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**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

JJF 1638-2017

Replacing JJG 445-1986

**Calibration Specification for Multifunction Standard Sources
(English Translation)**

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8 Re-school interval (15)

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Introduction

This specification is based on JJF 1071-2010 "Rules for the preparation of national metrological calibration specifications", JJF 1059.1-2012 "The measurement of uncertainty evaluation and expression" preparation.

This specification replaces JJG445-1986 "DC standard voltage source" and the scope of application is revised to the highest DC voltage standard.

Accuracy level is better than class 0.01 DC standard voltage source, and calibration items and calibration methods for DC voltage are performed Rewrite it.

The previous releases of this specification are.

---JJG445-1986.

Multi-standard source calibration specification

1 Scope

This specification applies to the highest accuracy level better than DC 0.01 and AC 0.05, with DC voltage, straight the calibration of multi-function standard sources for current, DC resistance, AC voltage, and AC current output functions also applies to Calibration of the standard source with the above single output function or combined output function.

The DC voltage calibration range of this specification is $\pm 10\text{mV} \sim \pm 1000\text{V}$, and the AC voltage calibration range is $10\text{mV} \sim 1000\text{V}$ (10Hz~1MHz), DC Current Calibration Range $\pm 10\mu\text{A} \sim \pm 100\text{A}$, AC Current Calibration Range $10\text{mA} \sim 100\text{A}$ (10Hz~10kHz), DC resistance calibration range $1\Omega \sim 1\text{G}\Omega$.

2 references

This specification refers to the following documents.

JJF 1001-2011 Universal Measurement Terms and Definitions GB/T 15637-2012 General Specifications for Digital Multimeter Calibrators for dated references, only dated editions apply to this specification; all undated references the latest version (including all amendments) applies to this specification.

3 Overview

The multi-standard source is a high-precision, high-accuracy standard signal source for digital display and can output AC voltage, DC voltage, AC current, DC current, DC resistance 5 kinds of electrical signals, usually used to have one or more of the above the digital meter of the measurement function is calibrated.

The multi-standard source is mainly composed of a power supply unit, a reference standard unit, an amplifying unit, an output buffer unit, and a control unit.

System unit and other components.

4 Metrological characteristics

4.1 Indication error the indication errors of DC voltage, DC current, DC resistance, AC voltage and AC current are all given by formula (1) Said that the relative indication error is represented by formula (2).

$$\Delta = Y_x - Y_s \quad (1)$$

In the formula.

Δ --- indication error;

Y_x --- The output of the calibrated standard source.

Y_s --- corresponding to the reference value of the output (standard value).

$\gamma =$

$$\frac{Y_x - Y_s}{Y_s}$$

$$\times 100\%$$

In the formula.

γ --- relative indication error.

4.2 Maximum allowable error for multi-range AC voltage, DC voltage, AC current, DC current, DC resistance function, each function Different maximum allowable error indicators are allowed for each range. For AC voltage and AC current, same function in a range, different frequency bands also allow different maximum allowable error indicators.

The maximum allowable error of DC voltage, DC current, DC resistance, AC voltage and AC current can generally be used Formula (3) shows. The relative maximum allowable error can generally be expressed by formula (4).

$$\Delta_{MPE} = \pm(a\%Y_x + b\%Y_m) \quad (3) \text{ in the formula.}$$

Δ_{MPE} --- maximum allowable error;

Y_x --- output of the standard source;

Y_m --- standard source output range value;

a --- error coefficient associated with the output indication;

b --- The error coefficient associated with the output range value and requires $a > b$.

$$\gamma_{MPE} =$$

$$\frac{\Delta_{MPE}}{Y_x}$$

$$\times 100\% = \pm a\% + b\%$$

$\div \times 100\%$ (4)

In the formula.

γ MPE---relative maximum allowable error.

Note:

1. The range value is the abbreviation of the range rating, generally the upper limit of the range. For example, a standard source 1V range output range is 0.000V~1.199V, it is generally considered that the range value is 1V.
2. By comparing the indication error and the maximum allowable error of a calibration point to determine whether the test point meets the requirements, if using in the specification, only the annual stability index is given and no standard source of maximum allowable error is given. The year stability indicator can be used.

Marked as the maximum allowable error of the instrument. The probability of confidence in the annual stability indicator given in the instructions is not only First, the annual stability index with a large confidence probability is regarded as the maximum allowable error.

5 calibration conditions

5.1 Environmental conditions Ambient temperature. $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$;

Relative humidity. $\leq 75\%$;

AC supply voltage. $220\text{V} \pm 22\text{V}$;

Power frequency. $50\text{Hz} \pm 0.5\text{Hz}$.

Note: The allowable deviation of ambient temperature and AC supply voltage can also refer to the instructions in the instrument's instruction manual.

5.2 Measurement Standards and Other Equipment

5.2.1 The standard equipment and supporting equipment required for calibration are shown in Table 1, which can be based on the actual needs of the multi-standard source being calibrated.

Seeking choice.

5.2.2 The absolute value (or uncertainty) of the maximum allowable error of the corresponding function of the calibration device shall not be greater than the calibrated standard source the 1/3 of the absolute value of the maximum allowable error of the corresponding function.

5.2.3 The calibration device (including the measurement circuit) should have good shielding protection and grounding measures, and stay away from strong electric fields Strong magnetic field.