

MODEL 8525

Withstanding Voltage & Insulation Resistance Tester

Instruction Manual

TSURUGA ELECTRIC CORPORATION

I-01456

FOR SAFE USE

For safe use of this product, please observe the following warning and caution. In order to help the users' safe use of the products, the following symbol marks are used in this manual.

WARNING

This is the warning to avoid the danger when it is assumed that such danger as may cause fatal accident or severe injure to a user occurs in case that the product is mishandled.

CAUTION

This is the caution to avoid the danger when it is assumed that such danger as may cause minor injure to a user or generate only physical obstacle occurs in case that the product is mishandled.

WARNING

This tester outputs high voltage. As there is danger of an electric shock, please strictly follow the directions below:

- **Do not touch high voltage cables or test samples during the test.**
The places marked with  on the tester are the dangerous parts where the high voltage is generated.
- **Make sure to connect the protective ground terminal to the earth.**
- **Do not short-circuit the output to the ground or commercial power supply line.**
It is dangerous as the housing of tester is charged with high voltage. It also causes the break-down of the tester.
- **When operating the tester, put on the rubber gloves for an electric operation.**
- **For the connection to the sample to be tested, use the attached high voltage cable or an electric cable appropriate to the operating voltage.**
- **Do not repeat ON/OFF of the power supply switch. It is dangerous and causes the break-down of the tester.**
- **Place for installation**
Never install or use this product in the place where such explosive or flammable materials as mentioned below are used or stored (Occupational Safety and Health Laws, Enforcement Regulations Appendix Table 1 Dangerous Materials, [Explosive material], [Flammable material], [Inflammable material], [Flammable gas], [Oxidizing material])
 - ※Model 8525 internally uses the metallic materials. There is a fear of deterioration due to corrosion or rust and explosion or inflaming by an electric spark.
- **Do not put anything on the 8525 or use it as foot stool.**
 - ※It affects the heat radiation, causing internal heat up and breakdown.
 - ※It may also cause a deformation of the top part of the product.
- **When the voltage is applied to the capacitance load (test sample), the output voltage may rise higher than the case of no load depending upon the capacitance value of the load. Also, in case of the voltage liable load (test sample), wave distortion may occur.**
In case of test voltage 2kV, the influence of capacitance 2000pF or less can be ignored.

CAUTION

Pay attention to the following cautions about the power supply.

This tester is equipped with a high voltage transformer 500VA, so it can happen in the following cases that the considerably big current (a few 10A) flows to the commercial power supply line which this tester is connected to.

- ▶ **During a few 10ms immediately after the start of withstanding voltage test.**
- ▶ **During a few 10ms while this tester makes a NG (no good) judgement for the test sample.**

Take care for the capacity of supply power line and the other equipment or devices connected to the same line.

Besides, in case that the stabilized AC power supply is used, depending upon the action of its current limiter circuit, the output is turned ON/OFF at high speed. It eventually generates the considerably big surge voltage and is very dangerous.

⚠ CAUTION

- To avoid break-down, malfunction or other troubles, do not use the tester in such places where:
 - ▶ exposed to rain, water drops or direct sunlight.
 - ▶ high temperature or humidity, heavy dust or corrosive gas.
 - ▶ affected by external noise, radio waves or static electricity.
 - ▶ unstable or of much mechanical vibration
 - ▶ high sensitivity measuring instruments or receiver locates nearby
- Do not open the case or modify the tester as it may cause a danger of an electric shock or other troubles.
- In case that abnormal operation occurs, turn off the power supply switch immediately and pull out the power supply cable from the plug socket.
- When doing the maintenance or checking, be sure to stop the use of product and turn off the power supply.
- Do not use the product in the place of vibration or where the shock may occur as it will cause the breakdown of the product.

MAINTENANCE & TRANSPORTATION

⚠ WARNING

- Take care that the water drops like rain do not wet the product.
 - * It may cause the electric shock or malfunction.
- Do not lay along the product. Also take care that the product does not fall down by vibration or else.
 - * It may cause the damage of internal mechanism or malfunction.

⚠ CAUTION

- When the product is transported, hold the chassis (bottom plate).
Do not carry the product holding its red bushing at high voltage output terminal section (refer to ⑥ and ⑱ of the article 3 Name of parts and functions).
 - * The bushing (red) may break, causing serious injury by the fallen 8525.
- Minimize the mechanical shock or vibration when transporting the product.
 - * It may cause the damage of internal mechanism or malfunction.

INTERLOCK

Model 8525 is provided with interlock function.

During the interlock function is in operation, no test is allowed.

The interlock function can be canceled by connecting the attached **REMOTE/OUT** plug into the **REMOTE/OUT** connector ⑱ on the back and then pressing the **STOP** switch ②.

Please refer to the article 14.3 (P60) for the interlock function.

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1. Preface

For proper use of this tester, please carefully read these instructions before initial operation. Please make sure that this instruction manual reaches the responsible person of operation and also keep it near the tester so the operator can read it any time.

Model 8525 deals high voltage, so it is designed to provide many protective functions and various concerns to secure the operators' safety.

- As the withstanding voltage tester, this model has the capability of max. output 5kV and output capacity 500VA, which allow for a withstanding voltage test of various electronic equipment or components, in accordance with the various standard.
- Referential voltage setting, which prevents the test from being started unless the test voltage comes into the range of either higher value of $\pm 5\%$ of set value or $\pm 50V$, high and low leak current setting, timer function ensures highly accurate measurement.
- As the insulation resistance tester, this model is provided with two ranges of 500V/2000M Ω and 1000V/2000M Ω .
- Large green LED of high visibility is employed for the display of test voltage, current and test time.
- 9 memory is provided to write in and read out the test conditions regulated by the various standards or regulations.
- Relay contact can be output as the status output during the test.
- By means of remote/out connector, an output signal to show "waiting", "in-test" or "judgement" can be output in open collector, depending upon the status of the tester.
- This tester is also provided with the remote control connector and terminal blocks which allows remote start/stop of the test. With use of this function jointly with judgement result and output signals, it facilitates the automation and labour-saving.

1.1 ● Initial setting at the time of delivery

The tester has the following initial setting at the time of delivery from factory.

Function	Setting	Remarks
Key lock	OFF	For detail, please refer to the article 7.3 Key lock.
Double action	OFF	For detail, please refer to the article 12 Special test mode.
GOOD hold	OFF	
Momentary	OFF	
FAIL mode	OFF	

Memory (Common for No.1~No.9)

Test mode	Withstanding voltage test condition	Insulation resistance test condition
W-I	Test voltage range 2.5kV	Test voltage range 0.5kV
	Referential voltage 0.00kV (OFF)	High limit resistance value 2000M Ω
	High limit leak current 10.0mA	Low limit resistance value 10M Ω
	Low limit leak current 0.0mA (OFF)	Mask timer 0.3S
	Test time 60.0s	Test time 60.0s
		Discharge function ON

2. Confirmation prior to use

2.1 ●Unpacking

(1) Unpacking

When the tester is delivered, please check whether it has not been damaged in transit and unpack it carefully. If any damage or inconvenience is found, please consult the dealer whom you purchased the tester from for proper solution.

(2) Check of contents

Please do not leave in the carton any item of the contents listed below.

List of accessories:

High voltage cable 2m	1 pair
Earth wire 3m	1 piece
Power supply cord 2.5m	1 piece (with 3P→2P, E conversion adapter)
REMOTE/OUT plug	1 piece (36P)
Fuse 7A	1 piece
Instruction manual	1 copy
RS-232C interface instruction manual	1 copy

 **CAUTION**

RS-232C connector (D-sub 9 pins) Model 5881-11-018 (9 pins – 9 pins / 1.8m) for external communication is available at option. When a customer procures it, please use the inch pitch screw type.

2.2 ●Cautions for handling

Since the Model 8525 deals high voltage, it is designed paying special attention to safety. However, it is still dangerous as it outputs high voltage of max. 5kV. An erroneous handling may cause fatal accident. In order avoid any accident, please strictly observe the following cautions and take utmost care for safety.

- (1) Make sure to connect the protective grounding terminals (back panel) to the earth. If the grounding is insufficient, the tester housing is charged with high voltage when the output is short-circuited to the earth or the power source line, and is very dangerous. Please also check if the grounding cable is disconnected or not.

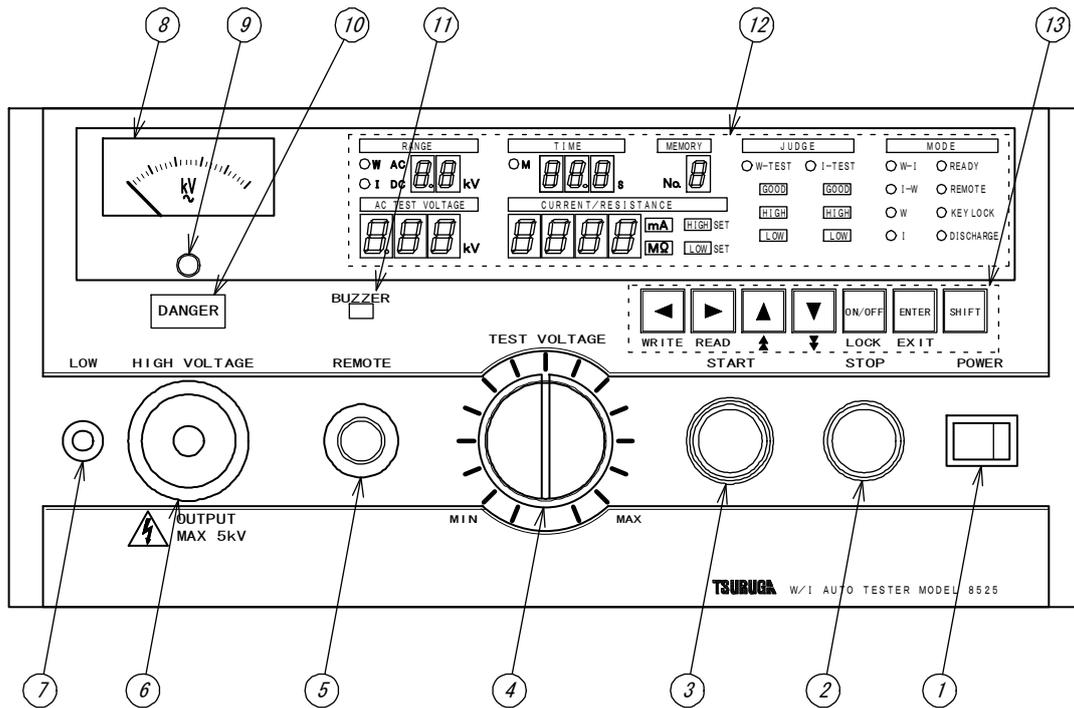
 **WARNING**

Insufficient grounding may cause the electric shock.

- (2) Never touch the output terminals, high voltage cable and test samples during the test.
(3) When making a connection to the test sample, connect the LOW side prior to the other, with the output OFF.
(4) When operating the Model 8525, put a rubber glove for prevention of electric shock.

3. Name of parts and functions

3.1 ●Front panel



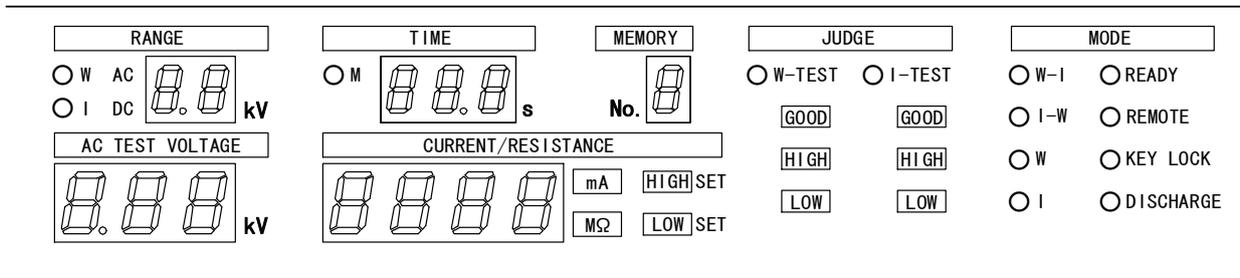
- ① **POWER** Power supply switch. Press right to turn ON and left to turn OFF.
- ② **STOP** Switch to interrupt the test operation and to reset a judgement.
- ③ **START** Switch to start the test.
This switch is disabled when the **REMOTE** connector ⑤ is used, or the remote operation is made through the **REMOTE** terminal blocks ② or the **REMOTE/OUT** connector ⑩.
- ④ **TEST VOLTAGE** Knob to adjust the voltage of withstanding voltage test.
- ⑤ **REMOTE** Connector for remote control.
- ⑥ **HIGH VOLTAGE** High voltage side terminal of the test voltage output.
It outputs high voltage during the test, so never touch it during the **DANGER** lamp ⑩ is lit up. The operator may suffer electric shock. It is common with **HIGH VOLTAGE** on the back panel.
- ⑦ **LOW** Low voltage side terminal of the test voltage output. It is of the same voltage as the case of this tester.
- ⑧ **Output voltmeter** Electrical instrument to indicate the output voltage value.
- ⑨ **Zero adjuster** Knob to adjust the zero position of the voltmeter for withstanding voltage tester. The adjustment is done when no power is applied.
- ⑩ **DANGER** lamp It gives warning during the test voltage is output.
Never touch the high voltage cable and test sample during the **DANGER** lamp ⑩ is lit up. The operator may suffer electric shock.

- ⑪ Buzzer hole Hole to let the buzzer sound be audible at the time of judgement.

⚠ WARNING

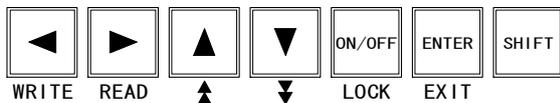
Do not put any thing in the buzzer hole or insert a screwdriver or else.

- It may cause electric shock if touched with metal piece.
- It may also cause trouble of breakdown or mal-function.



- ⑫ Display section Displays the information of test condition, test result and so on.
- READY lamp Lit up in READY status.
- REMOTE lamp Lit up when the remote control is done.
During this lamp is lit up, the **START** switch ③ is disabled.
- KEY LOCK lamp Lit up when the key lock function is turned ON.
During this lamp is lit up, the switches other than the **START** switch ③ and the **STOP** switch ② are disabled.
- DISCHARGE lamp Lit up when the status is READY and the discharge function is turned ON.
During the test it turns OFF, and after the insulation resistance test, it is lit up during the discharging.
- W-I lamp Lit up when the test mode moves W-test → I-test.
- I-W lamp Lit up when the test mode moves I-test → W-test.
- W lamp Lit up when the test mode is withstanding voltage test.
- I lamp Lit up when the test mode is insulation resistance test.
- Range display W AC Displays the voltage range of withstanding voltage test. (2.5kV or 5.0kV)
(RANGE) I DC Displays the voltage range of insulation resistance test. (0.5kV or 1.0kV)
- Voltage display of During the setting of referential voltage, it displays the set value, and during
Withstanding volt. test the test, it displays the output voltage value.
(AC TEST VOLTAGE)
- Current/resistance (1) During the setting of high and low leak current, it displays the set value
display of leak current, and during the test, it displays the measured value.
(CURRENT/
RESISTANCE) (2) During the setting of high and low resistance, it displays the set value
 of resistance, and during the test, it displays the measured value.
- mA** lamp Lit up during the withstanding voltage test to indicate that **the value displayed on the current/resistance display is leak current value.**
- MΩ** lamp Lit up during the insulation resistance test to indicate that **the value displayed on the current/resistance display is insulation resistance value.**

Test time display (TIME)	Displays the test time of each test (withstanding voltage and insulation resistance test). During the test it display the time remaining. When the test time is set to OFF, the time lapse is displayed during the test.
M lamp	Lit up during time of mask timer, in the insulation resistance test.
HIGH SET	(1) Lit up at the setting of high limit leak current, during the W-test. (2) Lit up at the setting of high limit resistance, during the I-test.
LOW SET	(1) Lit up at the setting of low limit leak current, during the W-test. (2) Lit up at the setting of low limit resistance, during the I-test.
GOOD	(1) W-test side: Lit up after the W-test when the test result is acceptable. (2) I-test side: Lit up after the I-test when the test result is acceptable.
HIGH	(1) W-test side: Lit up after the W-test when the test result is rejected for its high limit. (2) I-test side: Lit up after the I-test when the test result is rejected for its high limit.
LOW	(1) W-test side: Lit up after the W-test when the test result is rejected for its low limit. (2) I-test side: Lit up after the I-test when the test result is rejected for its low limit.
Memory No. display (MEMORY No.)	Displays memory number being set in the memory mode.
W-TEST lamp	Lit up when the W-test is started and turns off when the test is finished.
I-TEST lamp	Lit up when the I-test is started and turns off when the test is finished.



⑬ Setting keys

Keys to set the test condition such as referential voltage, leak current, test time etc. and to write in or read out the memory.

◀ key
WRITE

Key to feed and select each setting item toward left.
(When pressed together with SHIFT key, it becomes WRITE key used for writing the memory.)

▶ key
READ

Key to feed and select each setting item toward right.
(When pressed together with SHIFT key, it becomes READ key used for read-out of the memory.)

▲ key
▲

Key to increase the first digit of the set value one by one digit.
(When pressed together with SHIFT key, it becomes ▲ key used to increase the second digit of the set value one by one digit.
When kept pressed, the digit continuously increases.

▼ key
▼

Key to decrease the first digit of the set value one by one digit.
(When pressed together with SHIFT key, it becomes ▼ key used to decrease the second digit of the set value one by one digit.
When kept pressed, the digit continuously decreases.

ON/OFF key
LOCK

Key for selection to set or not to set each setting item.
(When pressed together with SHIFT key, it becomes LOCK key and is used to set/reset the key lock.)

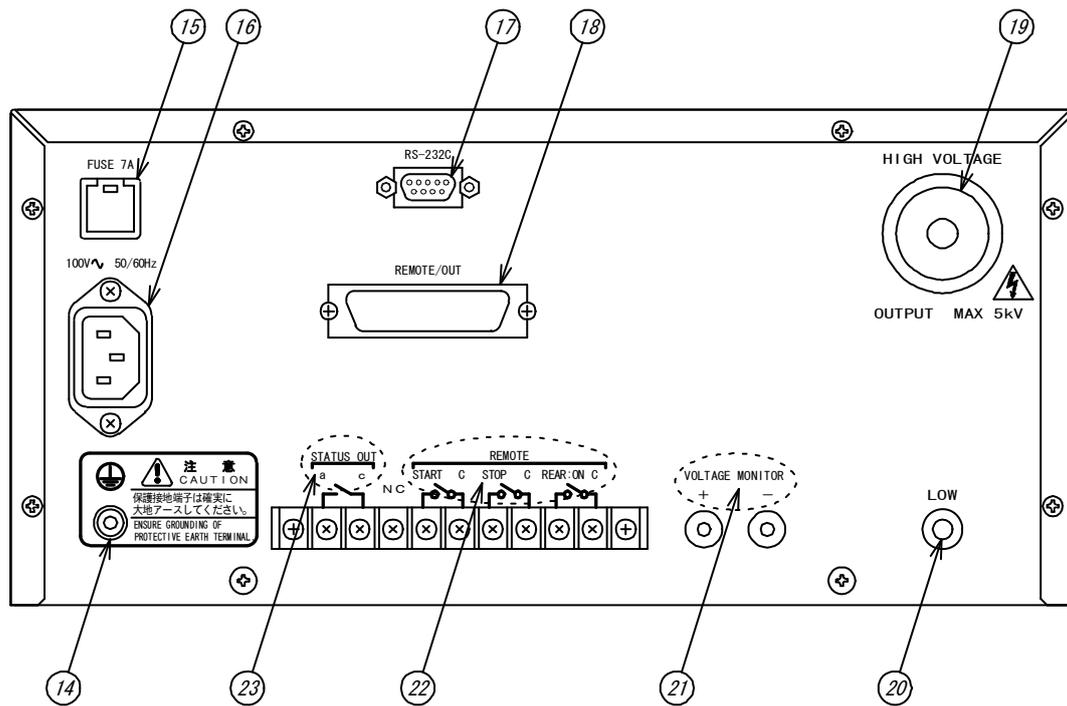
ENTER key
EXIT

Key to finish the setting of test condition or to decide in memory setting.
(When pressed together with SHIFT key, it becomes EXIT key used to interrupt the setting or memory mode and return to READY status.)

SHIFT key

Shift key to use together with one of other keys.
(The function indicated on each key in blue letters becomes effective.)

3.2 ●Rear panel



⑭ Protecting grounding terminal Terminal for grounding to the earth. Make sure to ground to the earth using the attached earth cable (green). It is the same voltage as the case of the tester.

⑮ **FUSE 7A** Fuse socket. The rate of fuse is as the following table shows.

Type	Power source voltage	Rate of fuse
Standard	100V AC	125V 7A
	115V AC	
Optional	200V AC	250V 4A
	220V AC	
	240V AC	

Do not use the fuse other than rated one.

⑯ **100V~50/60Hz** Inlet for connection of supply power source. It conforms to the attached power cord (3P).

⑰ **RS-232C** Connector for RS-232C serial communication (D-sub 9 pins). Refer to the instruction manual of interface.

⑱ **REMOTE/OUT** Connector for the setting inputs of interlock and to output the output signals. For detail, refer to the article 14.1 (P59).

⑲ **HIGH VOLTAGE** High voltage side terminal of test voltage output. It outputs high voltage during the test, so never touch it during the **DANGER** lamp ⑩ is lit up. The operator may suffer electric shock. It is common with **HIGH VOLTAGE** on the front panel.

⑳ **LOW** Low voltage side terminal of the test voltage output. It is of the same voltage as the case of this tester.

㉑ **VOLTAGE MONITOR** Monitor output of withstanding voltage output. Output voltage: 0~5V DC (to 0~5kV AC)

⑫ REMOTE

Terminal blocks for remote control.

START C

When the REAR:ON C terminal is in short-circuit, the test is started by short-circuiting the START C terminal.
When the REMOTE connector ⑤ is in use, START C terminal is disabled.

STOP C

By making the short-circuit between the terminals, the test action can be interrupted and the judgement result can be reset.

REAR:ON C

By making the short-circuit between the terminals, the start of the test becomes possible from the rear terminals. The START switch ③ on the front panel becomes ineffective.
For detail, refer to the article 13 (P55).

⑬ STATUS OUT

Terminal blocks for status output.
For detail, refer to the article 15 (P62).

4. Preparation prior to use

4.1 ● Zero adjustment of output voltmeter

Before powering ON the power source switch, please confirm that the pointer of the output voltmeter indicates “0”.
If it is deviated, make an adjustment turning the zero adjuster ⑨ with the screwdriver.

4.2 ● Connection of protective ground terminal

Make sure to connect the protective grounding terminals (back panel) to the earth. If the grounding is insufficient, the tester housing is charged with high voltage when the output is short-circuited to the earth or the power source line, and is very dangerous.
Please also check if the grounding cable is disconnected or not.

⚠ WARNING

Insufficient grounding may cause the electric shock.

4.3 ● Connection with external control device

An external control device can be connected to the **REMOTE** connector ⑤, **REMOTE** terminal ②, **REMOTE/OUT** connector ⑱ and **STATUS OUT** terminal ③.

For detail of connection, refer to the article 13~15 (P55~63).

4.4 ● Connection of high voltage cable

Choice of output section

Make a choice where to take out the high voltage output, either from the front panel or from the rear panel. During the test, the high voltage output terminal at both front and rear panel are charged with high voltage.

When the front panel is selected

Make a connection of the attached high voltage cable to the **HIGH VOLTAGE** terminal ⑥ and **LOW** terminal ⑦.

When the rear panel is selected

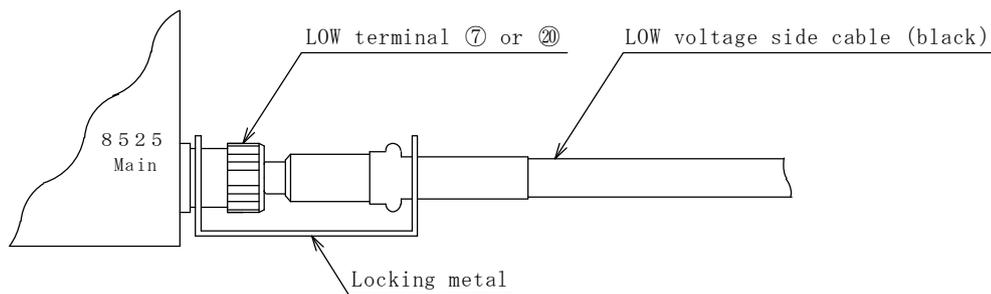
Make a connection of the attached high voltage cable to the **HIGH VOLTAGE** terminal ⑲ and **LOW** terminal ⑳.

Use the attached high voltage cable or the cable appropriate to the voltage to use.

⚠ WARNING

- | |
|--|
| <ul style="list-style-type: none">● Before making a connection of high voltage cable, ensure that the output is OFF and the output voltmeter ⑧ indicates “0”V.
There is a danger of electric shock.● A vinyl coating of alligator clip of the attached high voltage cable has no insulation withstandibility, so never touch it during the test.
There is a danger of electric shock.● Take out the high voltage output at either side, front or rear panel.
Never use the both sides together, as it is very dangerous. |
|--|

After connecting the low voltage side cable to the **LOW** terminal, make sure to fix the locking metal to the terminal.



Fasten the U-shape ditch side to the LOW terminal of the tester main unit.

⚠ WARNING

If the low voltage side cable is disconnected, whole the test sample is charged with high voltage and may cause a danger of an electric shock.

4.5 ● Connection of power supply cable

After confirming that the power supply switch **POWER** ① is OFF, connect the attached power source cord to the inlet for the supply source power on the rear panel. Connect the plug (3P) of power source cord to the socket with the earth connection.

⚠ WARNING

Confirm that the power source voltage is 100V AC, and use the tester within the range of 90V~110V AC. Use of the tester out of this range causes a breakdown or incomplete operation. In case of optional non-standard power source voltage, use the tester within $\pm 10\%$ of the nominal voltage.

4.6 ● Throw in and shut off of power source

Before turning ON the **POWER** switch ① and throw in the power, confirm that the **TEST VOLTAGE** knob ④ is completely turned anti-clockwise to the end. For shut off of the power supply, turn the **TEST VOLTAGE** knob ④ clockwise completely to the end, and after confirming the **DANGER** lamp ⑩ is turned off and the output voltmeter ⑧ indicates 0V, turn OFF the **POWER** switch ①.

⚠ WARNING

While the test voltage is output, do not turn OFF the **POWER switch ①, as it will cause the breakdown, excepting such emergency case that the voltage output can not decreased even though the **STOP** switch is pressed.**

The test conditions at the time of power shutdown are retained even if the power is turned OFF and the tester returns with these test conditions when the power is turned ON again.

4.7 ● Before the test

- (1) Before powering on the tester, carefully read the article 2.2 **Cautions for handling**.
- (2) For about 3 seconds after the power source switch is turned ON, whole the display segments are lit up (lamp test), and after the while lighting is finished, the tester enters into the test mode the last time when the power is turned OFF.

5. Setting items in each mode

5.1 ●READY status

When turned ON the **POWER** switch ①, all the display segments are lit up for about 3 seconds and then **READY** switch is lit up, entering into READY status.

In READY status of automatic test mode (W-I, I-W), the setting of test condition of the withstanding voltage test and insulation resistance test are alternatively displayed at the cycle of 2 seconds.

The test condition when the power was turned OFF last time is displayed.

Pressing the **START** switch ③ starts the test.

In READY mode, the setting of the following items can be done.

Items to set

Test condition	Refer to the article 7~9 (P16~34)
Key lock	Refer to the article 7.3 (P17)
Buzzer sounding	Refer to the article 17 (P65)
Status output	Refer to the article 15 (P62~63)
Special function	Refer to the article 12 (P54)
① Double action	
② GOOD hold	
③ Momentary	
④ FAIL mode	

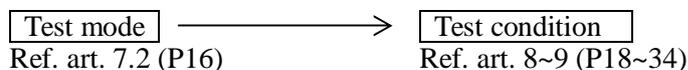
5.2 ●Setting mode of test condition

In READY status, by pressing the **▶** (or **◀**) key, **READY** is turned off and the tester enters into the test condition setting mode.

In the test condition setting mode, the test mode and condition can be set or changed.

A press of **ENTER** key finishes the setting and the tester becomes READY status.

Item to set



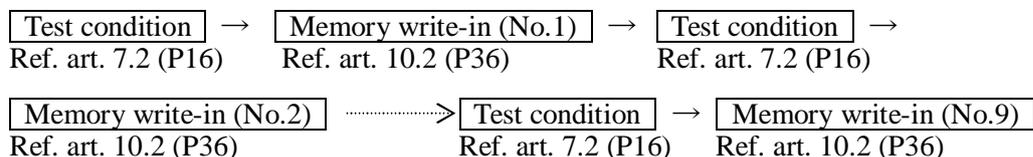
5.3 ●Memory write-in mode

After setting the test condition in the test condition setting mode, press the **WRITE** key (**SHIFT** + **◀**), then the memory number blinks, being ready to write in the memory.

