Figure (a) Keypad

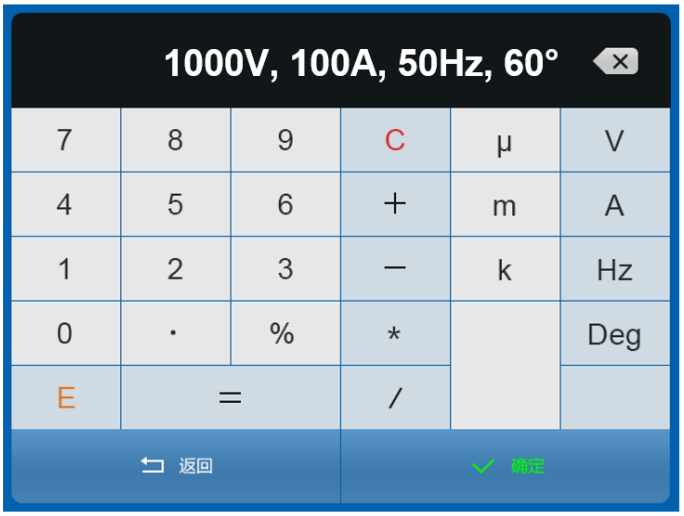
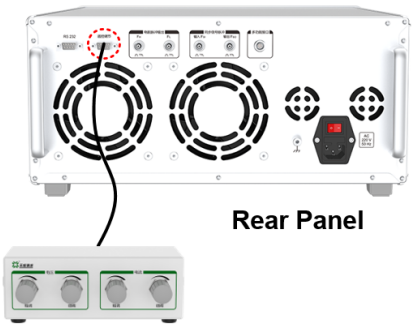


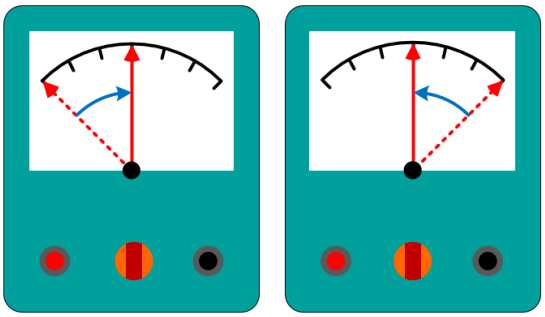
Figure (b) Touch Screen Output

- "**Direct output**" mode: the value output can be set directly by physical key or touch screen.



Rear Panel

Remote Box (optional)



Convinent to calibrate "difference between rising and falling"

- Calibration of the analog pointer meter usually needs to test scale by scale, especially "differences between rising and falling" (the change caused by the rise and fall of the calibration point).
- Remote box can realize the coarse and fine adjustment of current or voltage.

☆ Multiple output\adjustment methods

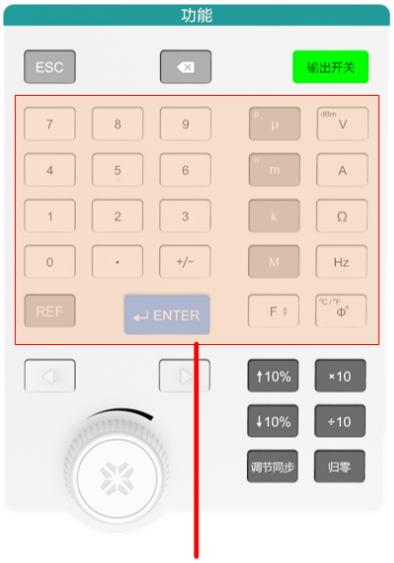
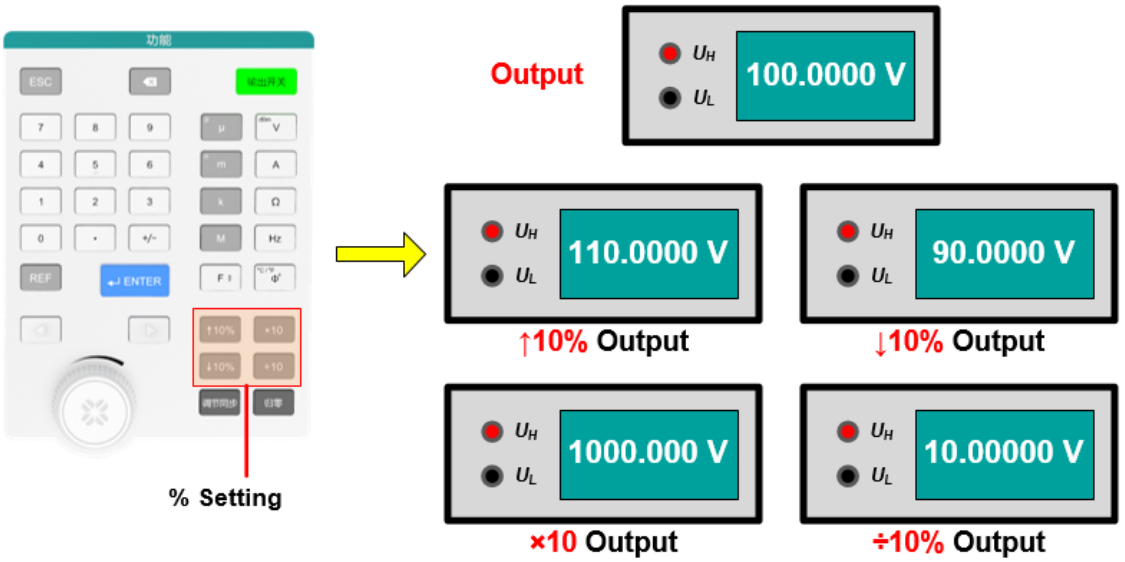


