7.1 Withstanding Voltage Tester

WITHSTANDING VOLTAGE TESTER			
Test Voltage	Applied AC Voltage	0 to 2.5kV/0 to 5kV (tow ranges)	
	Output Rating	500VA (5kV, 100mA with 100V line voltage) See Note 1.	
	Waveform	AC line waveform	
	Voltage regulation	Better than 20% (for maximum rated load to no load, with 100V line voltage)	
	Switching	With zero-start type switch	
Output Voltmeter	Scales	2.5kV f.s / 5kV f.s, two ranges linear scales	
	Class of meter	JIS Class 1	
	Accuracy	±3% f.s or better	
	Indication	Mean-value response, effective-value scale graduation	
Judgment of Test Result GO-NOGO judgment. Output cutoff by leakage current detection	Judgment	○Window comparator system ○NG judgment when leakage current larger than high limit reference value is detected. ○NG judgment also when leakage current smaller than low limit reference value is detected. ○When NG judgment is made, output is cutoff and NG alarm is generated. ○If no NG judgment is made after preset period has elapsed, GOOD signal is generated.	
	High limit reference value (CUTOFF CURRENT)	0.5/1/2/4/8/10/100mA (7 values)	
		By combinations of above values, a range of 0.5 to 25.5mA can be covered in 0.5mA steps.	
	Low limit reference value (LOWER REFERENCE)	0 to one-half of high limit reference values (continuously variable)	
	Accuracy of judgment (See Note 2.)	○±5% of high limit ○±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.	
	No-load output voltage need for detection (See Note 3.)	2.5kV range	Approx. 450V when set at 100mA
		5kV range	Approx. 550V when set at 100mA
Test time		0.2s to 10min. (with 4-range timer)	
Terminals		Terminals for monitoring of leakage current	

Note 1 : When the Tester is delivering its maximum rated current, its maximum rated continuous operation time is 30 minutes.

Note 2 : 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 next table. 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.

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

Note 3 : When making an NG 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.

Test Voltage Waveform

When an AC output voltage is applied to a capacitive load, it is possible that the voltage becomes higher than that 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 1.5 kV, however, effects caused by a capacitance of 1000 pF or less are negligible.

7.2 Insulation resistance Tester

INSULATION RESISTANCE TESTER		
Measuring Voltage		500V or 1000V DC, negative polarity (two ranges)
Effective Measuring Ranges	500V range	1 to 1000MΩ
	1000V range	2 to 2000MΩ
Values center of scale	500V range	20MΩ
	1000V range	50MΩ
Accuracy		○1set effective measuring range : ±5% of the indicated value ○2nd effective measuring range : ±10% of the indicated value (See Note 4 and 5)
Measuring terminal voltage	When output terminals are open	0% to +5% of rated measuring voltage
	When at center of scale	95% or more of rated measuring voltage
Judgment of Test Result GO-NOGO judgment	Judgment	○Window comparator system (mutually independent settings of high limit and low limit) ○NG judgment when measured resistance is smaller than low limit reference value. ○NG judgment when measured resistance is larger than high limit reference value. ○When NG judgment is made, output is cutoff and NG alarm is generated. ○If no NG judgment is made after preset period has elapsed , GOOD 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 : ±10% of set value ○2nd effective measuring range : ±15% of set value (See Note 4 and 5)
	Waiting-time for judgment	Approx. 0.3s
Test time		0.5s to 10min. (with 4-range timer)

Note 4 : At 25℃±10℃

Note 5 : 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.

Note 6 : Since the Tester operates on an AC power line, measuring errors may be introduced if the device under test is connected to the AC line.

