

DIGITAL SINGLE PHASE ENERGY AUTO-CALIBRATION EQUIPMENT

MODEL: TF 9100



1. General

The Model TF 9100 test bench is under the newest technology of digital power source using PWM technology. It is designed under digital control for frequency amplitude and phase adjustment, PWM (Pulse Width Modulation) etc. to overcome traditional low efficiency, heat and reliability problem. It can improve the working reliability and better load. Up to 48 energy meters can be tested simultaneous with different constant (same current and voltage level).

This bench is ideal for testing all kind of electro-mechanic and electronic single phase meters for both active and reactive energy meter without separate voltage/current input. It can test automatically the energy register and maximum demand of RF meter and PLC meter.

The test bench uses power supply 220V – 50Hz single phase. It's convenient for installations and without influences by unbalance of 3-phase power's line.

The test bench accords with the standard IEC 60736:1982 - Testing equipment for electrical energy meter. Automatic protection for over load, over-voltage and short-circuit.

The proposed TF 9100 test bench comprises:

- **Single Phase Digital Power Source:** consist of Digital Voltage and Current Sources which adopts the latest digital control technology which can adjust easily the output signal of frequency, amplitude value as well as phase by software. This PWM is suitable for long time continuous work and output the specified range of voltage, current, resistive load, capacitive load, inductive load work.
- **Micro-Computer Control Unit:** It's easy to run in both automatic test program with computer and semi-automatic test program without computer
- **Single Phase Wild Range Reference Standard:** Model HC 3101A, class accuracy 0.05.
- **Suspension Rack:** Each meter's position composed of:
 - Quick connectors and Top fixing device
 - Photoelectric Scanning Head for electromechanical and electronic meters
- **Control Software**
- **Computer and printer:** (Optional)

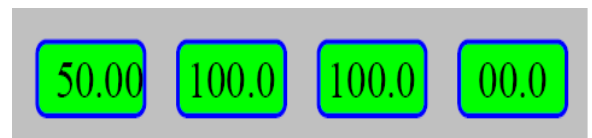
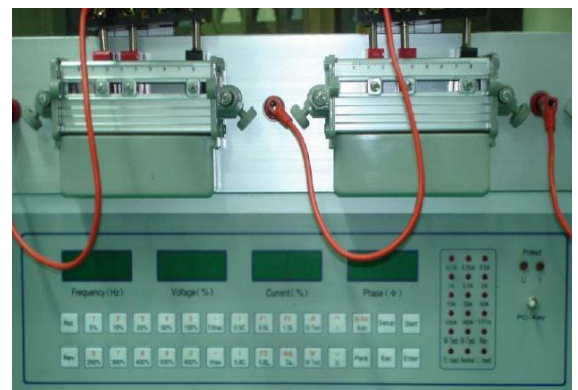
2. Specification:

Single Phase Digital Power Source

- Output voltage range (Phase-Neutral): (0 ~ 288)V – Max 300V
- Accuracy of output voltage: 0.05%
- Adjustable range: Continuous(0 ~ 288)V - Resolution: $\leq 0.0001V$
- Output power of voltage: (200 ~ 1000)VA (according to number of positions)
- Output current range: (1mA ~ 100)A – Max 120A
- Accuracy of output current: 0.05%
- Minimum output current: 1mA
- Adjustable range: Continuous (0.001 ~ 120)A - Resolution: $\leq 0.0001A$
- Output power of current: (200 ~ 1500)VA (according to number of positions)
- Phase angle range (voltage/current): 0 ~ 360° - Resolution: 0.01° - Accuracy: 0.5%
- Frequency of the fundamental component: (45 ~ 65) Hz - Resolution: 0.001Hz - Accuracy: 0.01%
- Power factor range: -1.00000 ~ 0 ~ +1.00000
- Power factor resolution: 0.00001
- Power resolution: 0.0001VA
- Stability of the output power: $\pm 0.05\%/180s$ - PF=1.0L
- Waveform distortion coefficient: $\leq 0.5\%$
- Harmony step range : 2 to 21 on first sine wave with full 100% level.
- Harmony step adjust: 0 ~ 40% of basic sine wave component. Resolution: 1s
- Environment EMC effect: $\leq 0.05mT$
- Efficiency of the output power stages: $\geq 85\%$

Micro-Computer Control Unit (MCU) :

- **Display:** All parameters for setup and working such as Voltage, Current, Power, Energy, Power factor, Frequency, etc... are always showing on 2 displays simultaneously.
- **The error processor system:** The error processor system to directly see the error of each energy meter from the sub-error processor system for each meter. Every sub-error processor system can be connected by the internal RS 485, which together collects the data to the computer and accept the signal from photo-pickup and pulse output from energy meter.
- **Manual keyboard operation:** The bench is also equipped with manual direct operation panel keyboard, which has I_{max} / $0.5I_{max}$ / $600\%I_b$ / $400\%I_b$ / $200\%I_b$ / $100\%I_b$ / $50\%I_b$ / $20\%I_b$ / $10\%I_b$ / $5\%I_b$ / 1.0L / 0.5L / 0.5C / 0.8L / 0.8C for normal testing and easily to adjust the error.



