

TA2100 Wideband Power Calibrator



1. Summary

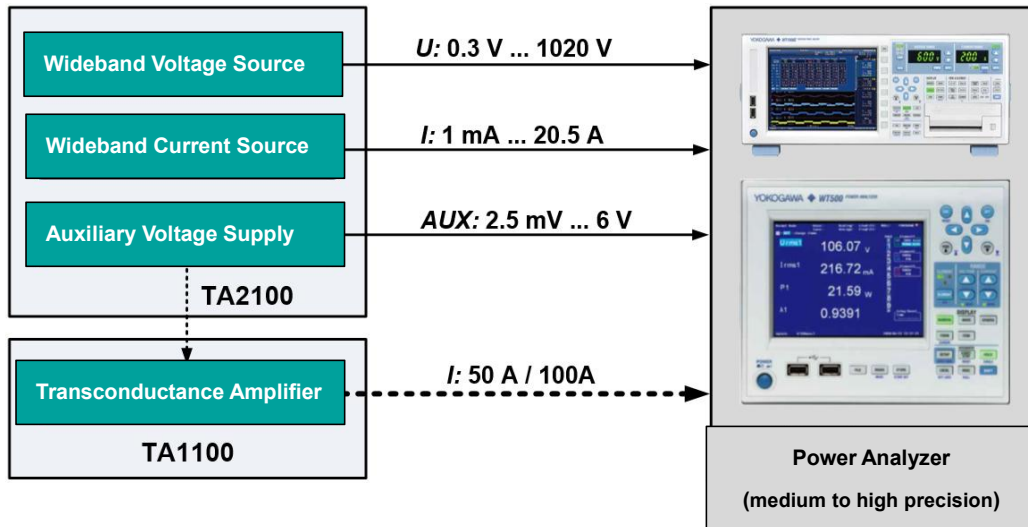
TA2100 is a wide range, high precision, high stability wideband power calibrator, the instrument can output DC voltage, current and power, and has a dual voltage output mode, suitable for calibration power analyzer, AC / DC power meter, voltmeter, ammeter and other electrical measuring instruments.

2. Product features

- Standard Source of AC / DC Voltage: 0.3 V ~ 1020 V
- Standard Source of AC / DC Current: 0.5 mA ~ 20.5 A
- Standard Source of Auxiliary Voltage: 2.5 mV ~ 5.5 V
- Sine Wave Frequency: 5 Hz ~ 100 kHz
- Power Accuracy: Class 0.05
- Phase-Shifted Output
- Wideband Power Output
- A variety of quantity and value output mode
- Cross-guide amplifier (optional)

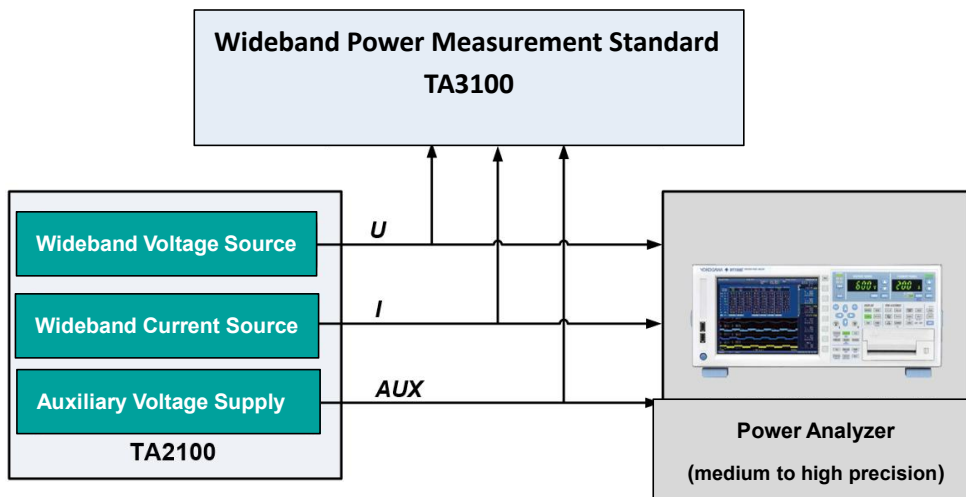
3. Main applications

☆ Calibration power analyzer (medium to low precision)



- The accuracy is Class 0.05, using the standard source method to calibrate the medium and low precision (Class 0.2 and below) power analyzer.
- The direct output of the maximum 20.5A, can output an current of 50A or 100A.

