

Three Meter Calibrator

I. Overview

Three Meter Calibrator (hereinafter referred to as "verification") is a kind of six LED digital display the output value of ac, dc standard voltage, current generator, can be used for calibration, verification and digital measurement, three pointer with tables and the following all kinds of current and voltage magnitude 0.2 meter, and the other group is equipped with standard resistor, easy to check resistance meter.

The calibrator ac, DC voltage output 22 grades (0~1000V); Ac and DC current output 22 levels (0~20A); Median resistance 11×2 grade ($10 \Omega \sim 20M \Omega$); Ac frequency 50Hz, 60Hz, 400Hz (digital synthesis, button selection), the above items and range are converted by precision switch. It has the advantages of digital display, wide range, fine classification, high precision, good stability and easy to use. Widely used by instrument production, maintenance, metrological verification and other departments.

II. Working principle

The calibrator mainly consists of digital synthesis sine wave signal generator, power amplifier, project and range conversion, CPU unit, keyboard and display unit, power supply and protection unit, standard resistor and so on. Its basic working principle is: the weak electrical signal generated by digital sine wave signal generator is amplified by the power amplifier, and the fixed signal after amplification is transformed into voltage, sent to the project, range conversion, voltage distribution or current limiting, so as to obtain multiple limits; Direct output. Keyboard input information, processed by CPU, sent to the display unit to display the results.

III. Main features

- 3.1 Voltage short circuit, current open circuit automatic protection.
- 3.2 AC and DC current output up to 24A.
- 3.3 Output overload automatic protection, manual reset, more reliable work.
- 3.4 Output adjustment can be adjusted by "bit" or "percentage".
- 3.5 Output adjustment adopts external control code adjustment or panel digital adjustment.
- 3.6 The whole machine adopts "closed-loop control", circuit design, high output accuracy and stability.
- 3.7 Clamp meter detection range 0-1000A.

IV. Technical performance

4.1 Technical specification

Output project	Output range	Rated output	Maximum output	Accuracy (20°C±2°C)
AC/DC voltage	0~200 mV	20mA	100mA	Basic error: DCV: $\pm(0.03\% \text{ reading} + 0.02\% \text{ full scale})$ DCI:
	0~1V~2V	50mA	100 mA	
	0~5V~10V~20V	100mA	200mA	
	0~50V~100V~200V	50mA	100mA	

	0~500V~1000V	20mA	40mA	±(0.05% reading +0.02% full scale)
AC/DC current	0~100uA~500uA~2mA ~5mA~20 mA~50 mA ~200 mA~500 mA		DC: 3V AC: 12V	ACV: ±(0.05% reading +0.02% full scale) ACI: ± (0.06% reading +0.02% full scale) 400Hz additional error : ±0.05% reading Additional voltage error: ±0.02mV ACI<1mA no assessment
	0~2A~5A		DC: 3V AC: 12V	
	0~20A		3V	±(0.1% reading +0.02% full scale)
Standard resistance	Show value		Power	Accuracy
	10Ω、20Ω、50Ω、100Ω、200Ω、 500Ω、1kΩ、2kΩ、5kΩ、10kΩ、 20kΩ、50kΩ、100kΩ、200kΩ、 500kΩ、1MΩ、2MΩ、5MΩ、 10MΩ、20MΩ		0.25W	±(0.2%+20mΩ)
(1) The additional error is less than the basic error of the range for every 10℃ change of ambient temperature over 20℃±2℃				
(2) 20A 400Hz error is±(0.15% reading +0.05% full scale)				

4.2: Stability: AC< 0.02% of full range /5min DC< 0.005% of full scale /5min

8 hour stability: 30% accuracy

4.3: Resolution: 20ppm (0.002%)

