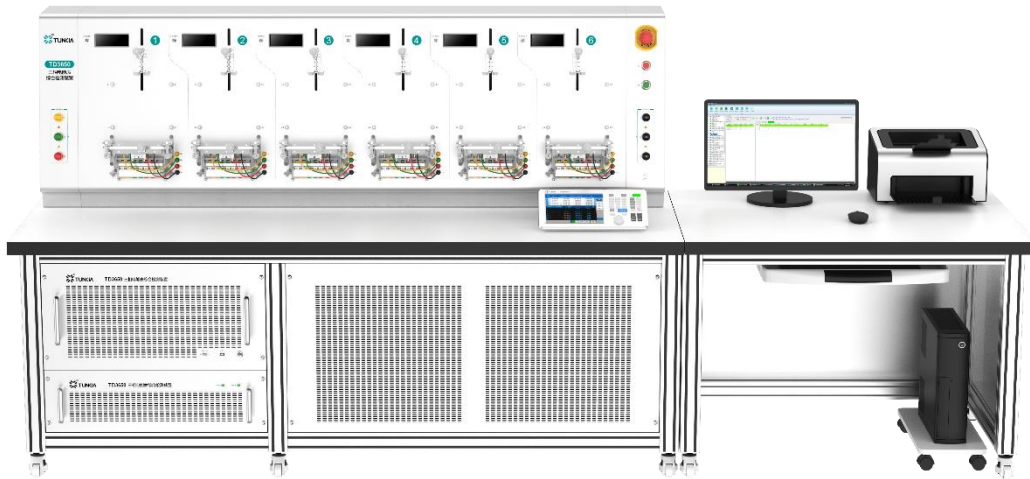


TD3650 Three-phase Energy Meters Verification Device



1. Summary

TD3650 is applied for the verification of new three-phase energy meters. TD3650 supports simultaneous verification of **3 to 16** three-phase energy meters (Three-phase electrical meters, Three-phase smart electricity meters, Three-phase smart IoT electricity meters, etc.) with the same voltage/current range, different meter constant.

2. Features

2.1 Basic Features

- **Maximum output capacity:** 576 V / 120 A.
- **Fundamental frequency:** 45 Hz ~ 100 Hz.
- **Accuracy:** class 0.02 or 0.05.
- **Minimum current output:** As low as 0.2 mA.
- **Auto range:** Automatic range switching and load matching.
- **Energy measurement:** Positive / negative active and reactive energy.
- **Harmonic output:** The 2nd ~ 63st @ 50 / 60 Hz, Harmonic content / phase are programmable.
- **High-order harmonic test:** Built in high-order harmonic test schemes. So it automatically superposes the 15f_{nom} to 40f_{nom} sweep signals to the voltage and current loops and reads the data of each harmonic to measure the error offset caused by the high-order harmonic.
- **Complex waveform test:** Built in square-wave, peaked wave, even harmonics, odd harmonics

and other schemes. It also allows users to customize other complex waveforms for influence quantity test.

- **DC and even harmonics test:** Equipped with TD3410 half wave rectifier box.
- **Daily reckoning error test:** Built in standard clock tester.
- **Automatic patrol inspection:** Support automatic patrol inspection.
- **Connection:** Equipped with special pressure gauge holder.
- **Communication:** DUT through RS-485 port.
- **Energy pulse:** Electric and optical pulse sampling ports.
- **Multi-position verification platform:** Optional 3,6,12,16 positions.
- **Mobile control unit:** LCD touch screen for value output.
- **Professional verification software:** Support semi-automatic or fully automatic verification of the DUT, data management and certificate export. The software has the function of single point multiple tests, the test interval can be set, and the error curve can be drawn automatically.

2.2 Optional Features

- **Offering compatibility with both single/three-phase:** The Potential Transformer Offer compatibility with both single/three-phase (The single-phase energy meters need Manual wiring). Up to 12 test positions.
- **Current Transformer:** The Current Transformer add the capability to test energy meter without keeping its voltage terminal separate from its current terminal. Up to 12 test positions.
- **Auxiliary supply:** AC/DC: 100V~240V; It can support the power consumption test of auxiliary power supply circuit and auxiliary power supply voltage change test.
- **Power consumption test of voltage circuit:** Only one test position is supported.
- **Power consumption test of current circuit:** Multiple-positions are supported.
- **Burden current fast change test:** The user can set the duration of ton and toff, as well as the total time for a single test. The current switches at zero crossing and switches off and on within one nominal frequency period. The repetition time of single test was more than 4 hours.
- **AC voltage dip and short interruption test:** AC Voltage dips and interruptions test supporting voltage circuit power supply.
- **Smart electricity meter function test:** Cost control function test, Freezing test, Key update test, Parameter update test, The remote control test, Safety certification test, Events recording test, Communication protocol consistency check, etc.
- **Fault earthing test:** Support fault earthing test. In the case of fault earthing and 10% overvoltage, the electricity meter connected to the isolated distribution network with fault earthing suppressor or star contact by three-phase four-wire connection is examined.
- **Standard meter:** Class 0.05/0.02 of conventional or harmonic standard electricity meter.
- **Harmonic energy:** Support harmonic power/measurement accuracy test.