☆ Calibration power analyzer (medium to high precision)



- TA2100 matches TA3100 wide frequency power measurement standard with accuracy of 0.015%.
- Use the standard meter method to calibrate the power analyzer with medium and high precision (Class0.05 and below).

4. Main technical specifications

4.1 AC / DC Voltage Output

Range	Resolving Power	Voltage Output range	Output Frequency Range	Maximum Load Current
3 V	10 μ V	0.30000 V ~ 3.30000 V	DC, 5 Hz ~ 100 kHz	50 mA
10 V	100 μ V	1.0000 V ~ 11.0000 V	DC, 5 Hz ~ 100 kHz	50 mA
30 V	100 μ V	3.0000 V ~ 33.0000 V	DC, 5 Hz ~ 100 kHz	50 mA
100 V	1 mV	10.000 V ~ 110.000 V	DC, 45 Hz ~ 100 kHz	50 mA
300 V	1 mV	30.000 V ~ 330.000 V	DC, 45 Hz ~ 100 kHz	50 mA
600 V	1 mV	60.000 V ~ 660.000 V	DC, 45 Hz ~ 100 kHz	20 mA
1000 V	10 mV	100.00 V ~ 1020.00 V	DC, 45 Hz ~ 10 kHz	20 mA

Range	Measurement Uncertainty at different frequencies (Hz) (k=2) @ (23°C \pm 5°C), (ppm * reading + ppm * range)						
	DC	5~45	45~1k	1k~10k	10k~20k	20k~50k	50k~100k
3 V	120+80	300+200	120+80	300+200	500+300	600+400	1000+500
10 V	120+80	300+200	120+80	300+200	500+300	600+400	1000+500
30 V	120+80	300+200	120+80	300+200	500+300	600+400	1000+500
100 V	120+80	—	120+80	300+200	500+300	600+400	1000+500
300 V	120+80	—	120+80	300+200	500+300	600+400	1000+500
600 V	120+80	—	120+80	300+200	500+300	600+400	1000+500
1000 V	120+80	—	120+80	300+200	—	—	—

- Range switching: manual or automatic shift
- Protection function: short-circuit protection, overload protection, overheat protection

4.2 AC / DC Current Output

Range	Resolving Power	Current Output Range	Output Frequency Range	Maximum Load Voltage
5 mA	10 nA	0.50000 mA ~ 5.50000 mA	DC, 5 Hz ~ 100 kHz	7 V
10 mA	100 nA	1.0000 mA ~ 11.0000 mA	DC, 5 Hz ~ 100 kHz	7 V
25 mA	100 nA	2.5000 mA ~ 27.5000 mA	DC, 5 Hz ~ 100 kHz	7 V
50 mA	100 nA	5.0000 mA ~ 55.0000 mA	DC, 5 Hz ~ 100 kHz	7 V
100 mA	1 μA	10.000 mA ~ 110.000 mA	DC, 5 Hz ~ 100 kHz	7 V
200 mA	1 μA	20.000 mA ~ 220.000 mA	DC, 5 Hz ~ 100 kHz	6 V
500 mA	1 μA	50.000 mA ~ 550.000 mA	DC, 5 Hz ~ 100 kHz	6 V
1 A	10 μA	0.10000 A ~ 1.10000 A	DC, 5 Hz ~ 100 kHz	6 V
2.5 A	10 μA	0.25000 A ~ 2.75000 A	DC, 5 Hz ~ 100 kHz	6 V
5 A	10 μA	0.50000 A ~ 11.0000 A	DC, 5 Hz ~ 100 kHz	6 V
10 A	100 μA	1.0000 A ~ 11.0000 A	DC, 5 Hz ~ 100 kHz	6 V
20 A	100 μA	2.0000 A ~ 20.5000 A	DC, 5 Hz ~ 100 kHz	6 V

