TOS7200

Insulation Resistance Tester

Complied with the test voltage -25 V to -1000 Vdc of the JIS C 1302-2002

TOS7200(IR)

RS-232C CE

Testing voltage range -25V to -1,000V,
Resistance measurement range 0.01MΩ to 5,000MΩ

The TOS7200 is an insulation resistance tester available for a wide range of various electric and electronic components, as well as electric and electronic equipment. The output voltage can be set at desired value in the range of - 25 V to -1,000 V with a resolution of 1 V. (conforms with the output characteristics of the JIS C 1302-2002) . As it is fitted with a window comparator and timer function, the tester is capable of efficiently conducting insulation resistance tests based on various safety standards. In addition, this product is equipped with panel memory as standard feature, which can be recalled by remote control, SIGNAL I/O connector, and the RS-232C interface for easy automatic testing system construction.

- Provided with the discharge function
- Equipped with the window comparator
- Hold function
  (which holds the measured resistance at the end of testing while PASS judgment is being output)
- Provided with the timer function
- Rear output terminals
- Measured-value monitoring terminals
- Equipped with the panel memory (enabling 10 different settings to be stored)
- Equipped with the SIGNAL I/O connector and remote control terminal
- Equipped with the RS-232C interface as standard

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Output section		
Output voltage range		-25 V to -1000 V
	Resolution	1 V
	Accuracy	±(1.5 % of setting + 2 V)
Maximum rated load		1 W (-1000 V DC/1 mA)
Maximum rated current		1 mA
Output terminals	Output type	Floating
	Isolation voltage	±1000 VDC
Ripple	1000 V / under no load	2 Vp-p or less
	Maximum rated load	10 Vp-p or less
Short-circuiting current		12 mA or less
Output rise time		50 ms or less (10 % to 90 %) [no load]
Discharge function		Forced discharge at the end of test (discharge resistance: 25 k Ω)
Voltmeter		
Measurement range		0 V to -1200 V
Resolution		1 V
Accuracy		±(1 % of reading +1 V)
Resistance meter		
Measurement range		0.01 M Ω to 5000 M Ω (In the range of over 100 nA to a maximum rated current of 1 mA)
Display		R < 10.0 MΩ: ❑.❑ ❑ MΩ 10.0MΩ ≤ R < 100.0MΩ: ❑ ❑.❑ MΩ 100.0MΩ ≤ R < 1000MΩ: ❑ ❑ ❑ MΩ 1000MΩ ≤ R ≤ 5000MΩ: ❑ ❑ ❑ ❑ MΩ R = measured insulation resistance
Accuracy		100 nA < i ≤ 200 nA: ± (10 % of reading) 200 nA < i ≤ 1 µA: ± (5 % of reading) 1 µA < i ≤ 1 mA: ± (2 % of reading) i =measured output-voltage value/measured resistance value [In the humidity range of 20 %rh to 70 %rh (no condensation), with no disturbance such as swinging of the test leadwire]
Measurement range		The current measurement range is selectable between AUTO and FIX.
	AUTO	Automatically changes the current measurement range according to the measured current value.
	FIX	Fixes the current measurement range based on the output voltage set value and LOWER set value (in UPPER OFF status).
Holding function		Holds the resistance value obtained at the end of testing while a PASS judgment is being output.
Judgment function		
Judgement method/action		See table below.
Setting range for the upper resistance (UPPER)		0.01 M Ω to 5000 M Ω [In the range of the maximum rated current or less]
Setting range for the lower resistance (LOWER)		0.01 M Ω to 5000 M Ω [In the range of the maximum rated current or less]
Judgement accuracy For both UPPER and LOWER		See table below.
Time		
Setting range for the test duration (TEST TIME)		0.5 s to 999 s (TIMER OFF function provided)
Setting range for the wait time (WAIT TIME)		0.3 s to 10 s [TEST TIME > WAIT TIME]
Accuracy		±(100 ppm + 20 ms)