7.3 Common Specifications

Common Specifications			
Types of test	1.AUTO W→I	Withstanding voltage test first and insulation resistance test next	
	2.AUTO I→W	Insulation resistance test first and withstanding voltage test next	
	3.MANUAL W	Withstanding voltage test alone	
	4.MANUAL I	Insulation resistance test alone	
Remote Control	Test / Reset control	○Low active control ○Input conditions (See Note 7) · High level input voltage 11 to 15V · Low level input voltage 0 to 4V · Low level sweep out current 2mA or less · Input pulse width 20ms minimum	
	Protection	Protection is effected when PROTECTION input terminal is made open (test is disabled).	
Output signals (See Note 8)	Signal Name	Conditions for Signal Generation	Type of Signals
	TEST ON signal	Delivered during entire test-on period.	Make-contact signal and lamp
	GOOD signal	Delivered when GOOD judgment is made, for approximately 50ms.	Make-contact signal, lamp and buzzer
	W/NG alarm	Delivered continuously when NG judgment of withstanding voltage test is made.	Make-contact signal, lamp and buzzer
	I/NG alarm	Delivered continuously when NG 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 TEST button is pressed within approximately 0.5s after pressing the RESET button.	
	2.GOOD HOLD	The GOOD state is held.	
	3.MOMENTALY	Test is executed only during the period the TEST button is kept pressed.	
	4.NG ALARM	NG alarm and PROTECTION state cannot be reset by the remote-control RESET signal.	

Note 7 : The input terminal is pulled up to +15V supply voltage by resistor. Opening of the input terminals is equivalent to a high level input.

Note 8 : ① The rating of the signal contacts is 100VAC, 1A, or 30VDC, 1A.

② Loudness of the buzzer is adjustable with a knob in common for the GOOD signal and NG alarm.

Ambient Temperature and Humidity	Specification range	5 to 35℃ (41 to 95°F) /20 to 80% RH	
	Operable range	0 to 40℃ (32 to 104°F) /20 to 80% RH	
	Storage range	-20 to 70℃ (-4 to 158°F) /80% RH or less	
EMC	Complied with the following standards (See Note 9) IEC61326-1:1997-03/A1:1998-05 Electrical Equipment for Measurement, Control and Laboratory Use - EMC requirements Radiated Emissions Class A Conducted Emissions Class A IEC61000-4-2:1995-01/A1:1998-01 Electrostatic discharge IEC61000-4-3:1995-02 Radiated, radio-frequency, electromagnetic field IEC61000-4-4:1995-01 Electrical fast transient/Burst IEC61000-4-5:1995-02 Surge IEC61000-4-6:1996-04 Conducted disturbances IEC61000-4-11:1994-06 Voltage dips, short interruptions and voltage variations Under following conditions 1. Used HV test leadwire TL01-TOS. 2. No discharge in testing.		
Safety	Complied with the following standards (See Note 9) European Community Requirements (73/23/EEC)		
Power Requirements	Line voltage	100VAC±10%, 50/60 Hz (See Note 10)	
	Power consumption	When no load (RESET state) : 15VA or less (See Note 11) When with rated load : Approx. 600VA	
	Insulation resistance	30MΩ or more, 500VDC	
	Withstanding voltage	1000VAC, 1minute	
Dimensions		430W×199H×370D mm (16.93W×7.83H×14.57D in) Including extrusions : 430W×214H×435D mm (16.93W×8.43H×17.13D in)	
Weight		Approx. 24kg (53lb) Approx. 28kg (62lb) when in Line Voltage modified.	
Accessories		○ TL01-TOS High Voltage Test Leadwires, approx. 1.5m long.	1
		○ 5P DIN plug (assembly type)	1
		○ AC Power cable	1
		○ "HIGH VOLTAGE DANGER" label	1
		○ Operation Manual	1
		○ AC Power Fuse One in present use and the other as spare (in the fuse holder cap).	2

Note 9 : CE marking are put only on the products sold in Europe.

Note 10 : Can be factory-modified to nominal 110V, 120V, 220V, 230V and 240V.

Options	○ RC01-TOS Remote Control Box ○ RC02-TOS Remote Control Box ○ HP01A-TOS High Voltage Test Probe, approx. 1.5m (4.9ft) long ○ HP02A-TOS High Voltage Test Probe, approx. 3m (9.8ft) long ○ TL02-TOS High Voltage Test Readwires, approx. 3m (9.8ft) long ○ PL01-TOS Warning Light Unit ○ BZ01-TOS Buzzer Unit ○ BH4M-TOS Rackmount Bracket (for JIS) ○ BH5-TOS Rackmount Bracket (for DIN)

Note 11 : Power consumption of the instrument modified to operate on an AC line voltage other than 100 V is as follows.

110V / 120V	: 25 VA or less
220V / 230V / 240V	: 45 VA or less