TOS8870A

Global Standard of The Hipot / Insulation Resistance Testers

Applying to various safety standards
Capable to perform the continuous Withstanding Insulation Resistance Testing.

TOS8870A is a combination of a Hipot tester and an insulation resistance tester, and it is capable of performing Hipot Test and Insulation Resistance Test in one continuous process.

(Choice of setting arrangement: AUTO ACW→IR, AUTO IR→ACW, MANU.ACW, MANU.IR.)

The Tester can provide a maximum output of 5kV and an output capacity of 500VA (AC), and can be used for hipot test for the electrical equipment and components in compliance with major electrical standards and ordinances. As for the insulation resistance tester, the tester has two ranges of 500V/1000MΩ and 1000V/2000MΩ.

- Capable of performing hipot test and insulation resistance test in one continuous process.
- Hipot Tester: Maximum Output AC 5kV/100mA and Output Capacity 500VA
- Insulation resistance in 2 ranges: 500V/1000MΩ and 1000V/2000MΩ
- Output characteristics complied with JIS C 1302-1994 for Insulation/Resistance testing
- Voltmeter: JIS class 1, Accuracy: ±1.5% f.s
- GO-NOGO judgment with a window comparator type
- Remote control function
- PASS, FAIL contact signal output
- Equipped with Digital Timer: 0.2sec to 99.9sec/1sec to 999sec
- Downsized approximately 30% in volume (compared to the existing type)
Moreover, when the capacitance of the load is voltage dependent (typical examples are ceramic capacitors), the voltage waveform may be distorted. When the test voltage is applied to a capacitive load, it is possible that the voltage becomes higher than when in the no-load state due to the capacitance of the load.

### Insulation resistance Tester

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<thead>
<tr>
<th>Ambient temperature</th>
<th>Test current 1</th>
<th>Pause time</th>
<th>Maximum test time</th>
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<td>≤ 40 °C</td>
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### Test Voltage Waveform

When an AC output voltage is applied to a capacitive load, it is possible that the voltage becomes higher than when in the no-load state due to the capacitance of the load.

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<th>3 kV</th>
<th>4 kV</th>
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<tbody>
<tr>
<td>Values center of scale</td>
<td>500 V range 50 MΩ</td>
<td>1000 V range 100 MΩ</td>
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<tr>
<td>Voltage regulation</td>
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### Test Voltage Output

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### Output Voltmeter Scales

- 2.5 kV f.s / 5 kV f.s, two ranges linear scales

### Class of meter

JIS Class 1

### Accuracy

- 5 °C to 15 °C: ±3 % f.s
- 15 °C to 35 °C: ±5 % f.s (with a sine wave)

### Indication

Mean-value response, effective-value scale graduation

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### Test time

- Timer 0.2 s to 999 s (x 0.1 range) ±50 ms
- 1 s to 999 s (x 1 range) ±0.5 s

### Others

- Terminals for monitoring of leakage current

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1. The heat radiation of the output section of the tester is designed to be 1/2 of the rated output, taking the size, weight, cost, etc., into consideration. Therefore, use it within the limitations shown in Table 1. If it is used in excess of these limitations, the temperature of the output section rises excessively and the internal protection circuit may be activated. In this case, cancel the test for a while and wait until the normal temperature is restored.

2. Crest factor of 1.35 to 1.41, distortion of 3% or less

3. The current which flows due to stray capacitances of the output circuit and leadwires causes an error. The overall accuracy of judgement is the above-mentioned accuracy of judgement plus a factor caused by this current. Typical values of this type of currents are shown in the Table 2. Note that, when a test is made with a high voltage and high sensitivity, the current which flows through the stray capacitances may become larger than the preset low limit reference value and low limit judgement may become unavailable.

4. When making an FAIL judgement test with the output terminals shorted, a certain level of no-load output voltage is needed due to the internal resistance of the output circuit. The voltages shown here are this type of output voltages.

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### Insulation resistance Tester

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<th>Measuring Voltage</th>
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<td>Measuring terminal voltage</td>
<td>0% to + 5% of rated measuring voltage (At rated measuring current or less)</td>
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<tr>
<td>Output current</td>
<td>Rated measuring current 1.0 mA</td>
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<tr>
<td>Sheet circuit current</td>
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### Effective Measuring Ranges

- 500 V range 1 MΩ to 1000 MΩ
- 1000 V range 2 MΩ to 2000 MΩ

### Values center of scale

- 500 V range 20 MΩ
- 1000 V range 50 MΩ

### Accuracy

1st effective measuring range: ±5 % of the indicated value
2nd effective measuring range: ±10 % of the indicated value

### Judgment of Test Result

PASS-FAIL

FAIL judgment when leakage current larger than high limit reference value is detected.

FAIL judgment also when leakage current smaller than low limit reference value is detected.

When FAIL judgment is made, output is cutoff and FAIL alarm is generated.

If no FAIL judgment is made after preset period has elapsed, PASS signal is generated.