Figure (a) Keypad

Figure (b) Touch Screen Output

- "**Direct output**" mode: the value output can be set directly by physical key or touch screen.



- 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.

6. Specifications

6.1 AC Voltage Output

Range	Frequency [1]	Resolution	Voltage Output	Maximum Burden Current
3 V	40 Hz ~ 70 Hz	10 μV	0.30000 V ~ 3.30000 V	500mA
	70 Hz ~ 1500 Hz			
10 V	40 Hz ~ 70 Hz	100 μV	1.0000 V ~ 11.0000 V	500mA
	70 Hz ~ 1500 Hz			
30 V	40 Hz ~ 70 Hz	100 μV	3.0000 V ~ 33.0000 V	500mA
	70 Hz ~ 1500 Hz			
100 V	40 Hz ~ 70 Hz	1 mV	10.000 V ~ 110.000 V	350 mA
	70 Hz ~ 1500 Hz			
300 V	40 Hz ~ 70 Hz	1 mV	30.000 V ~ 330.000 V	120 mA
	70 Hz ~ 1500 Hz			
600 V	40 Hz ~ 70 Hz	1 mV	60.000 V ~ 660.000 V	50 mA
1000 V	40 Hz ~ 70 Hz	10 mV	100.00 V ~ 1100.00 V	40 mA
Note: [1] 70 Hz ~ 1500 Hz is optional。				

- Adjustment fineness: 0.001%*RG, 6 digits display.
- Short-circuit and overload protection

Range	Frequency	Short-term Stability (±%*RG/min)		Measurement Uncertainty (k=2) ±(ppm*RD+ppm*RG) [1]		Distortion Factor (%)
		Class 0.05	Class 0.02	Class 0.05	Class 0.02	
3 V	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
10 V	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
30 V	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
100 V	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
300 V	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
600 V	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
1000 V	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
Note: [1] RD is reading, RG is range, same below.						

6.2 AC Current Output

Range	Frequency [1]	Resolution	Current Output	Maximum Burden Voltage
3 mA	40 Hz ~ 70 Hz	10 nA	0.30000 mA ~ 3.30000 mA	50 V
	70 Hz ~ 1500 Hz			
10 mA	40 Hz ~ 70 Hz	100 nA	1.0000 mA ~ 11.0000 mA	50 V
	70 Hz ~ 1500 Hz			
30 mA	40 Hz ~ 70 Hz	100 nA	3.0000 mA ~ 33.0000 mA	50 V
	70 Hz ~ 1500 Hz			
100 mA	40 Hz ~ 70 Hz	1 μA	10.000 mA ~ 100.000 mA	50 V
	70 Hz ~ 1500 Hz			
300 mA	40 Hz ~ 70 Hz	1 μA	30.000 mA ~ 330.000 mA	50 V
	70 Hz ~ 1500 Hz			
1 A	40 Hz ~ 70 Hz	10μA	0.10000 A ~ 1.10000 A	50 V
	70 Hz ~ 1500 Hz			
3 A	40 Hz ~ 70 Hz	10μA	0.30000 A ~ 3.30000 A	30 V
	70 Hz ~ 1500 Hz			
10 A	40 Hz ~ 70 Hz	100μA	1.0000 A ~ 10.0000 A	6 V
	70 Hz ~ 1500 Hz			
30 A	40 Hz ~ 70 Hz	100μA	3.0000 A ~ 33.0000 A	2.5 V
	70 Hz ~ 1500 Hz			
100 A	40 Hz ~ 70 Hz	1 mA	10.000 A ~ 110.000 A	1.2 V
	70 Hz ~ 1500 Hz		10.000 A ~ 50.000 A	
Note: [1] 70 Hz ~ 1500 Hz is optional.				