In the memory write-in mode, 9 memory sets can be written. Each memory set consists of 4 items of test conditions which are set in the test condition setting mode.

A press of **ENTER** key finishes the setting and the tester becomes READY status.

Item to set



5.4 ●Memory read-out mode

In READY status, by pressing the **READ** key (**SHIFT** + **▶**), a memory No. blinks and the tester becomes ready to read out the memory. In the memory read out mode, one of the 9 memories written in [ref. art. 10.3 (P37)] can be called up and read out.

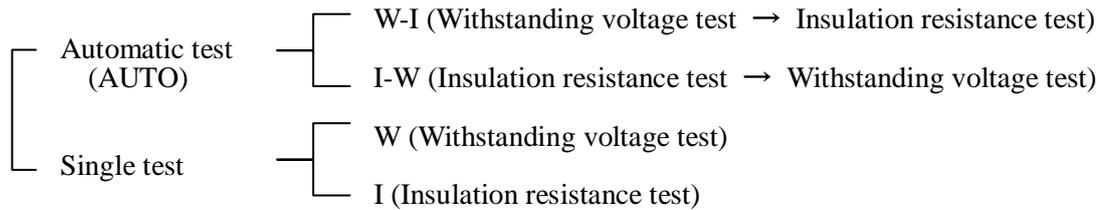
A press of **ENTER** key finishes the setting and the tester becomes READY status.

Item to set

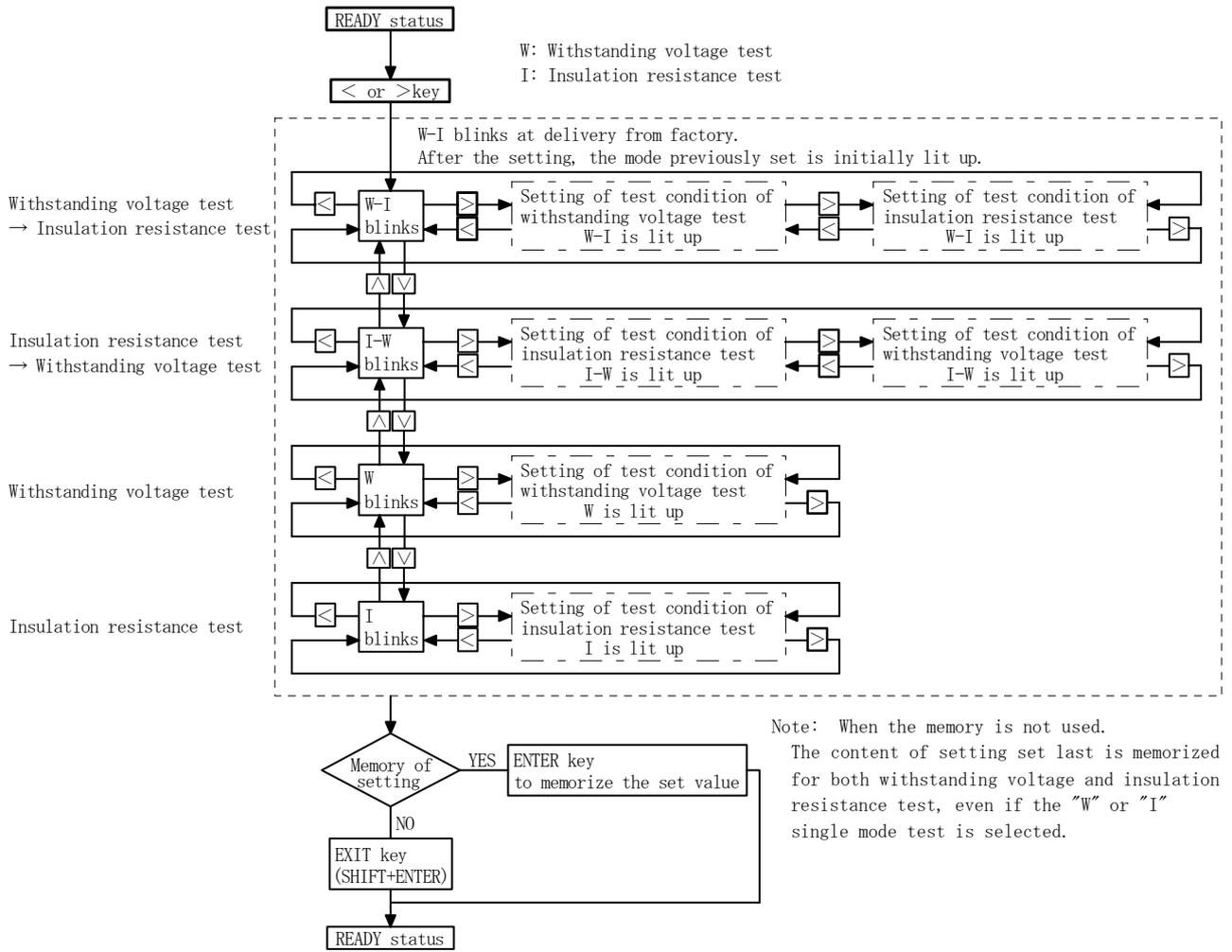
Memory read out (Select memory No.)	Ref. art. 10.3 (P37)
--	----------------------

6. Kind of test and flow of setting

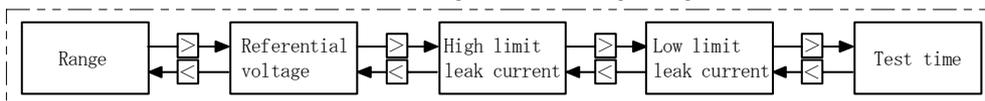
6.1 Kind of test



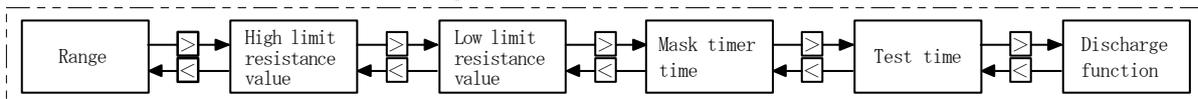
6.2 Flow of setting



Flow of setting for withstanding voltage test



Flow of setting for insulation resistance test



7. Setting of test item

7.1 ● Status of display and expression in instruction manual

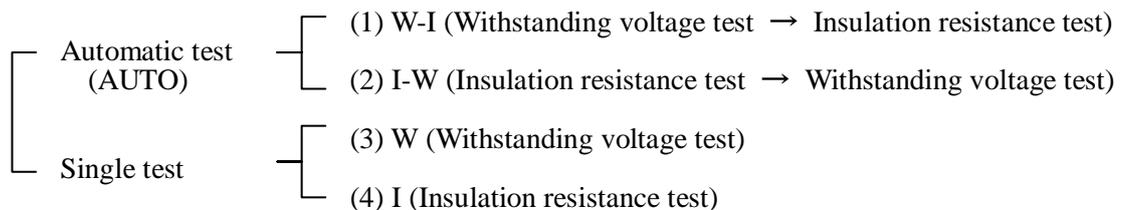
	Digital display	Flat display	LED lamp
Lit-up mode			● W-TEST
Blinking mode			◎ W-TEST
Turn-off mode			○ W-TEST

The above displays are expressed as follows in this instruction manual.

Display	Explanation	Example
Digital display	Lit up or blinking as above.	
Operation switch	Name surrounded by line + switch	
Set key	Name surrounded by line + key	
Flat display	Name surrounded by line	
LED lamp	Name + lamp	W-TEST lamp

7.2 ● Setting of each test item

The following 4 test modes can be set.



RANGE <input checked="" type="radio"/> W AC kV <input type="radio"/> I DC kV	TIME <input type="radio"/> M s	MEMORY No.	JUDGE <input type="radio"/> W-TEST <input type="radio"/> I-TEST <input type="radio"/> HIGH <input type="radio"/> LOW	MODE <input checked="" type="radio"/> W-I <input type="radio"/> READY <input type="radio"/> I-W <input type="radio"/> REMOTE <input type="radio"/> W <input type="radio"/> KEY LOCK <input type="radio"/> I <input checked="" type="radio"/> DISCHARGE
AC TEST VOLTAGE kV	CURRENT/RESISTANCE mA [HIGH] SET MΩ [LOW] SET			

① To enter the selection of test mode

In READY status, press or key, then the lamp of memorized test mode blinks. Test mode lamp moves up and down with or key. Select the required test mode lamp (make the lamp blinking). Press key to decide and the tester returns to READY status.

② To enter the setting mode of automatic test (AUTO)

From the condition ① above, press or key while W-I lamp (W-test → I-test) or I-W lamp (I-test → W-test) is blinking, then the tester enters the setting of condition of withstanding voltage or insulation resistance test.

③ To enter the withstanding voltage test (single test)

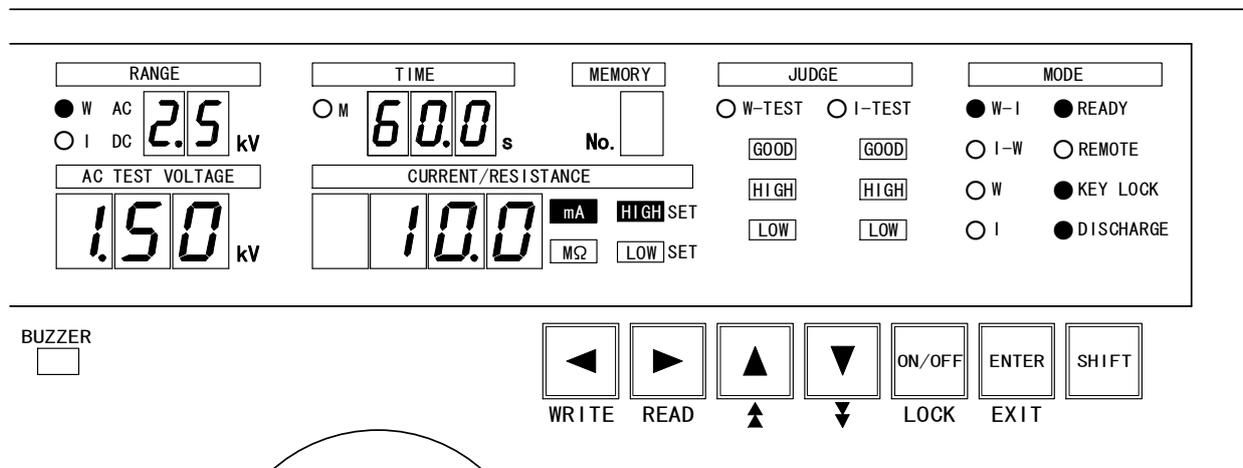
From the condition ① above, press or key while W lamp (W-test) is blinking, then the tester enters the setting of the condition of withstanding voltage test.

④ To enter the insulation resistance test (single test)

From the condition ① above, press or key while I lamp (I-test) is blinking, then the tester enters the setting of the condition of insulation resistance test.

7.3 ●Key lock

Key lock disables the operation by the switches other than **START** switch ③ and **STOP** switch ②. When remote controlled, the start is made through the remote control.



Setting procedure of key lock

- ① In READY status, keep pressing for 3 seconds or more the **LOCK** key (**SHIFT** and **ON/OFF** at a time). While pressing, KEY LOCK lamp blinks.
- ② KEY LOCK lamp is then lit up and the key lock function is set up.

Cancellation of key lock

- ① While KEY LOCK lamp is lit up, press again the **LOCK** key (**SHIFT** and **ON/OFF** at a time) for 3 seconds or more. For 3 seconds being pressed, KEY LOCK lamp blinks.
- ② KEY LOCK lamp is then turned off and the key lock function is cancelled.

8. Setting of test condition for withstanding voltage test

The test condition can be set when the test mode W-I, I-W or W is selected.

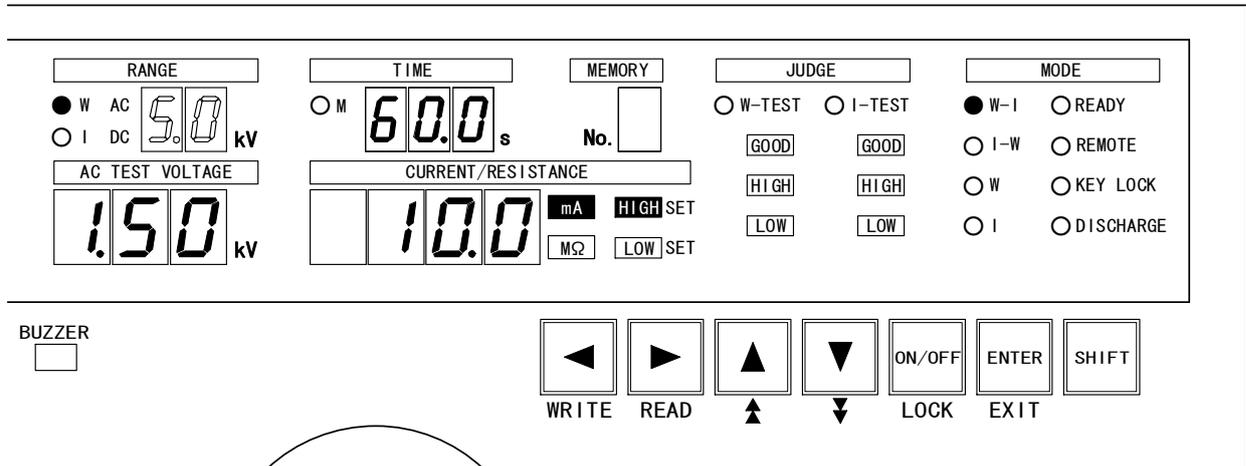
W-I is the automatic test mode of withstanding voltage test → insulation resistance test.

I-W is the automatic test mode of insulation resistance test → withstanding voltage test.

W is the single test mode of withstanding voltage test.

8.1 ● Test range of withstanding voltage test

Range to set: 2.5kV or 5kV



To enter setting mode

- In READY status, press or key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with or key. Make the required test mode lamp blinking (W-I, I-W or W lamp).
- Press or key and make the test mode lamp lit.

Setting of test voltage range

- During the setting mode, press or key and, select the lit up W AC lamp and blinking test voltage range (refer to the above figure).
- Switch the test voltage to 2.5kV or 5kV with or key. When the test voltage range is switched, the range display displays the switched voltage value in blinking. Press or key, then the voltage value changes from blinking to lit-up and moves to the next item of condition setting.

Interruption of setting

If the key (and at a time) is pressed while the display of test voltage range, referential voltage, current or test time is blinking, the test condition setting mode is interrupted and becomes to READY status.

The test mode then is the condition before entering the test condition setting mode.

To the next setting

Press key, then changes to the **setting of referential voltage**.

Note: If key is pressed, it changes to the setting below depending on the test item.

Test item	Setting item after movement
W-I (withstanding voltage test → insulation resistance test)	Returns to blinking of W-I test mode lamp.
I-W (insulation resistance test → withstanding voltage test)	Setting of discharge function of insulation resistance test.
W (withstanding voltage test) single test	Returns to blinking of W test mode lamp.

Finish of setting

Press key, then the setting is memorized and returns to READY status.

8.2 ● Referential voltage

Adjustable range: 0.00~5.00kV

This is the voltage to apply to the sample to be tested, and which is to be set according to the specifications of the test sample.

Once the referential voltage is set, the test is stopped unless the test voltage set by the **TEST VOLTAGE** knob ④ comes within the range of referential voltage (within $\pm 5\%$ of set value). [In case of 1000V or less, within $\pm 50V(\pm 5\text{digit})$]

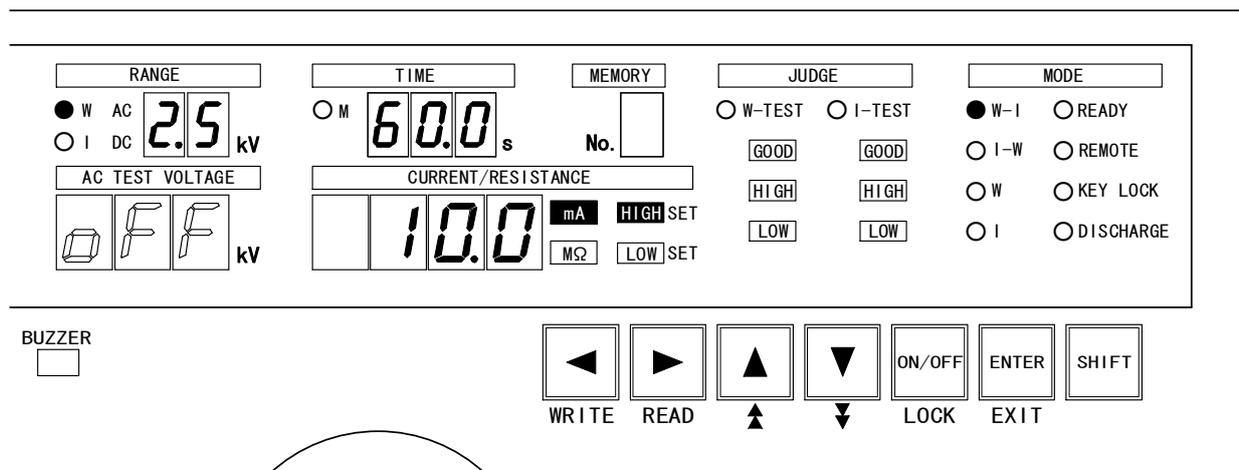
In case that the test voltage is lower than the range of referential voltage, the tester waits for 5 seconds, and when exceeded the range, it immediately stops the test.

On this occasion, the timer does not work and the W-TEST lamp blinks.

When the test voltage goes out of the range of referential voltage, the test is also stopped.

When the setting of referential voltage is not required, it can be turned OFF.

[When turning OFF the setting of referential voltage]



To enter setting mode

- ① In READY status, press **▶** or **◀** key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with **▲** or **▼** key. Make the required test mode lamp blinking (W-I, I-W or W lamp).
- ② Press **▶** or **◀** key and make the test mode lamp lit.

To turn OFF the setting of referential voltage

- ① During the setting mode, press **▶** or **◀** key.
- ② The test voltage display blinks and the setting of referential voltage is enabled.
- ③ If the setting of referential voltage is not required, press **ON/OFF** key and select the status that the display blinks with **OFF** (refer to the above figure).

Interruption of setting

If the **EXIT** key (**SHIFT** and **ENTER** at a time) is pressed while the display of test voltage range, referential voltage, current or test time is blinking, the test condition setting mode is interrupted and becomes to READY status.

The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press **◀** key, then changes to the **setting of the range of withstanding voltage test**.

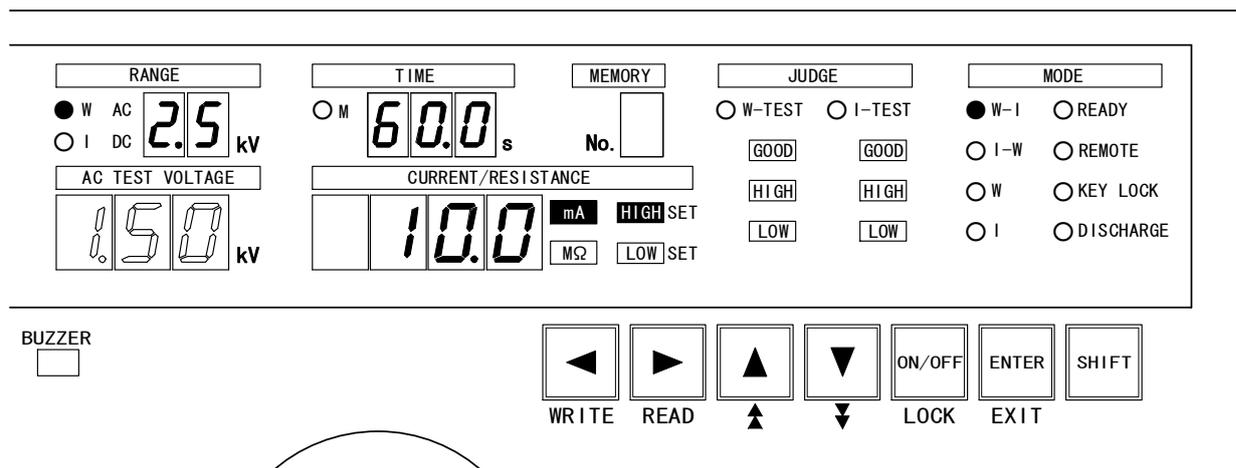
To the next setting

Press **▶** key, then changes to the **setting of high limit of leak current**.

Finish of setting

Press **ENTER** key, then the setting is memorized and returns to READY status.

[When setting the referential voltage]



To enter setting mode

- ① In READY status, press or key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with or key. Make the required test mode lamp blinking (W-I, I-W or W lamp).
- ② Press or key and make the test mode lamp lit.

Setting of referential voltage

- ① During the setting mode, press or key and select the blinking test voltage display.
 - ② When setting the referential voltage, press key and select the status that the display blinks with the numeral.
 - ③ While the numeral is in blinking, press or key and set the referential voltage.
Pressing of key (and keys at a time) or key (and keys at a time) allows the setting of second digit (the digit of 100V) (refer to the above figure).
- Note:** The referential voltage can be set within the range of 0.00~5.00kV.
Press key, then the setting is memorized and returns to READY status.

Interruption of setting

If the key (and at a time) is pressed while the display of test voltage range, referential voltage, current or test time is blinking, the test condition setting mode is interrupted and becomes to READY status.
The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press key, then changes to the **setting of the range of withstanding voltage test**.

To the next setting

Press key, then changes to the **setting of high limit of leak current**.

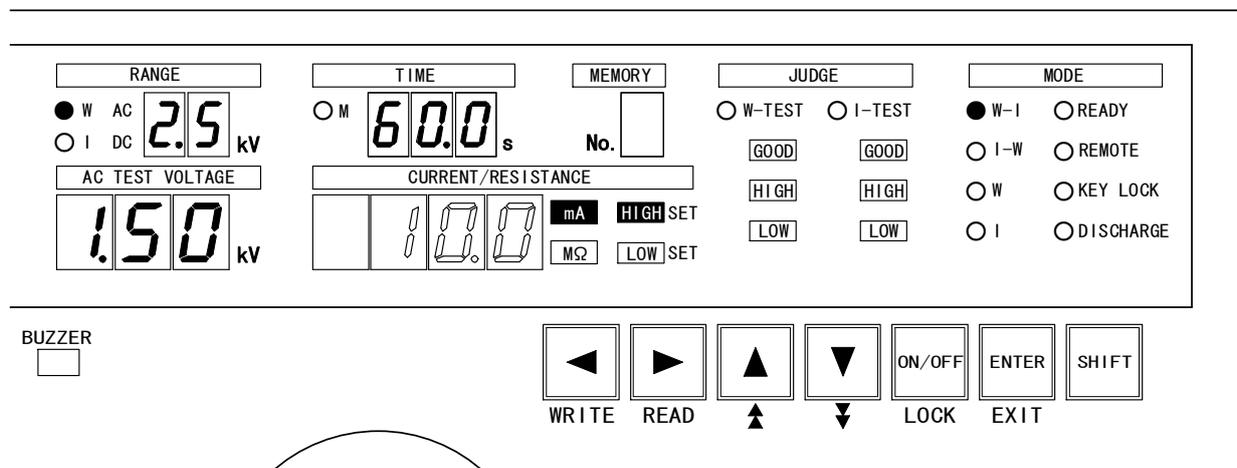
Finish of setting

Press key, then the setting is memorized and returns to READY status.

8.3 ● High limit of leak current

Adjustable range: 0.1~110.0mA, provided that it is higher than the low limit value.

Once the high limit of leak current is set, the test is stopped when the leak current of test sample exceeds the set value, lighting the JUDGE **HIGH** up and sounding the buzzer.



To enter setting mode

- ① In READY status, press **▶** or **◀** key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with **▲** or **▼** key. Make the required test mode lamp blinking (W-I, I-W or W lamp).
- ② Press **▶** or **◀** key and make the test mode lamp lit.

Setting of high limit of leak current

- ① During the setting mode, press **▶** or **◀** key.
- ② The current display blinks, **mA** is lit up and **HIGH SET** is also lit up, then the setting of high limit of leak current is allowed (refer to the above figure).
- ③ While the numeral is in blinking, press **▲** or **▼** key and set the high limit value of leak current.
- ④ Pressing of **▲** key (**SHIFT** and **▲** keys at a time) or **▼** key (**SHIFT** and **▼** keys at a time) allows the setting of second digit.

Note-1: The adjustable range is 0.1~110.0mA (resolution 0.1mA).

Note-2: The high limit value of leak current can not be lower than that of low limit, so please apply either corrective solution below:

1. When the low limit value is determined, set the high limit value to exceed the value of low limit.
2. When the high limit value is determined, set the low limit value not to exceed the value of high limit, or turn OFF the low limit.

Interruption of setting

If the **EXIT** key (**SHIFT** and **ENTER** at a time) is pressed while the display of test voltage range, referential voltage, current or test time is blinking, the test condition setting mode is interrupted and becomes to READY status.

The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press **◀** key, then changes to the **setting of referential voltage**.

To the next setting

Press **▶** key, then changes to the **setting of low limit of leak current**.

Finish of setting

Press **ENTER** key, then the setting is memorized and returns to READY status.

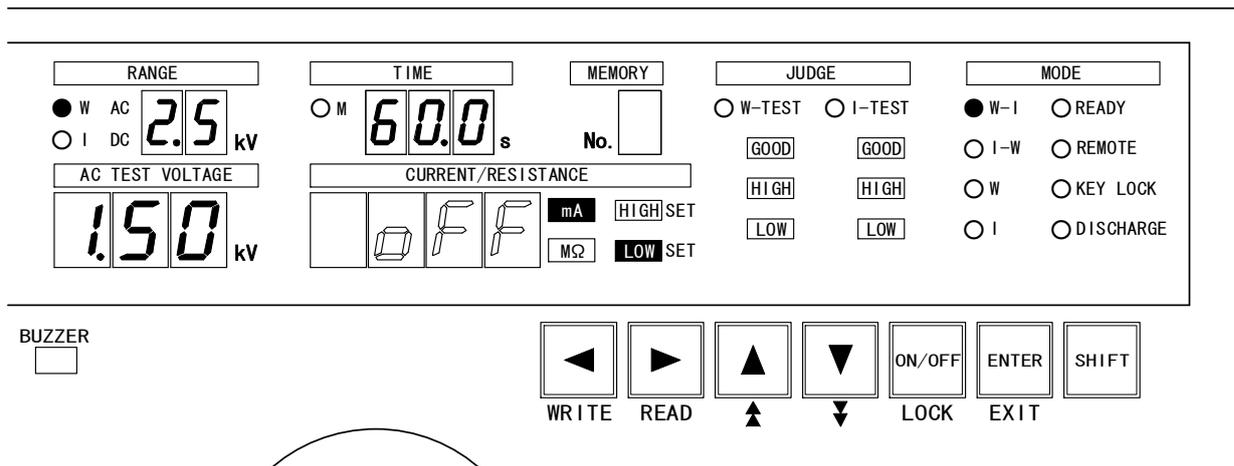
8.4 ● Low limit of leak current

Adjustable range: 0.0~109.0mA, provided that it is less than the high limit value.

Once the low limit of leak current is set, the test is stopped when the leak current of test sample is less than the set value, lighting the JUDGE **LOW** up and sounding the buzzer. When the low limit of leak current is set to the value lower than the lowest value of the variation of leak current, it facilitates to detect a disconnection, contact failure and etc. of the measuring leads.

When the setting of low limit of leak current is not required, it can be turned OFF.

[When turning OFF the setting of low limit of leak current]



To enter setting mode

- ① In READY status, press **▶** or **◀** key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with **▲** or **▼** key. Make the required test mode lamp blinking (W-I, I-W or W lamp).
- ② Press **▶** or **◀** key and make the test mode lamp lit.

To turn OFF the setting of low limit of leak current

- ① During the setting mode, press **▶** or **◀** key.
- ② The current display blinks, **mA** is lit up and **LOW SET** is also lit up, then the setting of low limit of leak current is allowed.
- ③ If the setting of low limit of leak current is not required, press **ON/OFF** key and select the status that the display blinks with **OFF** (refer to the above figure).

Note: When the setting is turned OFF, no judgement for the low limit is made.

When the setting is restored (ON) from **OFF**, and when the low limit value is higher than the high limit value, the low limit value is replaced with 0.0mA.

Interruption of setting

If the **EXIT** key (**SHIFT** and **ENTER** at a time) is pressed while the display of test voltage range, referential voltage, current or test time is blinking, the test condition setting mode is interrupted and becomes to READY status. The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press **◀** key, then changes to the **setting of high limit of leak current**.