Single Phase Energy Reference Standard:

- Model: HC 3101A - Class accuracy: 0.05
- Voltage range: (60 / 120 / 240 / 400) V
- Current range: (0.1A / 1A / 10A / 100A) max 120A
- Frequency: (45 – 65)Hz

- Reading / display of registered parameters with 6 bit.
- Reference Meter Constant(imp/KWh): up to 3.6×10^9 impuls/kWh
- Communication interface (RS 232)
- Input power: 220V \pm 10% - 50Hz
- Temperature Influence (from 5 to 45 °C): max 20 ppm / °C

Suspension Rack

The frame of bench is made of stainless alloy.

Quick connectors and Top fixing device

- The Quick Fixing Device is a mechanical device which allows for very easy, quick installing the meters for tests and enables easy reorganization of the current pins outlay for the requirements.
- Quick connector for voltage to 300V and current to 120A and automatic connect current's circuit when no have meter on hanging rack.
- Special connector to test meters of OmniSystem Manufacturer (on requested).
- Together with the quick fixing device, a suitable adjustable top fixing device is provided. With its help, hanging the meter can be done very quickly and firmly.



Photoelectric scanning head

- The Photoelectric Scanning Heads HD 108 is a modern, multifunction device enabling readouts of both marks from electromechanical meters and impulses from electronic meters. The modern design allows for obtaining high operational efficiency and reliability under various ambient light conditions. The mechanical construction of the instrument allows for its individual, and very easy, positioning up/down, right/left, forward/backward.



Control Software:

Three languages Chinese, English and Vietnamese can be choose. With this auto-testing programmable software the test bench can operate automatically. The operation testing software can run under Windows 98 / 2000 / XP / Window7, which can test energy meters with different constant automatically.

Software functions:

- Error Test of meter under test.
- Starting test and Creep test (Or No Load Test) by automatic/manual.
- Auto mark search function of test bench uses for no load, starting and register test.
- Register, deviation and repeat test.
- Automatic energy register test and maximum demand test for RF meters, PLC meters
- Data are stored as per the user's need
- Data are retrieved in Excel format (compatible with MS environment) and file structure meets the Customer's management sub-system requirements
- Queried and printed test report

3. Other technical specification

- Accuracy class of test bench: 0.1

- Voltage is isolated by MSVT (Multi-Secondary Voltage Transformer) output: accuracy 0.001%.
- Time setting range : 0 ~ 9999s
- Time setting resolution : 1s
- Error display By LED
- Error Indicator: 0 ± 99.999%
- Improves working efficiency by installation of photo-sensor turn-over rack device.
- In the case of emergency can stop working immediately by STOP button.
- Comm. port: RS 232, RS 485 or USB (on requested)
- Influence of external magnetic field: ≤ 0.05mT
- Isolated resistance the voltage and circuit board : ≥ 5MΩ
- Isolated resistance the voltage and neutron : ≥ 5MΩ
- Number of meters calibrated: As table in item 4 or upon user's request
- Input power: Single phase 220V ± 10% - 50Hz ± 0.5Hz
- Condition Working Ambient:

Temperature: (5 ~ 40)°C

Relative Humidity: ≤ 85%, non condensing

4. Dimensions and Order Information

Type of bench	Meters	Number of module	Number of row	Size (mm)	Order Information	Order Info. for bench with special connector
Integration	6	1	Single	1600 x 750 x 1800	TF 9106	TF 9106 S
	12	1	Double	1600 x 700 x 1800	TF 9112	TF 9112 S
	24	1	Double	2400 x 700 x 1800	TF 9124	TF 9124 S
	30	2	Double	1800 x 700 x 1800	TF 9130	TF 9130 S
	40	2	Double	2200 x 700 x 1800	TF 9140	TF 9140 S
	48	2	Double	2400 x 700 x 1800	TF 9148	TF 9148 S
Fission	24	1	Single (back to back)	3400 x 600 x 1800	TF 9124 F	TF 9124 FS
	24	1	Double	2400 x 600 x 1800	TF 9124 C	TF 9124 CS
	30	2	Double	1800 x 600 x 1800	TF 9130 C	TF 9130 CS
	40	2	Double	2200 x 600 x 1800	TF 9140 C	TF 9140 CS
	48	2	Double	2400 x 600 x 1800	TF 9148 C	TF 9148 CS
	Console			600 x 800 x 1800		



Test bench with fission type and console



Special connector for Omnisystem meter