- Current output: 0.3 mA ~ 110 A @ 40 Hz ~ 70 Hz; 0.3 mA ~ 50 A @ 70Hz ~ 1.5 kHz.
- Adjustment Fineness: 0.001%*RG, 6 digits display.
- Open-circuit and overload protection

Range	Frequency	Short-term Stability (±%*RG/min)		Measurement Uncertainty (k=2) ±(ppm*RD+ppm*RG) [1]		Distortion Factor (%)
		Class 0.05	Class 0.02	Class 0.05	Class 0.02	
3 mA	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
10 mA	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
30 mA	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
100 mA	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
300 mA	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
1 A	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
3 A	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
10 A	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
30 A	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0
100 A	40 Hz ~ 70 Hz	0.01	0.005	300 + 200	120 + 80	<0.5
	70 Hz ~ 1500 Hz					<1.0

6.3 AC Low Voltage Output

Range	Frequency [1]	Resolution	Voltage Output	Maximum Burden Current
5 mV	40 Hz ~ 70 Hz	10 nV	0.50000 mV ~ 5.50000 mV	10 mA
	70 Hz ~ 1500 Hz			
20 mV	40 Hz ~ 70 Hz	100 nV	2.0000 mV ~ 22.0000 mV	10 mA
	70 Hz ~ 1500 Hz			
50 mV	40 Hz ~ 70 Hz	100 nV	5.0000 mV ~ 55.0000 mV	10 mA
	70 Hz ~ 1500 Hz			
200 mV	40 Hz ~ 70 Hz	1 μV	20.000 mV ~ 220.000 mV	10 mA
	70 Hz ~ 1500 Hz			
500 mV	40 Hz ~ 70 Hz	1 μV	50.000 mV ~ 550.000 mV	10 mA
	70 Hz ~ 1500 Hz			
2 V	40 Hz ~ 70 Hz	10μV	0.20000 V ~ 2.20000 V	10 mA
	70 Hz ~ 1500 Hz			
5 V	40 Hz ~ 70 Hz	10μV	0.50000 V ~ 5.50000 V	10 mA
	70 Hz ~ 1500 Hz			
Note: [1] 70 Hz ~ 1500 Hz is optional.				

- Adjustment Fineness: 0.001%*RG, 6 digits display.
- Short-circuit and overload protection

Range	Frequency	Short-term Stability (±%*RG/min)		Measurement Uncertainty (k=2) ±(ppm*RD+μV)		Distortion Factor (%)
		Class 0.05	Class 0.02	Class 0.05	Class 0.02	
5 mV	40 Hz ~ 70 Hz	0.5	0.2	300 + 20	120 + 10	<1.0
	70 Hz ~ 1500 Hz					<1.0
20 mV	40 Hz ~ 70 Hz	0.1	0.05	300 + 20	120 + 10	<1.0
	70 Hz ~ 1500 Hz					<1.0
50 mV	40 Hz ~ 70 Hz	0.05	0.02	300 + 20	120 + 10	<1.0
	70 Hz ~ 1500 Hz					<1.0
200 mV	40 Hz ~ 70 Hz	0.05	0.02	300 + 100	120 + 60	<0.5
	70 Hz ~ 1500 Hz					<1.0
500 mV	40 Hz ~ 70 Hz	0.05	0.02	300 + 100	120 + 60	<0.5
	70 Hz ~ 1500 Hz					<1.0
2 V	40 Hz ~ 70 Hz	0.02	0.01	300 + 400	120 + 150	<0.5
	70 Hz ~ 1500 Hz					<1.0
5 V	40 Hz ~ 70 Hz	0.02	0.01	300 + 1000	120 + 400	<0.5
	70 Hz ~ 1500 Hz					<1.0
Note: [1] RD is reading, RG is range, same below.						

6.4 Sinusoidal Wave Frequency Output

Range	Resolution	Measurement Uncertainty (k=2)	
		Class 0.05	Class 0.02
40.0001Hz ~ 99.9999 Hz	0.0001 Hz	±0.02%	±0.01%
100.000 Hz ~ 999.999 Hz	0.001 Hz	±0.02%	±0.01%
1000.00 Hz ~1500.00 Hz	0.01 Hz	±0.02%	±0.01%

6.5 AC Power Output

Frequency Range (*f*)	Voltage Range (U)	Current Range (I)	Low Voltage Range (Aux)	Phase Range (*φ*)	Power Factor Range (*λ*)
40 Hz ~ 70 Hz	0.3 V ~ 600 V	0.3 mA ~ 110 A	0.5 mV ~ 5.5 V	0°~360°	-1~0~1
70 Hz ~ 1500 Hz	0.3 V ~ 330 V	0.3 mA ~ 50 A	0.5 mV ~ 5.5 V	0°~360°	-1~0~1

Note [1]: active power |sinφ|≥0.5，reactive power |cosφ|≥0.5；

Note [2]: For more accurate technical indicators of power accuracy or power accuracy 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 accuracy of voltage，U_I is the accuracy of current，U_λ Is the accuracy of power factor.