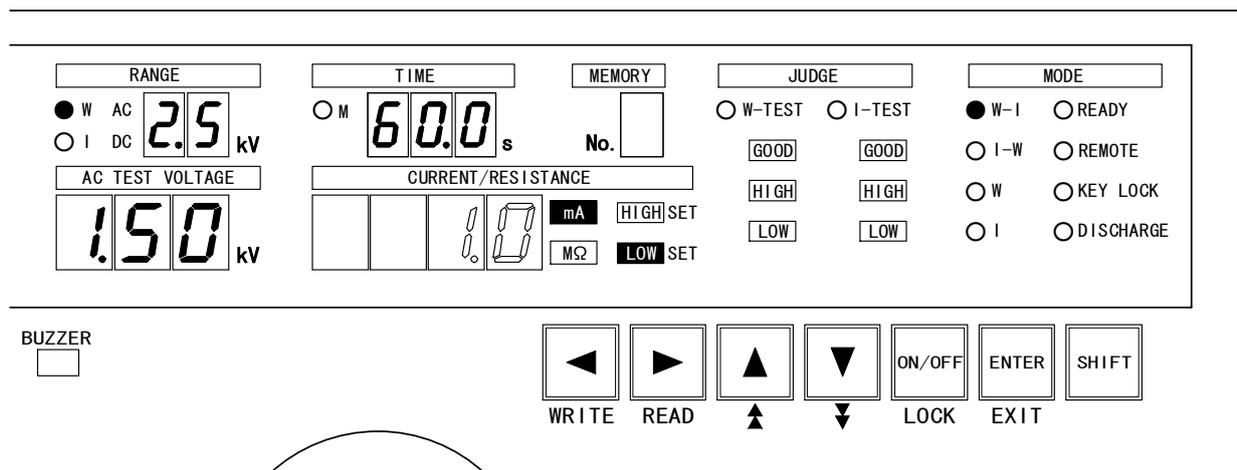
To the next setting

Press **▶** key, then changes to the **setting of test time**.

Finish of setting

Press **ENTER** key, then the setting is memorized and returns to READY status.

[When setting the low limit of leak current]



To enter setting mode

- ① In READY status, press or key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with or key. Make the required test mode lamp blinking (W-I, I-W or W lamp).
- ② Press or key and make the test mode lamp lit.

Setting of low limit of leak current

- ① During the setting mode, press or key.
- ② The current display blinks, is lit up and is also lit up, then the setting of low limit of leak current is allowed.
- ③ When setting the low limit of leak current, press key and select the status that the display blinks with the numeral (refer to the above figure).
- ④ While the numeral is in blinking, press or key and set the low limit value. Pressing of key (and keys at a time) or key (and keys at a time) allows the setting of second digit.

Note-1: The adjustable range is 0.1~109.0mA (resolution 0.1mA).

In relation with the high limit, the low limit can be set to 0.0mA, however, it makes no sense as the NG judgement is made with the leak current 0.0mA. When the low limit is not required, make the setting of it to "OFF".

Note-2: The low limit value of leak current can not be higher than that of high limit, so please apply either corrective solution below:

1. When the low limit value is determined, set the high limit value to exceed the value of low limit.
2. When the high limit value is determined, set the low limit value not to exceed the value of high limit.

Interruption of setting

If the key (and at a time) is pressed while the display of test voltage range, referential voltage, current or test time is blinking, the test condition setting mode is interrupted and becomes to READY status.

The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press key, then changes to the **setting of high limit of leak current**.

To the next setting

Press key, then changes to the **setting of test time**.

Finish of setting

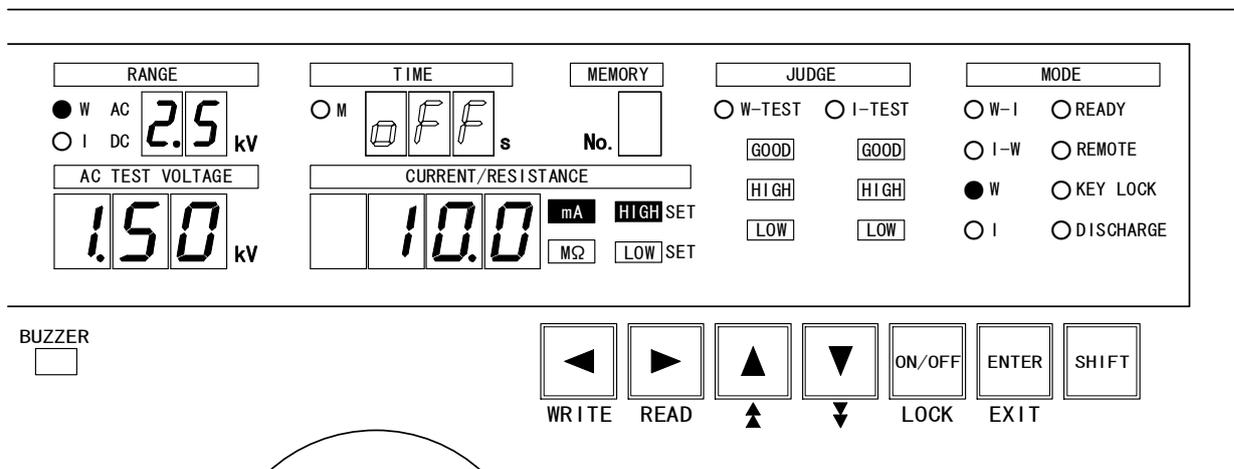
Press key, then the setting is memorized and returns to READY status.

8.5 ● Test time

Adjustable range: 0.5~999 s

The test time can be set to arbitrary value, or can be turned OFF.

[When turning OFF the setting of test time] ... Effective in W (withstanding voltage) single test



To enter setting mode

- ① In READY status, press or key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with or key. Make the W test mode lamp blinking.
- ② Press or key and make the test mode lamp lit.

To turn OFF the setting of test time

- ① During the setting mode, press or key.
- ② The test time display blinks, then the setting of test time is allowed.
- ③ If the setting of test time is not required, press key and select the status that the display blinks with OFF (refer to the above figure).

Note-1: In case that the test time is set to OFF, the test time display displays the time lapse from the start of test. However, when it exceeded the 999s, the display changes to , while the test is continued.

Note-2: To finish the test, press manually the switch ②.

Note-3: High voltage transformer of this tester is designed to about 1/2 of the rated output. When it is used with the leak current of 50mA or higher, limit the test time to maximum 30 minutes or less.

Interruption of setting

If the key (and at a time) is pressed while the display of test voltage range, referential voltage, current or test time is blinking, the test condition setting mode is interrupted and becomes to READY status.

The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press key, then changes to the **setting of low limit of leak current**.

Setting of test condition for withstanding voltage test

To the next setting

Press  key, then changes to the followings depending upon the test item.

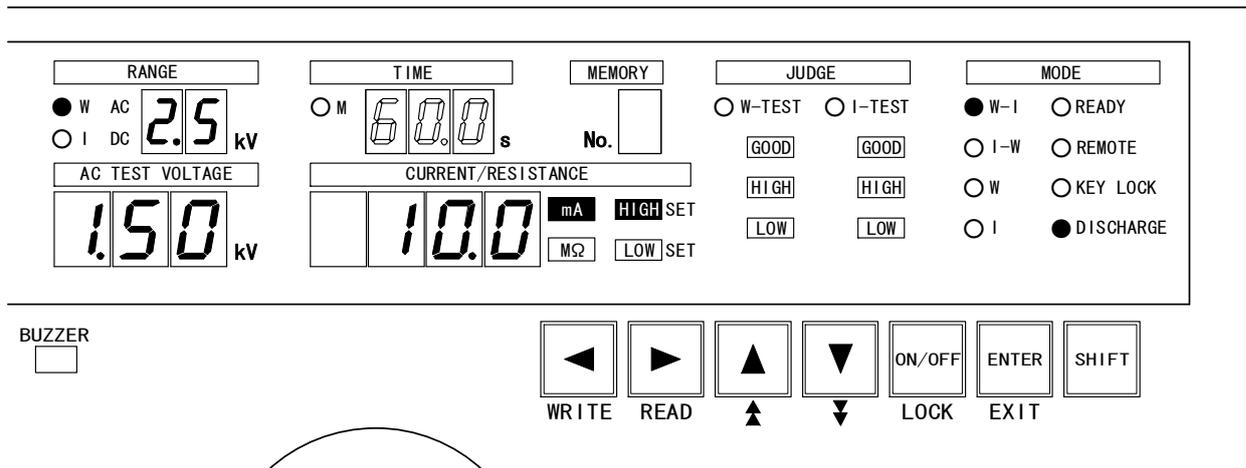
Test item	Setting item after movement
W-I (withstanding voltage test → insulation resistance test)	Setting of test voltage for insulation resistance test.
W (withstanding voltage test) single test	Returns to blinking of W test mode lamp.
I-W (insulation resistance test → withstanding voltage test)	Returns to blinking of I-W test mode lamp.

Finish of setting

Press the  key, then the setting is memorized and returns to READY status.

Note: After the test time is turned OFF and, when the test mode is changed to W-I or I-W auto mode and the  key is pressed, the test time display blinks with *OFF*. Turn ON the test time, set the time and press the  key.

[When setting the test time]



To enter setting mode

- ① In READY status, press or key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with or key. Make the required test mode lamp blinking (W-I, I-W or W lamp).
- ② Press or key and make the test mode lamp lit.

Setting of test time

- ① During the setting mode, press or key.
 - ② The test time display blinks, then the setting of test time is allowed.
 - ③ When setting the test time, press key and select the status that the display blinks with the numeral (refer to the above figure).
 - ④ While the numeral is in blinking, press or key and set the test time. Pressing of key (and keys at a time) or key (and keys at a time) allows the setting of second digit.
- Note:** The adjustable range is 0.5~999 seconds.
The resolution is 0.1s (0.5~99.9s) and 1s (100~999s).

Interruption of setting

If the key (and at a time) is pressed while the display of test voltage range, referential voltage, current or test time is blinking, the test condition setting mode is interrupted and becomes to READY status.
The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press key, then changes to the **setting of low limit of leak current**.

To the next setting

Press key, then changes to the followings depending upon the test item.

Test item	Setting item after movement
W-I (withstanding voltage test → insulation resistance test)	Setting of test voltage for insulation resistance test.
W (withstanding voltage test) single test	Returns to blinking of W test mode lamp.
I-W (insulation resistance test → withstanding voltage test)	Returns to blinking of I-W test mode lamp.

Finish of setting

Press the key, then the setting is memorized and returns to READY status.

9. Setting of test condition for insulation resistance test

The test condition can be set when the test mode W-I, I-W or I is selected.

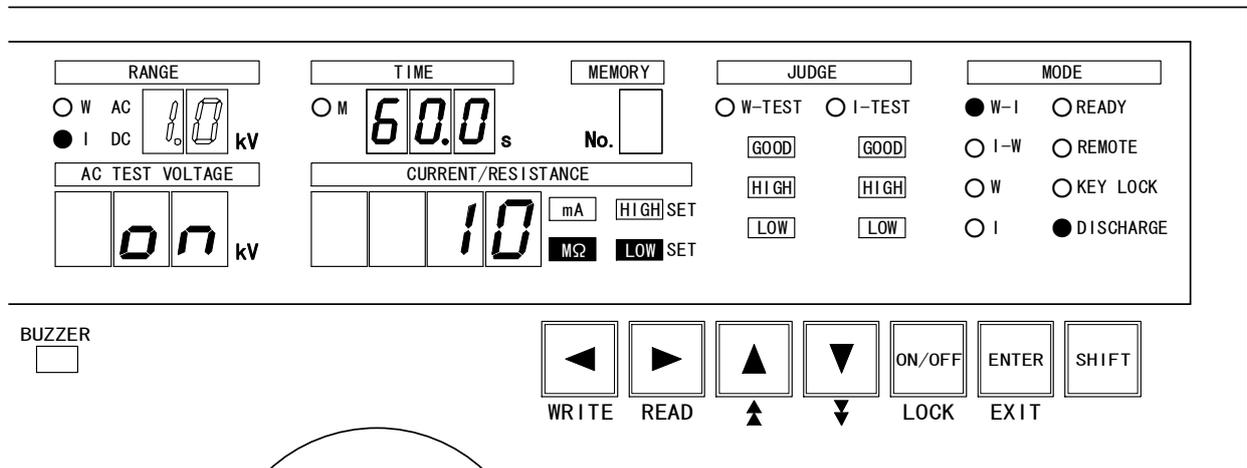
W-I is the automatic test mode of withstanding voltage test → insulation resistance test.

I-W is the automatic test mode of insulation resistance test → withstanding voltage test.

I is the single test mode of insulation resistance test.

9.1 ● Test range of insulation resistance test

Range to set: 1.0kV or 0.5kV



To enter setting mode

- In READY status, press or key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with or key. Make the required test mode lamp blinking (W-I, I-W or I lamp).
- Press or key and make the test mode lamp lit.

Setting of test voltage range

- During the setting mode, press or key and, select the lit up I DC lamp and blinking test voltage range (refer to the above figure).
- Switch the test voltage to 1.0kV or 0.5kV with or key. When the test voltage range is switched, the range display displays the switched voltage value in blinking. Press or key, then the voltage value changes from blinking to lit-up and moves to the next item of condition setting.

Interruption of setting

If the key (and at a time) is pressed while the display of test voltage range, high or low limit of resistance, mask timer time, test time or discharging function setting is blinking, the test condition setting mode is interrupted and becomes to READY status. The test mode then is the condition before entering the test condition setting mode.

To the next setting

Press key, then changes to the **setting of high limit of resistance value**.

Note: If key is pressed, it changes to the setting below depending on the test item.

Test item	Setting item after movement
W-I (withstanding voltage test → insulation resistance test)	Setting of test time of withstanding voltage test.
I-W (insulation resistance test → withstanding voltage test)	Returns to blinking of I-W test mode lamp.
I (insulation resistance test) single test	Returns to blinking of I test mode lamp.

Finish of setting

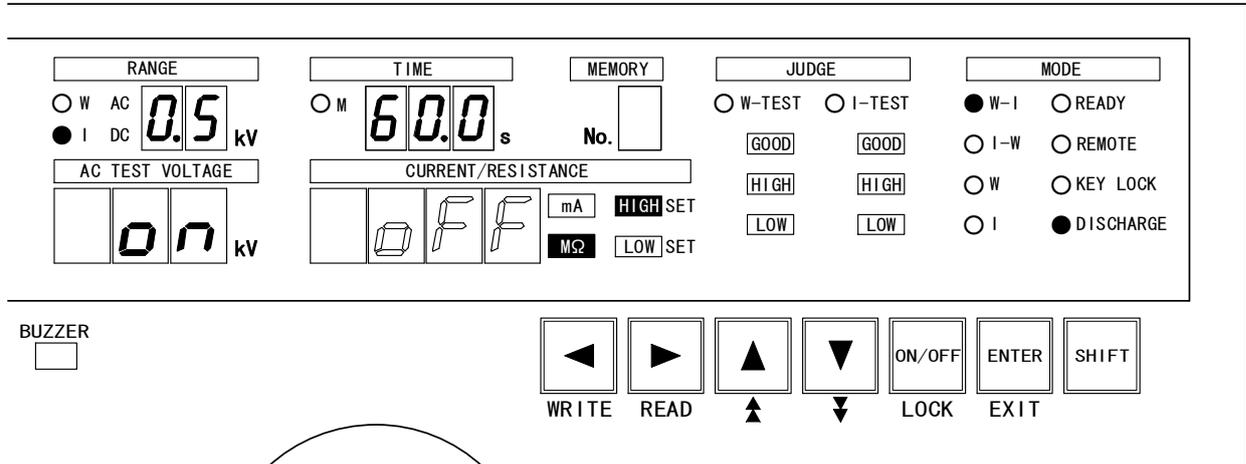
Press key, then the setting is memorized and returns to READY status.

9.2 ● High limit of resistance value

Adjustable range: 0.2MΩ ~2000MΩ

Once the high limit of resistance value is set, the test is stopped when the insulation resistance of test sample is higher than the set value, lighting the JUDGE **HIGH** up and sounding the buzzer.

[When turning OFF the setting of high limit of resistance value]



To enter setting mode

- ① In READY status, press **▶** or **◀** key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with **▲** or **▼** key. Make the required test mode lamp blinking (W-I, I-W or I lamp).
- ② Press **▶** or **◀** key and make the test mode lamp lit.

To turn OFF the setting of high limit of resistance value

- ① During the setting mode, press **▶** or **◀** key.
- ② The resistance value display blinks, **MΩ** is lit up and **HIGH**SET is also lit up, then the setting of high limit of resistance value is allowed.
- ③ If the setting of high limit of resistance value is not required, press **ON/OFF** key and select the status that the display blinks with **OFF** (refer to the above figure).

Note: When the setting is turned OFF, no judgement for the high limit is made. When the setting is restored (ON) from **OFF**, and when the high limit value is lower than the low limit value, the high limit value of resistance is replaced with 2000 MΩ.

Interruption of setting

If the **EXIT** key (**SHIFT** and **ENTER** at a time) is pressed while the display of test voltage range, high or low limit of resistance, mask timer time, test time or discharging function is blinking, the test condition setting mode is interrupted and becomes to READY status. The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press **◀** key, then changes to the **setting of test range of insulation resistance test**.

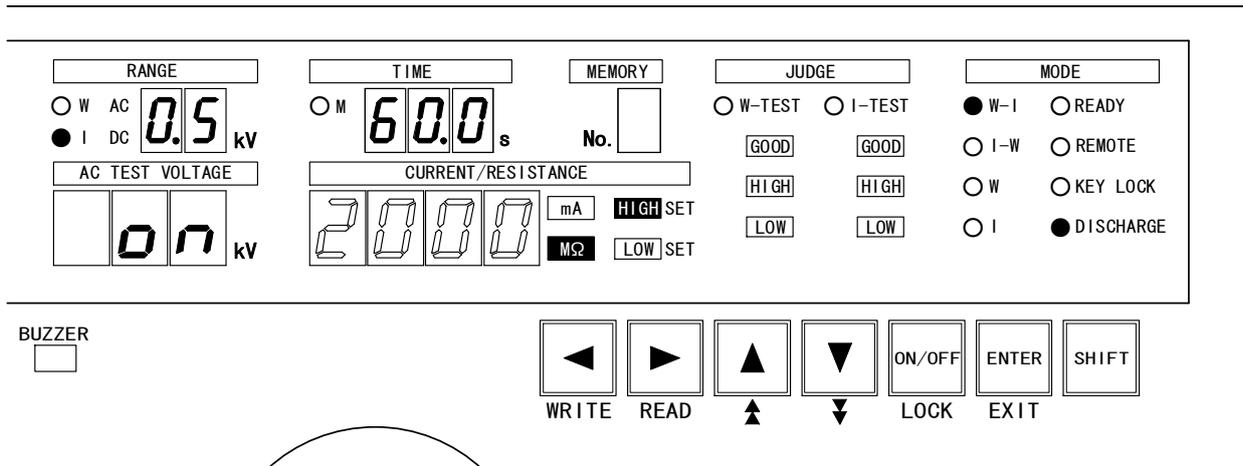
To the next setting

Press **▶** key, then changes to the **setting of low limit of resistance test**.

Finish of setting

Press **ENTER** key, then the setting is memorized and returns to READY status.

[When setting the high limit of resistance value]] ... Useful for detection of disconnection of test sample and so on



To enter setting mode

- ① In READY status, press **▶** or **◀** key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with **▲** or **▼** key. Make the required test mode lamp blinking (W-I, I-W or I lamp).
- ② Press **▶** or **◀** key and make the test mode lamp lit.

Setting of high limit of resistance value

- ① During the setting mode, press **▶** or **◀** key.
- ② The resistance value display blinks, **MΩ** is lit up and **HIGH SET** is also lit up, then the setting of high limit of resistance value is allowed.
- ③ When setting the high limit of resistance value, press **ON/OFF** key and select the status that the display blinks with the numeral (refer to the above figure).
- ④ While the numeral is in blinking, press **▲** or **▼** key and set the high limit value. Pressing of **▲** key (**SHIFT** and **▲** keys at a time) or **▼** key (**SHIFT** and **▼** keys at a time) allows the setting of second digit (1 MΩ digit).

Note-1: The adjustable range is 0.2~9.9MΩ (resolution 0.1MΩ) and 10~2000MΩ (resolution 1MΩ)

Note-2: The high limit of resistance value can not be lower than that of low limit, so please apply either corrective solution below:

1. When the low limit value is determined, set the high limit value to exceed the value of low limit, or turn OFF the setting.
2. When the high limit value is determined, set the low limit value not to exceed the value of high limit.

Interruption of setting

If the **EXIT** key (**SHIFT** and **ENTER** at a time) is pressed while the display of test voltage range, high or low limit of resistance, mask timer time, test time or discharging function is blinking, the test condition setting mode is interrupted and becomes to READY status. The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press **◀** key, then changes to the **setting of test range of insulation resistance test**.

To the next setting

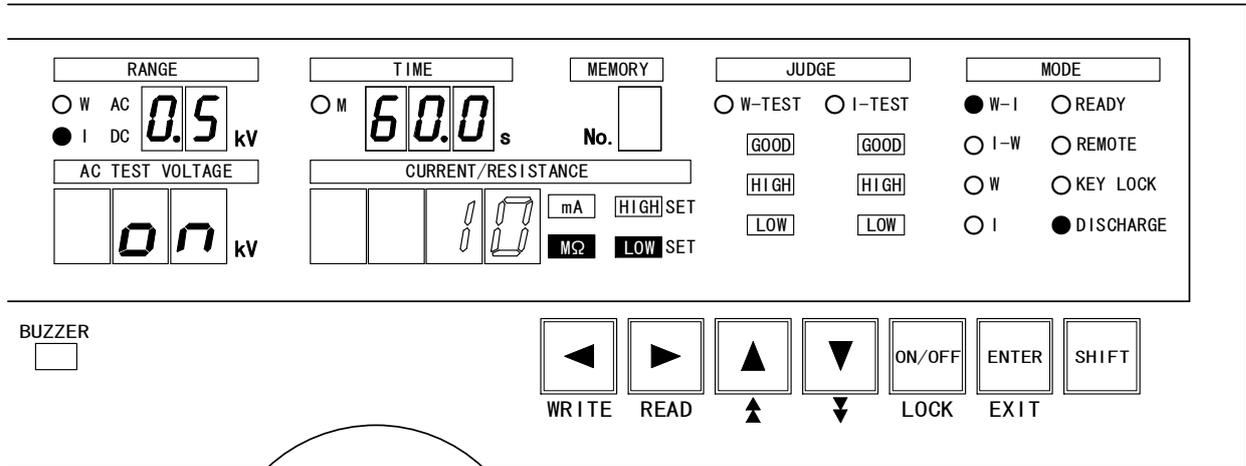
Press **▶** key, then changes to the **setting of low limit of resistance value**.

Finish of setting

Press **ENTER** key, then the setting is memorized and returns to READY status.

9.3 ● Low limit of resistance value

Adjustable range: 0.1MΩ~1999MΩ, provided that it is less than the high limit value. Once the low limit of resistance value is set, the test is stopped when the insulation resistance of test sample is lower than the set value, lighting the JUDGE **LOW** up and sounding the buzzer.



To enter setting mode

- ① In READY status, press **▶** or **◀** key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with **▲** or **▼** key. Make the required test mode lamp blinking (W-I, I-W or I lamp).
- ② Press **▶** or **◀** key and make the test mode lamp lit.

Setting of low limit of resistance value

- ① During the setting mode, press **▶** or **◀** key.
- ② The resistance value display blinks, **MΩ** is lit up and **LOW SET** is also lit up, then the setting of low limit of resistance value is allowed (refer to the above figure).
- ③ While the numeral is in blinking, press **▲** or **▼** key and set the low limit value.
- ④ Pressing of **▲** key (**SHIFT** and **▲** keys at a time) or **▼** key (**SHIFT** and **▼** keys at a time) allows the setting of second digit.

Note-1: The adjustable range is 0.1~9.9MΩ (resolution 0.1MΩ) and 10~1999MΩ (resolution 1MΩ)

Note-2: The low limit of resistance value can not be higher than that of high limit, so please apply either corrective solution below:

1. When the low limit value is determined, set the high limit value to exceed the value of low limit.
2. When the high limit value is determined, set the low limit value not to exceed the value of high limit.

Interruption of setting

If the **EXIT** key (**SHIFT** and **ENTER** at a time) is pressed while the display of test voltage range, high or low limit of resistance, mask timer time, test time or discharging function is blinking, the test condition setting mode is interrupted and becomes to READY status. The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press **◀** key, then changes to the **setting of high limit of resistance value**.

To the next setting

Press **▶** key, then changes to the **setting of mask timer time**.

Finish of setting

Press **ENTER** key, then the setting is memorized and returns to READY status.

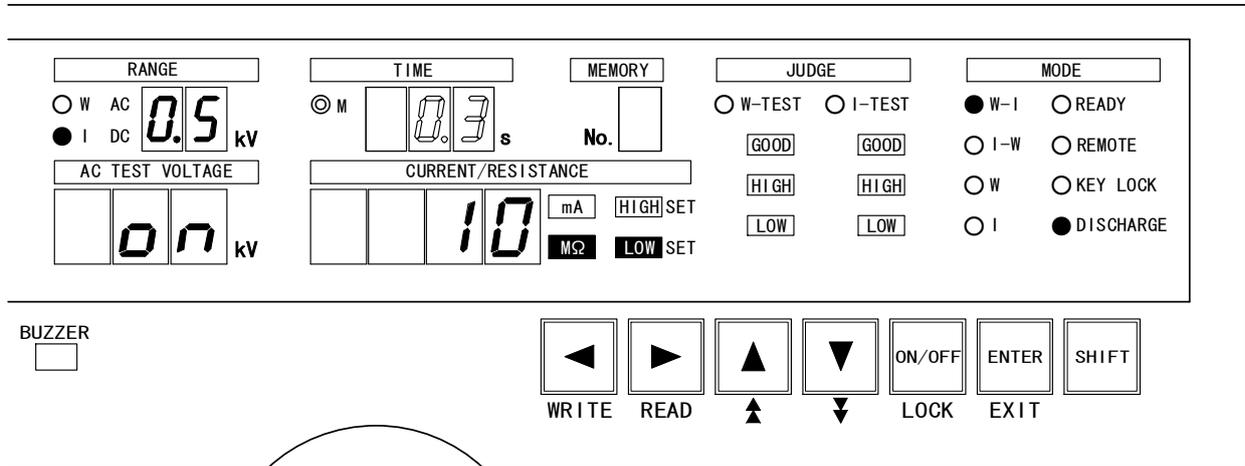
9.4 ● Time of mask timer

Adjustable range: 0.3~50.0s. Mask time can not be turned OFF.

Mask timer is the timer to prohibit the comparator action for a certain period of time.

During the mask timer is in operation, M lamp is lit up.

The timer is used when the waiting time is necessary for such a test sample as capacitor load having the delay time



To enter setting mode

- ① In READY status, press or key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with or key. Make the required test mode lamp blinking (W-I, I-W or I lamp).
- ② Press or key and make the test mode lamp lit.

To set the mask timer time

- ① During the setting mode, press or key.
- ② M lamp and the test time display blinks, allowing the setting of mask timer time.
- ③ When the mask timer time is set, press key and select the status that the display blinks with the numeral (refer to the above figure).
- ④ While the numeral is in blinking, press or key and set the low limit value. Pressing of key (and keys at a time) or key (and keys at a time) allows the setting of second digit (1s digit).

Note: It is not possible to set the mask timer time longer than the test time, so please apply either corrective solution below:

1. When the test time is determined, set the mask timer time to (set value of test time - 0.2s or less)
2. When the mask timer time is determined, set the test time to (mask timer time + 0.2s or more)

Interruption of setting

If the key (and at a time) is pressed while the display of test voltage range, high or low limit of resistance, mask timer time, test time or discharging function is blinking, the test condition setting mode is interrupted and becomes to READY status. The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press key, then changes to the **setting of low limit of resistance value.**

To the next setting

Press key, then changes to the **setting of test time.**

Finish of setting

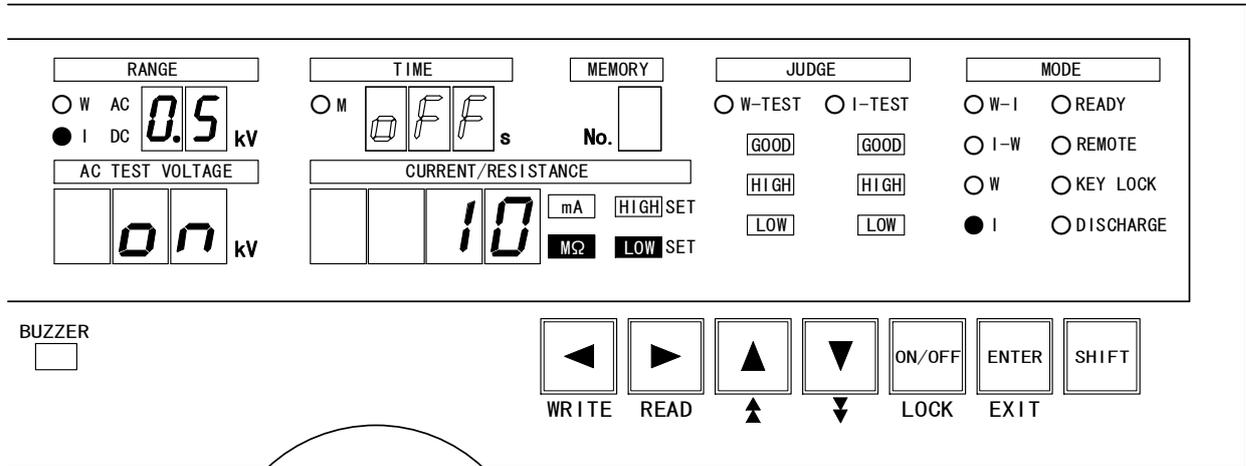
Press key, then the setting is memorized and returns to READY status.