Judgement	Judgement method	Display	Buzzer	SIGNAL I/O
UPPER FAIL	If a resistance value equal or higher than the upper resistance is detected, the tester shuts off the output and returns an UPPER FAIL judgment.	FAIL LED lights. UPPER LED lights.	ON	Outputs an U FAIL signal
LOWER FAIL	If a resistance value equal or less than the lower resistance is detected, the tester shuts off the output and returns a LOWER FAIL judgment. Note that no judgment is made within the judgment wait time (WAIT TIME) after the start of the test.	FAIL LED lights. LOWER LED lights.	ON	Outputs a L FAIL signal
PASS	If no abnormality is found when the set test time has elapsed, the tester shuts off the output and returns a PASS judgment.	PASS LED lights.	ON	Outputs a PASS signal

• A PASS signal is output for approx. 200 ms. However, if the PASS HOLD function is set to "HOLD," the signal is continuously output until a STOP signal is input.
• An UPPER FAIL or LOWER FAIL signal is continuously output until a STOP signal is input.
• The FAIL and PASS buzzer volumes are adjustable. However, they cannot be adjusted individually, as they are set in common.

Judgement current		100 nA < i ≤ 200 nA	200nA < i ≤ 1 µA	1 µA < i ≤ 1 mA
UPPER, LOWER	0.01 ≤ R < 10.0 MΩ	—	—	± (2 % of setting + 3digit)
	10.0 ≤ R < 50.0 MΩ	—	± (5 % of setting + 5digit)	± (2 % of setting + 3digit)
	50.0 ≤ R < 100 MΩ	—	± (5 % of setting + 5digit)	± (2 % of setting + 3digit)
	100 MΩ ≤ R < 200 MΩ	± (10 % of setting + 5digit)	± (5 % of setting + 5digit)	± (2 % of setting + 3digit)
	200 MΩ ≤ R < 500 MΩ	± (10 % of setting + 5digit)	± (5 % of setting + 5digit)	± (2 % of setting + 3digit)
	500 MΩ ≤ R < 1000 MΩ	± (10 % of setting + 5digit)	± (5 % of setting + 5digit)	± (2 % of setting + 3digit)
	1000 MΩ ≤ R < 2000 MΩ	± (10 % of setting + 50digit)	± (5 % of setting + 50digit)	—
	2000 MΩ ≤ R < 5000 MΩ	± (10 % of setting + 100digit)	± (5 % of setting + 50digit)	—

Judgement current = test voltage /(UPPER,LOWER)

[The humidity must be in the range of 20 %rh to 70 %rh (no condensation permitted), and there must be no disturbance such as swinging of the test leadwires.]
[The lower judgment requires a test duration of 0.5 s or more after the wait time has expired. It also requires a wait time of 1.0 s or more for a lower judgment of 200 nA or less.]

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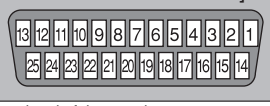
Interface and Other Functions

REMOTE	6-pin mini-DIN connector on the front panel The optional remote controller RC01-TOS or RC02-TOS is connected to remotely control starting/stopping of a test (note that a DIN-mini DIN adapter is required).
SIGNAL I/O	D-SUB 25-pin connector on the rear panel For names and descriptions of connector signals.

No.	Signal name	I/O	Description of signal
1	PM0	I	LSB *1
2	PM1	I	*1
3	PM2	I	*1
4	PM3	I	MSB *1
5	N.C		
6	N.C		
7	N.C		
8	N.C		
9	STB	I	Input terminal for the strobe signal of the panel memory
10	N.C		
11	N.C		
12	N.C		
13	COM		Circuit common (chassis potential)
14	HV ON	O	ON during a test or while a voltage remains between the output terminals
15	TEST	O	ON during a test
16	PASS	O	ON for approx. 0.2 seconds when PASS judgment is made, or continuously ON while PASS HOLD is activated
17	U FAIL	O	Continuously ON if an insulation resistance equal to or exceed-ing the upper resistance is detected, resulting in FAIL judgment
18	L FAIL	O	Continuously ON if an insulation resistance equal to or falling below the lower resistance is detected, resulting in FAIL judg-ment
19	READY	O	ON during standby
20	N.C		
21	START	I	Input terminal for the START signal
22	STOP	I	Input terminal for the STOP signal
23	ENABLE	I	Remote control enable signal input terminal
24	N.C		
25	COM		Circuit common (chassis potential)

[Pin Configuration for the SIGNAL I/O Connector]



*1: 1-digit BCD active LOW input
Panel memory's selection signal input terminal
Memory recall by latching this selection signal at the rise of the strobe signal

