

## **Insulation & Earth Testers. (Scroll down to find your model)**

### 1. Why has the rated voltage for insulation testers changed from 100V to 125V?

The ratings of 25, 50 and 125V are applicable to instruments released after the revisions to JIS C1302-1994.

### 2. What is the difference between the 1st and 2nd measuring ranges for resistance measurements?

IS C1302: 2002 clause 3.1.7 is summarized in the table below. The 1st effective measuring range has a tolerance of  $\pm 5\%$  of reading, while the second effective measuring range has a tolerance of  $\pm 10\%$  of reading. Effective measuring range means the measuring range where its intrinsic error is guaranteed. Table below explains the details.

Rating	1st Effective Measuring Range	2nd Effective Measuring Range	Central Scale Marking
100V/20M $\Omega$	0.02 to 10M $\Omega$	10 to 20M $\Omega$	0.5M $\Omega$
250V/50M $\Omega$	0.05 to 20M $\Omega$	20 to 50M $\Omega$	1M $\Omega$
500V/100M $\Omega$	0.1 to 50M $\Omega$	50 to 100M $\Omega$	2M $\Omega$
500V/1000M $\Omega$	1 to 500M $\Omega$	500 to 1000M $\Omega$	20M $\Omega$
1000V/2000M $\Omega$	2 to 1000M $\Omega$	1000 to 2000M $\Omega$	50M $\Omega$

### 3. Is the impressed voltage for insulation resistance measurement same as that of actual AC line voltage?

DC voltage to be impressed is generated in the resistance insulation testers and apply the same.

### 4. Is it possible to use the insulation testers for live lines?

Insulation testers are not used for live lines. The measurement of live lines requires Yokogawa Model 30031A Leakage Clamp-on Tester which measures the current leakages.

It estimates the insulation resistance value equivalently.

5. Please advise the necessary equipment for the calibration at a user's site.

The following pre-calibrated equipment shall be required.

- \* Yokogawa Model 279303 Decade Resistance Box.
- \* Yokogawa Model 394790 Calibration Box for Resistance Insulation Tester.
- \* Yokogawa Model 270800 Galvanometer.
- \* Any DC voltage standard which generates DC 1300V.

Unless otherwise specified, the testing for insulation testers shall be performed in the following conditions.

- Ambient Temperature:  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$
- Relative Humidity: 45 to 75%
- Position: Vertical (angle of gradient is less than  $5^{\circ}$  from vertical level)
- External Magnetic Field: None (least effect direction against magnetic field of earth)
- Battery Voltage: Battery effective range

6. Is it possible to use rechargeable batteries?

It depends on the product. Some models can use and some cannot. The MY40 Digital Insulation Tester and MY10 Analog Insulation Tester have a battery checking function that enables the use of rechargeable batteries.

7. Which is + potential, LINE or EARTH of the lead wire in the insulation tester?

People tend to think that the LINE is + polar. Actually, however, the EARTH is + polar and generates higher potentials.

8. Why is the indication value changed when the LINE and EARTH probes of the insulation tester are transposed in case of water pump insulation resistance measurement? Why is the EARTH probe(+ side) required to be located in the grounding side ?

There are two (2) kinds of terminals available for insulation testers, one is line terminal L (LINE) . and the other is grounding terminal E (EARTH). This terminal L is stipulated to connect to "- polar side" of DC power supply (high pressure generating circuit) through the indication circuit which is located in the inside of insulation tester and terminal E is to "+ polar side" of DC power supply.

In general, DC grounding insulation measurement for the object to be measured is as follows. Compare the two ways of measurements, grounding side of the object to be measured is connected to terminal L, and non-grounding side to terminal E, the former outputs the smaller insulation resistance value. It is assumed that the fiber of the insulating material such as insulation paper or cotton contains much moisture, the insulation resistance value changes in accordance with the polarity changes of DC power supply. Therefore, transposing line probe and earth probe of the insulation tester may change the measuring value measuring range depending on the object to be measured.

The reasons why the earth probe is connected to the grounding side of the object to be measured are as follows.

- \* Insulation resistance value may vary in accordance with the terminal E connection either to grounding or non-grounding side.
- \* It is easier to detect the insulation failure.
- \* Safety in use is considered.

Accordingly, connect the terminal E to grounding side of the object to be measured, and the terminal L to non-grounding side. Terminals for insulation testers are line terminal (LINE) and grounding terminal (EARTH).

#### 9. Why is the accuracy specified as $\pm 5\%$ of rdg even for the digital insulation testers?

Descriptions in the catalogs and other sales literatures have been made based on JIS standards. Therefore, the term of "accuracy" which is generally used in the test and measuring instruments is not used for resistance measurements, but specified as "tolerance" instead. The term "rdg" means the value indicated by the instrument, and  $\pm 5\%$  of rdg means there is allowable error of  $\pm 5\%$  of the value displayed.