9.5 ● Test time

Adjustable range: 0.5~999 s

The test time can be set to arbitrary value, or can be turned OFF.

[When turning OFF the setting of test time] ... Effective in I (insulation resistance) single test



To enter setting mode

- ① In READY status, press or key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with or key. Make the required test mode lamp blinking (W-I, I-W or I lamp).
- ② Press or key and make the test mode lamp lit.

To turn OFF the setting of test time

- ① During the setting mode, press or key.
- ② The test time display blinks, then the setting of test time is allowed.
- ③ If the setting of test time is not required, press key and select the status that the display blinks with OFF (refer to the above figure).

Note-1: In case that the test time is set to OFF, the test time display displays the time lapse from the start of test. However, when it exceeded the 999s, the display changes to [- - -], while the test is continued.

Note-2: To finish the test, press manually the switch ②.

Note-3: High voltage transformer of this tester is designed to about 1/2 of the rated output. When it is used with the leak current of 50mA or higher, limit the test time to maximum 30 minutes or less.

- ④ Press or key, then the numeral on the test time display changes from blinking to lit-up, finishing the setting of test time, and moves to the setting pf referential voltage or low limit of current. Also, if the key is pressed, the test condition setting mode is interrupted and becomes to READY status, lighting the READY lamp up.

Note: When restored (ON) from OFF, and if it is shorter than the mask timer time, the test time is replaced with 60.0s.

Interruption of setting

If the key (and at a time) is pressed while the display of test voltage range, high or low limit of resistance, mask timer time, test time or discharging function is blinking, the test condition setting mode is interrupted and becomes to READY status. The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press key, then changes to the **setting of mask timer time**.

To move to the previous setting

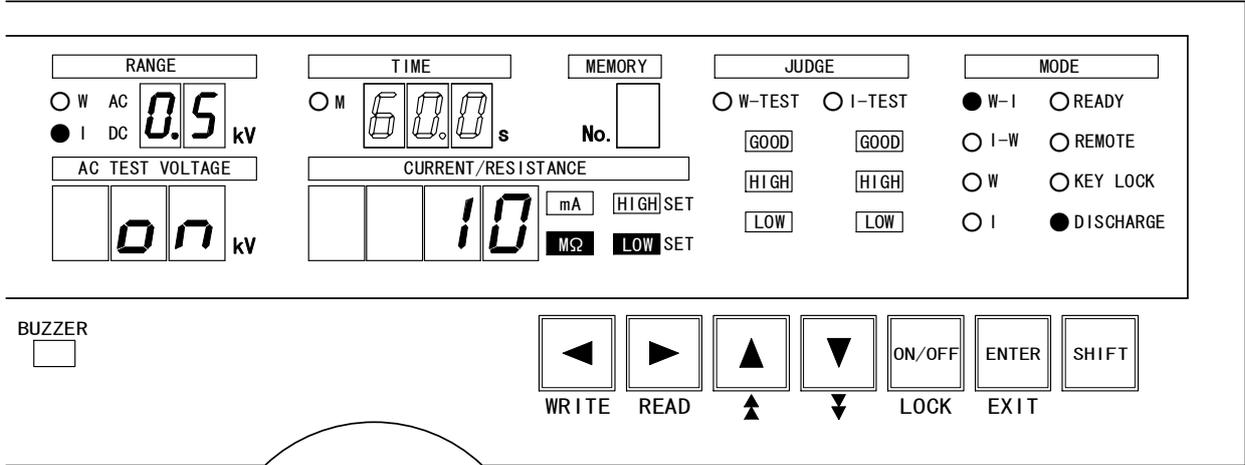
Press key, then changes to the **setting of discharging function**.

Finish of setting

Press **ENTER** key, then the setting is memorized and returns to READY status.

Note: After the test time is turned OFF and, when the test mode is changed to W-I or I-W auto mode and the **ENTER** key is pressed, the test time display blinks with **OFF**. Turn ON the test time, set the time and press the **ENTER** key.

[When setting the test time]



To enter setting mode

- ① In READY status, press **▶** or **◀** key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with **▲** or **▼** key. Make the required test mode lamp blinking (W-I, I-W or I lamp).
- ② Press **▶** or **◀** key and make the test mode lamp lit.

Setting of test time

- ① During the setting mode, press **▶** or **◀** key.
- ② The test time display blinks, then the setting of test time is allowed.
- ③ When the test time is set, press **ON/OFF** key and select the status that the display blinks with the numeral (refer to the above figure).
- ④ While the numeral is in blinking, press **▲** or **▼** key and set the test time. Pressing of **▲** key (**SHIFT** and **▲** keys at a time) or **▼** key (**SHIFT** and **▼** keys at a time) allows the setting of second digit (1s digit).
Note: The adjustable range is 0.5~999 seconds.
- ⑤ Press **▶** or **◀** key, then the numeral on the test time display changes from blinking to lit-up, finishing the setting of test time, and moves to the setting pf referential voltage or low limit of current.
 Also, if the **ENTER** key is pressed, the test condition setting mode is interrupted and becomes to READY status, lighting the READY lamp up.

Note: It is not possible to set the test time shorter than the mask timer time, so please apply either corrective solution below:

1. When the test time is determined, set the mask timer time to (set value of test time - 0.2s or less)
2. When the mask timer time is determined, set the test time to (mask timer time + 0.2s or more)

Interruption of setting

If the **EXIT** key (**SHIFT** and **ENTER** at a time) is pressed while the display of test voltage range, high or low limit of resistance, mask timer time, test time or discharging function is blinking, the test condition setting mode is interrupted and becomes to READY status. The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press **◀** key, then changes to the **setting of mask timer time**.

To move to the previous setting

Press **▶** key, then changes to the **setting of discharging function**.

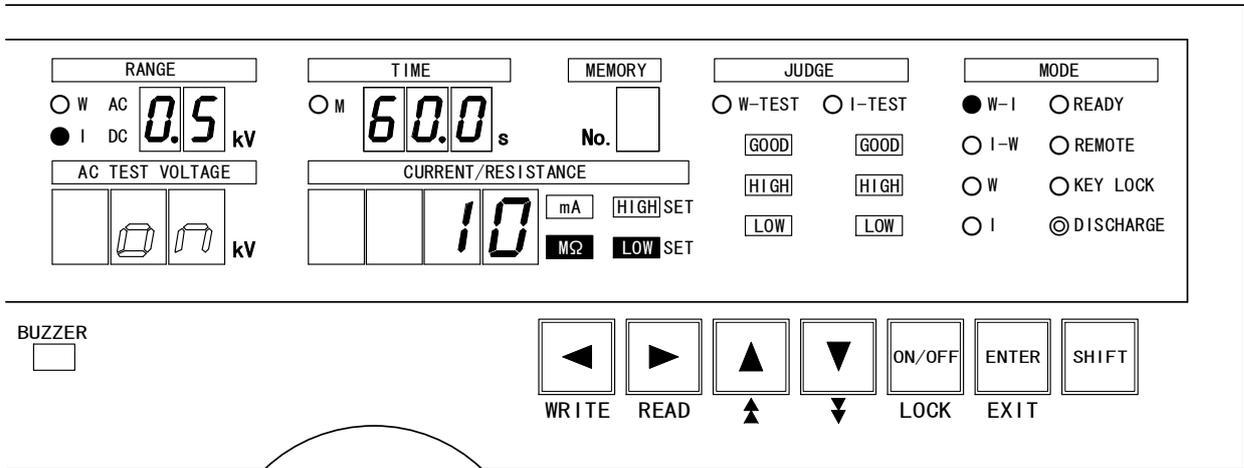
Finish of setting

Press **ENTER** key, then the setting is memorized and returns to READY status.

9.6 ● Discharging function

Setting: ON or OFF

This function allows to discharge the electricity charged in the test sample.



To enter setting mode

- ① In READY status, press or key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with or key. Make the required test mode lamp blinking (W-I, I-W or I lamp).
- ② Press or key and make the test mode lamp lit.

To set the discharging function

- ① During the setting mode, press or key.
- ② The test time display blinks with *on* or *off* and DISCHARGE lamp also blinks, then the setting of discharging function is allowed.
- ③ When the test time is set, press key and select the status that the display blinks with *on* (refer to the above figure).
- ④ When the discharging function is not required, press key and select the status that the display blinks with *off*.

Interruption of setting

If the key (and at a time) is pressed while the display of test voltage range, high or low limit of resistance, mask timer time, test time or discharging function is blinking, the test condition setting mode is interrupted and becomes to READY status. The test mode then is the condition before entering the test condition setting mode.

To move to the previous setting

Press key, then changes to the **setting of test time**.

To the next setting

Press key, then changes to the setting below depending on the test item.

Test item	Setting item after movement
W-I (withstanding voltage test → insulation resistance test)	Returns to blinking of W-I test mode lamp.
I (insulation resistance test) single test	Returns to blinking of I test mode lamp.
I-W (insulation resistance test → withstanding voltage test)	Setting of test range of withstanding voltage test.

Finish of setting

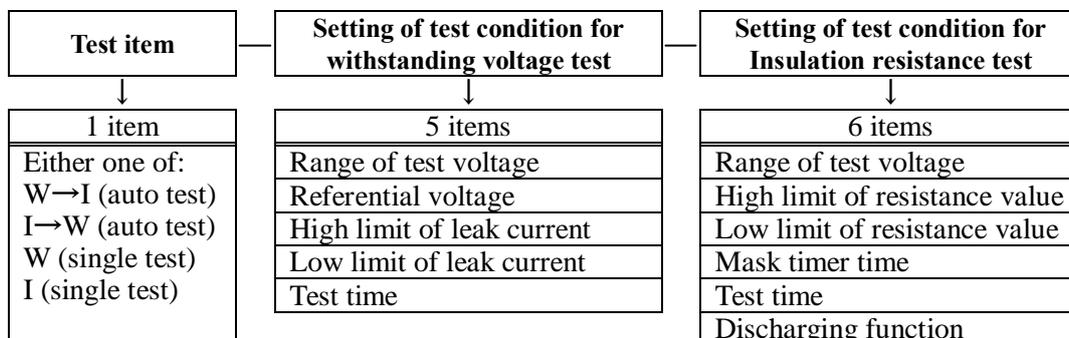
Press key, then the setting is memorized and returns to READY status.

10. Memory function

This tester is provided with 9 program memories to memorize the setting of test items and test condition of withstanding voltage and insulation resistance test.

10.1 ● Configuration of memory

The items which can be memorized.



W: Withstanding voltage test

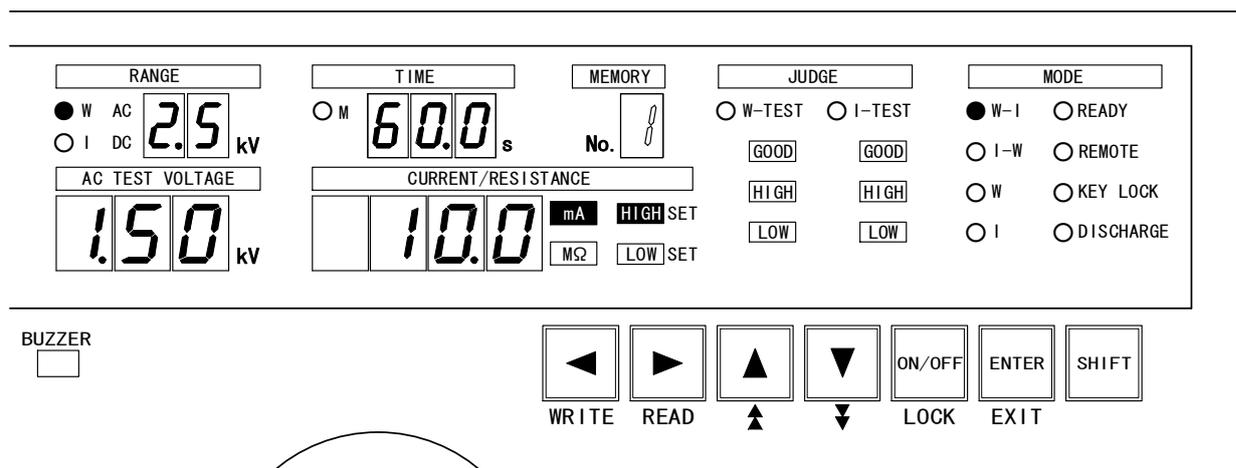
I : Insulation resistance test

Setting example of memory setting

Memory No.	Test item	Test condition of W test	Test condition of I test
1	W→I	5 items	6 items
2	I→W	5 items	6 items
3	I	-----	6 items
4	W	5 items	-----
5	I→W	5 items	6 items
6	W→I	5 items	6 items
7	I	-----	6 items
8	W	5 items	-----
9	W→I	5 items	6 items

Note: The content of memory memorized in the auto test is retained for the part marked with -----, so, when the mode is changed from single test to auto test and the memory content is set, the original content of the memory is set.

10.2 ● Memory write-in

**Procedure of memory write-in**

- ① Make the setting of test items and condition required to be written in the memory, and make the tester READY status (ref. article 7~9).
- ② Press [WRITE] key ([SHIFT] and [◀] at a time), then the numeral on the memory No. display blinks, entering into the memory write-in mode.
- ③ Select the memory No. to write in with [▲] or [▼] key.
- ④ Press [ENTER] key and the memory No. changes from blinking to lit-up, writing in the memory. The tester then returns to READY status, with READY lamp lit up.
Note-1: The data is over-written, so the previous data is deleted and the new data becomes effective.
Note-2: When the double action is set, READY lamp blinks in READY mode.
- ⑤ Repeat the procedure ① to ④ to write the test condition in each memory No. Up to max. 9 memories can be written in.

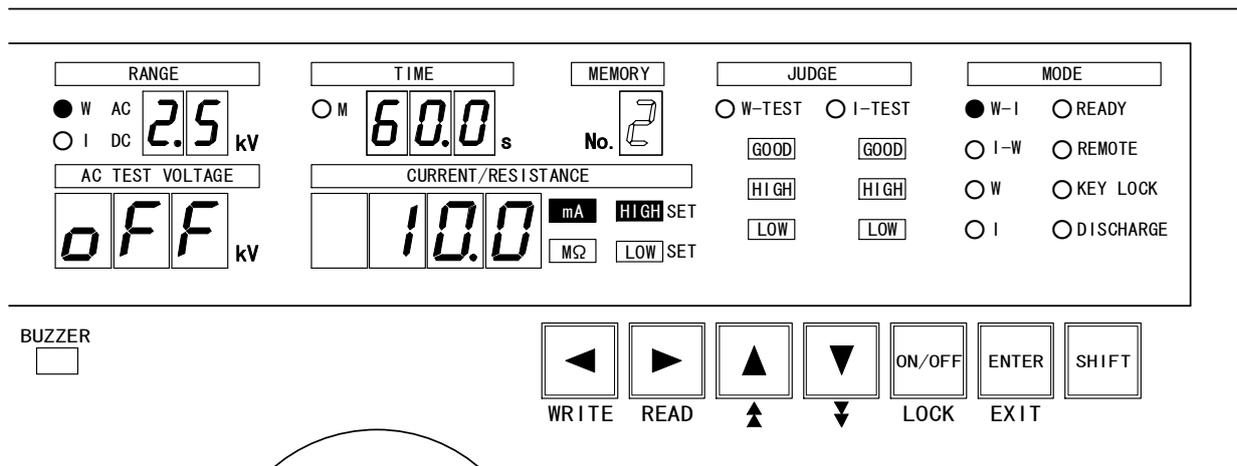
Interruption of memory write-in mode

- ① While the memory No. is blinking, press the [EXIT] key ([SHIFT] and [ENTER] at a time), then the memory write-in mode is interrupted and becomes READY status. The test condition then is the condition before entering the memory write-in mode.
Note: When the write-in of the data is to be stopped and to return to READY status, the [EXIT] key is used.
- ② When the test condition is changed while the memory No. is lit up and the [ENTER] key is pressed, the memory No. turns off and becomes READY status. On this occasion, the content of setting of the original memory is protected.

Note: At the time of delivery from factory, the following data are written in for all the memory No.1~9. When the tester is powered on pressing the [ENTER] key and [SHIFT] key at a time, the settings are reset to the initial ones at the time of delivery from factory.

Test mode	Withstanding voltage test Test condition	Insulation resistance test Test condition
W-I	Test voltage range 2.5kV	Test voltage range 0.5kV
	Referential voltage 0.00kV(OFF)	High limit resistance value 2000MΩ (OFF)
	High limit leak current 10.0mA	Low limit resistance value 10MΩ
	Low limit leak current 0.0mA(OFF)	Mask timer time 0.3s
	Test time 60.0s	Test time 60.0s
	-----	Discharging function ON

10.3 ● Memory read-out



Procedure of memory read-out

- ① In READY status, press **READ** key (**SHIFT** and **▶** key at a time).
- ② The numeral of memory No. display blinks, entering into the memory read-out mode. Each display displays the content of the setting of the memory No. in blinking.
- ③ Select the memory No. to read out with **▲** or **▼** key. (Refer to the above figure.)
- ④ Press **ENTER** key and the memory No. changes from blinking to lit-up, making its content effective, then the tester returns to READY status, with READY lamp lit up. During the test, the memory No. read out on the memory No. display is displayed.
Note: When the double action is set, READY lamp blinks in READY mode.
- ⑤ To change it to one of other memory No., repeat the procedures ① to ④.

Interruption of memory read-out mode

- ① While the memory No. is blinking, press the **EXIT** key (**SHIFT** and **ENTER** at a time), then the memory read-out mode is interrupted and becomes READY status. The test condition then is the condition before entering the memory read-out mode.
Note: When the read-out of the data is to be stopped and to return to READY status, the **EXIT** key is used.
- ② When the test condition of the read out memory is changed and the **ENTER** key is pressed, this memory No. turns off but the content of setting is protected. In order to memorize the modified content of the setting, write it in a new memory No.

11. Test procedure (from start to judgement result)

It is possible to make the test result NG in case that the test voltage of withstanding voltage becomes out of the planned range. For that purpose, it is possible to set the test voltage in advance.

Although it is mentioned in the article 8.2 **Referential voltage**, the explanation is repeated as follows. If the setting of referential voltage is not required, it can be OFF.

11.1 ● Setting of test voltage for withstanding voltage test (before starting test)

Confirmation of adjustment knob at 0V position

- ① Confirm that the **TEST VOLTAGE** knob ④ is turned anti-clock-wise completely to the end.
- ② Also confirm that the READY lamp is lit (blinking when the double action is set) and the tester is in READY mode, that the **DANGER** lamp ⑩ is turned off and that the output voltmeter ⑧ indicates 0kV.
- ③ In READY status, press **▶** or **◀** key, then the memorized test mode lamp blinks. Test mode lamp moves up and down with **▲** or **▼** key. Make the W lamp blinking, the single withstanding voltage test. Then, the pressing of **▶** or **◀** allows to enter the setting of test condition of withstanding voltage test.
- ④ Confirm the test voltage range on the range display.

Set the adjustment knob to the test voltage

- ① Leaving as it is the referential voltage set as per the article 8.2 **Referential voltage**, make the test voltage display (AC TEST VOLTAGE) **OFF**, and pressing the **ENTER** key, make the READY mode.
- ② Press **START** switch ③ and generate the test voltage. On this occasion, the **DANGER** lamp ⑩ is lit up. Never touch **HIGH VOLTAGE** ⑥⑱, **LOW** ⑦⑳ and **VOLTAGE MONITOR** ㉑. It may cause the electric shock.
- ③ Looking at the analog output voltmeter ⑧ or the test voltage display (AC TEST VOLTAGE), set the test voltage, gradually turning the **TEST VOLTAGE** knob ④ clock-wise.
- ④ Press **STOP** switch ② and shut down the output voltage.
- ⑤ Restore with **ON/OFF** key the referential voltage value turned OFF at ①.
- ⑥ Set the test condition to the test mode corresponding to the test sample.
- ⑦ In order to do the auto test, restore the timer setting with **ON/OFF** key. When the setting of test voltage is finished, press **STOP** switch ②.

**⚠ CAUTION
HIGH VOLTAGE
GENERATED**

⚠ WARNING

**If the test range of withstanding voltage test is switched from 2.5kV to 5kV, leaving the test voltage knob at the position set at the range 2.5kV, the test voltage is doubled when output.
When making a change of test range of withstanding voltage test, or reading out a memory, please always do it turning the knob anti-clock-wise to the end.**

**Connection
procedure**

Confirmation of safety

- ① Confirm that the analog output voltmeter ⑧ indicates 0V.
- ② Confirm that the **DANGER** lamp ⑩ is turned off
- ③ Confirm that the READY lamp is lit up.

Start of connection

- ① Connect the LOW side test lead to **LOW** ⑦ (or ⑳) of 8525 main unit.
- ② Connect the high voltage side test lead to **HIGH VOLTAGE** ⑥ (or ⑱) of 8525.
- ③ Making a short-circuit between the clips of LOW and high voltage side test leads, check that the high voltage is not applied to the output terminal.
- ④ Connection the clip of LOW side test lead to the test sample.
- ⑤ Connection the clip of high voltage side test lead to the test sample.

※Caution When the test voltage is out of the range of referential voltage

- ① Press **START** switch ③, then the W-TEST and the **DANGER** lamp ⑩ are lit up, starting the test with the preset test condition.
- ② When the test condition is called from the memory, the test is carried out on the condition of this memory, and its memory number is displayed on the memory No. display.

Note: In case that the referential voltage of the withstanding voltage test is set, the test is stopped unless the test voltage comes within the range of referential voltage (within $\pm 5\%$ of set value). (In case of 1000V or less, within $\pm 50V$)

[Judgement output when the voltage is out of the range of referential voltage]

Judgement display ... **HIGH** **LOW** lamps are lit up

Judgement output No judgement is output. PROTECTION (pin 12) is output at the **REMOTE/OUT** connector ⑱.

- ③ In case that the test voltage is less than the range of referential voltage, waits for 5 seconds (W-TEST lamp blinks while waiting). Turn the **TEST VOLTAGE** knob ④ to get the desired test voltage to output.

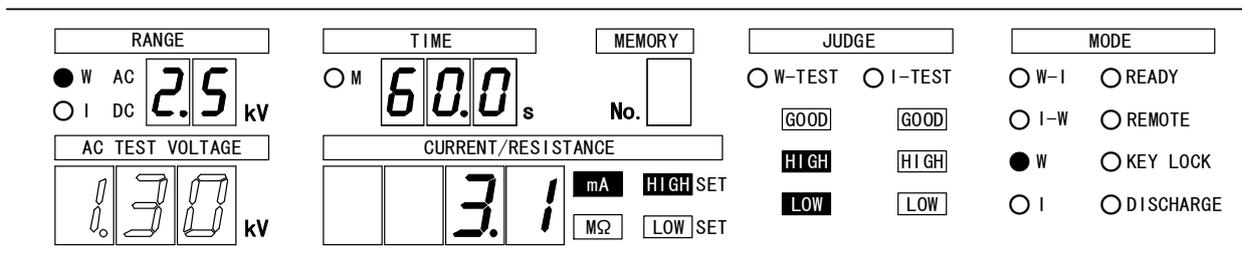
When the voltage exceeds the range of test voltage, the test is immediately stopped. The voltage value is displayed on the output voltmeter and the test voltage display.

- ④ When the voltage is still out of the range, the test voltage display displays the test voltage output value at that time in blinking, and further more, JUDGE **HIGH** **LOW** blink, stopping the test. Redo the setting after pressing the **STOP** switch ② and making the tester in READY mode (return to ③ or the article 11.1 **Setting of test voltage for withstanding voltage test**).

Note-1: The test voltage is, however, output even during the waiting, so if the leak current exceeds the high limit value, the waiting is interrupted and gives the judgement of rejection JUDGE **HIGH**.

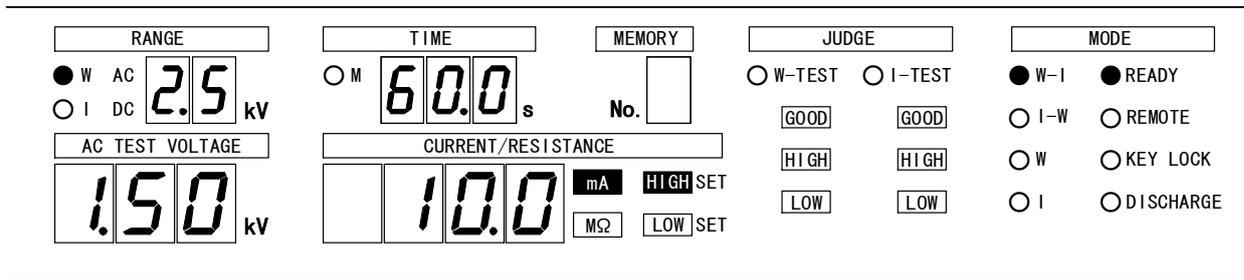
Note-2: Also, when the test voltage becomes out of the range of referential voltage, the test is immediately stopped and JUDGE **HIGH** **LOW** are lit up. (Refer to the figure below.)

[When the test voltage is out of the range of referential voltage]



11.2 ● W-I test (withstanding voltage test → insulation resistance test)

In READY status, the display of test conditions of withstanding voltage test and insulation resistance test (P44) alternates at the cycle of 2 seconds.



(1) Start

Display during the test

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up depending upon the setting.

① During the withstanding voltage test

Display item		Lit-up or blinking (items not mentioned are turned off)
Test item	MODE	W-I lamp lit up.
Test lamp	W-TEST, I-TEST	W-TEST lamp lit up.
Judgement	JUDGE	All the judgement lamps are turned off.
Voltage range	RANGE	W AC lamp lit up, "5.0 kV" or "2.5 kV" displayed.
Test voltage display	AC TEST VOLTAGE	"Measured output voltage value kV" displayed.
Current display	CURRENT/RESISTANCE	"Measured leak current value" displayed and [mA], [HIGH] SET lit up, and [LOW] SET lit up when the low leak current limit is set.
Test time display	TIME	"Remaining time s" of W test displayed.
High volt. output lamp	[DANGER]	Lit up

② During the insulation resistance test

Display item		Lit-up or blinking (items not mentioned are turned off)
Test item	MODE	W-I lamp lit up.
Test lamp	W-TEST, I-TEST	I-TEST lamp lit up.
Judgement	JUDGE	[GOOD] of withstanding voltage test lit up.
Voltage range	RANGE	I DC lamp lit up, "1.0 kV" or "0.5 kV" displayed.
Test voltage display	AC TEST VOLTAGE	Turned off.
Insulation resistance display	CURRENT/RESISTANCE	"Measured insulation resistance value" displayed and [MΩ], [LOW] SET lit up, and [HIGH] SET lit up when the high resistance limit is set.
Mask timer time		Immediately after starting the insulation resistance test, mask timer set time (minute) M lamp lit up.
Test time	TIME	"Remaining time s of I test displayed.
High volt. output lamp	[DANGER]	Lit up.

Note: Even if the test is stopped during the insulation resistance test, with the discharging function ON, the tester enters the action of discharging function.



- ③ When the discharging function is set (display after finishing the insulation resistance test)
In case that the discharging function is OFF, the process is up to ②.