4.4: AC distortion: < 0.5%, 20 a <2%

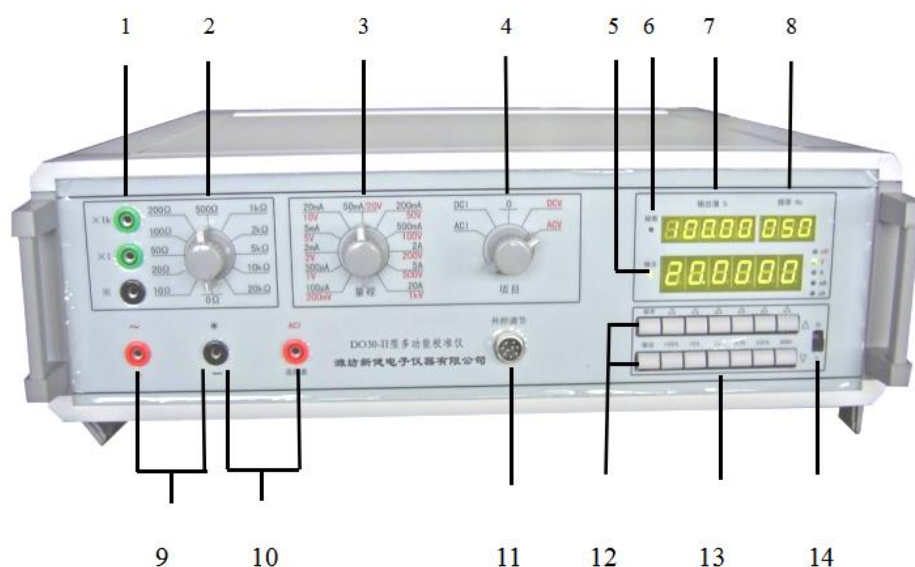
4.5: DC ripple coefficient: < 0.1%.

4.6: Output frequency accuracy: < 0.1% clamp meter coil conversion accuracy: ≤0.5%

4.7: Appearance size: 490×500×150 (mm)

4.8 weight: about 15Kg

V. Front panel Diagram



(1) resistance output terminal (2) standard resistance selection (3) range conversion

- (4) project conversion (5) output display (6) overload indication
 (7) output ratio display (8) frequency display (9) voltage, current output end
 (10)ACI high resistance output (11) external control output adjustment (12) function key
 (13) Adjustment of internal control output (14) Selection of adjustment mode

VI. Usage rules

6.1: Working environment

- A) The calibrator shall be placed in a dry and clean place with good ventilation and no direct sunlight.
 B) The calibrator is suitable for use in the environment with ambient temperature $0^{\circ}\text{C}\sim+35^{\circ}\text{C}$ and relative humidity below 80%.

6.2: Power supply

Mains $220\text{V}\pm 10\%$, $50\text{Hz}\pm 2\%$ AC power supply, large power fluctuation, will affect the output stability of the calibrator.

6.3: Preparation before use

- A) Put "Project Conversion" at position 0 before starting.
 B) The ground wire on the calibrator should be reliably connected with the earth, otherwise the accuracy of the whole machine will be affected.

6.4: Detection instrument

A) Switch on the power switch on the rear panel, "output display" window, "output ratio display" window, "frequency display" window, there are several digital tubes, should display several sections of "-", other no display or indication, preheat for ten minutes to work, if the precise detection, need to preheat for one hour.

B) Connect the meter to the "voltage and current output terminal" of the calibrator with a wire $\leq 10\text{m}\ \omega$.

C) Put "item conversion", "range conversion" and "frequency selection" in the required position according to the requirements of the inspected table. Press the output key of 'function key', the 'output indicator' lights on. Slowly adjust the output of the calibrator, so that the table under test indicates (or displays) the value, can easily read the absolute error, so as to calculate the relative error, reference error, the test is completed.

D) For communication item detection: Press the frequency key of "Function key" to select 50Hz, 60Hz or 400Hz(cyclic key).

For DC item detection: do not need to select, the calibrator automatically default.

Output regulation mode

1) External control code adjustment: calibrator output, arbitrary adjustment.

2) Internal control panel digital adjustment:

- Adjustment by bit: switch the "adjustment mode selection" switch to the (bit) side, press the corresponding rise button of the six digital tubes once, and the corresponding bit will increase by 1. If the rise button does not move, the corresponding bit will increase by 1 continuously. If pressed to the highest position, the calibrator output can only be adjusted to the full scale value. If you press the down key, vice versa.
- Percentage adjustment: switch "Adjustment mode selection" to (%) side, press the corresponding up and down keys of the six digital tubes, and adjust according to the percentage corresponding to the range value. If press the 100% up key, the output will

slowly rise to the full scale value, press the down key again, the output will slowly drop to zero, which can be convenient to check the needle phenomenon of pointer table. "Percentage" adjustment: each range can be adjusted by 100%, 10%, 1%, 0.1%, 0.01%, 0.005% and can realize the output of AC and DC current and voltage value with one key. Can be designated to lose

Output AC/DC voltage: 2mV, 20mV, 200mV, 1V, 2V, 5V, 10V, 20V, 50V, 100V, 200V, 500V, 1000V. Fixed-point output AC and DC current: 1uA, 5uA, 10uA, 50uA, 100uA, 500uA, 2mA, 5mA, 20mA, 50mA, 200mA, 500mA, 2A, 5A, 20A, etc.