Range	Measurement Uncertainty at different frequencies (Hz) (k=2) @ (23°C ± 5°C), (ppm * reading + ppm * range)						
	DC	5~45	45~1k	1k~10k	10k~20k	20k~50k	50k~100k
5 mA	120+80	300+200	120+80	300+200	600+400	1000+500	2k + 1k
10 mA	120+80	300+200	120+80	300+200	600+400	1000+500	2k + 1k
25 mA	120+80	300+200	120+80	300+200	600+400	1000+500	2k + 1k
50 mA	120+80	300+200	120+80	300+200	600+400	1000+500	2k + 1k
100 mA	120+80	300+200	120+80	300+200	600+400	1000+500	2k + 1k
200 mA	120+80	300+200	120+80	300+200	600+400	1000+500	2k + 1k
500 mA	120+80	300+200	120+80	300+200	600+400	1000+500	2k + 1k
1 A	120+80	300+200	120+80	300+200	600+400	1000+500	2k + 1k
2.5 A	120+80	300+200	120+80	300+200	600+400	1000+500	2k + 1k
5 A	120+80	300+200	120+80	300+200	600+400	1000+500	2k + 1k
10 A	120+80	300+200	120+80	300+200	600+400	1000+500	2k + 1k

20 A	120+80	300+200	120+80	300+200	600+400	1000+500	2k + 1k
------	--------	---------	--------	---------	---------	----------	---------

- Range switch: manual or automatic shift; open circuit protection, overload protection, overheating protection

4.3 Auxiliary Voltage Output

Range	Resolving Power	Voltage Output Range	Output Frequency Range	Maximum Load Current
25 mV	100 nV	2.5000 mV ~ 27.5000 mV	DC, 5 Hz ~ 100 kHz	10 mA
50 mV	100 nV	5.0000 mV ~ 55.0000 mV	DC, 5 Hz ~ 100 kHz	10 mA
100 mV	1 μV	10.000 mV ~ 110.000 mV	DC, 5 Hz ~ 100 kHz	10 mA
250 mV	1 μV	25.000 mV ~ 275.000 mV	DC, 5 Hz ~ 100 kHz	10 mA
500 mV	1 μV	50.000 mV ~ 550.000 mV	DC, 5 Hz ~ 100 kHz	10 mA
1 V	10 μV	0.10000 V ~ 1.10000 V	DC, 5 Hz ~ 100 kHz	10 mA
2.5 V	10 μV	0.25000 V ~ 2.75000 V	DC, 5 Hz ~ 100 kHz	10 mA
5 V	10 μV	0.50000 V ~ 5.50000 V	DC, 5 Hz ~ 100 kHz	10 mA

Range	Measurement Uncertainty at different frequencies (Hz) (k=2) @ (23°C ± 5°C), (ppm * reading + ppm * range)						
	DC	5~45	45~1k	1k~10k	10k~20k	20k~50k	50k~100k
25 mV	150+200	350+250	150+200	350+250	600+400	1000+500	1200+800
50 mV	150+200	350+250	150+200	350+250	600+400	1000+500	1200+800
100 mV	150+200	350+250	150+200	350+250	600+400	1000+500	1200+800
250 mV	150+200	350+250	150+200	350+250	600+400	1000+500	1200+800
500 mV	120+80	300+200	120+80	300+200	500+300	600+400	1000+500
1 V	120+80	300+200	120+80	300+200	500+300	600+400	1000+500
2.5 V	120+80	300+200	120+80	300+200	500+300	600+400	1000+500
5 V	120+80	300+200	120+80	300+200	500+300	600+400	1000+500

- Range switching: manual or automatic shift
- Wiring mode: BNC plug
- Protection function: short-circuit protection, overload protection, overheat protection
- Note: This output is especially suitable for the sensor small signal input of the power analyzer

4.4 Frequency

Adjustable Range	Resolving Power	Annual Measurement Uncertainty (k=2) @ (23°C ± 5°C)
5.000 0 Hz ≤ F ≤ 99.999 9 Hz	0.000 1 Hz	0.01%
100.000 Hz ≤ F ≤ 999.999 Hz	0.001 Hz	0.01%
1.000 00 kHz ≤ F ≤ 9.999 99 kHz	0.01 Hz	0.01%
10.000 0 kHz ≤ F ≤ 99.999 9 kHz	0.1 Hz	0.01%
100.000 kHz	1 Hz	0.01%