3. Verification Items

NO.	Verification Items	Completion (√/standard)	Remarks
1	Appearance, signs, power check	Observation	
2	Accuracy Test	Initial inherent error test	√
3		Starting current test	√
4		Test of no-load	√
5		Meter constant test	√
6		Electric energy display value combination error	√
7		Demand indicating value error	√
8		A clock test powered by a power supply	√
9		Impact of the standby power supply on the clock	√
10		Error consistency test	√
11		Variation requirement test	√
12		The load current rises and falls worse test	√
13		Repeat test	√
14	EMC	Voltage dips and interruptions	Optional-Fast change test of load current
15	Resistance to other influences	Harmonic in voltage-current circuits –the 5st harmonic test	√
16		Harmonic in voltage-current circuits - square-wave test	√
17		Harmonic in voltage-current circuits - peaked wave test	√
18		Interharmonic in the current	√

		circuits - the pulse train triggers the waveform		
19		Odd harmonic in voltage-current circuits –waveform test triggered by 90 degree phase	√	
20		Impact Test of DC and Even Harmonics –waveform of half wave rectification	√	
21		Load unbalance test	√	
22		Voltage change test	√	
23		One or two-phase voltage interruption	√	
24		Frequency change test	√	
25		Reverse phase sequence test	√	
26		Auxiliary power supply voltage change test	Auxiliary power supply (optional)	
27		Burden current fast change test	Burden current fast change test (optional)	
28		Self-heating test	√	
29		High-order harmonic test	√	
30		Fault earthing test (Only for three-phase four-wire transformer type energy meter)	Fault earthing test (optional)	Only for class 0.05 TD3650
31	Electrical performance test	Power consumption test of voltage circuits	optional	
32		Power consumption test of current circuits	optional	
33		Power consumption test of auxiliary power supply circuit	optional	
34	IOT electricity	Harmonic power accuracy test	harmonic	

35	meter	Harmonic measurement accuracy test	power(optional)	
----	--------------	---------------------------------------	-----------------	--

4. Specifications

4.1 AC Voltage Output

Range	Resolution	Short-term Stability (% / min)		Accuracy ±(ppm of reading + ppm of range) ^[1]		Distortion Factor (%)
		Class 0.05	Class 0.02	Class 0.05	Class 0.02	
60 V	0.1 mV	0.01	0.005	200 + 50	60 + 40	< 0.3
120 V	1 mV	0.01	0.005	200 + 50	60 + 40	< 0.3
240 V	1 mV	0.01	0.005	200 + 50	60 + 40	< 0.3
480 V	1 mV	0.01	0.005	200 + 50	60 + 40	< 0.3

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

- Output range: 0 V ~ 264 V, 6-digits display, load capacity: 15VA/ (phase · position)
- Symmetry: Voltage ≤ 0.2%, Phase ≤ 0.5°
- Protective function: Short-circuit protection, Overload protection

4.2 AC Current Output

Range	Resolution	Short-term Stability (% / min)		Accuracy ±(ppm of reading + ppm of range)		Distortion Factor (%)
		Class 0.05	Class 0.02	Class 0.05	Class 0.02	
5 mA	10 nA	0.03	0.02	400 + 300	240 + 160	< 1
10 mA	0.1 μA	0.02	0.01	300 + 200	120 + 80	< 0.5
20 mA	0.1 μA	0.02	0.01	300 + 200	120 + 80	< 0.5
50 mA	0.1 μA	0.02	0.01	200 + 50	60 + 40	< 0.5
100 mA	1 μA	0.01	0.005	200 + 50	60 + 40	< 0.5
200 mA	1 μA	0.01	0.005	200 + 50	60 + 40	< 0.5

500 mA	1 μ A	0.01	0.005	200 + 50	60 + 40	< 0.5
1 A	10 μ A	0.01	0.005	200 + 50	60 + 40	< 0.5
2 A	10 μ A	0.01	0.005	200 + 50	60 + 40	< 0.5
5 A	10 μ A	0.01	0.005	200 + 50	60 + 40	< 0.5
10 A	100 μ A	0.01	0.005	200 + 50	60 + 40	< 0.5
20 A	100 μ A	0.01	0.005	200 + 50	60 + 40	< 0.5
50 A	100 μ A	0.01	0.005	200 + 50	60 + 40	< 0.5
100 A	1 mA	0.01	0.005	200 + 50	60 + 40	< 0.5

