

# TOS8870A

Hipot and Insulation Resistance Tester

Global Standard of The Hipot / Insulation  
Resistance Testers



TOS8870A



## 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 :  $\pm 1.5\%$  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)

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## Hipot and Insulation Resistance Tester

### Hipot test mode

Test Voltage	Output AC Voltage	0 V to 2.5 kV/0 V to 5 kV (two ranges)
	Output Rating	500 VA (5 kV, 100 mA with 100 V line voltage) *1
	Waveform	AC line waveform
	Voltage regulation	Better than 20% (for maximum rated load to no load, with 100 V line voltage)
	Switching	With zero-start type switch
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 : $\pm 3\%$ f.s    15 °C to 35 °C : $\pm 1.5\%$ f.s (with a sine wave) *2
	Indication	Mean-value response, effective-value scale graduation
Judgment of Test Result PASS-FAIL judgment. Output cutoff by leakage current detection	Judgment	Window comparator system
		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.
	High limit reference value	0.5/1/2/4/8/10/100 mA (7 values) By combinations of above values, a range of 0.5 mA to 25.5 mA can be covered in 0.5 mA steps.
	Low limit reference value	0 to one-half of high limit reference values (continuously variable)
	Accuracy of judgment *3	$\pm 5\%$ of high limit $\pm 20\%$ of low limit reference value (one-half of high limit reference values at maximum counterclockwise). (Other are non-calibrated.)
	Judging method	Absolute value of leakage current is integrated and compared with preset limit reference value
	Calibration	Calibrated with rms value of sine wave, using a pure resistance load.
Test time	No-load output voltage	2.5 kV range                      Approx. 450 V when set at 100 mA
	need for detection *4	5 kV range                        Approx. 550 V when set at 100 mA
Test time	Timer :0.2 s to 99.9 s ( $\times 0.1$ range) $\pm 50$ ms	
	1 s to 999 s ( $\times 1$ range) $\pm 0.5$ s	
Others	Terminals for monitoring of leakage current	

\*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.

[Table 1.]

Ambient temperature	Test current I	Pause time	Maximum test time
$t \leq 40\text{ }^{\circ}\text{C}$	$25.5 < I \leq 100$	Test time or longer	30 minutes or less
	$I < 25.5$	Not required	Continuous test possible

[Table 2.]

Output voltage	1 kV	2 kV	3 kV	4 kV	5 kV
Test alone (without leadwires)	4 $\mu\text{A}$	8 $\mu\text{A}$	12 $\mu\text{A}$	16 $\mu\text{A}$	20 $\mu\text{A}$
When 350mm long leadwires are hung in air	6 $\mu\text{A}$	12 $\mu\text{A}$	18 $\mu\text{A}$	24 $\mu\text{A}$	30 $\mu\text{A}$
When the accessory leadwire (TL01-TOS) are used	20 $\mu\text{A}$	40 $\mu\text{A}$	60 $\mu\text{A}$	80 $\mu\text{A}$	100 $\mu\text{A}$

### 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.

### Insulation resistance Tester

Measuring Voltage		500 V or 1000 V DC, negative polarity (two ranges)
Measuring terminal voltage		0% to + 5% of rated measuring voltage (At rated measuring current or less)
Output current	Rated measuring current	1.0 mA
	Short circuit current	12 mA or less
Effective Measuring Ranges	500 V range	1 M $\Omega$ to 1000 M $\Omega$
	1000 V range	2 M $\Omega$ to 2000 M $\Omega$
Values center of scale	500 V range	20 M $\Omega$
	1000 V range	50 M $\Omega$
Accuracy		1st effective measuring range : $\pm 5\%$ of the indicated value *1
		2nd effective measuring range : $\pm 10\%$ of the indicated value *1
Judgment of Test Result PASS-FAIL judgment	Judgment	Window comparator system (mutually independent settings of high limit and low limit)
		FAIL judgment when measured resistance is smaller than low limit reference value.
		FAIL judgment when measured resistance is larger than high limit reference value.
		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.
	Limit reference value setting range	Low and high limit reference values can be set at any points within the effective measuring range of the Tester.
	Accuracy of judgment	1st effective measuring range : $\pm 10\%$ of set value *1    2nd effective measuring range : $\pm 15\%$ of set value *1
	Waiting-time for judgment	Approx. 0.3 s
Test time	Timer :0.5 s to 99.9 s ( $\times 0.1$ range) $\pm 50$ ms	
	1 s to 999 s ( $\times 1$ range) $\pm 0.5$ s	

\*1. At 25 °C  $\pm 10$  °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.



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## Hipot and Insulation Resistance Tester

### 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
	TEST ON signal	Delivered during entire test-on period.
	PASS signal	Delivered when PASS judgment is made, for approximately 50 ms.
	ACW/FAIL alarm	Delivered continuously when FAIL judgment of hipot test is made.
	IR/FAIL alarm	Delivered continuously when FAIL judgment of insulation resistance test is made.
	READY signal	Delivered when in the READY state.
Special Test Mode	1.DOUBLE ACTION	Test starts only when the START switch is pressed within approximately 0.5 s after pressing the STOP switch.
Selectable with DIP switches at rear of Tester	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 Under following conditions 1. Used HV test leadwire TL01-TOS. 2. No discharge in testing.
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)

\*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 125VAC, 1A, or 30VDC, 1A.

Loudness of the buzzer is adjustable with a knob in common for the PASS signal and FAIL alarm.

\*3 Only on models that have CE marking on the panel. Not applicable to custom order models.

\*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.

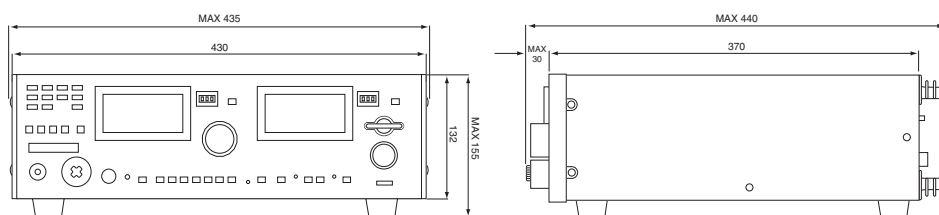
\*5. Can be factory-modified to nominal 110V, 120V, 220V, 230V and 240V.

\*6. Power consumption of the instrument modified to operate on an AC line voltage other than 100V is as follows.

110V / 120V: 25VA or less

220V / 230V / 240V: 45VA or less

### External dimensional diagrams



Unit: mm



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