

MODEL 860
AUTOMATIC WITHSTANDING
VOLTAGE AND
INSULATION TESTER
INSTRUCTION MANUAL

KIKUSUI ELECTRONICS CORP.

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On Power Supply Source, it is requested to replace the related places in the instruction manual with the following items.

(Please apply the item of mark.)

Power Supply Voltage: to _ _ _ _ _ V AC

Line Fuse: to _ _ _ _ _ A

Power Cable: to 3-core cable (See Fig. 1 for the colors.)

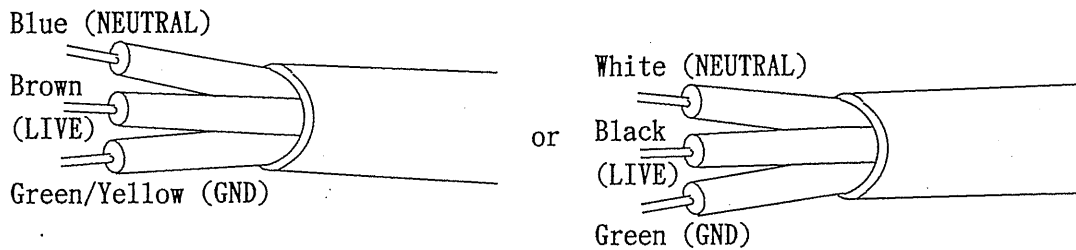


Fig. 1

Please be advised beforehand that the above matter may cause some alteration against explanation or circuit diagram in the instruction manual.

* AC Plug: In case of Line Voltage 125V AC or more, AC Plug is in principle taken off and delivered, in view of the safety.

(AC Plug on 3-core cable is taken off in regardless of input voltages.)

TO connect the AC plug to the AC power cord, connect the respective pins of the AC plug to the respective core-wires (LIVE, NEUTRAL, and GND) of the AC power cord by referring to the color codes shown in Fig. 1.

Before using the instrument, it is requested to fix a suitable plug for the voltage used.

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1. Outline

This equipment is an automatic measuring instrument consisting of withstanding voltage tester and insulation resistance tester. It can perform automatically production line inspection on all kinds of electronic parts and electronic equipments as regulated by JIS specification on electrical appliances.

In automatic test, push test button while being connected to equipment under test, then withstanding voltage and insulation resistance tests are carried out automatically under set test voltage and test time.

Also it is provided with functions of various single tests and automatic judgement, together with ensuring safety of test personnel with safeguard and alarm devices.

2. Specifications

Power supply 100 V 50/60 Hz Approx. 45 VA, max approx.600VA
Weight Approx. 33 kg
Dimensions 497W x 280H x 380D mm
(Maximum part) 500W x 295H x 415D mm
Accessories Instruction Manual Test lead 1 each

o Withstanding voltage tester

Test voltage

Applied voltage AC (50/60Hz) with ZERO CROSS SWITCH
0 - 2.5 kV/5 kV (2 range continuously variable)

Output capacity 500 VA (5kV, Max 100 mA)

Voltage regulation Not more than 3 % on 5 kV, 10 mA

Voltmeter Interlocked with test voltage range switching

Scale 2.5 kV/5 kV full scale equal graduation

Class Class 1

Indication AC effective value

Accuracy ± 5 % of full scale

Test time

Manual/timer MANUAL/TIMER

Timer set time TIMER 0.5 - 10 seconds

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Leak current detection

Range 0.5/1/2/5/10/100 mA (6 ranges)
Accuracy $\pm 5\%$

Test and result judgement

TEST ON	Lamp indication
NG	Lamp indication
NG	Buzzer operation

o Insulation resistance tester

Measuring voltage and range

DC 500 V	0.05 M Ω - 250 M Ω
	Center value 2.5 M Ω
DC 1000 V	0.1 M Ω - 500 M Ω
	Center value 5 M Ω

Measuring accuracy First effective measuring range* $\pm 5\%$ of indicated value
Second effective measuring range* $\pm 10\%$ of indicated value

* mark shall conform to JIS C1302 1.2 (3).

Measuring voltage accuracy $\pm 5\%$ when terminal is opened.
(Applied voltage to sample) Center value shall be 90% or more of rated voltage.

Measuring time MANUAL/TIMER 0.5 - 10 seconds

Criteria of measurement	Free setting	0.1 M Ω - 250 M Ω (500 V DC)
		0.2 M Ω - 500 M Ω (1 kV DC)
	Accuracy of set value	\pm 5 % of measuring accuracy
	Criteria	Judged approx. 0.1 second after the application of test voltage
Measurement and judgement	TEST ON	Lamp indication
	NG	Lamp indication
	NG	Buzzer operation

o Test method

Single test (withstanding voltage insulation) Single test is possible on either of withstanding voltage test or insulation resistance test.

Automatic test Push TEST button, then automatic test is carried out on measured devices with predetermined test voltage and time with regard to withstanding voltage test and insulation test.

3. Description of panel surface

POWER Power supply switch. Confirm securely clause 4.2 Precautions on handling before closing it. When POWER ON, reset condition takes place for approx. 2 seconds.