Input specifications		
High-level input voltage	11 V to 15 V	All input signals are active Low controlled. The input terminal is pulled up to +12 V using a resistor. Opening the input terminal is equivalent to inputting a high-level signal.
Low-level input voltage	0 V to 4 V	
Low-level input current	-5 mA maximum	
Input time width	5 ms minimum	
Output specifications		
Output method	Open collector output (4.5 V to 30 V DC)	
Output withstand voltage	30 V DC	
Output saturation voltage	Approx. 1.1 V (at 25°C)	
Maximum output current	400 mA (TOTAL)	
ANALOG OUT	Outputs a logarithmically compressed voltage corresponding to the measured resistance value	
+	Vo = log (1 + Rx / 1MΩ) where Rx = measured resistance value (1 M Ω: 0.30 V; 10 M Ω: 1.04 V; 100 M Ω: 2.00 V; 1000 M Ω: 3.00 V; 10000 M Ω or more: 4.00 V). Output impedance: 1 k Ω	
COM	Analog output-circuit common	
Accuracy	±(2 % of full scale)	
RS-232C	D-SUB 9-pin connector on the rear panel (compliant with EIA-232-D) All functions other than the POWER switch and KEY-LOCK function are remotely controllable.	
Baud rate	9600 bps/19200 bps/38400 bps (data: 8 bits; parity: none; stop bit: 2 bits fixed)	
Display	7-segment LED, 4-digit voltage display, 4-digit insulation resistance display, and 3-digit time display	
Memory function	A maximum of 10 types of test conditions can be stored in memory.	
Backup battery life	3 years or more (at 25 °C)	
TEST MODE		
MOMENTARY	A test is conducted only when the START switch is pressed.	
FAIL MODE	Disables cancellation of FAIL judgment using a stop signal via remote control.	
DOUBLE ACTION	Starts a test only when the STOP switch is pressed and the START switch is pressed within approximately a half-second.	
PASS HOLD	Allows the time of holding PASS judgment to be set to 0.2 s or HOLD.	
KEYLOCK	Places the tester in a state in which no keystroke other than the START/STOP switch is accepted.	

General Specifications

Environment	
Installation location	Indoors and at altitudes up to 2000 m
Warranty range	Temperature 5 °C to 35 °C
	Humidity 20 %rh to 80 %rh (no condensation)
Operating range	Temperature 0 °C to 40 °C
	Humidity 20 %rh to 80 %rh (no condensation)
Storage range	Temperature -20 °C to 70 °C
	Humidity 90 %rh or less (no condensation)
Power requirements	
Nominal voltage range (allowable voltage range)	100 V to 240 V AC (85 V to 250 V AC)
Power consumption At rated load	30 VA maximum
Allowable frequency range	47 Hz to 63 Hz
Insulation resistance	30 M Ω or more (500 V DC) [AC LINE to chassis]
Hipot	1390 V AC for 2 seconds, 10 mA or less [AC LINE to chassis]
Ground bond	25 A AC/0.1 Ω or less

Electromagnetic compatibility (EMC)*1

Conforms to the requirements of the following directive and standard.
EMC Directive 2004/108/EC
EN61326
EN61000-3-2
EN61000-3-3

Under following conditions
1. Used HV test leadwires TL08-TOS which is supplied.
2. No discharge occurs at outside of the tester.
3. Used the shielded cable which length is less than three meters when the SIGNAL I/O is used.

Safety*1, 2

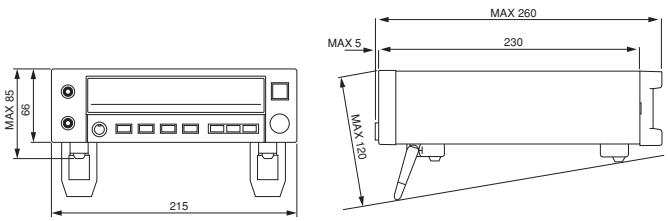
Conforms to the requirements of the following directive and standard.
Low Voltage Directive 2006/95/EC
EN61010-1
Class I
Pollution degree 2

Dimensions (max.)	215 (215) W x 66 (85) H x 230 (260) Dmm
Weight	Approx. 2 kg
Accessories	AC power cable 1 pc. TL08-TOS high-voltage test leadwires (1.5 m) 1 set Operation Manual 1 copy

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

*2: 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.

External dimensional diagrams



Unit: mm