### **Model MY40 Digital Insulation Testers**

#### 1. What is the difference between accessory housing case and carrying case?

It is possible to allocate as many as three (3) user-defined reference values to each rating.

#### 2. Please advise the desirable storage temperature and humidity for insulation testers.

Nominated storage temperature is  $-10$  to  $60^{\circ}\text{C}$  and humidity is less than 70% RH. In addition, the batteries should be removed and free from condensation for storing.

3. Please advise the preferable working temperature range and humidity range for insulation testers.

Working temperature of 0 to 40°C and humidity of 90% RH maximum are preferable. In addition, please do not use the products under condensed conditions.

## **Model MY10 Analog Insulation Testers**

1. What is the difference between accessory housing case and carrying case?

Part # 9108XA accessory housing case holds the line probe (98001) and the earth probe (98002) only. While, the Model 93015 Carrying Case holds the MY10 main unit, line probe and earth probe. Please note that the Model MY10 main unit should be put in the case with the yellow cover removed.

## **Model 3213A Analog Insulation Testers**

1. Non-loaded (open circuit) voltage is specified as 130% of rated voltage. The Model 321343 outputs approx. 640V in measuring with the range of 500V/100MΩ. Is this normal?

It is normal. Since the revisions of JIS C1302 in 1994, non-loaded (open circuit) voltage should not exceed 130% of rated measuring voltage. Where, the equation is  $500V \times 130\% = 650V$ . Therefore, the calculated value of approx. 640V could be understood to be normal.

2. First effective measuring range of  $\pm 5\%$ 、second effective measuring range of  $\pm 10\%$  are read in the tolerance for Model 321345. What are their measuring ranges? Incidentally, what do you mean by "0 (zero) and  $\infty$ (infinite) are less than 0.7%"?

First effective measuring range for this unit is  $2M\Omega \sim 1000M\Omega$  and second effective measuring ranges are  $1M\Omega \sim 2M\Omega$  and  $1000M\Omega \sim 2000M\Omega$ . In addition, zero indication and infinite indication mean that 0 (zero) and  $\infty$  (infinite) scale positions allow less than 0.7% of scale length as a tolerance.

3. Please advise how to measure the voltage output by Model 321343. Also, how is the confirmation of current for the nominal voltage measurements done?

The voltage output is measured in a null method by connecting Yokogawa Model 270800 Galvanometer between the DC voltage generator which generates DC 1300V and measuring terminal. Confirmation of nominal current of 1mA is available by connecting 500kΩ(= rated voltage/1mA = 500V/1mA) to an ammeter in series. Summaries of JIS C1302: 2002 are as follows.

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- Relative Humidity: 45 to 75%
- Position: Vertical (angle of gradient is less than  $5^{\circ}$  from vertical level)
- External Magnetic Field: None (least effect direction against magnetic field of earth)
- Battery Voltage: Battery effective range

\* Open circuit voltage test

Measuring terminal test at infinite scale Test is performed by connecting the voltmeter (current consumption is less than  $10 \mu\text{A}$ ) between grounding terminal and guard terminal. Please use voltage divider whenever it is required. Tolerance should not exceed 1.3 times of rated measuring voltage.

\* Rated measuring current test

Test is performed by connecting the resistance below and DC ammeter (internal resistance should be less than  $200 \Omega$ ) in series between measuring terminals. Please check if the reading current are within the following tolerance.

Model Rated value Resistance (test point) Tolerance

321341	100V/20MΩ	0.1MΩ	1.0 to 1.2mA
321342	250V/50MΩ	0.25MΩ	1.0 to 1.2mA
321343	500V/100MΩ	0.5MΩ	1.0 to 1.2mA
321344	500V/1000MΩ	0.5MΩ	1.0 to 1.2mA
321345	1000V/2000MΩ	1MΩ	1.0 to 1.2mA

## **Model 3235 Earth Tester**

1. Please advise how to check the operation of main body and provide simple calibration method.

Cause short circuit between the terminals P - C, and apply known resistance ( $10\Omega$ ,  $100\Omega$  or so) between the terminals P - E. It is adequate to check the operation to know the results being within the tolerance by rotating the dial just like the grounding resistance measurements.

For simple calibration, connect  $R_p = R_c = 500\Omega$  and apply known resistance (0, 2, 10, 20, 100, 200, 300,  $1000\Omega$ ) to Re and confirm if the checking results are within the tolerance by rotating the dial just like the grounding resistance measurements.