TEST Test starting button of withstanding voltage and insulation tests.

RESET HV OFF NG indication reset button of each test. By pushing it, test voltage and current are interrupted.

TEST VOLTAGE Knob for adjusting test voltage of withstanding voltage test. Turn it clockwise from "0" position, then test voltage increases to 2.5 kV or 5kV. Set this knob securely at "0" position for the prevention of danger unless during test.

RANGE (2.5kV/5kV) Change switch of variable range of voltage test voltage (2.5kV/5kV). Voltmeter and lamp indication are interlocked. Confirm clause 4.4 of Precautions on handling.

LEAK CURRENT Knob setting operating current of leak current detection circuit.

TIMER/MANUAL Change switch of voltage and insulation test time to TIMER and MANUAL.

- o TIMER Unless leak current (withstanding voltage test) or judgement level (insulation test) circuit operates, test

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voltage is generated for a predetermined time (0.5 - 10 seconds).

o MANUAL Voltage is generated unless leak current (withstanding voltage test) or judgement level (insulation test) circuit operates.

RANGE (500 V/ 1 kV) Change switch of insulation test voltage setting.

Insulation resistance meter and lamp indication are interlocked. (Refer to Precautions on handling 4.5.)

ALARM SET/ MEASURE Change switch of judgement level setting and measurement of insulation resistance value.

o ALARM SET Judgement level of measured resistance can be set by a semi-fixed resistor located on upper portion.

o MEASURE Resistance measurement is possible.

FUNCTION Change switch between automatic and single test.

AUTO Green lamp of AUTO lamp A is lit, thus automatic test of withstanding voltage and insulation can be carried out.

MANUAL Single test of withstanding voltage or insulation test can be carried out.

* When AUTO-MANUAL switch is changed, mode is

changed to designated one by pushing RESET switch.

WITHSTANDING VOLTAGE

Voltage test (single) can be carried out.

Red lamp of withstanding voltage test lamp W is lit during test voltage application.

INSULATION

Insulation test (single) can be carried out.

Blue lamp of insulation test lamp I is lit during test voltage application.

OFF

Automatic test by AUTO can be carried out but neither withstanding voltage nor insulation test by MANUAL operation can be carried out.

OUTPUT (H.V.)

Output terminal of withstanding voltage and insulation tests.

GND

GND terminal is connected electrically to panel surface and chassis. Securely ground it to the earth after confirming . Precautions on handling 4.2.

PANEL/REMOTE

Change switch of remote operation.

o PANEL

Operation of TEST,RESET button on panel surface is enabled.

o REMOTE

Remote control operation of TEST, RESET is enabled. Operation on panel surface is not possible.

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4. Precautions on handling

This equipment generates high voltage up to 5 kV. Therefore, vital trouble may be caused if handling is not correct. Read the following precautions carefully to apply it always with maximal care together with confirmation of safety.

4.1 Grounding of the equipment

Securely ground GND terminal on panel surface to a grounding point on the earth.

If panel surface is incompletely grounded, electrical shock may be applied to person who contacts equipment panel, case or tested article.

4.2 ON/OFF of power supply switch

Apply POWER OFF operation during test voltage application only after pushing RESET (HV OFF) button. Do not make POWER switch OFF earlier.

4.3 Test interruption (TEST OFF)

Securely return knob of TEST VOLTAGE to "0" position unless during test operation, then turn POWER switch OFF.

4.4 Knob operation

Securely push RESET button and make TEST OFF con-

dition before switching the following knobs and switches.

TEST CURRENT knob

RANGE (2.5 kV/5kV) switch

RANGE (500 V/1kV) switch

FUNCTION knob

4.5 Connection of output terminal

Securely confirm output voltage and current are OFF (TEST ON lamp is extinguished and indications of voltmeter and ammeter are zero.) before connecting output terminal, then connect it from GND side to article under test. If GND terminal is disconnected, whole article under test are subjected to high voltage causing danger.

4.6 Continuous test

Do not apply long time TEST ON condition to each test.

4.7 CURRENT LIMITING ON↔OFF Switch

Normally, it's desirable to use "ON" position but the Test Voltage Max. Output Capacity (Multiplication of Test Voltage and Leak Current) is only approx. 300 VA.

Therefore in case of applying over 300 VA, set "OFF" position. In this case, if the test sample is shorted or if the insulation of the test sample is destroyed, the Line Fuse is cut-off once in a while.

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5. Method of application

5.1 Withstanding voltage test

POWER lamp is lit by the application of power supply.

Set FUNCTION knob to WITHSTANDING VOLTAGE.

Selection of test voltage

Select test voltage of 2.5kV/5kV by RANGE switch.

Setting of leak current

Set leak current detection circuit operating current.

Sample connection

Confirm output voltage OFF (TEST ON lamp is extinguished.) condition, then connect it from GND side to sample under test.

Starting test

(1) In case of MANUAL

Set TIMER/MANUAL change switch to MANUAL condition, depress TEST button, then red lamp is lit to indicate readiness of test voltage application.

Then turn TEST VOLTAGE knob clockwise, thus test voltage is applied to sample under test.