For example: in the project DCV, the range of 100V, according to the "percentage" adjustment, can be one button output 100V, 10V, 1V, 0.1V, 0.01V, 0.005V. When each range is adjusted by "percentage", six values of the percentage of each range can be fixed output. Convenient detection.

3) External control code adjustment and internal control panel digital adjustment can be used together.

6.5: After each measurement, hold down the 100% drop button for 2~3 seconds to return the output of the calibrator to zero. Then switch to another range or item. During the item conversion, the calibrator will automatically cut off the output. Therefore, press the output key of "Function key" again to re-test.

6.6: When there is overload, the 'output indicator' light is off, the 'overload indicator' light is on, the calibrator enters the protection state, and the output is zero. At this time, please check whether there is overload phenomenon and whether the connection is wrong. After finding out the reason, press the output key of the 'function key' to re-test.

6.7: 'ACI High Resistance Output' terminal: designed for testing high internal resistance ammeters up to 1A.

6.8: Application of standard resistors

Standard resistors (median resistors) are designed for multimeter or resistance meter testing. They are independent parts of the calibrator and can be used without turning on the 'power switch'.

A) First connect the calibrator with the resistance meter, set "standard resistance selection" to 0 ω , adjust the zero adjustment button on the resistance meter, so that the pointer points to zero (i.e., the full line), and the digital multimeter should display zero. If the instrument has no zero adjustment or cannot be adjusted to zero, record the remaining value X_0 of the instrument. After the detection is completed, subtract X_0 from the result to obtain the measured value. When the X_0 value exceeds 5% of the range, it can be judged that the instrument is faulty or the battery is low.

B) After zero calibration, according to the test value requirements of the table under test: less than 20K ω , use '*' and 'x1' sockets; Greater than 20K ω , use '*' and 'x1K' sockets.

C) The calibrated resistance value can be obtained by rotating the standard resistance switch.

VII. Calibration and maintenance

7.1: Regular or periodic calibration shall be carried out after the calibrator is used for a certain period of time. The calibration work shall meet the following equipment conditions and environmental conditions:

A) Standard: accuracy is better than 0.01% and resolution is better than 0.001%.

B) AC and DC standard resistors: accuracy is better than 0.01%, power is greater than 2W and temperature coefficient is better than 10PPm.

C) Environmental conditions: $20^{\circ}\text{C}\pm 2^{\circ}\text{C}$, relative humidity $\leq 60\%$.

D) Mains conditions: AC voltage $220\text{V}\pm 5\%$, frequency $50\text{Hz}\pm 1\text{Hz}$, no pulse interference.

7.2: The standard and the checked calibrator shall be preheated by electricity for one hour before calibration.

7.3: Maintenance

A) Maintenance of calibrator: maintenance work should be undertaken by professional and technical personnel, and should be equipped with special instruments and electronic components that meet the requirements. If not, please contact the manufacturer in time, and the manufacturer will repair or replace it free of charge within the warranty period.

B) Maintenance of the calibrator: the calibration instrument is a national standard ii instrument, which belongs to the precision electronic device. It has made a series of provisions on packaging, storage, transportation, use and maintenance. In addition to complying with the provisions, the operator should also pay attention to long-term use or high humidity in the use environment. It should often be powered on to drive the tide, and the cold and hot environment should be used alternately. It should not be powered on immediately, in order to prevent dew and rust affecting the use of connectors and other devices.

VIII. Precautions for Use

8.1 The operator can only use it after reading the operation manual carefully.

8.2 When the calibrator has output, avoid "item conversion", "range conversion" and frequency conversion, so as not to damage the calibrator or the instrument to be checked.

8.3 The maximum output voltage of the calibrator is more than 1000V. Insulation protection should be done during operation to prevent electric shock.

8.4 When the calibrator outputs high current, the cross-sectional area of the connecting wire shall be greater than 5mm square meters and the length shall be less than 100cm to avoid current limiting and unnecessary detection errors.

8.5 The calibrator should not be used in an environment where the relative humidity is greater than 80%. The quality of the power supply will affect the output stability.

8.6 Please adjust the output of the calibrator to zero before shutdown.