

## DIGITAL THREE PHASE ENERGY AUTO-CALIBRATION EQUIPMENT MODEL: TF 9300



### 1. General

The Model TF9300 class 0.1 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. The bench can be used to test all kinds of meter with accuracy under 0.5% for both single/ three phase active and reactive energy meter, it's also suitable for four quadrant test (Energy import/export).

Up to 40 energy meters can be tested simultaneous with different constant (same current and voltage level).

Now, the new updated on bench allows to test automatically energy register and maximum demand of some kinds of electronic meters such as Elster, Landis&Gyr, EDM1 Genius and Actaris,.... via IEC1107, and can update with many other kind.

Optional isolation voltage transformer can be chosen to test single phase electronic meter without separate voltage/current input.

The test bench accords with the standard IEC 60736:1982 - Testing equipment for electrical energy meter.

Automatic protection from over-load, over-voltage and short-circuit and indicated by an alarm signal.

#### The proposed TF 9300 test bench comprises:

- **Three Phase Digital Power Source:** The signal source 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. The signal source can repeatedly add 2 - 21 harmonics on first sine wave, or cause sub-harmonic wave and odd sub-harmonic wave.
- **Micro-Computer Control Unit:** It's easy to run in both automatic test program with computer and semi-automatic test program without computer
- **Three Phase Energy Reference Standard:** Model HC 3100A, class accuracy 0.05
- **Suspension Rack:** is made from stainless material, each meter's position composed of:
  - Quick connectors and Top fixing device
  - Photoelectric Scanning Head for electromechanical and electronic meters
- **USB Optical Probe:** communicate with meters for energy register and maximum demand test.

- **Control Software**
- **Computer and printer** (optional)

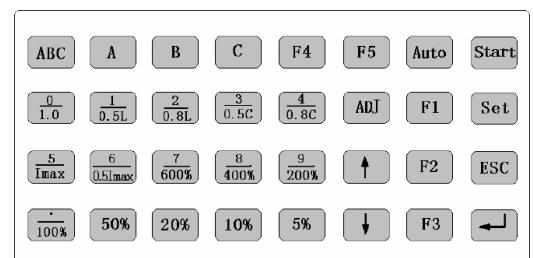
## 2. Specification:

### 2.1 Three Phase Digital Power Source

- Output voltage: 3 x (57,7/120/220/380)V
- Adjustable range 0 ~ 120%
  - (Phase – Neutral): (40 ~ max 400)V
  - (Phase – Phase): (70 ~ max 600)V
- Accuracy of output voltage: 0.05%
- Resolution:  $\leq 0.0001V$
- Output power of voltage per phase : (200 ~ 1000)VA (according to number of positions)
- Output current range: 3 x (0.001 ~ 100)A, max 120A
- Accuracy of output current: 0.05%
- Adjustable range: (0.001 ~ 120)A
- Resolution:  $\leq 0.0001A$
- Minimum output current per phase : 1 mA
- Output power of current per phase : (200 ~ 1500)VA (according to number of positions)
- Phase angle range (voltage/current): (0 ~ 360.0) $^{\circ}$
- Phase angle resolution: 0.01 $^{\circ}$
- Symmetry phase angle : 120 $^{\circ} \pm 0.2^{\circ}$
- Frequency of the fundamental component: (45 ~ 65) Hz
- Frequency resolution: 0.001Hz
- Power factor range: -1.00000 ~ 0 ~ +1.00000
- Pf resolution 0.0001
- Power resolution 0.0001VA
- Stability of the output power:  $\pm 0.05\%/180s$  - PF=1.0L
- Waveform distortion coefficient:  $\leq 0.5\%$
- Harmony range: 2 to 21 on first sine wave with full 100% level.
- Harmony step adjust: 0 ~ 40% of basic sine wave component.
- Efficiency of the output power stages:  $\geq 85\%$

### 2.2 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 big 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 with all parameters for quick operation such as A, B, C and ABC phase selector, I<sub>max</sub> / 0.5 I<sub>max</sub> / 600%I<sub>b</sub> / 400%I<sub>b</sub> / 200%I<sub>b</sub> / 100%I<sub>b</sub> / 50%I<sub>b</sub> / 20%I<sub>b</sub> / 10%I<sub>b</sub> / 5%I<sub>b</sub> / 1.0L / 0.5L / 0.5C / 0.8L / 0.8C, etc.
- **Error Indicator by LED:** 0 ....  $\pm 999.999\%$ , automatic adjust the comma depend on accuracy of meter under test.