- Output range: 1 mA ~ 120 A, 6-digits display, load capacity: 30VA/ (phase · position)
- Symmetry: Current $\leq 0.5\%$, Phase $\leq 0.5^\circ$
- Protective function: Open-circuit protection, Overload protection

4.3 Frequency / Phase

Measurement Type		Class 0.05	Class 0.02
Frequency	Measuring Range	45 Hz~100 Hz	45 Hz~100 Hz
	Minimum Resolution	0.000 01 Hz	0.000 01 Hz
	Accuracy	$\pm 0.005\% \cdot RD$	$\pm 0.005\% \cdot RD$
Phase ($I \geq 50mA$)	Measuring Range	0~360°	0~360°
	Minimum Resolution	0.000 1°	0.000 1°
	Accuracy	$\pm 0.012^\circ$	$\pm 0.006^\circ$

4.4 Power / Energy

Voltage Range	Current Range	Power Factor	Accuracy \pm (% of reading)	
			Class 0.05	Class 0.02
30 V \leq U \leq 480 V	50 mA \leq I \leq 120 A	0.5L~1~0.5C	0.05%*RD	0.02%*RD
		1	0.05%*RD	0.02%*RD
	10 mA \leq I < 50 mA	0.5L~1~0.5C	0.08%*RD	0.04%*RD
		1	0.08%*RD	0.04%*RD
	3 mA \leq I < 10 mA	0.5L~1~0.5C	0.15%*RD	0.08%*RD
		1	0.15%*RD	0.08%*RD

	$0.2 \text{ mA} \leq I < 3 \text{ mA}$	1	$0.08\% \cdot RD \times 3 \text{ mA/I}$	$0.04\% \cdot RD \times 3 \text{ mA/I}$
--	--	---	---	---

- Stability of output power: 0.02% / 2min (Class 0.05), 0.05% / 2min (Class 0.1);
- Measuring range of power/energy: Combination of AC voltage and AC current range ;
- Measuring range of power factor: -1.000 00...0.000 00...1.000 00;
- Standard electric energy pulse output: High frequency pulse output port outputs 60KHz at full range, low frequency pulse output port outputs 6Hz at full range;
- Standard electric energy pulse input: frequency $\leq 200 \text{ kHz}$, voltage: 0...3.3 V...24 V;
- Electric energy error display: Auto, resolution is 0.0001%.


4.5 Clock

- Daily reckoning error bounds: $\pm 0.05 \text{ s/d}$

5. General Specifications

Power supply	AC (220 ± 22) V, (50 ± 2) Hz				
Warm up time	30 min				
Temperature performance	Storage temperature: 5°C~45°C Operating temperature: -10°C~55°C				
Humidity performance	Operating humidity: < 80% @ 30°C, < 70% @ 40°C, < 40% @ 50°C Storage humidity: (20%~80%) R·H, non-condensing				
Elevation	< 3000 m				
Communication interface	RS232, RS485, LAN				
Dimensions of test bench (L*W *table H / total H, mm)	Position number	3 test positions	6 test positions	12 test positions	16 test positions
	Manual wiring	1350*800*75 0/1140	1950*800*75 0/1140	—	—
	Crimping wiring	1350*750*75 0/1395	1850*750*75 0/1395	1830*750*61 0/1765	2350*750*61 0/1765
Dimensions of computer desk (L*W*H, mm)	No Standard meter	1000*800*750			
	Standard meter	1500*800*750			

6. Ordering Information

TD3650 – 

Class	
Code	Note
200	Class 0.02
500	Class 0.05

Position Number	
Code	Note
3	3 Positions
6	6 Positions
12	12 Positions
16	16 Positions

Special Customized	
Code	Note
None	—
C	✓

Select from the Special Customized Function Selection Table

e.g.: **TD3650-500-12** represents Class 0.05, 12 positions, without special customized.

Other Options		
Tick	Optional function	Description
	Manual wiring	The default option is Crimping wiring (with meter rack), Manual wiring is optional.
	Offering compatibility with both single-phase and three-phase	Up to 12 test positions
	Current transformer	Up to 12 test positions
	Auxilliary supply	AC/DC: 100V~240V, Up to 3 test positions
	Power consumption test of voltage circuit	Up to 1 test position (proposal)
	Power consumption test of current circuit:	Up to 3 test positions (proposal)
	Burden current fast change test	Once selected, all test positions are supported; AC voltage dip and short interruption test.
	Fault earthing test	
	Standard meter	TD3300 Standard meter (Class 0.05 / 0.02)

	Harmonic energy	TD3300-R Standard meter (Class 0.05 / 0.02)
--	------------------------	---