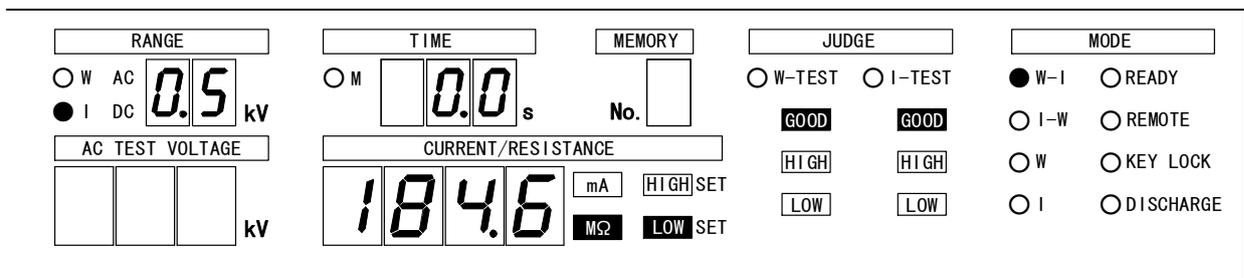
Display item		Lit-up or blinking (items not mentioned are turned off)
Test item	MODE	W-I lamp lit up.
Test lamp	W-TEST, I-TEST	I-TEST lamp lit up.
Judgement	JUDGE	<input type="checkbox"/> GOOD of withstanding voltage test, <input type="checkbox"/> GOOD of insulation resistance test lit up.
Voltage range	RANGE	I DC lamp lit up, “ 10 kV” or “ 0.5 kV” displayed.
Test voltage display	AC TEST VOLTAGE	Turned off.
Insulation resistance display	CURRENT/RESISTANCE	“Measured insulation resistance value” displayed and <input type="checkbox"/> MΩ, <input type="checkbox"/> LOW SET lit up, and <input type="checkbox"/> HIGH SET lit up when the high resistance limit is set.
Mask timer time		M lamp lit up.
Test time	TIME	“ 0.0 s” displayed.
Discharging function	DISCHARGE	DISCHARGE lit up when the discharging is set ON and the voltage of test sample becomes 30V or less, or turned off when the discharging is set to OFF.
High volt. output lamp	<input type="checkbox"/> DANGER	Lit up.

(2) Good judgement

Condition of good judgement

- ① Withstanding voltage test
When the leak current value of the test sample is within the range until the time reaches the set time.
- ② Insulation resistance test
When the resistance value of test sample is within the range high and low resistance limit until the time reaches the set time, except for the case within the mask time.

GOOD output can be changed to continuous output by the setting of GOOD output.
[ref. article 12 (P54)]



Display at the time of good judgement

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up depending upon the setting.

- ① When the good judgement time is 0.2 seconds (standard condition), the tester returns to READY status before the start.
- ② When the good judgement time is continuous output, the display is as the table below shows (refer also to the above figure).
Re-start is not allowed during the **GOOD** is continuously output. In this case, press **STOP** switch ②, then it becomes READY status.

Display item	Display	Lit-up or blinking (items not mentioned are turned off)
Test item	MODE	W-I lamp lit up.
Test lamp	W-TEST, I-TEST	I-TEST lamp lit up.
Judgement	JUDGE	GOOD of withstanding voltage test, GOOD of insulation resistance test lit up.
Voltage range	RANGE	I DC lamp lit up, "10 kV" or "0.5 kV" displayed.
Test voltage display	AC TEST VOLTAGE	Turned off.
Insulation resistance display	CURRENT/RESISTANCE	"Measured insulation resistance value" displayed and MΩ , LOW SET lit up, and HIGH SET lit up when the high resistance limit is set.
Mask timer time		M lamp lit up.
Test time	TIME	"00s" displayed.
Discharging function	DISCHARGE	DISCHARGE lit up when the discharging is set ON and the voltage of test sample becomes 30V or less, or turned off when the discharging is set to OFF.
High volt. output lamp	DANGER	Lit up.

Note: About the judgement for the low leak current limit

No judgement for the low leak current limit is made by the time when 0.3 seconds have passed from the start of withstanding voltage test. Also, when the referential voltage is set, the judgement for the low leak current limit is made when 0.3 seconds have passed after reaching the range of referential voltage.

(3) NG judgement

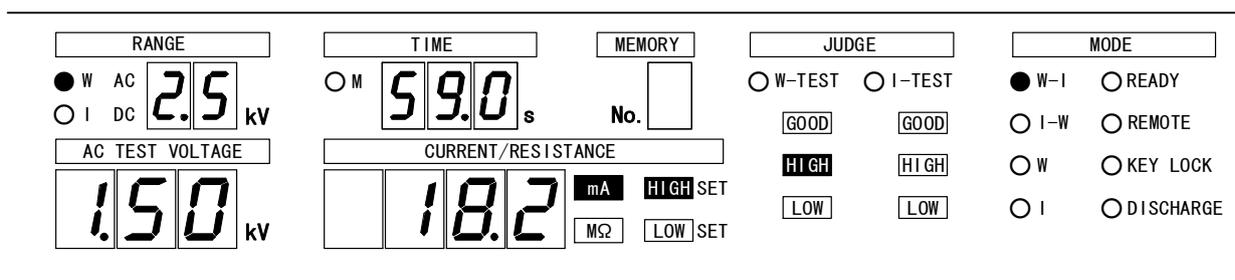
When the withstanding voltage test is NG

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up depending upon the setting.

- ① W-TEST and DANGER lamp ⑩ are turned off.
- ② The output of test voltage is stopped and the test is stopped. When the leak current value is higher than the high limit value, JUDGE HIGH is, and when the leak current value is lower than the low limit value, JUDGE LOW is continuously lit up.

Display item	Lit-up or blinking (items not mentioned are turned off).
Test item MODE	W-I lamp lit up.
Test lamp W-TEST, I-TEST	Turned off.
Judgement JUDGE	HIGH or LOW of withstanding volt. test lit up.
Voltage range RANGE	W AC lamp lit up, "5.0 kV" or "2.5 kV" displayed.
Test voltage display AC TEST VOLTAGE	Voltage at the NG judgement displayed.
Insulation resistance display CURRENT/RESISTANCE	"Measured leak current value" displayed and mA, HIGH SET lit up, and LOW SET lit up when the low leak current limit is set.
Test time TIME	Remaining time of withstanding voltage test at the NG judgement displayed.
High volt. output lamp DANGER	Lit up.

Note: Test voltage value and leak current value are not always the value at the time of NG judgement, in relation to the response speed.
Also, when the leak current sharply increased at the NG judgement and exceeded the measuring range, the current display may give an over-range display UUUU.



- ③ Press STOP switch ②, then it becomes READY status.

When the insulation resistance test is NG

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up depending upon the setting.

- ① I TEST and DANGER lamp ⑩ are turned off.
- ② When the measured resistance value becomes out of the range, after passed the withstanding voltage test, the output of test voltage is immediately stopped and the test is stopped. When the measured resistance value is higher than the high limit value, JUDGE HIGH is, and when the measured value is lower than the low limit value, JUDGE LOW is continuously lit up.

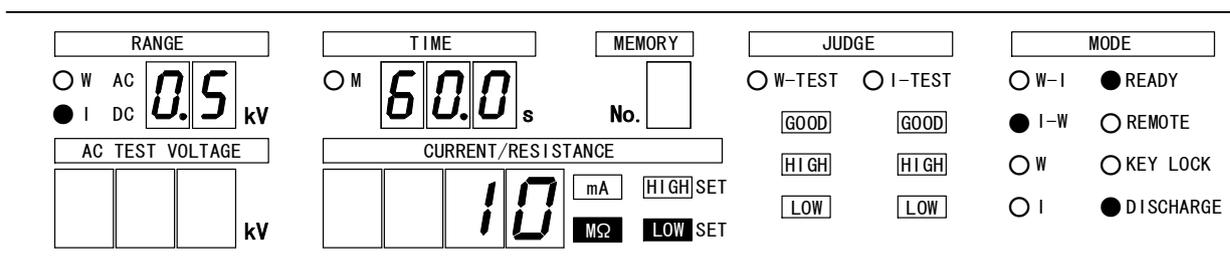
Display item	Lit-up or blinking (items not mentioned are turned off).
Test item MODE	W-I lamp lit up.
Test lamp W-TEST, I-TEST	Turned off.
Judgement JUDGE	GOOD of withstanding voltage test lit up. HIGH or LOW of insulation resist. test lit up.
Voltage range RANGE	I DC lamp lit up, "1.0 kV" or "0.5 kV" displayed.
Test voltage display AC TEST VOLTAGE	Turned off.
Insulation resistance display CURRENT/RESISTANCE	"Measured insulation resistance value" displayed and MΩ, LOW SET lit up, and HIGH SET lit up when the high resistance limit is set.
Test time TIME	Remaining time of insulation resistance test at the NG judgement displayed.
High volt. output lamp DANGER	Turned off.

Note: When the measured resistance value exceeds 2000MΩ, over-range UUUU is displayed.

- ③ Press STOP switch ②, then it becomes READY status.

11.3 ● I-W test (insulation resistance test → withstanding voltage test)

In READY status, the display of test conditions of withstanding voltage test (P40) and insulation resistance test alternates at the cycle of 2 seconds.



(1) Start

Display during the test

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up depending upon the setting.

① During the insulation resistance test

Display item	Lit-up or blinking (items not mentioned are turned off)
Test item MODE	I - W lamp lit up.
Test lamp W-TEST, I-TEST	I-TEST lamp lit up.
Judgement JUDGE	All the judgement lamps turned off.
Voltage range RANGE	I DC lamp lit up, “ 10 kV” or “ 0.5 kV” displayed.
Test voltage display AC TEST VOLTAGE	Turned off.
Insulation resistance display CURRENT/RESISTANCE	“Measured insulation resistance value” displayed and $M\Omega$, LOW SET lit up, and HIGH SET lit up when the high resistance limit is set.
Mask timer time	Immediately after starting the insulation resistance test, mask timer set time (minute) M lamp lit up.
Test time TIME	“Remaining time s of I test displayed.
High volt. output lamp DANGER	Lit up.

Note: Even if the test is stopped during the insulation resistance test, with the discharging function ON, the tester enters the action of discharging function.

② When the discharging function is set (display after finishing the insulation resistance test) In case that the discharging function is OFF, the display changes from ① to ③.

Display item	Lit-up or blinking (items not mentioned are turned off)
Test item MODE	I - W lamp lit up.
Test lamp W-TEST, I-TEST	I-TEST lamp lit up.
Judgement JUDGE	GOOD of insulation resistance test lit up.
Voltage range RANGE	I DC lamp lit up, “ 10 kV” or “ 0.5 kV” displayed.
Test voltage display AC TEST VOLTAGE	Turned off.
Insulation resistance display CURRENT/RESISTANCE	“Measured insulation resistance value” displayed and $M\Omega$, LOW SET lit up, and HIGH SET lit up when the high resistance limit is set.
Mask timer time	M lamp turned off.
Test time TIME	“00s” displayed.
Discharging function DISCHARGE	DISCHARGE lit up when the discharging is set ON and the voltage of test sample becomes 30V or less, or turned off when the discharging is set to OFF.
High volt. output lamp DANGER	Lit up.



③ During the withstanding voltage test

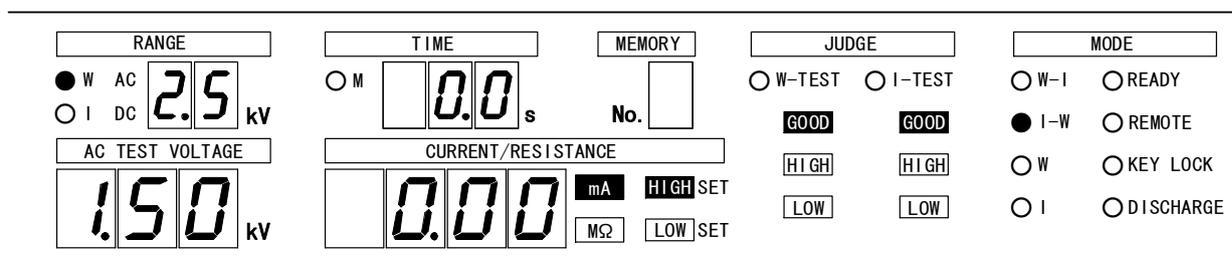
Display item	Lit-up or blinking (items not mentioned are turned off)
Test item MODE	I - W lamp lit up.
Test lamp W-TEST, I-TEST	W-TEST lamp lit up.
Judgement JUDGE	GOOD of insulation resistance test lit up.
Voltage range RANGE	W AC lamp lit up, “ 5.0 kV” or “ 2.5 kV” displayed.
Test voltage display AC TEST VOLTAGE	“Measured output voltage value” kV displayed.
Current display CURRENT/RESISTANCE	“Measured leak current value” displayed and mA , HIGH SET lit up, and LOW SET lit up when the low leak current limit is set.
Test time display TIME	“Remaining time s of W test displayed.
High volt. output lamp DANGER	Lit up

(2) Good judgement

Condition of good judgement

- ① Withstanding voltage test
When the leak current value of the test sample is within the range until the time reaches the set time.
- ② Insulation resistance test
When the resistance value of test sample is within the range high and low resistance limit until the time reaches the set time, except for the case within the mask time.

GOOD output can be changed to continuous output by the setting of GOOD output.
[ref. article 12 (P54)]



Display at the time of good judgement

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up depending upon the setting.

- ① When the good judgement time is 0.2 seconds (standard condition), the tester returns to READY status before the start.
- ② When the good judgement time is continuous output, the display is as the table below shows (refer also to the above figure).
Re-start is not allowed during the **GOOD** is continuously output. In this case, press **STOP** switch ②, then it becomes READY status.

Display item	Lit-up or blinking (items not mentioned are turned off)
Test item MODE	I-W lamp lit up.
Test lamp W-TEST, I-TEST	Turned off.
Judgement JUDGE	GOOD of withstanding voltage test, GOOD of insulation resistance test lit up.
Voltage range RANGE	W AC lamp lit up, "5.0 kV" or "2.5 kV" displayed.
Test voltage display AC TEST VOLTAGE	Voltage at the judgement displayed.
Insulation resistance display CURRENT/RESISTANCE	"Measured leak current value" displayed and mA, HIGH SET lit up, and LOW SET lit up when the low resistance limit is set.
Mask timer time	M lamp turned off.
Test time TIME	"00s" displayed.
Discharging function DISCHARGE	Turned off.
High volt. output lamp DANGER	Turned off.

(3) NG judgement

When the insulation resistance test is NG

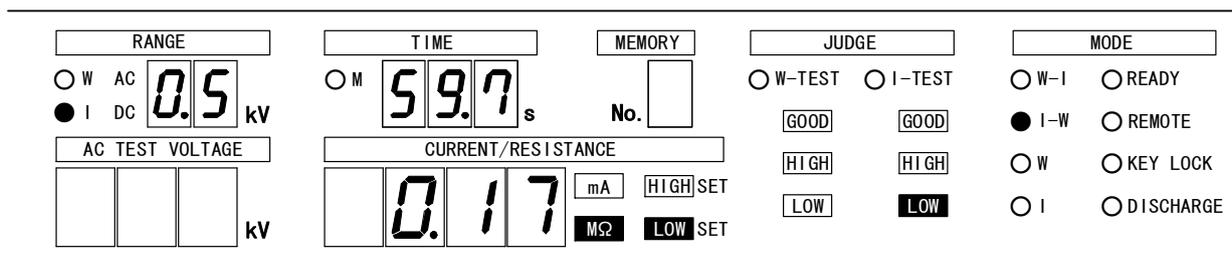
When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up depending upon the setting.

- ① I-TEST and **DANGER** lamp ⑩ are turned off.
- ② When the measured resistance value becomes out of the range, after passed the withstanding voltage test, the output of test voltage is immediately stopped and the test is stopped. When the measured resistance value is higher than the high limit value, JUDGE **HIGH** is, and when the measured value is lower than the low limit value, JUDGE **LOW** is continuously lit up.

Note

Display item	Lit-up or blinking (items not mentioned are turned off).
Test item MODE	I-W lamp lit up.
Test lamp W-TEST, I-TEST	Turned off.
Judgement JUDGE	HIGH or LOW of insulation resist.. test lit up.
Voltage range RANGE	I DC lamp lit up, “ 1.0 kV ” or “ 0.5 kV ” displayed.
Test voltage display AC TEST VOLTAGE	Turned off.
Insulation resistance display CURRENT/RESISTANCE	“Measured insulation resistance value” displayed and MΩ , LOW SET lit up, and HIGH SET lit up when the high resistance limit is set.
Test time TIME	Remaining time of insulation resistance test at the NG judgement displayed.
High volt. output lamp DANGER	Turned off.

Note: When the measured resistance value exceeds 2000MΩ, over-range **UUUU** is displayed.



- ③ Press **STOP** switch ②, then it becomes READY status.

When the withstanding voltage test is NG

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up depending upon the setting.

- ① W-TEST and **DANGER** lamp ⑩ are turned off.
- ② The output of test voltage is stopped and the test is stopped. When the leak current value is higher than the high limit value, JUDGE **HIGH** is, and when the leak current value is lower than the low limit value, JUDGE **LOW** is continuously lit up.

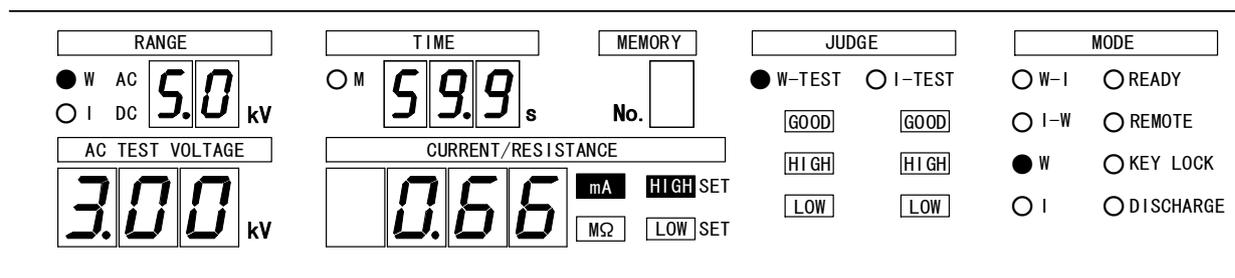
Display item	Lit-up or blinking (items not mentioned are turned off).
Test item MODE	I-W lamp lit up.
Test lamp W-TEST, I-TEST	Turned off.
Judgement JUDGE	GOOD of insulation resistance test lit up. HIGH or LOW of withstanding volt. test lit up.
Voltage range RANGE	W AC lamp lit up, “ 5.0 kV ” or “ 2.5 kV ” displayed.
Test voltage display AC TEST VOLTAGE	Voltage at the NG judgement displayed.
Insulation resistance display CURRENT/RESISTANCE	“Measured leak current value” displayed and mA , HIGH SET lit up, and LOW SET lit up when the low leak current limit is set.
Test time TIME	Remaining time of withstanding voltage test at the NG judgement displayed.
High volt. output lamp DANGER	Turned off.

Note: Test voltage value and leak current value are not always the value at the time of NG judgement, in relation to the response speed. Also, when the leak current sharply increased at the NG judgement and exceeded the measuring range, the current display may give an over-range display **UUUU**.

- ③ Press **STOP** switch ②, then it becomes READY status.

11.4 ● W test (withstanding voltage single test)

(1) Start

**Display during the test**

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up or turned off depending upon the setting.

Display item	Lit-up or blinking (items not mentioned are turned off)
Test item MODE	W lamp lit up.
Test lamp W-TEST, I-TEST	W-TEST lamp lit up.
Judgement JUDGE	Turned off.
Voltage range RANGE	W AC lamp lit up, "5.0 kV" or "2.5 kV" displayed.
Test voltage display AC TEST VOLTAGE	"Measured output voltage value kV" displayed.
Current display CURRENT/RESISTANCE	"Measured leak current value" displayed and mA, HIGH SET lit up, and LOW SET lit up when the low leak current limit is set.
Test time display TIME	"Remaining time s" of W test displayed. Note: "Time lapse s" when OFF is set.
High volt. output lamp DANGER	Lit up

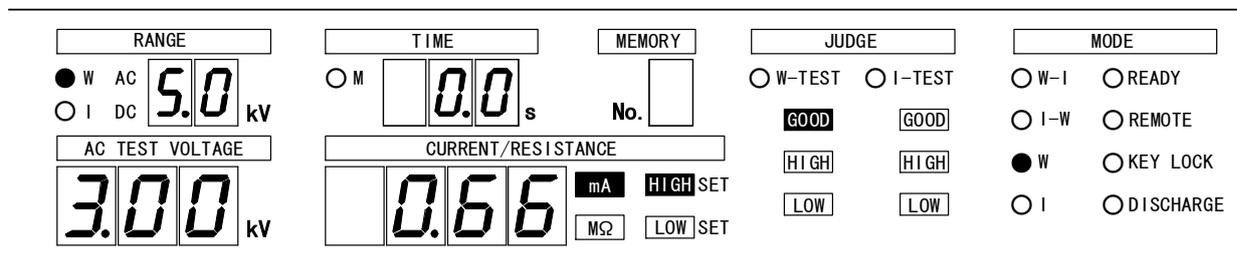
Note: When the test time is set to OFF, the time lapse up to the NG judgement.

(2) Good judgement

Condition of good judgement

When the leak current value of the test sample is within the range until the time reaches the set time.

GOOD output can be changed to continuous output by the setting of GOOD output. [ref. article 12 (P54)]



Display at the time of good judgement

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up depending upon the setting.

- ① When the good judgement time is 0.2 seconds (standard condition), the tester returns to READY status before the start.
- ② When the good judgement time is continuous output, the display is as the table below shows.

Re-start is not allowed during the **GOOD** is continuously output. In this case, press **STOP** switch ②, then it becomes READY status.

Display item	Lit-up or blinking (items not mentioned are turned off)
Test item MODE	W lamp lit up.
Test lamp W-TEST, I-TEST	Turned off.
Judgement JUDGE	GOOD of withstanding voltage test lit up.
Voltage range RANGE	W AC lamp lit up, "5.0 kV" or "2.5 kV" displayed.
Test voltage display AC TEST VOLTAGE	Voltage at the judgement displayed.
Current display CURRENT/RESISTANCE	"Measured leak current value" displayed and mA , HIGH SET lit up, and LOW SET lit up when the low leak current limit is set.
Test time display TIME	"0.0 s" displayed.
High volt. output lamp DANGER	Turned off.

(3) NG judgement

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up or turned off depending upon the setting.

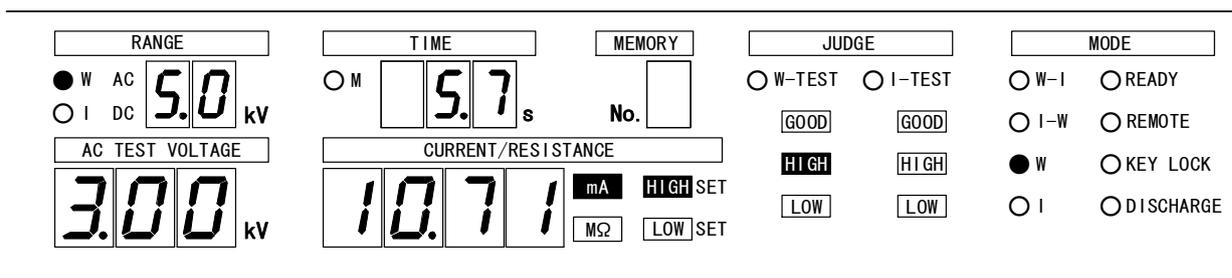
- ① W-TEST and DANGER lamp ⑩ are turned off.
- ② The output of test voltage is stopped and the test is stopped. When the leak current value is higher than the high limit value, JUDGE HIGH is, and when the leak current value is lower than the low limit value, JUDGE LOW is continuously lit up.

	Display item	Lit-up or blinking (items not mentioned are turned off).
Note-1	Test item MODE	W lamp lit up.
	Test lamp W-TEST, I-TEST	Turned off.
	Judgement JUDGE	<input type="checkbox"/> HIGH or <input type="checkbox"/> LOW of withstanding volt. test lit up.
	Voltage range RANGE	W AC lamp lit up, "5.0 kV" or "2.5 kV" displayed.
Note-2	Test voltage display AC TEST VOLTAGE	Voltage at the NG judgement displayed.
	Insulation resistance display CURRENT/RESISTANCE	"Measured leak current value" displayed and <input type="checkbox"/> mA, <input type="checkbox"/> HIGH SET lit up, and <input type="checkbox"/> LOW SET lit up when the low leak current limit is set.
	Test time TIME	Remaining time of withstanding voltage test at the NG judgement displayed.
	High volt. output lamp <input type="checkbox"/> DANGER	Turned off.

Note-1: Test voltage value and leak current value are not always the value at the time of NG judgement, in relation to the response speed. Also, when the leak current sharply increased at the NG judgement and exceeded the measuring range, the current display may give an over-range display .

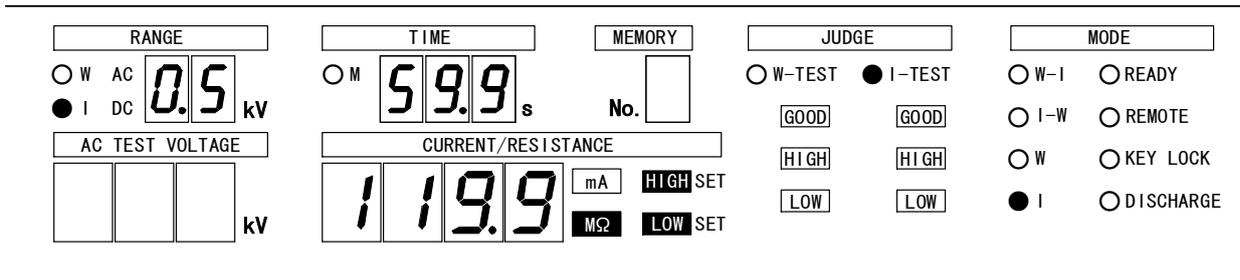
Note-2: When the test time is set to OFF, the time lapse up to the NG judgement.

- ③ Press STOP switch ②, then it becomes READY status.



11.5 ● I test (insulation resistance single test)

(1) Start



Display during the test

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up or turned off depending upon the setting.

Display item		Lit-up or blinking (items not mentioned are turned off)
Test item	MODE	I lamp lit up.
Test lamp	W-TEST, I-TEST	I-TEST lamp lit up.
Judgement	JUDGE	All the judgement lamps turned off.
Voltage range	RANGE	I DC lamp lit up, “ 10 kV” or “ 0.5 kV” displayed.
Test voltage display	AC TEST VOLTAGE	Turned off.
Insulation resistance display	CURRENT/RESISTANCE	“Measured insulation resistance value” displayed and $M\Omega$, LOW SET lit up, and HIGH SET lit up when the high resistance limit is set.
Mask timer time		Immediately after starting the insulation resistance test, mask timer set time (minute) M lamp lit up.
Test time	TIME	“Remaining time s of I test displayed. Note: “Time lapse s “ when OFF is set.
High volt. output lamp	DANGER	Lit up.

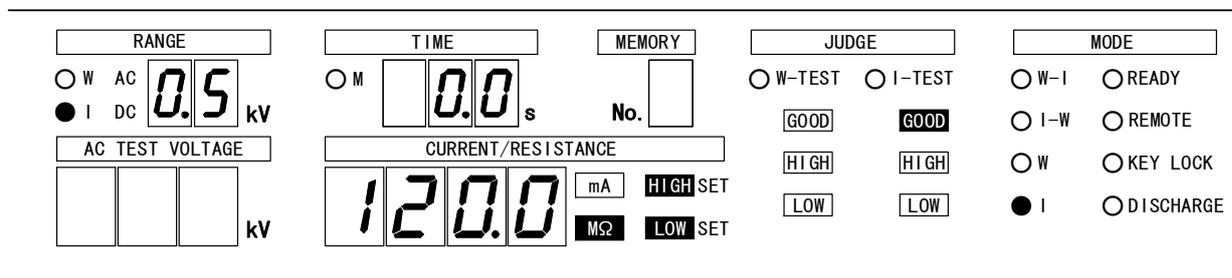
Note: When the test time is set to OFF, the time lapse up to the NG judgement.

(2) Good judgement

Condition of good judgement

When the resistance value of test sample is within the range high and low resistance limit until the time reaches the set time, except for the case within the mask time.

GOOD output can be changed to continuous output by the setting of GOOD output.
[ref. article 12 (P54)]



Display at the time of good judgement

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up depending upon the setting.

- ① When the good judgement time is 0.2 seconds (standard condition), the tester returns to READY status before the start.
- ② When the good judgement time is continuous output, the display is as the table below shows.

Re-start is not allowed during the **GOOD** continuously output. In this case, press **STOP** switch ②, then it becomes READY status.

Display item	Lit-up or blinking (items not mentioned are turned off)
Test item MODE	I lamp lit up.
Test lamp W-TEST, I-TEST	Turned off.
Judgement JUDGE	GOOD of insulation resistance test lit up.
Voltage range RANGE	I DC lamp lit up, "10 kV" or "0.5 kV" displayed.
Test voltage display AC TEST VOLTAGE	Turned off.
Insulation resistance display CURRENT/RESISTANCE	"Measured insulation resistance value" displayed and MΩ , LOW SET lit up, and HIGH SET lit up when the high resistance limit is set.
Mask timer time	M lamp turned off.
Test time TIME	"00s" displayed.
Discharging function DISCHARGE	Turned off.
High volt. output lamp DANGER	Turned off.

When the discharging function is ON

When the discharging function is set (display after finishing the insulation resistance test) In case that the discharging function is OFF, the process is up to ①.