(2) In case of TIMER

Set test voltage while observing voltmeter on panel

surface under the condition of (1). Then change it to TIMER (0.5 - 10 sec) by timer change switch, thus timer operation starts applying test voltage to sample under test for set time.

Reapplication of test voltage

When leak current flows more than set value during test, interrupted is applied voltage which is indicated NG by NG lamp and buzzer.

- (1) In this case, depress RESET (HV OFF) button to reset once detection circuit, then push TEST button. Thus test voltage is reapplied.
- (2) In case that applied voltage is interrupted by timer completion, push once RESET (HV OFF) button, then push TEST button, thus test voltage is reapplied.
- (3) If RESET (HV OFF) button is pushed during test, test voltage is interrupted. If TEST button is pushed thereafter, test voltage is reapplied.

5.2 Insulation resistance test

Set FUNCTION knob to INSULATION.

Selection of test voltage

Select test voltage of 500V/1kV by RANGE switch.

Setting of judgement level

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Set ALARM SET/MEASURE switch to ALARM side, then set judgement level of measured value by semi-fixed resistor while observing insulation resistance meter.

Upon completion of judgement level setting, set the switch to MEASURE side.

Sample connection

Confirm output voltage OFF (TEST ON lamp is extinguished.), then connect it from GND side to sample under test.

Starting test

(1) In case of MANUAL

Set TIMER/MANUAL change switch to MANUAL condition, then blue lamp of I is lit to indicate TEST ON, thus applying test voltage to the sample.

(2) In case of TIMER

Set TIMER/MANUAL change switch to TIMER (0.5 - 10 sec) condition, then blue lamp of I is lit to indicate TEST ON, starting TIMER operation. Thus test voltage is applied to the sample for a predetermined time.

On insulation resistance meter, indicated is measured resistance value.

Reapplication of test voltage

If measured value is smaller than set value of judge-

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ment level, NG judgement is indicated by NG lamp and buzzer, then test voltage is interrupted.

TEST OFF and NG reset can be made by RESET (HV OFF) button. If TEST button is pushed thereafter, test voltage is reapplied.

5.3 Automatic test

Switch in power supply according to Precautions on handling 4.2.

Setting of test voltage, time and judgement

According to the method of application of voltage and insulation tests, set each test voltage, current, time and judgement level.

Set time setting of insulation test by a timer located on right hand side of panel surface. Then set FUNCTION knob to AUTO. Green lamp of A is lit, then automatic test becomes ready.

Sample connection

Confirm output voltage and current are OFF condition, then connect it from GND side to sample under test.

Starting test

Push TEST button, then voltage test (indicated by

W lamp) and insulation resistance test (indicated by I lamp) are carried out under set test voltage, current and time until completion of test.

Reapplication of test voltage and current

In case that measured value exceeds either set value of leak current or judgment level during test, NG indication is made in each test by NG lamp and buzzer and, at that time instant, test voltage and current are interrupted.

- (1) In this case, push RESET (HV OFF) button to reset detection circuit once, then depress TEST button. Thus voltage/current is reapplied.
- (2) After completion of test, voltage/current is reapplied by pushing TEST button.
- (3) If RESET (HV OFF) button is pushed during test, test voltage/current is interrupted at that instant. If TEST button is pushed, it is reapplied.

5.6 Remarks on operation

- (1) When applying power supply, reset condition is generated for approx. 2 seconds after POWER ON, during which time control is not possible.

(2) Change of AUTO/MANUAL switch

Even if AUTO/MANUAL switch is changed during test, test continues to either of timer completion or RESET button pushing.

By pushing and releasing RESET button, AUTO/MANUAL change mode takes place.

(3) Insulation resistance test

Judgement of measurement is made approx. 0.1 seconds after the application of test voltage.

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6. Calibration

6.1 Withstanding voltage tester

Calibration of test voltage

Connect voltmeter or electrostatic voltmeter having input impedance of 1000 M Ω or more and accuracy of 1 % or more to output terminal, then calibrate panel surface voltmeter by F.S with semi-fixed resistor METER ADJ 2.5 kV, 5 kV positioned on left hand side board.

Calibration of leak current detection

Connect load and ammeter to output terminal in series, then apply 100 mA.

Apply calibration by GAIN ADJ semi-fixed resistor on the left hand side board in such a manner that NG operation works in this case on LEAK CURRENT 100 mA setting.

Then apply calibration by each semi-fixed resistor located on the board in succession in such a manner that NG operation works by each set value of LEAK CURRENT.

6.2 Insulation resistance tester

Calibration of test voltage

Connect voltmeter or electrostatic voltmeter having input impedance of 1000 M Ω or more to output terminal, then apply calibration by 500 V ADJ, 1 KV ADJ semi-fixed resistors

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located on the right hand side board.

Zero adjustment of resistance meter

Set ALARM set at zero ohm or less, then set it to MEASURE side. Then set resistance meter to 0 position by ZERO ADJ semi-fixed resistor on panel surface under the condition of output short-circuit.

However, previously apply mechanical zero adjustment of resistance meter during POWER OFF.