6.6 Phase and Power Factor Adjustment

Phase		Power factor	Accuracy			
			Phase		Power factor	
WATTS	VARS	*λ=cosφ*	Class 0.05	Class 0.02	Class 0.05	Class 0.02
0°	90°	1.00000	0.02°	0.01°	0.000%	0.000%
10°	80°	0.98481	0.02°	0.01°	0.006%	0.003%
20°	70°	0.93969	0.02°	0.01°	0.013%	0.006%
30°	60°	0.86603	0.02°	0.01°	0.020%	0.010%
40°	50°	0.76604	0.02°	0.01°	0.029%	0.015%
50°	40°	0.64279	0.02°	0.01°	0.042%	0.021%
60°	30°	0.50000	0.02°	0.01°	0.060%	0.030%
70°	30°	0.34202	0.02°	0.01°	0.096%	0.048%
80°	10°	0.17365	0.02°	0.01°	0.198%	0.099%
90°	0°	0.00000	—	—	—	—

- [1] Phase range: 0.000°~359.999°, adjustment fineness: 0.005°
- [2] Power factor range: -1 ~ 0 ~ 1, adjustment fineness: 0.000 1
- [3] Other accuracy of power factor formula: $U_\lambda = [1 - \cos(\varphi + \Delta\varphi)/\cos\varphi] \times 100\%$

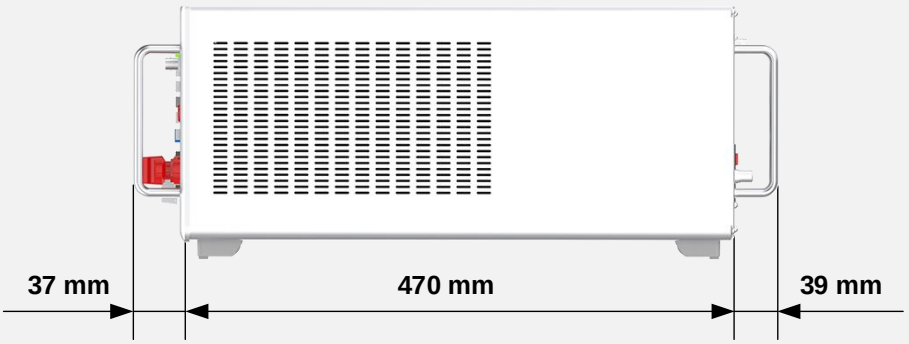
6.7 Harmonic Output(optional)

- 2^{nd} ~ 31^{th}
- Amplitude: 0 ~ 40%
- Phase: 0.0° ~ 359.9°

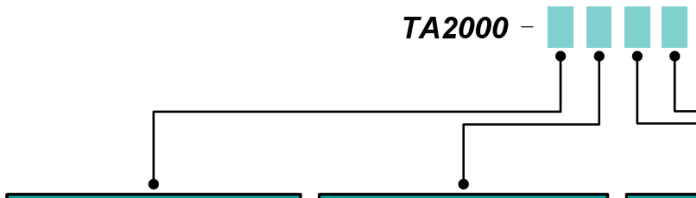
6.8 Energy Testing(optional)

- Energy pulse output: 60 kHz for high frequency range, 6 Hz for low frequency range
- Energy pulse input: frequency ≤200 kHz, voltage amplitude: 0…3.3 V…24 V

7. General Specifications

Power supply	AC (220±22) V, (50±2) Hz
Maximum power consumption	600 VA
Warm up time	Twice the time since last warmed up, to a maximum of 30 minutes.
Temperature performance	Operating temperature: 0°C~40°C Calibrating temperature: 18°C~28°C Storage temperature: -20°C~70°C
Humidity performance	Operating humidity: <80% @ 30°C, <70% @ 40°C Storage humidity: (20%~80%) R·H, No condensation
Communication interface	RS232
Dimensions	450 mm(W)× 470 mm (D) × 205 mm (H), Handles and feets excluded.
	 
Weight	About 30.5 kg

8. Ordering Information



Accuracy	
Code	Note
200	Class 0.02
500	Class 0.05

Frequency	
Code	Note
70Hz	40 Hz~70 Hz
1.5kHz	40 Hz~1.5 kHz

Harmonic Output	
Code	Note
Empty	/
H	✓

Energy Meter Dection	
Code	Note
Empty	/
E	✓

e.g. : ***TA2000-500-70Hz-E*** represents the instrument: class 0.05，*40 Hz~70 Hz*，with the function of energy meter detection.