Display item	Lit-up or blinking (items not mentioned are turned off)
Test item MODE	I lamp lit up.
Test lamp W-TEST, I-TEST	I-TEST lamp blinks.
Judgement JUDGE	GOOD of insulation resistance test lit up.
Voltage range RANGE	I DC lamp lit up, "10 kV" or "0.5 kV" displayed.
Test voltage display AC TEST VOLTAGE	Turned off.
Insulation resistance display CURRENT/RESISTANCE	"Measured insulation resistance value" displayed and MΩ , LOW SET lit up, and HIGH SET lit up when the high resistance limit is set.
Mask timer time	M lamp turned off.
Test time TIME	"00s" displayed.
Discharging function DISCHARGE	DISCHARGE lit up when the discharging is set ON and the voltage of test sample becomes 30V or less, or turned off when the discharging is set to OFF.
High volt. output lamp DANGER	Lit up.

Note: Even if the test is stopped during the insulation resistance test, with the discharging function ON, the tester enters the action of discharging function.

(3) NG judgement

When the insulation resistance test is NG

When the memory is read out, the memory No. is displayed on the memory No. display. REMOTE, KEY LOCK lamps may be lit up or turned off depending upon the setting.

① I-TEST and DANGER lamp ⑩ are turned off.

② When the measured resistance value becomes out of the range, after passed the withstanding voltage test, the output of test voltage is immediately stopped and the test is stopped. When the measured resistance value is higher than the high limit value, JUDGE HIGH is, and when the measured value is lower than the low limit value, JUDGE LOW is continuously lit up.

Display item		Lit-up or blinking (items not mentioned are turned off).
Test item	MODE	I lamp lit up.
Test lamp	W-TEST, I-TEST	Turned off.
Judgement	JUDGE	HIGH or LOW of insulation resist.. test lit up.
Voltage range	RANGE	I DC lamp lit up, "10 kV" or "0.5 kV" displayed.
Test voltage display	AC TEST VOLTAGE	Turned off.
Insulation resistance display	CURRENT/RESISTANCE	"Measured insulation resistance value" displayed and MΩ, LOW SET lit up, and HIGH SET lit up when the high resistance limit is set.
Test time	TIME	Remaining time of insulation resistance test at the NG judgement displayed.
High volt. output lamp	DANGER	Turned off.

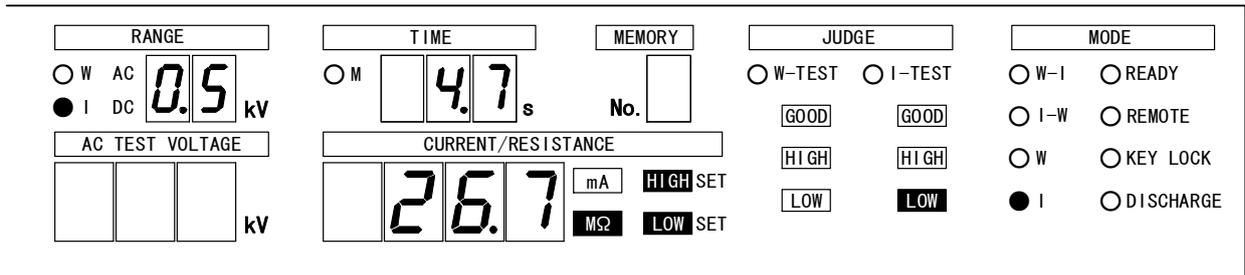
Note-1

Note-2

Note-1: When the measured resistance value exceeds 2000MΩ, over-range UUUU is displayed.

Note-2: When the test time is set to OFF, the time lapse up to the NG judgement.

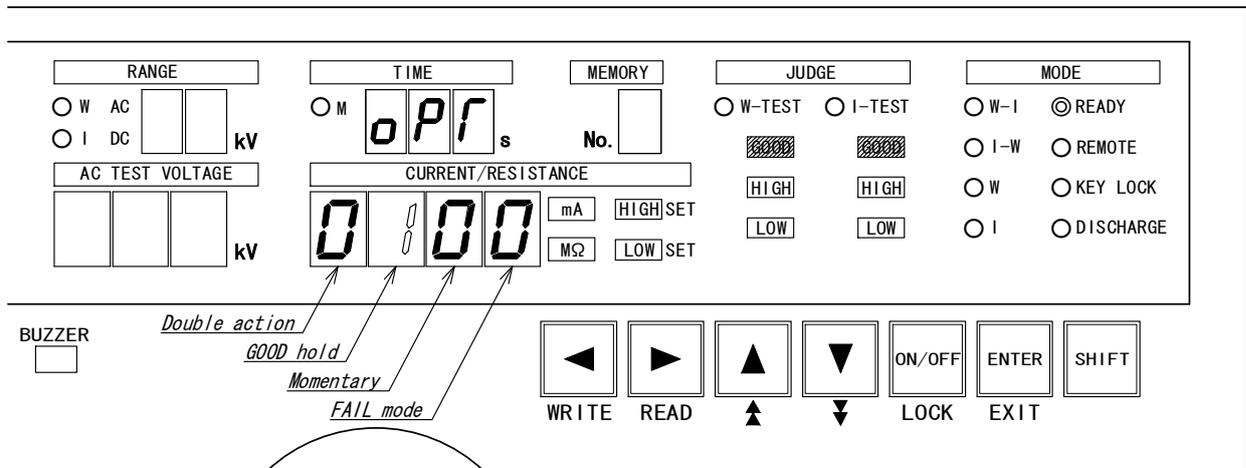
③ Press STOP switch ②, then it becomes READY status.



12. Special test mode

Model 8525 is able to have the setting of 4 special functions by means of key operation on the front panel.

- (1) Double action start function
Within 0.5 second from the stop signal having been ON/OFF, the test starts with input of start signal.
Note: When the function is set, READY lamp blinks in READY status.
- (2) GOOD hold function
This is the function to concern the good judgement. The output becomes continuous until the stop signal is input.
- (3) Momentary start function
The test is done only when the start signal is input.
- (4) FAIL mode function
This is the function to disable the resetting of NG judgement and PROTECTION action by the stop signal of remote control, and enables the resetting only by the stop switch on the tester main unit.



Setting procedure of special test mode

- ① Press [SHIFT] key and [STOP] key at a time for 3 seconds or more.
READY lamp blinks and the test time display is lit up with "0 P F".
The 4th digit of the current/resistance display blinks with "0" (at standard condition).
- ② The item to set can be moved with [▶] or [◀] key.
- ③ Refer to the following table for the items to select.

CURRENT/RESISTANCE

0 0 0 0

▲ key: Numeral increases.
▼ key: Numeral decreases.

				Lamps to synchronously blink at the setting	
0	-	-	-	Cancel of setting	READY lamp
/	-	-	-	Setting of double action start function	
0	-	-	-	Cancel of setting	GOOD (both W-TEST, I-TEST) In total 2 parts
/	-	-	-	Setting of GOOD hold function Note: In order to re-start, once of stop signal input is necessary	
2	-	-	-	Setting of GOOD hold function Note: When the start signal is input, the judgement output is reset and re-starts.	
0	-	-	-	Cancel of setting	I-TEST, W-TEST lamp
/	-	-	-	Setting of momentary start function	
0	-	-	-	Cancel of setting	HIGH LOW (both W-TEST, I-TEST) In total 4 parts
/	-	-	-	Setting of FAIL mode	

Finish of setting

Press [ENTER] key, then the setting is memorized and returns to READY status.

13. Remote control

On the model 8525, a remote control is possible through **REMOTE** connector ⑤ on the front panel, **REMOTE** terminal ㉓ or **REMOTE/OUT** connector ⑱ on the rear panel.

⚠ WARNING

When the tester is remote-controlled, high voltage is switched ON/OFF by the external signal, so utmost care must be taken so that the high voltage can no be erroneously generated and that no one never touches the output terminals, high voltage cable or test sample, putting the first priority to safety.

13.1 ● Operation by REMOTE connector

With use of the optional Remote Control Box (Model 5858-07, 07W) connected to the **REMOTE** connector ⑤, the start/stop operation can be remote-controlled.

When the plug of the remote control box is inserted, the REMOTE lamp is lit up and the type of operation changes from the switch operation on the front panel to the remote control by the remote control box.

During the remote operation, the **START** switch ③ on the front panel is disabled.

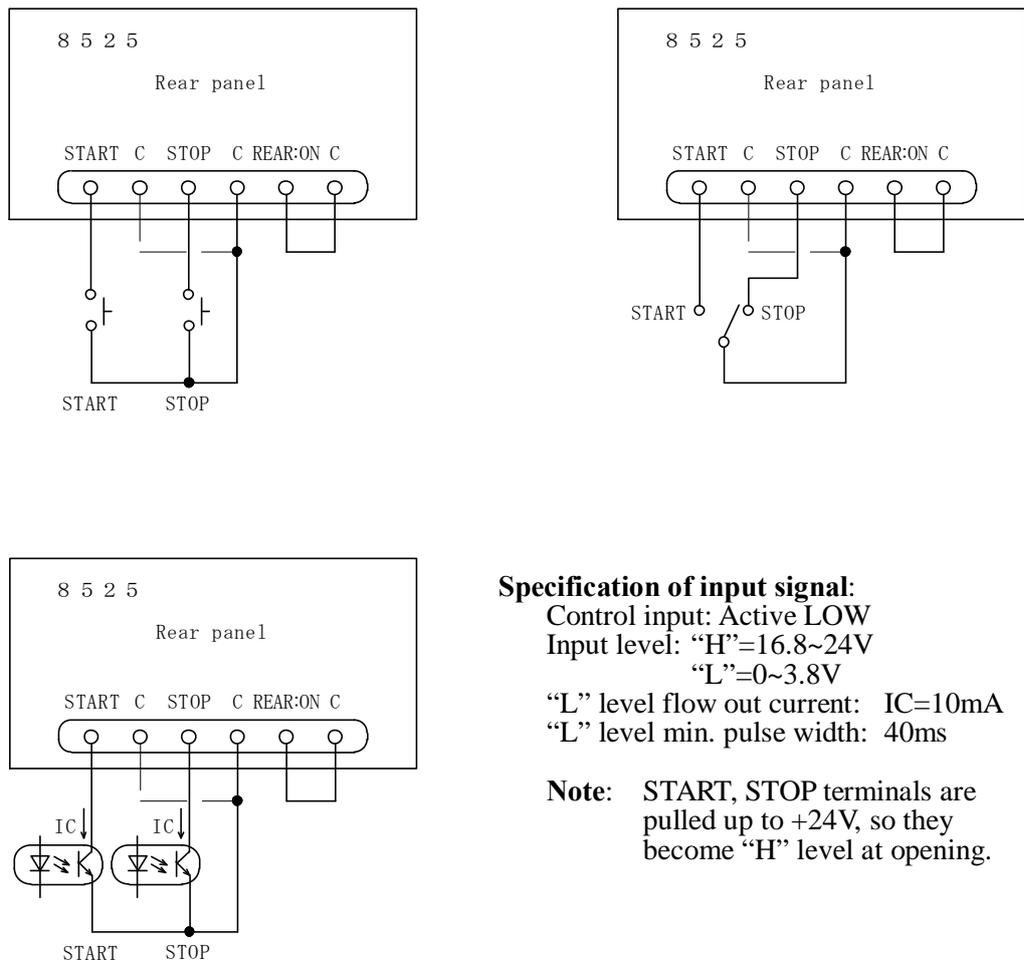
13.2 ● Operation by REMOTE terminal

An equivalent operation to that through **REMOTE** connector ⑤ is also possible through the **REMOTE** terminal ㉓ on the rear panel.

By connecting the optional foot switch (model 5858-04) to the START terminal, the start operation can be done by foot.

- ① Turn the power supply OFF and confirm that the **DANGER** lamp ⑩ is turned off.
- ② Make a short-circuit between REAR:ON and C terminal of the **REMOTE** terminal ㉓. Or alternatively, make a short-circuit between the pin No.2 of the **REMOTE/OUT** connector ⑱ and the COM of the same connector ⑱.
- ③ Connect a logic element such as switch, relay contact, transistor, photo-coupler etc. between START and C, and between STOP and C.
- ④ Turn ON the power supply and the REMOTE lamp at the display section is lit up, then the remote control is enabled.

Note: When the remote control is in operation, the **START** switch ③ on the front panel is disabled. However, the stop operation is still possible from both of the **STOP** switch ② on the front panel and the STOP terminal of the **REMOTE** terminal ㉓.



Specification of input signal:

Control input: Active LOW

Input level: “H”=16.8~24V

“L”=0~3.8V

“L” level flow out current: IC=10mA

“L” level min. pulse width: 40ms

Note: START, STOP terminals are pulled up to +24V, so they become “H” level at opening.

Fig.13.1 Connection examples of remote control terminal

CAUTION

In case that the control is made by switch, relay and etc. and when the chattering occurs, it may cause faulty operation.

13.3 ● Operation by REMOTE/OUT connector

Same remote operation as that through **REMOTE** terminal (22) can be done through the **REMOTE/OUT** connector (18) on the rear panel.

For connection of connector, please refer to the article 14.2 (P59).

The operation is same as that of REMOTE terminal, the article 13.2 (P55).

13.4 ● Operation by REAR:MODE

Features of REAR:MODE

1. The test mode (withstanding voltage or insulation resistance test) can be selected by a relay, sequencer etc. When the test mode is not selected, the test is performed by the test condition before entering the REAR:MODE.
2. The test can be done, reading out the content of memory setting by a sequencer etc.
3. The test mode can be externally controlled but the change of numeral setting is not possible, so make the setting in advance by the memory etc.
4. Since the tester is used by the external control, the tester becomes key lock condition during the setting.
5. The start signal is decided depending upon the setting condition of remote control.
6. An interruption of the test is possible from the **STOP** switch ②, **STOP** terminal ㉓, on the rear panel and **STOP** Pin No.4 of the **REMOTE/OUT** connector.

REAR:MODE from the setting to the start

- (1) Make a short-circuit between the Pin No.20 (REAR:MODE) of the **REMOTE/OUT** connector ⑱ on the rear and COM (either 19, 23 or 36) of the same connector ⑱. **7** is displayed on the memory number display.
Note: When auto operation is done by the sequencer etc. without using the **START** switch ③ (manual start), make the Pin No.2 (REAR : ON) ON. Or, make a short-circuit between REAR : ON and C of the **REMOTE** terminal ㉒.
- (2) Select a test mode.
 Make a selection of either test mode in advance, withstanding voltage or insulation resistance test, by means of Pin No.21 (W-MODE) or Pin No.22 (I-MODE) on the **REMOTE/OUT** connector ⑱.
- (3) After confirming the wiring with the test sample, safety and so on, press **START** switch ③. Or, start the test by remote control.

In order to do the withstanding voltage and insulation resistance test in sequence (W-I, I-W), make a re-start switching over the other test mode, after the good judgement at the item (2) above.

[Example] When the withstanding voltage test → insulation resistance test (W-I) is done.

- ① In READY status, turn ON the Pin No.21 (W-MODE) of the **REMOTE/OUT** connector ⑱. The test is started. The tester becomes in operation of withstanding voltage test and the **DANGER** lamp ⑩ is lit up.
- ② After the good judgement of withstanding voltage test, turn OFF the Pin No.21 (W-MODE). The tester is then in READY status.
- ③ To do the insulation resistance test next, turn ON the No.22 (I-MODE).
- ④ Start the test. The tester becomes in operation of insulation resistance test and the **DANGER** lamp ⑩ is lit up.
- ⑤ Afterwards, the judgement can be made normally.

To start reading out the memory

- (1) Make a short-circuit between the Pin No.20 (REAR:MODE) of the **REMOTE/OUT** connector ⑱ on the rear and COM (either 19, 23 or 36) of the same connector ⑱. **7** is displayed on the memory number display.
- (2) By the combination of the BCD code of the Pin No.6~9 (MEM SET 1, 2, 4, 8) of the same connector ⑱, read out the memory No.1~9.
Note: When the A~F code is input, A~F is displayed on the display but no read out is possible.
- (3) After confirming the wiring with the test sample, safety and so on, press **START** switch ③. Or, start the test by remote control.

Remote control which can be jointly used with REAR:MODE

Basically, it is as explained at the **REAR:MODE from the setting to the start**.

During the REAR:MODE setting, the remote control can also be used jointly.

The start from the **REMOTE** connector ⑤ (front panel), **REMOTE** terminal ㉒ (rear panel) and Pin No.3 (STOP) of the **REMOTE/OUT** connector ⑱ is also possible.

Refer to the article 13.5 for the priority of remote control.

Likely error at the REAR:MODE

Blinking display of <i>Err No. dE</i>	For a likely cause and solution, refer to the article 19 Error messages.
Blinking display of <i>Err E-40</i>	
Blinking display of <i>Err rNFE</i>	

13.5 ● Priority of each remote control

On the model 8525 there are 4 parts of setting for the remote control. If the plural numbers of the setting are made, they follow the priority specified in the following table.

Item	Setting of remote control	Priority
A	<input type="checkbox"/> RS-232C connector ⑰ (rear panel)	1
B	<input type="checkbox"/> REMOTE connector ⑤ (front panel)	2
C	<input type="checkbox"/> REMOTE / OUT connector ⑱ (rear panel)	3
D	<input type="checkbox"/> REMOTE terminal ㉒ (rear panel)	3

The items C and D (REAR:ON) are internally of parallel connection, so when controlled from the rear panel, it can be done either C or D.

14. External control

14.1 ● Control by REMOTE/OUT connector

By means of the REMOTE/OUT connector ⑩ on the rear panel, the remote control of start/stop, the setting of interlock to secure the safety, and the output signals corresponding to each condition of the 8525 can be output by open collector.

The input and output signals are isolated from the internal circuit by photo-coupler.

Also, the 8525 is provided with the power source of 24V DC 0.1A, which can be utilized as power supply for the external control.

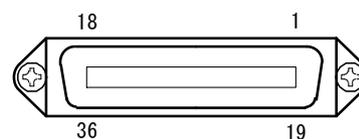
14.2 ● Arrangement and function of connector pins

I/O	Signal name	Pin No.	Function
	+24V	1	Power 24V DC for external control is output. (capacity 0.1A)
I	REAR:ON	2	Change-over signal for remote control. Ref. article 13.2 for detail.
	START	3	Input signal for start.
	STOP	4	Input signal for stop.
	INTERLOCK	5	Signal for interlock.
	MEM SET 1	6	BCD code input for read out of memory. (effective at the setting of REAR:MODE) Effective for No.1~No.9 A~F code are ineffective, no memory can be read.
	MEM SET 2	7	
	MEM SET 4	8	
MEM SET 8	9		
O	TEST/H.V.OUT	10	Output at high voltage terminal during the voltage output.
	READY	11	Output at READY status.
	PROTECTION	12	Output when the protective function works. Ref. article 14.4 for detail.
	GOOD	13	Output at good judgement.
	W HIGH	14	Output at NG judgement for high limit of W test.
	W GOOD	15	Output at good judgement of W test.
	I HIGH	16	Output at NG judgement for high limit of I test.
I GOOD	17	Output at good judgement of I test.	
-	NC	18	Vacant pin (do not use it as relay terminal).
COM	COM	19	Common (common with 23, 26)
I	REAR:MODE	20	Change-over action of test mode (W, I) from the rear panel.
	W-MODE	21	Setting of mode for W test (effective at the setting of REAR:MODE).
	I-MODE	22	Setting of mode for I test (effective at the setting of REAR:MODE).
COM	COM	23	Common (common with 19, 36)
O	W-TEST	24	Output during the W test, not output while W-TEST is blinking.
	I-TEST	25	Output during the I test, not output while I-TEST is blinking.
	TEST	26	Output during the test, not output while W-TEST or I-TEST is blinking.
-	NC	27	Vacant pin (do not use it as relay terminal).
O	END	28	Output at the end of test.
-	NC	29	Vacant pin (do not use it as relay terminal).
	NC	30	Vacant pin (do not use it as relay terminal).
O	NG	31	Output at NG judgement.
	W LOW	32	Output at NG judgement for low limit of W test.
-	NC	33	Vacant pin (do not use it as relay terminal).
O	I LOW	34	Output at NG judgement for low limit of I test.
-	NC	35	Vacant pin (do not use it as relay terminal).
COM	COM	36	Common (common with 19, 23)

Type of input/output:

I: input
O: Open collector output.
COM: Common for input/output
- : Vacant pin

Connector used: 36P Anphenol



Note: When externally remote controlled, REAR:ON and COM are short-circuited. The operation is same as that of REMOTE terminal, the article 13.2 (P55).

14.3 ● Interlock signal

The interlock is the function to shut off the output getting the tester to jointly work with the external device, in order to secure the safety of operator.

By making open the pin 5 (INTER-LOCK) of the REMOTE/OUT connector ⑱ on the rear panel, the tester becomes interlock status and the start of the test is disabled.

During the interlock function is in operation, *Err LOCK* is displayed, the output of 8525 is shut off and the operation of all the switches are disabled.

To cancel the interlock, short-circuit the pin 5 and pin 23 (COM) of the REMOTE/OUT connector ⑱ to make it to “L” level, and then press the STOP switch ②.

Err LOCK is turned off and READY lamp is lit up, enabling the test.

Note: The pin 5 and 23 of the attached REMOTE/OUT plug (36P) are short-circuited.

Considering the safety aspect, please provide a proper interlock solution to jointly work with the external device, for example, as the following connection example shows.

REMOTE/OUT connector

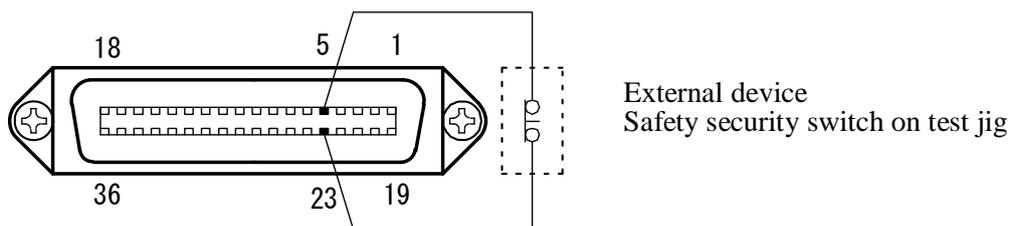


Fig.14.1 Interlock connection example

14.4 ● Protective function (PROTECTION)

The protective function is the action that the PROTECTION is output from the REMOTE/OUT connector ⑱ on the following condition.

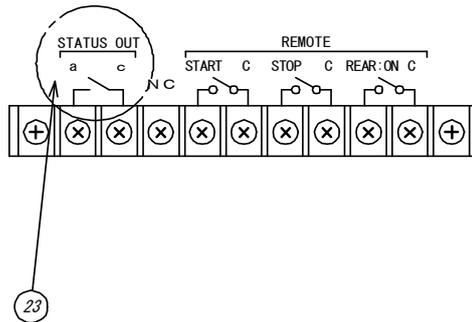
- When the discharging of the test sample does not finish even after passing 10 seconds from the finish of test.
- When the voltage output does not fall even after passing 10 seconds from the finish of test.
- When the interlock input is turned OFF.
- When the remote status is changed during the test.

15. Status output

15.1 ● Name of STATUS OUTPUT and condition for output

When the preset condition for output is met, the relay contact is output from the **STATUS OUT** ②③ on the rear panel. In case that the plural numbers of output are selected, the output is given when either condition is met.

Output name	Output condition
TEST/H.V. OUT	Output when the voltage is output to the high voltage terminal (when DANGER is lit up).
TEST	During the test (when TEST lamp is lit up).
GOOD	At GOOD judgement (when GOOD lamp is lit up).
NG	At NG judgement (when JUDGE HIGH , LOW lamp is lit up).
READY	In READY status (when READY lamp is lit up).
REMOTE	When remote controlled (when REMOTE lamp lit up).
POWER ON	When the power supply is ON.



It can be connected to the optional buzzer unit (5858-05) and so on.
Plural numbers of output names for status output can be selected (it is OR selection).

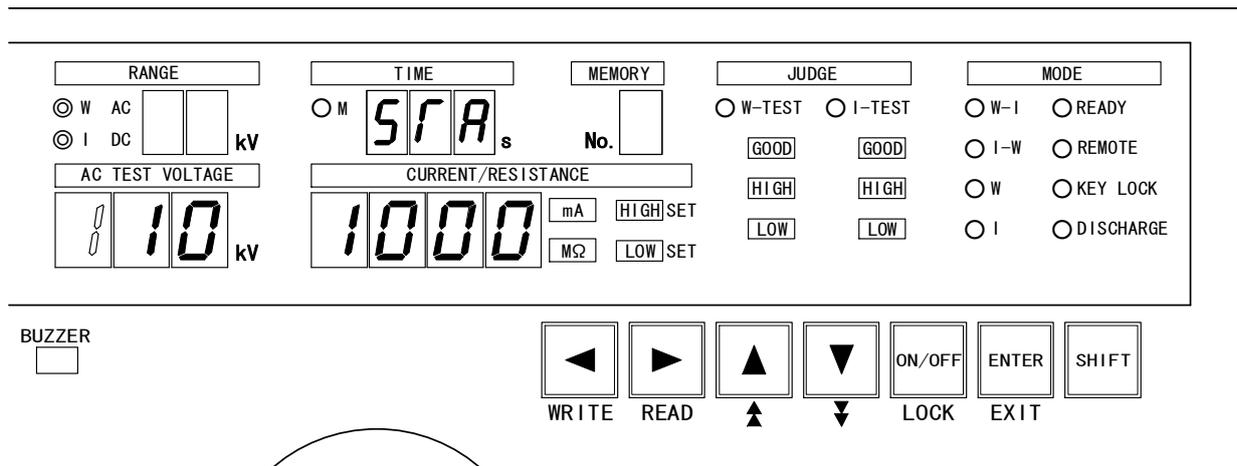
15.2 ● Specifications of status output

Output relay configuration : 1a relay contact
 Max. output capacity : 250V AC/1A (30V DC/1A) resistive load
 Terminal screw to use : M3

⚠ WARNING

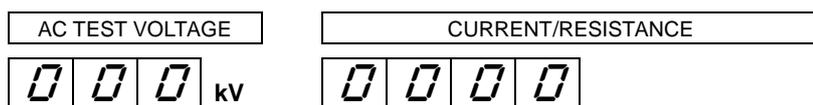
Do not connect the device to consume 250V AC/1A (30V DC/1A) or more to the outlet of the status output. It will cause a break-down of this tester.

15.3 ● Setting of condition for status output



Setting procedure of condition for status output

- ① Press **ON/OFF** key and **▲** key at a time for 3 seconds or more. W AC, I DC lamps blink and the test time display is lit up with “57A”. The highest digit of the voltage display blinks with “/” (at standard condition).
- ② The item to set can be moved with **▶** or **◀** key.
- ③ Refer to the following table for the items to select.



“/” or “/” blinks at selection of each item.

/ : To select / : Not to select

▶ key: Move to right, but when pressed at the item POWER ON, moves to the TEST/H.V. OUT.

◀ key: Move to left, but when pressed at the item TEST/H.V. OUT, moves to POWER ON.