### Test Voltage Waveform

When an AC output voltage is applied to a capacitive load, it is possible that the voltage becomes higher than when in the no-load state due to the capacitance of the load. Moreover, when the capacitance of the load is voltage dependent (typical examples are ceramic capacitors), the voltage waveform may be distorted. When the test voltage is 1.5kV, however, effects caused by a capacitance of 1000pF or less are negligible.

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5. At 25 °C ± 10 °C

The 1st effective measuring range is from 1/1000 to 1/2 of the maximum effective scale value. The 2nd effective measuring range is from the above to the maximum effective scale value.
**Common Specifications**

**Types of test**
1. AUTO ACW→IR  Hipot test first and insulation resistance test next
2. AUTO IR→ACW  Insulation resistance test first and hipot test next
3. MANUAL ACW  Hipot test alone
4. MANUAL IR  Insulation resistance test alone

**Remote Control**
- **Test / Reset control**
  - Low active control
  - Input conditions *1
    - High level input voltage
      - 11 V to 15 V
    - Low level input voltage
      - 0 V to 4 V
    - Low level sweep out current
      - 5 mA or less
    - Input pulse width
      - 20 ms minimum

- **Interlock**
  - Protection is effected when INTERLOCK terminal is made open (test is disabled).

**Output signals *2**
- **Signal Name**  Conditions for Signal Generation  Type of Signals
  - TEST ON signal  Delivered during entire test-on period.  Make-contact signal and lamp
  - PASS signal  Delivered when PASS judgment is made, for approximately 50 ms.  Make-contact signal, lamp and buzzer
  - ACW/FAIL alarm  Delivered continuously when FAIL judgment of hipot test is made.  Make-contact signal, lamp and buzzer
  - IR/FAIL alarm  Delivered continuously when FAIL judgment of insulation resistance test is made.  Make-contact signal, lamp and buzzer
  - READY signal  Delivered when in the READY state.  Make-contact signal

**Special Test Mode Selectable with DIP switches at rear of Tester**
1. **DOUBLE ACTION**
   - Test starts only when the START switch is pressed within approximately 0.5 s after pressing the STOP switch.
2. **PASS HOLD**
   - The PASS state is held.
3. **MOMENTARY**
   - Test is executed only during the period the START switch is kept pressed.
4. **FAIL ALARM**
   - FAIL alarm and PROTECTION state cannot be reset by the remote-control STOP signal.

**Ambient Temperature and Humidity**
- **Warranty**
  - 5 °C to 35 °C / 20 %rh to 80 %rh
- **Operable range**
  - 0 °C to 40 °C / 20 %rh to 80 %rh
- **Storage range**
  - -20 °C to 70 °C / 80 %rh or less

**EMC *3**
- Conforms to the requirements of the following directive and standard.
  - EMC Directive 89/336/EEC, EN61326, EN61000-3-2, EN61000-3-3

**Safety *3,4**
- Conforms to the requirements of the following directive and standard.
  - Low Voltage Directive 73/23/EEC, EN61010-1 (Class I, Pollution degree 2)

**Power Requirements**
- **Line voltage**
  - 100 VAC ± 10 %, 50/60 Hz *5
- **Power consumption**
  - When no load (RESET state) : 15 VA or less 6  When with rated load : Approx. 600 VA
- **Insulation resistance**
  - 30 MΩ or more, 500 VDC
- **Hipot**
  - 1390 VAC, 2 seconds  [between the AC LINE and chassis]

**Dimensions (maximum)**
- 430 (435) W x 132 (155) H x 370 (440) Dmm

**Weight**
- Approx. 23 kg

**Standard accessories**
- TL01-TOS High Voltage Test Leadwires, approx. 1.5 m long.  1
- AC Power cable  1
- Operation Manual  1

**Options**
- RC01-TOS Remote Control Box
- RC02-TOS Remote Control Box
- HP01A-TOS High Voltage Test Probe, approx. 1.5 m long
- HP02A-TOS High Voltage Test Probe, approx. 3 m long
- TL02-TOS High Voltage Test Readwires, approx. 3 m long
- KRB150-TOS Rackmount Bracket (for JIS)
- KRB3-TOS Rackmount Bracket (for EIA)

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*1. The input terminal is pulled up to +15V supply voltage by resistor. Opening of the input terminal is equivalent to a high level input.

*2. The rating of the signal contacts is 125 VAC, 1 A, or 30 VDC, 1 A.
   - Loudness of the buzzer is adjustable with a knob in common for the PASS signal and FAIL alarm.
   - Not applicable to custom order models.

*3. This instrument is a Class I equipment. Be sure to ground the protective conductor terminal of the instrument. The safety of the instrument is not guaranteed unless the instrument is grounded properly.

*4. This instrument is a Class I equipment. Be sure to ground the protective conductor terminal of the instrument. The safety of the instrument is not guaranteed unless the instrument is grounded properly.

*5. Can be factory-modified to nominal 110V, 120V, 220V, 230V and 240V.

*6. Power consumption of the instrument modified to operate on an AC line voltage other than 100V is as follows.
   - 110V / 120V: 25 VA or less
   - 220V / 230V / 240V: 45 VA or less

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**External dimensional diagrams**
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