4.5 Phase

Phase Position ^{[1][2]}	Annual Measurement Uncertainty (k=2) @ (23°C ± 5°C)					
	5~45Hz	45~1kHz	1k~10kHz	10k~20kHz	20k~50kHz	50k~100kHz
φ_{U-I}	0.05°	0.02°	0.05°	0.1°	0.2°	0.5°
φ_{U-AUX}	0.05°	0.02°	0.05°	0.1°	0.2°	0.5°

Note [1]: Adjustment range: 0.000° ~ 359.999°

Note [2]: Resolution: 0.001°

Phase Position (φ)	Power Factor (λ)	The Active Power Uncertainty Component caused by the Phase Uncertainty ^[3]					
		5~45Hz	45~1kHz	1k~10kHz	10k~20kHz	20k~50kHz	50k~100kHz
0°	1.00000	0.000%	0.000%	0.000%	0.000%	0.001%	0.004%
10°	0.98481	0.015%	0.006%	0.015%	0.031%	0.062%	0.158%
20°	0.93969	0.032%	0.013%	0.032%	0.064%	0.128%	0.321%
30°	0.86603	0.050%	0.020%	0.050%	0.101%	0.202%	0.508%
40°	0.76604	0.073%	0.029%	0.073%	0.147%	0.294%	0.736%
50°	0.64279	0.104%	0.042%	0.104%	0.208%	0.417%	1.044%
60°	0.50000	0.151%	0.060%	0.151%	0.302%	0.605%	1.515%
70°	0.34202	0.240%	0.096%	0.240%	0.480%	0.960%	2.401%
80°	0.17365	0.495%	0.198%	0.495%	0.990%	1.980%	4.953%
90°	0.00000	—	—	—	—	—	—

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

4.6 AC / DC Power Output

Quantity Range Combination	Measurement Uncertainty at different frequencies (Hz) (k=2) @ (23°C ± 5°C), (% * power output) ^[1]						
	DC	5~45	45~1k	1k~10k	10k~20k	20k~50k	50k~100k
Voltage and Current Output (U & I) @ (λ =1)							
(3 V ... 30 V) & (5 mA ... 20 A)	0.03	0.07	0.03	0.07	0.13	0.18	0.34
(100 V ... 600 V) & (5 mA ... 20 A)	0.03	—	0.03	0.07	0.13	0.18	0.34
1000 V & (5 mA ... 20 A)	0.03	—	0.03	0.07	—	—	—
Dual Voltage Output (U & AUX) @ (λ =1)							
(3 V ... 30 V) & (25 mV ... 250 mV)	0.04	0.08	0.04	0.08	0.13	0.18	0.25
(3 V ... 30 V) & (500 mV ... 5 V)	0.03	0.07	0.03	0.07	0.13	0.18	0.25
(100 V ... 600 V) & (25 mV ... 250 mV)	0.04	—	0.04	0.08	0.13	0.18	0.25
(100 V ... 600 V) & (500 mV ... 5 V)	0.03	—	0.03	0.07	0.13	0.18	0.25
1000 V & (25 mV ... 250 mV)	0.04	—	0.04	0.08	—	—	—
1000 V & (500 mV ... 5 V)	0.03	—	0.03	0.07	—	—	—
Note [1]: AC / DC power output range (virtual load): 0.15 mW ~ 20.91 kW Note [2]: Power factor adjustment range: -1 ~ 0 ~ + 1, resolution: 0.000 01 Note [3]: Power uncertainty calculation formula under other power factors: voltage and current output mode, dual voltage output mode, which: the voltage measurement uncertainty, the current measurement uncertainty, the auxiliary voltage measurement uncertainty, and the measurement uncertainty caused by							

$$\text{the power factor. } U_p = \sqrt{U_U^2 + U_I^2 + U_\lambda^2} \quad U_p = \sqrt{U_U^2 + U_{AUX}^2 + U_\lambda^2} U_U U_I U_{AUX} U_\lambda$$

5. General Technical Specifications

Power Supply Voltage	AC (220±22) V , (50±2) Hz
Preheating Time	2 times from the last preheating time, up to 30 minutes.
Temperature Performance	Operating temperature: 0°C~40°C Calibration temperature: 18°C~28°C Storage temperature: -20°C~70°C
Humidity Performance	Working Humidity: <80% @ 30°C, <70% @ 40°C Storage humidity: (20%~80%) R · H, no condensation
Above Sea Class	<3000 m
Communication Interface	RS232×1、USB×1、LAN×1