	Selection item of status output	Lamps to synchronously blinks at the setting
/	TEST/H.V. OUT	DANGER , W AC, I DC lamp
/	TEST	I-TEST, W-TEST lamp
/	GOOD	GOOD (both W-TEST, I-TEST) In total 2 parts
/	NG	HIGH LOW (both W-TEST, I-TEST) In total 4 parts
/	READY	READY lamp
/	REMOTE	REMOTE lamp
/	POWER ON	-----

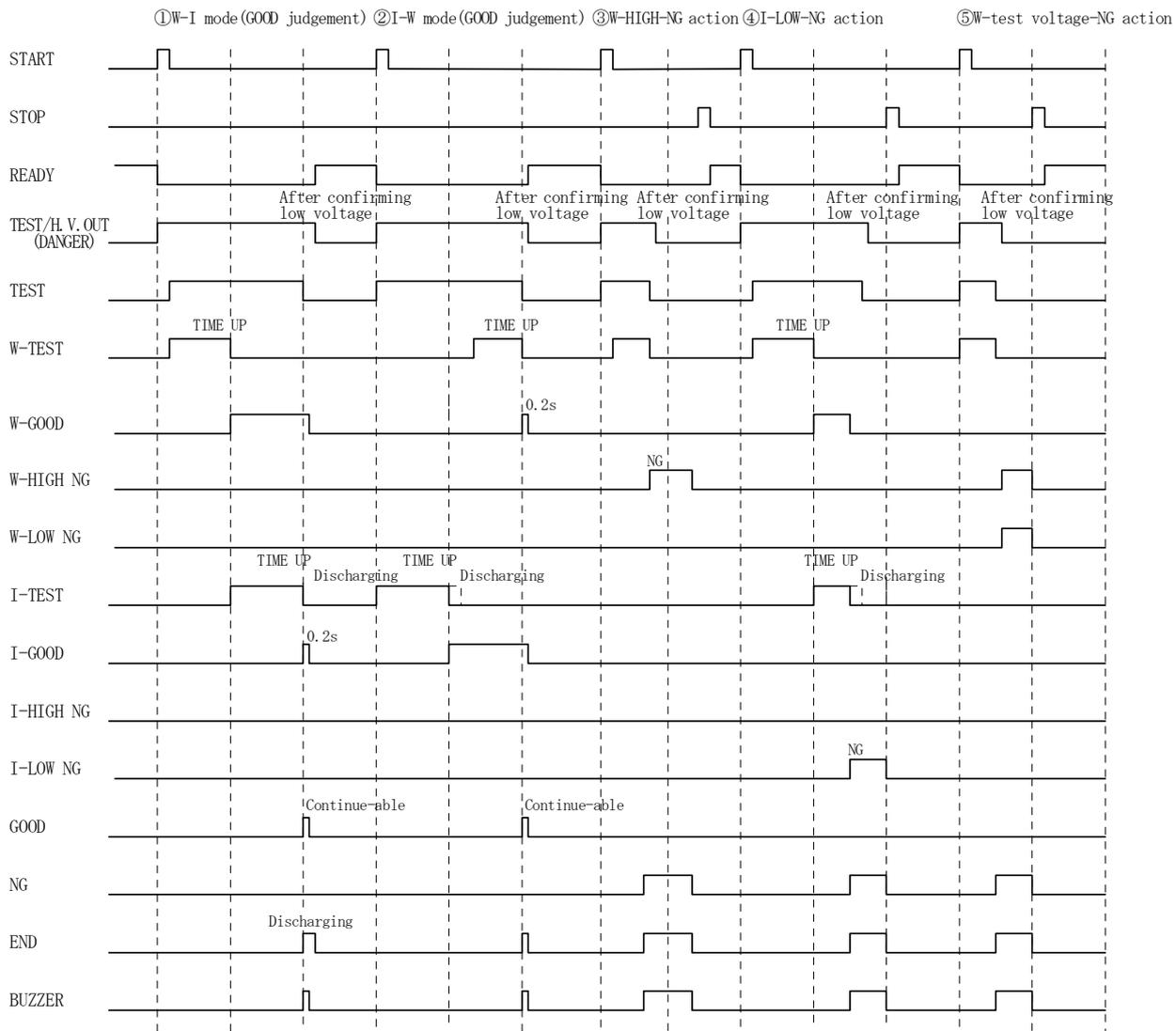
Interruption of setting

When the **EXIT** key (**SHIFT** and **ENTER** at a time) is pressed while the display of test time is blinking with “57A”, the setting of condition for status output is stopped and becomes to READY status. The output condition for status output then is the condition before entering the setting mode of status output condition.

Finish of setting

Press **ENTER** key, then the setting is memorized and returns to READY status.

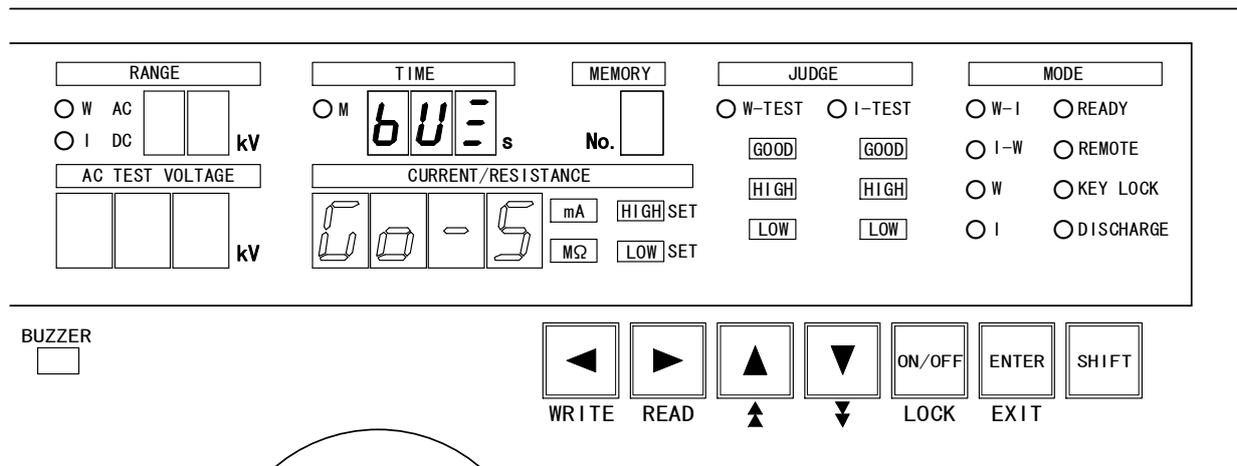
16. Timing chart



Signal name	Output condition
START	Input signal of start of the test.
STOP	Input signal of stop of the test.
READY	Output signal in READY status.
TEST/H.V. OUT	Output signal when the voltage is output to the high voltage terminal.
TEST	Output signal during the test.
W-TEST	Output signal during the withstanding voltage test.
W-GOOD	Output signal at GOOD judgement.for withstanding voltage test.
W-HIGH NG	Output signal at NG judgement of withstanding voltage test for high limit.
W-LOW NG	Output signal at NG judgement of withstanding voltage test for low limit.
I-TEST	Output signal during the insulation resistance test.
I-GOOD	Output signal at GOOD judgement.for insulation resistance test.
I-HIGH NG	Output signal at NG judgement of insulation resistance test for high limit.
I-LOW NG	Output signal at NG judgement of insulation resistance test for low limit.
GOOD	Output signal at GOOD judgement of the test.
NG	Output signal at NG judgement of the test.
END	Output signal at the finish of the test.
BUZZER	Buzzer sounding condition, except for the duration of discharging (DISCHARGE).

17. Adjustment of buzzer sound

At the time of GOOD and NG judgement, the buzzer sounds.
Sound volume of the buzzer is adjustable by the setting on the front panel.



To enter the setting of buzzer sound

In READY status, press **ON/OFF** key and **▼** key at a time for 3 seconds or more.
The test time display displays “**BU**”.

Adjustment of buzzer sound at the GOOD judgement

- ① Make the test time display lit with “**BU**” per **To enter the setting of buzzer sound**.
- ② The current/resistance display blinks with “**Co** - □”.
(□=3 when delivered from factory.)
The adjustment of buzzer sound at GOOD judgement can be made while “**Co** - □” is blinking.
- ③ The sound volume can be set with **▲** or **▼** key.
For the level of volume, refer to the table below.
Note: Pressing alternatively the **▶** or **◀** key, “at GOOD judgement” and “at NG judgement” can be switched over. Be sure to make a setting with blinking “**Co** - □”.

Adjustment of buzzer sound at the NG judgement

- ① Make the test time display lit with “**BU**” per **To enter the setting of buzzer sound**.
- ② The current/resistance display blinks with “**Co** - □”.
(□=3 when delivered from factory.)
Pressing alternatively the **▶** or **◀** key, GOOD judgement “**Co** - □” and NG judgement “**nCo** - □” can be switched over. Be sure to make a setting while “**nCo** - □” is blinking.
- ③ The sound volume can be set with **▲** or **▼** key.
For the level of volume, refer to the table below.

Interruption of setting

When the **EXIT** key (**SHIFT** and **ENTER** at a time) is pressed while “**BU**” is lit up on the test time display displays , the adjustment of buzzer sound is interrupted and becomes to READY status. The level of buzzer sound then is the level before entering the setting of buzzer sound.

Finish of setting

Press **ENTER** key, then the setting is memorized and returns to READY status.

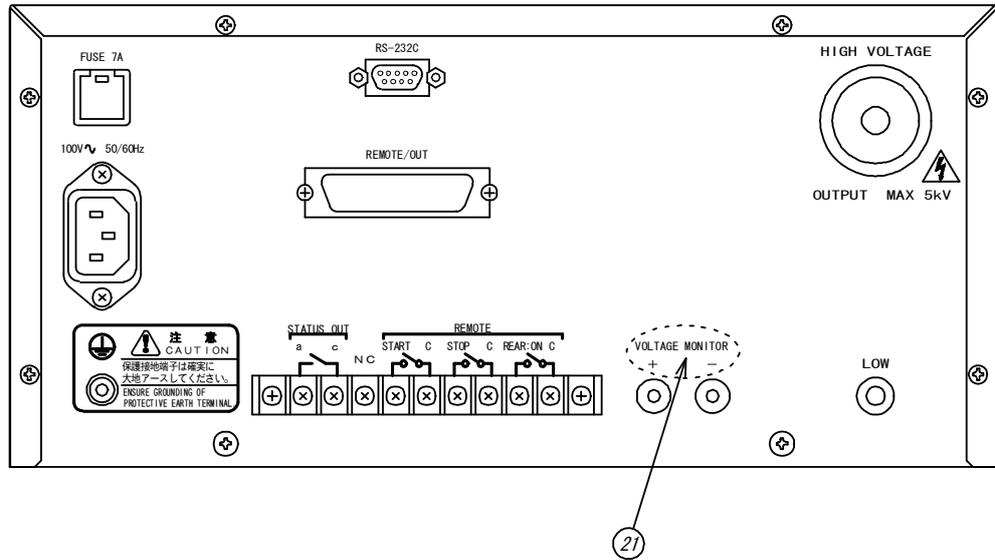
[Sound volume]

Adjustable range		Volume
For GOOD judgement	For NG judgement	
Co-5	nCo-5	Max ↑
Co-4	nCo-4	
Co-3	nCo-3	
Co-2	nCo-2	↓ Min
Co-1	nCo-1	
Co-0	nCo-0	
		OFF

Buzzer sounds by pressing **STOP** switch ② for confirmation.

18. Monitor output of voltage

The monitor output for the voltage of withstanding voltage test is provided on 8525.
The monitor output is output from ⑳ on the rear panel.



Output range : Output voltage 0~5VDC to the output 0~5kVAC of withstanding voltage test.
Tolerance : $\pm 1.5\%$ of F.S
External resistance load : $2k\Omega$ or more.

⚠ WARNING

VOLTAGE MONITOR is not isolated from the high voltage output ⑥, ⑦, ⑱, ⑳ and ⑲.
Take utmost care for the connection with the monitor equipment.

19. Error message

When the error occurs, the message is displayed as the following table shows depending upon the situation. Take proper action after confirming the error message.

AC TEST VOLTAGE	CURRENT/RESISTANCE
	

AC TEST VOLTAGE	CURRENT/RESISTANCE	Cause	Solution
<i>Err</i>	<i>CHRG</i>	When discharging of test sample does not finish after passing 10 sec.	A, I ※
<i>Err</i>	<i>SSr</i>	When voltage output does not drop after passing 10 sec.	A ※
<i>Err</i>	<i>LoCP</i>	When interlock input turns OFF.	B ※
<i>Err</i>	<i>rNFE</i>	When remote status is changed during the test.	C ※
Measuring	<i>UUUU</i>	When abnormal current is detected during withstanding voltage test.(Becomes NG for high limit of leak current.)	D
<i>Err</i>	<i>STrF</i>	When the time to retain start signal is less than 40ms.	E
<i>Err</i>	<i>E-11</i>	When start signal turns OFF in momentary action, during W test.	F
<i>Err</i>	<i>E-21</i>	When start signal turns OFF in momentary action, during I test.	F
<i>Err</i>	<i>Mode</i>	When the test mode is indecisive.	G
<i>Err</i>	<i>E-40</i>	Test mode W and I are simultaneously set in REAR:MODE.	H

※ PROTECTION is output from REMOTE/OUT connector ⑩.

Solutions:

- A : Turn OFF the power supply immediately. The 8525 main unit is may be faulty. Consult us or the dealer.
- B : Interlock input is turned OFF. Review the connection and sequence, and correctly connect the interlock input.
Press STOP switch ② and make READY status.
- C : The error is given when the connection is ON/OFF and the memory number or the test mode is changed during the test. Press STOP switch ② and make READY status, and check the connection or sequence.
- D : In case that the test sample is short-circuited or abnormal current flows, the judgement for high leak current becomes NG.
In view of priority on safety, the 8525 is designed to firstly check whether the load (test sample) is short-circuited or not, faster than the measurement.
Consequently, the measured voltage at this moment is the value in half-way of response and is not correct value. Pay attention to it.
After checking the connection or sequence, or replacing the load (test sample) with correct one, press STOP switch ② and make READY status.
- E : Press STOP switch ② and make READY status. Although the 10ms at the turning ON of start signal is disregarded, the 8525 defines the time at 40ms in order to differentiate from the noise of relay and etc.
The start signal of 40ms or more is necessary for 8525.
When the ON time is 10ms~40ms, the error is indicated. Make an arrangement to secure the start sequence 40ms or more.
- F : Press STOP switch ② and make READY status. Check the connection or sequence so that the start signal can not be turned OFF during the test.
- G : In case that the test mode before entering the REAR:MODE setting mode is the single test mode “W” or “I”, be sure to set the test mode to the same mode before the setting. To solve it, turn OFF the REAR:MODE and set to the single mode in question.
- H : When the REAR:MODE is operating, make the setting so that the test mode selection is W-MODE or I-MODE. During the setting, it can be avoided making the setting normal.
If it happens during the test, press STOP switch ② and make READY status. Make a review of the connection or sequence so that the W-mode and I-mode can not be turned ON together.
- I : In case that the electrical capacity of the sample to be tested is big, the electric discharge may be not completed and the high voltage may remain.
Turn off the power and sufficiently discharge the sample to be tested by the proper way.

20. Maintenance

20.1 ●Cleaning

When the front panel or the case becomes dirty, wipe it with soft cloth.
For heavy dirt, wipe it lightly with the soft cloth wetted with the neutral cleaner thinned by water, and finish the cleaning with dry cloth. Do not use organic solvent like benzene or paint thinner as they may deform or discolor the case.

20.2 ●Failure symptom

When the tester is supposed to be faulty, please check the following points before requesting the repair of it.

Symptom	Check points
Although the power is turned ON, display does not light up.	<ul style="list-style-type: none"> Isn't the power supply plug of socket? Isn't the fuse burnt out? Replace fuse referring to the art. 20.3 (P68).
<i>Err LOCK</i> is displayed.	<ul style="list-style-type: none"> Interlock functions. Cancel the interlock referring to the art. 14.3 (P60).
Key is not operable.	<ul style="list-style-type: none"> Isn't the KEY LOCK lamp lit up? Cancel the key lock referring to the art. 7.3 (P17)
Test can not be started, though START switch is pressed.	<ul style="list-style-type: none"> Isn't the READY lamp lit up? Isn't the REMOTE lamp lit up? START switch is disabled during the remote control. Refer to the article 13 (P55) for remote control.

20.3 ●Replacement of fuse

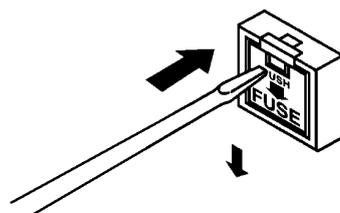
When the fuse is replaced, make sure to use one of the rated fuses listed below.
The fuse rated at 7A is attached as one of accessories.

Sort	Power source voltage	Rate of fuse
Standard	100V AC	125V 7A
	115V AC	
Option	200V AC	250V 4A
	220V AC	
	240V AC	

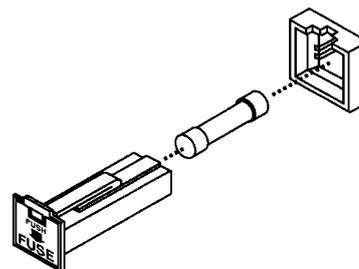
Do not use the fuse other than those rated above.

Procedure to replace fuse

- ① Turn OFF the **POWER** switch ① and pull out the power supply cable.
- ② Insert the screwdriver into the square hole of the fuse socket ⑮ on the rear panel and, pushing it downward, remove the fuse box.
- ③ Replace the fuse with the rated one.
- ④ Insert the fuse box.



(Fig.1)



(Fig.2)

21. Specifications

1. Withstanding voltage test section

1.1 Test voltage

- (1) Applied voltage 0~2.5kV / 0~5kV AC
- (2) Output capacity 500VA (5kV, 100mA) at the power source voltage 100V AC.
For the output current 50mA or higher, 30 min. or less continuously.
- (3) Wave shape Shape of commercial power source.
- (4) Voltage fluctuation rate 15% or less
(with the rated power source voltage and at no load ⇒ max. load)
- (5) Voltage output system Zero-cross throw switch.
- (6) Setting of output voltage Manual setting by volt slider.

1.2 Voltage measurement

- (1) Rectification system Effective average rectification value display.
- (2) Analog
 - Scale 0~5kV AC
 - Accuracy ±5% of F.S
- (3) Digital
 - Measuring range 0.00~6.00kV AC, 3 digits green LED, character height 10mm.
 - Accuracy ±1.5% of F.S (F.S 2.5kV/5kV)
 - Voltage display Voltage applied to the high voltage terminal is displayed during the test. Voltage at the judgement is retained at the finish of the test.

1.3 Current measurement

- (1) Rectification system Effective average rectification value display.
- (2) Measuring range 0.01~199.9mA (2 ranges, joint change-over with high limit value)
- (3) Display Digital display in 3 1/2 digits, green LED, character height 10mm.
- (4) Resolution 0.01mA (0.1~9.9mA) Note: () shows high limit set value.
0.1mA (10.0~110.0mA)
- (5) Measuring accuracy ±(5%+20 μ A) of high limit set value.
- (6) Current display Leak current value is displayed during the test.
Leak current value at the judgement is retained at the finish of the test (at NG of withstanding voltage or, I-W, W test mode).

1.4 Judgement of test result

- (1) Judgement system
 - High limit Analog and digital comparator.
 - High and low limit Digital comparator.
- (2) Adjustable range
 - High limit 0.1~110.0mA
(low limit + 1 digit or more), resolution 0.1mA.
 - Low limit 0.1~109.0mA
(high limit - 1 digit or less), resolution 0.1mA
 - Note:** Low limit setting can be ON/OFF (Judgement function: OFF, [LOW SET] LED is turned off.)
- (3) Judgement condition
 - High limit value > Leak current > Low limit value ... GOOD
(W-GOOD LED lit up, output ON)
 - High limit value ≤ Leak current NG
(W-HIGH LED lit up, output ON)
 - Low limit value ≥ Leak current NG
(W-LOW LED lit up, output ON)
 - Note:** Output time of GOOD judgement can be switched to continuous or 0.2s.

For the AC withstanding voltage testers, the leak current due to the capacity distribution in the high voltage cable, jig and so on can cause the judgement error.

Please determine the judgement criterion value, taking this leak current into account.

The following values are the referential values on condition that the wiring is made, keeping the distance between HIGH voltage side cable (red) and LOW voltage side cable (black) of the attached high voltage cable (5880-25-020).

Output voltage	1kV	2kV	3kV	4kV	5kV
Leak current	10 μ A	20 μ A	30 μ A	37 μ A	47 μ A

1.5 Test time

- (1) Adjustable range 0.5~999s, with time off function.
- (2) Setting resolution 0.1s (0.5~99.9s) / 1s (100~999s)
- (3) Time display 0.0~999, 3 digits green LED, character height 8mm
During the test With timer ON Remaining time is displayed.
With timer OFF Time lapse is displayed.
- (4) Accuracy ±20ms (0.5~99.9s) / ±200ms (100~999s)

4. Input/output signal
- (1) Judgement system High and low limit digital comparator.
 - (2) Connector 36P Anphenol connector on the rear panel.
 - (3) Output signal Open collector 30V DC, 30mA MAX
 - (4) Name of output signal
 - TEST In test.
 - END Finish.
 - TEST/H.V. ON High voltage is output.
 - READY In waiting.
 - W-TEST In operation of withstanding voltage test.
 - I-TEST In operation of insulation resistance test.
 - GOOD At good judgement (0.2s / continuous changeable).
 - NG At NG judgement (continuous)
 - W HIGH At NG judgement of withstanding voltage test for high limit (continuous).
 - W LOW At NG judgement of withstanding voltage test for low limit (continuous).
 - W GOOD At GOOD judgement for withstanding voltage test.
 - I HIGH At NG judgement of insulation resistance test for high limit (continuous).
 - I LOW At NG judgement of insulation resistance test for low limit (continuous).
 - I GOOD At GOOD judgement for insulation resistance test.
 - PROTECTION When the protective function is activated.
 - (5) Power source for output/input signal 24V DC, 0.1A
 - (6) Input signal H=16.8~24V, L0~3.8V
Ic=10mA, L level minimum pulse width=40ms
 - (7) Name of input signal
 - START
 - STOP
 - REAR:ON
 - INTER LOCK
 - W-MODE
 - I-MODE
 - REAR:MODE

REMOTE I/O connector

Signal name	Pin No.		Signal name
+24V	1	19	COM
REAR:ON	2	20	REAR:MODE
START	3	21	W-MODE
STOP	4	22	I-MODE
INTERLOCK	5	23	COM
MEM SET1	6	24	W-TEST
MEM SET2	7	25	I-TEST
MEM SET4	8	26	TEST
MEM SET8	9	27	NC
TEST/H.V. OUT	10	28	END
READY	11	29	NC
PROTECTION	12	30	NC
GOOD	13	31	NG
W HIGH	14	32	W LOW
W GOOD	15	33	NC
I HIGH	16	34	I LOW
I GOOD	17	35	NC
NC	18	36	COM

5. Status output

The relay contact is output when the output condition set from the front panel.

Contact configuration : 1a contact.
 Contact capacity : 250V AC / 1A (30V DC / 1A) Resistive load
 Setting condition : 1) TEST/H.V. OUT 5) READY
 (Plural numbers of the 2) TEST 6) REMOTE
 condition selectable) 3) GOOD 7) POWER ON
 4) NG

6. Voltage monitor output

Monitor output for output voltage of withstanding voltage test.

Output terminal : One piece each of red and black Johnson terminal on the rear panel.
 Output voltage : 0~5V DC (to 0~5kV AC)
 Tolerance : ±1.5% of F.S

7. RS-232C interface

Setting of the test condition and take in of the test result data can be done by P/C and so on.

Connector : D-sub 9P
 Transmission system : Start-stop synchronous duplex transmission
 Transmission speed : 9600bps
 Data length : 8bit
 Parity : Nil

8. Remote control

The remote control listed below is possible by and through REMOTE connector (DIN5P) on the front panel, REMOTE terminal or REMOTE/OUT connector on the rear panel.

- (1) START
- (2) STOP

Start of test.

Interruption of the test and the reset of judgement.

In case that the remote control is done from the REMOTE connector on the front panel, it is necessary to connect the optional remote control box (5858-07).

It is also possible to remote control with no-voltage contact or logic element from the REMOTE terminal or REMOTE/OUT connector on the rear panel.

When the remote control is done, REAR:ON is to be short-circuited. REMOTE is displayed when remote controlled. Start switch on the front panel is not operable.

- (3) W-MODE
- (4) I-MODE

Withstanding voltage test mode (REMOTE/OUT connector pin 21)

Insulation resistance test mode (REMOTE/OUT connector pin 22)

When the remote control is done from the connector on the rear panel, make a short-circuit between REAR:MODE and COM.

The test mode set on the front panel becomes ineffective and the mode selected on the rear panel becomes effective.

- (5) Memory read-out

The test is performed by the condition memorized in the memory.

It is possible to do the test by the condition of the memory selected by REMOTE/OUT connector (MEM SET).

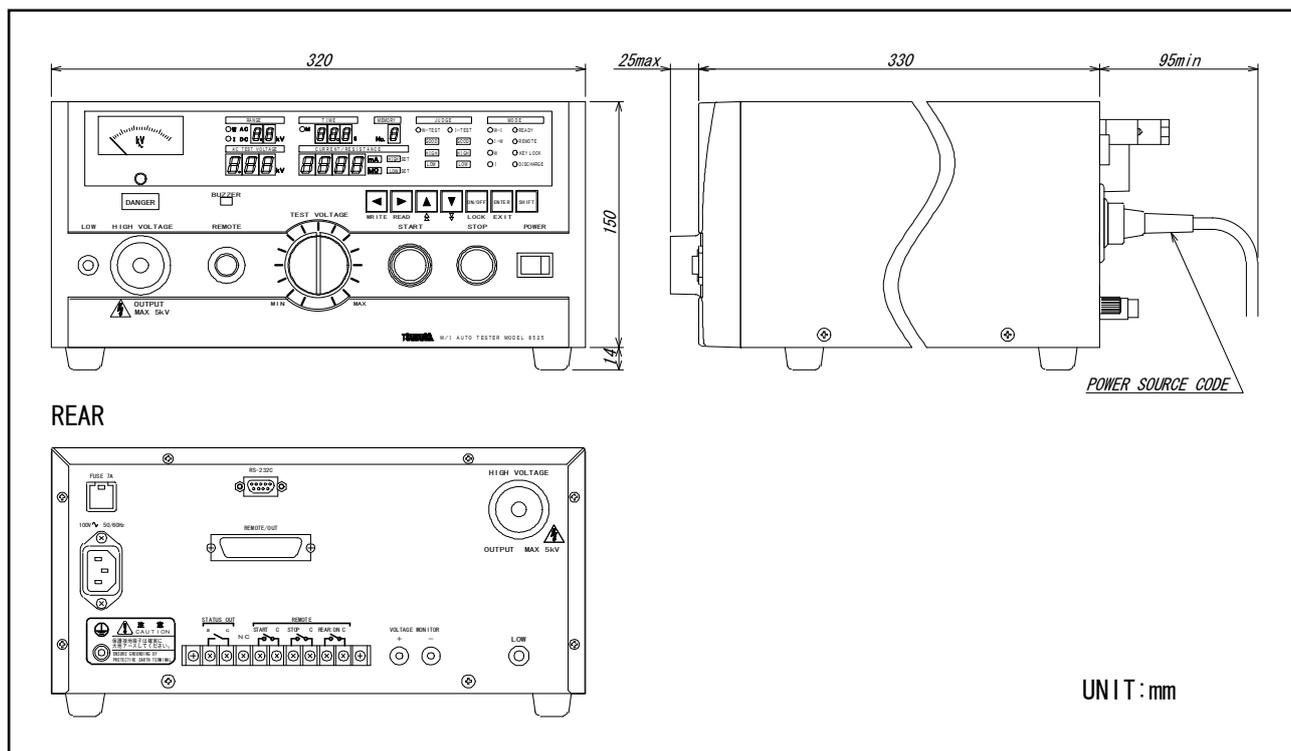
When this function is actuated, no change of the setting is allowed (unable to enter the setting mode).

9. Other functions
- (1) Interlock Locking condition when the lock PIN on the rear connector is open. When locked, *ERR LOCK* is displayed.
 - (2) Memory function 9 kinds of setting content (test mode, voltage range, referential voltage, high and low limit of leak current and test time of the withstanding voltage test, and voltage range, high and low limit value, test time, mask timer time and to activate or not discharging function of the insulation resistance test) are memorized. When the memory is written in or read out, the memory No.1~9 is displayed.
 - (3) Referential voltage Test is started when the voltage set by the slider is within $\pm 5\%$ of the set value.
Note: When the set voltage is 1000V or less, it is within $\pm 50V$ (± 5 digit). In case that the voltage comes out of the set value, the test is stopped and [W-HIGH], [W-LOW](NG) LED are lit up. (The function can be turned ON/OFF. When turned OFF, *OFF* is displayed on the voltage display at the time of setting and in READY.)
 - (4) Key lock When locked, operation of the switches other than start and stop is disabled.
(KEY LOCK lamp is displayed at locking)
 - (5) Buzzer adjustment Sound volume is individually adjustable (mute-able) for GOOD, NG. Setting is made on the front panel.
 - (6) Special mode
 - ① Double action start function
Within 0.5 second after the stop signal having been input, the test starts by input of start signal.
 - ② GOOD hold function
“GOOD” judgement is continuously output until the stop signal is input. When the setting is OFF, returns to “READY” mode after outputting for about 0.2 sec.
 - ③ Momentary start function
The test is done only when the start signal is input.
 - ④ FAIL mode function
NG judgement and PROTECTION action by the stop signal of remote control are disabled, and only the resetting by the stop switch on the tester main unit is enabled.
10. General specifications
- (1) Power supply 100V AC 50/60Hz
 - (2) Range of source power supply 90~110V AC
 - (3) Power consumption Approx. 650VA at rated load of withstanding voltage test, approx. 16VA with no load (READY)
 - (4) Operating ambient temp. 0~40°C
 - (5) Operating ambient hum. 20~80%RH
 - (6) Storage temp. and hum. -20~70°C, 90%RH or less (no dew)
 - (7) Withstanding voltage Power source – Outer housing 1000V AC for 1 minute
 - (8) External dimensions 320(W) × 150(H) × 330(D)mm
 - (9) Weight Approx. 15 kg.
(Increased by about 5.5 kg. for non-standard power source voltage.)
 - (10) Accessories

High voltage cable 2m	1 pair
Earth wire 3m	1 piece
Power supply cord 2.5m	1 piece (with 3P→2P adapter plug)
REMOTE I/O plug	1 piece (36P)
Miniature fuse 7A	1 piece
Instruction manual	1 copy
Interface manual	1 copy
 - (11) Optional accessories

Remote control box	Model 5858-07
Both-hands remote control box	Model 5858-07W
Foot switch	Model 5858-04
Communication cable (RS-232C cable, 9 pins – 9 pins / 1.8m)	Model 5881-11-018
Rack mount bracket	Model 5871-03-014
Relay unit	Model 5858-08
11. Optional specification (factory option, to be designated at ordering)
- Non-standard power Power source voltage 115V, 200V, 220V and 240V AC is available.