## 2.3 Three Phase Digital Energy Reference Standard

- The HC3100A class 0.05 is a new energy standard meter of advanced electronics intelligent instruments. Based on digital signal processing (DSP) technology, the HC 3100A is a multi-function precision power meter for three phase systems of 3 or 4 wires and single phase measurements. The measurements are comprehensive & fully auto-ranging covering 3 voltage, 3 current, active power and energy (kW + kWh), reactive power and energy (kvar + kvarh), apparent power (kVA), frequency, phase angle and power factor.



All parameters are of high accuracy: better than 0.05% reading.

The main features are :

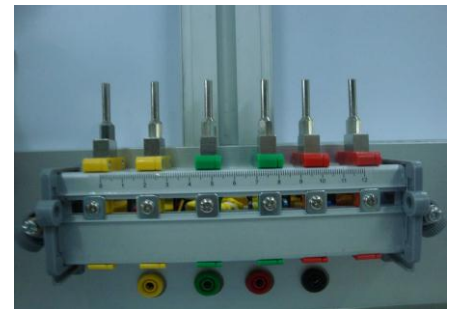
- Reading / display of registered parameters
- Measured system (phase and wires)
- Energy / power calibration function
- Energy / power reference output (pulse)
- Reference Meter Constant (imp/KWh): up to  $3.6 \times 10^9$
- Communication interface (RS 232)
- Input power: 220V  $\pm$  10% - 50Hz
- Temperature Influence (from 5 to 45°C):
  - Voltage/Current/Frequency : Less than 15 ppm/°C
  - Power / Energy : Less than 30 ppm/°C

## 2.4 Suspension Rack

The frame of bench is made of stainless alloy.

### 2.4.1 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.
- 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



### 2.4.2 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/back.



## 2.5 USB Optical Probe:

- The USB Optical Probe SHU200 is designed in compliance with IEC 62056-21 (IEC 1107), DLMS standard for communication with electronic meter in energy register and maximum demand test. Flexible usage with detachable mini USB cable, easy to replace broken cable or extend the cable length. The optical probe has two LEDs on the back side which show the operating conditions of the communication.

## 2.6 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 XP/ Vista/ Window7/ Window8/ Window10.

### Software functions:

- Error Test of meter under test.
- Starting test and Creep test (Or No Load Test) by automatic/manual.
- Register, deviation and repeat test.
- Automatic Test the energy register and maximum demand of electronic meters Elster, Landis & Gyr, EDM Genius and Actaris.
- 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
- Time setting range : 0 ~ 9999s;
- Time setting resolution : 1s
- Auto mark search function of test bench uses for no load, starting and register test.
- Diagnostic controlled of voltage and current output and with control protection and alarm.
- In the case of emergency can stop working immediately by STOP button.
- Comm. port: RS 232, RS 485 or USB (on requested)
- Magnetic field generated :  $\leq 0.05\text{mT}$
- Isolated resistance the voltage and circuit board :  $\geq 5\text{M}\Omega$
- Isolated resistance the voltage and neutron :  $\geq 5\text{M}\Omega$
- Number of meters calibrated: As table in item 4 or upon user's request
- Input power: Single phase 220V  $\pm 10\%$  - 50Hz  $\pm 0.5\text{Hz}$
- Working Ambient:
  - Temperature: (5 ~ 40) $^{\circ}\text{C}$
  - Relative Humidity:  $\leq 85\%$ , non condensing

## 4. Dimensions and Order Information

Type of bench	Order Code	Meters	Number of module	Number of row	Size (mm)
Integration	TF9306	6	1	Single	2000 x 750 x 1800
	TF9312	12	1	Double	2000 x 750 x 1800
	TF9320	20	1	Double	2800 x750 x 1800
Fission	TF9306C	6	1	Single	2000 x 750 x 1800
	TF9312C	12	1	Double	2000 x 750 x 1800
	TF9312CS	12	1	Single	3400 x 750 x 1800
	TF9320C	24	1	Double	2800 x 750 x 1800
	TF9324C	24	1	Double	2800 x 750 x 1800
	TF9324CS	24	1	Single (back to back)	3400 x 750 x 1800
	TF9330C	30	2	Double	2000 x 750 x 1800
	TF9340C	40	3	Double	2000 x 750 x 1800
	Console				