12. External dimensions



Contact Information	
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RS-232C Interface for Model 8525

Instruction Manual

TSURUGA ELECTRIC CORPORATION

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1. Specifications

The model 8525 is provided standard with the RS-232C interface for communication, which allows to the remote control and the output of various data by a personal computer.

[Note] There are many types of equipment on “host” side such as personal computer, sequencer and so on. In this manual, all these equipment are represented by the word “host”.

○Content operable with RS-232C interface.

Table 1.1

Function	Content
Setting / Operation	<ul style="list-style-type: none"> ●Test action mode ●Each test condition ●Memory No. ●Buzzer sound
Output	<ul style="list-style-type: none"> ●Test action mode ●Each test condition ●Each test result ●Status ●Memory No. ●Buzzer sound

[Note] ON/OFF of supply power source, change of test voltage by a volt slider, setting of special test mode and status output condition are not possible to do.

○Specifications

Table 1.2 Specifications

Transmission system	Start-stop synchronous duplex transmission
Transmission speed	9600bps
Data bit length	8 bit
Stop bit	1 bit
Parity bit	Nil
Delimiter	CR+LF
Xon/Xoff	Nil
Receiver buffer length	256 bites
Connector	D-sub 9 pin (male)

○Priority of remote control

Item	Setting of remote control	Priority
A	RS-232C connector (rear panel)	1
B	REMOTE connector (front panel)	2
C	REMOTE / OUT connector (rear panel)	3
D	REMOTE terminal (rear panel)	3

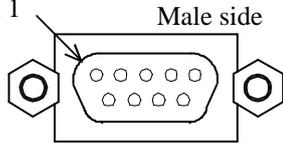
○Cautions when the power source is thrown in again after use of RS-232C.

When the power is turned OFF, the content other than those set by the memory, such as the memory number display, keylock, remote etc., return to the condition before being set by the RS-232C.

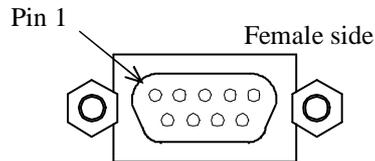
2. Connection

2.1 ● Connectors and signals

8525
connector
D-sub 9 pin
Pin 1



Connector: D-sub 9 pin plug type



Recommended connector : XM2D-0901 (OMRON)
Recommended lock screw : XM2S-0913 (OMRON) Inch screw

Note) Connector and cable for external connection,
Model 5881-11-018, 9 pins – 9 pins/1.8m (option),
are also provided.

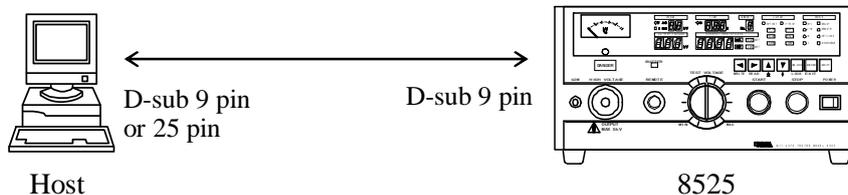
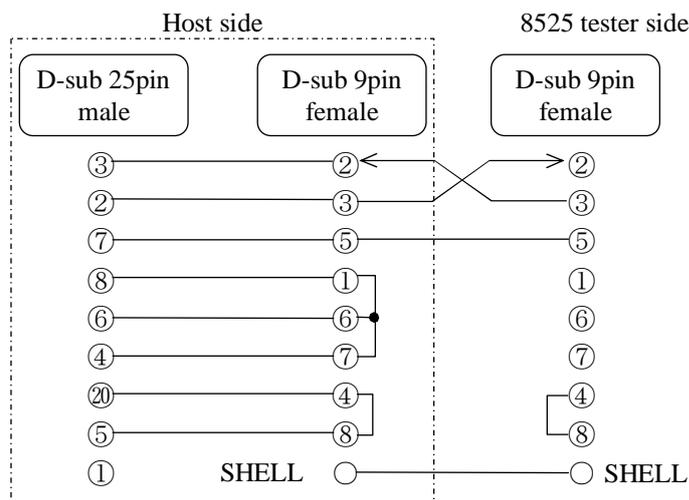
Pin No.	Tester signal JIS (RS-232C)	Direction	Name
①	NC		Not in use
②	RD (RXD)	←Host	Receiving data
③	SD (TXD)	→Host	Transmission data
④	ER (DTR)	←Host	Data terminal ready
⑤	SG (GND)		Ground for signal
⑥	NC		Not in use ※1
⑦	RS (RTS)	←Host	Request for transmission
⑧	CS (CTS)	→Host	Transmittable
⑨	NC		Not in use ※2

※1 Host side is DR (DSR) data set ready.

※2 Host side is RI

2.2 ● Connection with host (reference)

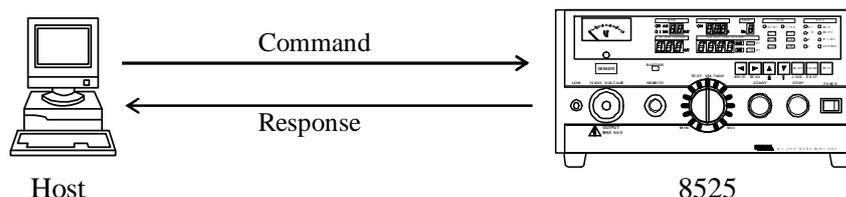
No hardware handshake.



Make a connection of 8525 and host by cable.

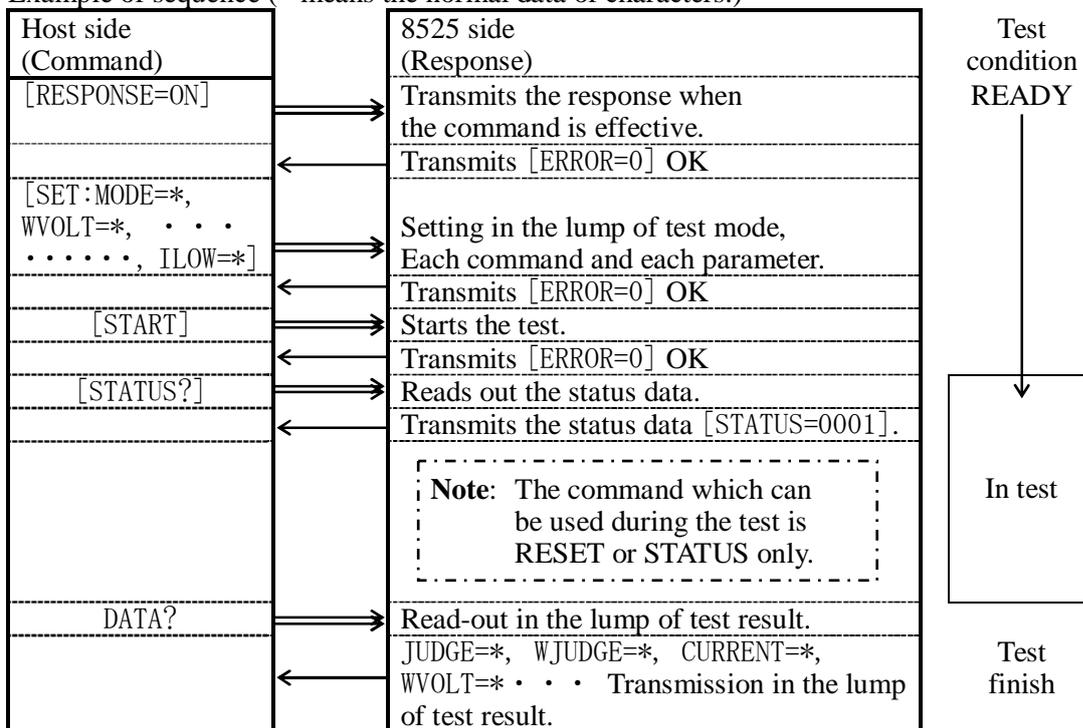
3. Explanation of communication method

3.1 ● Communication method for command

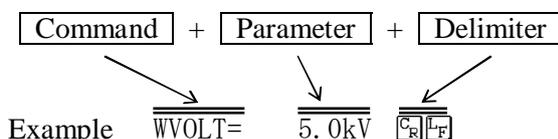


Command is sent from the host.
 When the 8525 received the effective command, it makes the corresponding transaction.
 After completion of transaction, a response is transmitted to the host.
 The host transmits the next command after confirming the response.

Example of sequence (* means the normal data of characters.)



Ⓐ Configuration of command



1. Command The command to control 8525.
It does not a matter whether the command is in capital or small letter.
2. Delimiter It means the division of transmission data.
3. JIS 8 bit code is used for the command, parameter and delimiter.
4. Command and parameter is divided by “=”.
5. In case that there is no parameter, transmit the delimiter following the command.
Example: RESET C_RL_F
6. 8525 responses even if a unit is not included in the parameter.

Ⓙ Caution at the transmission of command

Transmit the set command (○○○○=) when the 8525 is in READY status.
 When the set command is transmitted from the host during the test, 8525 transmits an error to the host.

B Configuration of command

When the host transmits the command to 8525, 8525 analyzes and transact the command, and transmits the response to the host.

In case that the command transmission is unconformable, 8525 transmits an error code to the host.

Also provided on 8525 is the **Response Setting** to set whether or not to transmit the normal response from 8525 when the received transmission of command is normal.

[Refer to the article 4.2.7 (P12) RESPONSE.]

[When the Response Setting is turned ON]

- For the effective setting and operation command, 8525 certainly transmits ERROR=0 to the host.

Example 3.1 In case of effective command START $\begin{matrix} \text{C}_R \\ \text{L}_F \end{matrix}$,

Response is: ERROR=0 $\begin{matrix} \text{C}_R \\ \text{L}_F \end{matrix}$

Example 3.2 In case of effective command WTIMER=60.0s $\begin{matrix} \text{C}_R \\ \text{L}_F \end{matrix}$,

Response is: ERROR=0 $\begin{matrix} \text{C}_R \\ \text{L}_F \end{matrix}$

The test time of withstanding voltage test is set to 60.0s.

- For the ineffective setting and operation command, 8525 certainly transmits ERROR=code to the host.

Example 3.3 In case of ineffective command RST $\begin{matrix} \text{C}_R \\ \text{L}_F \end{matrix}$ (incorrect spell of the test stop command)

Response is: ERROR=Error No $\begin{matrix} \text{C}_R \\ \text{L}_F \end{matrix}$

[When the Response Setting is turned OFF]

- 8525 does not transmit ERROR=0 to the effective setting and operation command.

Example 3.4 In case of effective command START $\begin{matrix} \text{C}_R \\ \text{L}_F \end{matrix}$,

No response is transmitted.

Example 3.5 In case of effective command WTIMER=60.0s $\begin{matrix} \text{C}_R \\ \text{L}_F \end{matrix}$,

No response is transmitted.

- For the ineffective setting and operation command, 8525 certainly transmits ERROR=code to the host, regardless of ON/OFF of Response Setting. Same as Example 3.3.

3.2 ● Basic format of read-out command

When the “?” is added to the command letters sent from the host, 8525 transacts it as read-out command. To the read-out command, 8525 adds “=parameter” to the command letters and transmits it to the host.

Command from the host side : Command letters?
 Response from 8525 to the host : Command letters=parameter
 In case of error, 8525 transmits the error code to the host.
 Refer to the **article 5 (P34) Error codes and hits to solve**.

Example 3.6 Command : ILOW?
 Reads out the low limit value of resistance of insulation resistance test.
 Response is : ILOW=10.0MOHM

3.3 ● Basic format of setting and operation

- When the “=” is added to the letters of setting command from the host side, 8525 transacts it as setting command.
- “=” is not necessary for the operation command START and RESET.

Setting command from the host side : Command letters=
 Operating command from the host side : Command letters

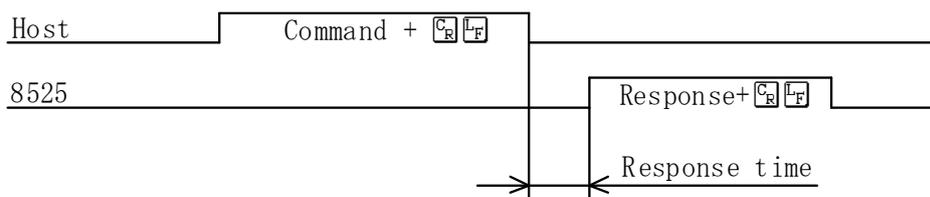
Example 3.7 In case of setting command
 Effective command : MODE=WI Test mode is set to W-I
 Response : ERROR=0 When Response Setting is ON.
 Response : No response When Response Setting is OFF.
 In case of error, the error code is transmitted to the host.

Example 3.8 In case of operation command
 Effective command : In case of START Starts the test.
 Response : ERROR=0 When Response Setting is ON.
 Response : No response When Response Setting is OFF.
 In case of error, the error code is transmitted to the host.

4. Explanation of command

4.1 Table of command

Function		Setting / read-out	Approx. response time (ms) (Note)	Explanation page
ON/OFF selection of remote control		REMOTE=/REMOTE?	23/19	9
Keylock		KEYLOCK=/KEYLOCK?	27/23	10
ON/OFF selection to suffix command name and unit to the transmission to the host		FORMAT=/FORMAT?	27/23	11
ON/OFF selection of response		RESPONSE=/RESPONSE?	32/24	12
Test mode		MODE=/MODE?	17/15	13
Start of test	Setting only	START	10~15	14
Stop of test and judgement reset	Setting only	RESET	10~15	14
Read-out of status	Read-out only	STATUS?	5~13	15
Read-out of tester identification	Read-out only	IDNT?	12	16
Withstand- ing voltage test	Test voltage range	WVOLT=/WVOLT?	19/15	16
	Referential voltage	WLEVEL=/WLEVEL?	28/16	17
	High limit of leak current	WHIGH=/WHIGH?	25/16	18
	Low limit of leak current	WLOW=/WLOW?	32/15	19
	Test time	WTIMER=/WTIMER?	29/26	20
Insulation resistance test	Test voltage range	IVOLT=/IVOLT?	19/16	21
	High limit of resistance value	IHIGH=/IHIGH?	32/14	22
	Low limit of resistance value	ILOW=/ILOW?	29/12	23
	Mask time	IMASK=/IMASK?	30/18	24
	Test time	ITIMER=/ITIMER?	25/18	25
	Discharge function	DISCHARGE=/DISCHARGE?	32/27	26
Read-out of judgement result	Read-out only	JUDGE?	20	27
Read-out in the lump of test result and data	Read-out only	DATA?	16	28
Parameter of test condition		SET:/SET:?	340/30	30
Change-over of memory No.		MEMORY=/MEMORY?	32/14	31
Parameter of test condition including memory No.	□:1~9	MEM□:/MEM□:?	420/20	32
Buzzer sound volume		BUZZ=/BUZZ?	23/15	33



Note: The response time mentioned in the table is the referential value and may vary depending upon the condition of use. It is not to warrant the performance of 8525.

4.2 ● Explanation of each command

4.2.1 REMOTE= (setting of remote control)

Function	By setting the remote control, REMOTE lamp is lit up and the tester enters in the keylock status (KEYLOCK lamp lit up).
Structure	REMOTE=[ON/OFF]
ON	: Becomes the status of remote control by the host. Keylock setting is also turned "ON" without condition. Keylock can be cancelled in the remote control status. Refer to the KEYLOCK=OFF command.
OFF	: Cancels the remote control status. Setting for the keylock at that time is retained.
Transmission	
REMOTE=ON C_R L_F	Makes the remote control setting ON.
REMOTE=OFF C_R L_F	Makes the remote control setting OFF.
Response	When 8525 received the effective command setting.
ERROR=0 C_R L_F	When the Response Setting is ON.
No response	When the Response Setting is OFF.

4.2.2 REMOTE? (read-out of setting of remote control)

Function	Reads out whether the setting of remote control is ON or OFF.
Structure	REMOTE?
Transmission	
REMOTE? C_R L_F	
Response	
REMOTE=ON C_R L_F	When the remote control setting ON is read out.
REMOTE=OFF C_R L_F	When the remote control setting OFF is read out.

4.2.3 KEYLOCK= (setting of keylock)

Function Lock or cancel the key operation on the front panel (KEYLOCK lamp lit up).

Structure KEYLOCK=**ON/OFF**

ON : Becomes keylock status.

OFF : Cancels the keylock status.

Transmission

KEYLOCK=ON **C_R****L_F**

KEYLOCK=OFF **C_R****L_F**

Response When 8525 received the effective command setting.

ERROR=0 **C_R****L_F** When the Response Setting is ON.

No response When the Response Setting is OFF.

Note: When the KEYLOCK=ON is set, the keylock can not be cancelled by key operation. In order to turn it OFF, make the KEYLOCK=OFF command or turn OFF the power supply.

4.2.4 KEYLOCK? (read-out of keylock status)

Function Reads out ON or OFF of the keylock setting.

Structure KEYLOCK?

Transmission

KEYLOCK?**C_R****L_F**

Response

KEYLOCK=ON **C_R****L_F** When the keylock setting ON is read out.

KEYLOCK=OFF **C_R****L_F** When the keylock setting OFF is read out.

Note: The status set by the switch on the tester main unit can not be read out. When the KEYLOCK lamp is lit up with KEYLOCK=OFF **C_R****L_F**, cancel it by the switch on the tester main unit.

4.2.5 FORMAT= (setting of response format)

- Function Command name and unit can be added to the response sent to the host.
- Structure FORMAT=ON/OFF
- ON : Adds command name and unit to the data sent to the host.
- OFF : Does not add command name and unit to the data sent to the host.
- Transmission
- FORMAT=ON C_RL_F Adds command name and unit to the response.
- FORMAT=OFF C_RL_F Does not add command name and unit to the response.
- Response When 8525 received the effective command setting.
- ERROR=0 C_RL_F When the Response Setting is ON.
- No response When the Response Setting is OFF.

4.2.6 FORMAT? (read-out of response format)

- Function Reads out whether the setting of response format is ON or OFF.
- Structure FORMAT?
- Transmission
- FORMAT?C_RL_F
- Response
- FORMAT=ON C_RL_F Setting of response format is ON.
- FORMAT=OFF C_RL_F Setting of response format is OFF.

⚠ CAUTION

**In this instruction manual, the explanations are made provided that
FORMAT=ON for comprehension.**

4.2.7 RESPONSE= (setting of response)

Function When 8525 received the effective command, it informs the host that the command is normally received. This communication function can be set to ON or OFF.

Structure RESPONSE=**ON/OFF**

ON : Always transmits the response.
When 8525 receives the effective command, it transmits to the host ERROR=0.
For the ineffective command, it transmits ERROR=**No**.

OFF : 8525 does not transmit the response to the host even if the effective command is received.
When the command is ineffective, ERROR=**No** is transmitted regardless of ON/OFF of the Response Setting.

Transmission

RESPONSE=ON **C_RL_F** Makes the response setting ON.

RESPONSE=OFF **C_RL_F** Makes the response setting OFF.

Response When 8525 received the effective command setting.

ERROR=0 **C_RL_F** When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.8 RESPONSE? (read-out of setting of response)

Function Reads out whether the setting of response is ON or OFF.

Structure RESPONSE?

Transmission

RESPONSE?**C_RL_F**

Response

RESPONSE=ON **C_RL_F** Setting of response is ON.

RESPONSE=OFF **C_RL_F** Setting of response is OFF.

4.2.9 MODE= (setting of test mode)

Function Makes the setting of test mode.

Structure MODE=**Parameter**

Parameter

- WI : Automatic sequential test mode, withstanding voltage test → insulation resistance test.
- IW : Automatic sequential test mode, insulation resistance test → withstanding voltage test.
- W : Single test mode of withstanding voltage test
- I : Single test mode of insulation resistance test

Transmission

MODE=WI

Test mode is set to automatic sequential test mode of WI (withstanding voltage test → insulation resistance test).

Response When 8525 received the effective command setting.

ERROR=0 When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.10 MODE? (read-out of test mode)

Function Reads out the test mode being set.

Structure MODE?

Transmission

MODE?

Response

MODE=I When the test mode setting I, insulation resistance test is read out.

4.2.11 START= (start of test)

Function Starts the test.

Note: When the setting on 8525 main unit side of the special test mode - GOOD hold function is \overline{L} , re-start with START command is also possible.

Structure START

Transmission

START $\overline{C_R} \overline{L_F}$

Response When 8525 received the effective command setting.

ERROR=0 $\overline{C_R} \overline{L_F}$ When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.12 RESET (stop of test, judgement reset)

Function Stops the test.
When the command is transmitted in the condition that the judgement is being out, the display and the contact are turned OFF.

Structure RESET

Transmission

RESET $\overline{C_R} \overline{L_F}$

Response

ERROR=0 $\overline{C_R} \overline{L_F}$ When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.13 STATUS? (read-out of status)

Function Reads out the status of 8525.
 It corresponds to the open collector output of **REMOTE/OUT** connector ⑩ (refer to the instruction manual of 8525 main unit).
Note: It has no relation with the relay output of **STATUS OUT** terminal on the rear of 8525 under **Setting of condition for status output** (refer to P63 of instruction manual of the tester main unit).

Structure STATUS?

Transmission

STATUS? $\text{C}_R \text{L}_F$

Response

STATUS= $\square \square \square \square \text{C}_R \text{L}_F$

\square : Numeral in 4 digits (Hexadecimal notation)

[Example]

STATUS=0005 $\text{C}_R \text{L}_F$ In test.
 HVOUT, TEST are being output.
 STATUS=2442 $\text{C}_R \text{L}_F$ At the finish of test.
 I-GOOD, W-GOOD, GOOD, END are being output.

●Kinds of parameter

Name of output	Condition of output	Weight of data (Hexadecimal digit)
TEST	In the course of test.	0001
END	Finish of test.	0002
TEST/H. V. OUT	High voltage being output.	0004
READY	In waiting	0008
W-TEST	In the course of withstanding voltage test.	0010
I-TEST	In the course of insulation resistance test.	0020
GOOD	Total judgement passed.	0040
NG	Total judgement failed.	0080
W-HIGH	Withstanding voltage test failed for high limit of leak current.	0100
W-LOW	Withstanding voltage test failed for low limit of leak current.	0200
W-GOOD	Withstanding voltage test passed.	0400
I-HIGH	Insulation resistance test failed for high limit of resistance.	0800
I-LOW	Withstanding voltage test failed for low limit of resistance.	1000
I-GOOD	Insulation resistance test passed.	2000
PROTECTION	Protective circuit is activated. Note-1	4000

Note-1: "Protective circuit is activated" means that the tester is in the status of interlock, error display and etc.

4.2.14 IDNT? (read-out of tester identification)

Function Reads out the model name, software version of the tester.

Structure IDNT?

Transmission

IDNT?RF

Response When 8525 received the effective command setting.

IDNT=TSURUGA_8525_ROM-NO. 421_Ver. 1. 02. 00 RF
 ① ②

① Model name

② Software version

(For improvement of quality, the software version might have been updated.)

4.2.15 WVOLT= (setting of test voltage range of withstanding voltage test)

Function Makes the setting of test voltage range of withstanding voltage test.

Structure WVOLT=

2.5kV or 5.0kV is to be set

Transmission

WVOLT=5.0kV RF Sets the range of withstanding voltage test at 5.0kV.

Response When 8525 received the effective command setting.

ERROR=0 RF When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.16 WVOLT? (read-out of test voltage range of withstanding voltage test)

Function Reads out the test voltage range of withstanding voltage test.

Structure WVOLT?

Transmission

WVOLT?RF

Response

WVOLT=2.5kV RF Indicates the test voltage range of withstanding voltage test 2.5kV.

4.2.17 WLEVEL= (setting of referential voltage of withstanding voltage test)

- Function Makes the setting of referential voltage of withstanding voltage test.
- Structure WLEVEL=Referential voltage
- Referential voltage OFF or 0.00~5.00kV is to be set.
- Transmission
- WLEVEL=1.50kV CRLF Sets the referential voltage of withstanding voltage test at 1.50kV.
- Response When 8525 received the effective command setting.
- ERROR=0 CRLF When the Response Setting is ON.
- No response When the Response Setting is OFF.

4.2.18 WLEVEL? (read-out of referential voltage of withstanding voltage test)

- Function Reads out the referential voltage of withstanding voltage test.
- Structure WLEVEL?
- Transmission
- WLEVEL?CRLF
- Response
- WLEVEL=1.50kV CRLF Indicates the referential voltage of withstanding voltage test 1.50kV.

4.2.19 WHIGH= (setting of high limit of leak current)

Function Makes the setting of high limit of leak current of withstanding voltage test.

Structure WHIGH=**High leak current**

High leak current 0.1~110.0mA is to be set.

Note: Set value of high leak current can not be lower than low limit value of leak current.

Transmission

WHIGH=10.0mA Sets the high limit of leak current of withstanding voltage test at 10.0mA.

Response When 8525 received the effective command setting.

ERROR=0 When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.20 WHIGH? (read-out of high limit value of leak current)

Function Reads out the high limit value of leak current of withstanding voltage test.

Structure WHIGH?

Transmission

WHIGH?

Response

WHIGH=10.0mA Indicates the high limit of leak current of withstanding voltage test 10.0mA.

4.2.21 WLOW= (setting of low limit of leak current)

Function Makes the setting of low limit of leak current of withstanding voltage test.

Structure WLOW=[Low leak current]

[Low leak current] OFF or 0.0~109.0mA is to be set.

Note: Set value of low leak current can not be higher than high limit value of leak current.

Transmission

WLOW=2.0mA Sets the low limit of leak current of withstanding voltage test at 2.0mA.

Response When 8525 received the effective command setting.

ERROR=0 When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.22 WLOW? (read-out of low limit value of leak current)

Function Reads out the low limit value of leak current of withstanding voltage test.

Structure WLOW?

Transmission

WLOW?

Response

WLOW=2.0mA Indicates the low limit of leak current of withstanding voltage test 2.0mA.

4.2.23 WTIMER= (setting of test time of withstanding voltage test)

Function Makes the setting of test time of withstanding voltage test.

Structure WTIMER=**Test time**

Test time OFF or 0.5~999sec. is to be set.

Transmission

WTIMER=60.0s Sets the test time of withstanding voltage test at 60.0sec..

Response When 8525 received the effective command setting.

ERROR=0 When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.24 WTIMER? (read-out of test time of withstanding voltage test)

Function Reads out the test time of withstanding voltage test.

Structure WTIMER?

Transmission

WTIMER?

Response

WTIMER=10.0s Indicates the test time of withstanding voltage test 10.0sec..

4.2.25 IVOLT= (setting of test voltage range of insulation resistance test)

Function Makes the setting of test voltage range of insulation resistance test.

Structure IVOLT=**Test voltage range**
 Test voltage range 0.5kV or 1.0kV is to be set.

Transmission
 IVOLT=1.0kV **C_RL_F** Sets the range of insulation resistance test at 1.0kV.

Response When 8525 received the effective command setting.

ERROR=0 **C_RL_F** When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.26 IVOLT? (read-out of test voltage range of insulation resistance test)

Function Reads out the test voltage range of insulation resistance test.

Structure IVOLT?

Transmission

IVOLT?**C_RL_F**

Response

IVOLT=0.5kV **C_RL_F** Indicates the test voltage range of insulation resistance test 0.5kV.

4.2.27 IHIGH= (setting of high limit of resistance value)

Function Makes the setting of high limit of resistance value of insulation resistance test.

Structure IHIGH=**High limit of resistance value**

High limit of resistance value OFF or 0.2MOHM~2000MOHM is to be set.

Note: High limit value of resistance can not be lower than the low limit value of resistance.

Transmission

IHIGH=100.00HM $\text{C}_R \text{L}_F$... Sets the high limit value of resistance of insulation resistance test at 100.0MΩ.

Response When 8525 received the effective command setting.

ERROR=0 $\text{C}_R \text{L}_F$ When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.28 IHIGH? (read-out of high limit of resistance value)

Function Reads out the high limit of resistance value of insulation resistance test.

Structure IHIGH?

Transmission

IHIGH? $\text{C}_R \text{L}_F$

Response

IHIGH=100.0MOHM $\text{C}_R \text{L}_F$.. Indicates the high limit value of resistance of insulation resistance test 100.0MΩ.

4.2.29 ILOW= (setting of low limit of resistance value)

Function Makes the setting of low limit of resistance value of insulation resistance test.

Structure ILOW=**Low limit of resistance value**

Low limit of resistance value 0.1MOHM~1999MOHM is to be set. It can not be set to OFF.

Note: Low limit value of resistance can not be higher than the high limit value of resistance.

Transmission

ILOW=0.2MOHM ... Sets the low limit value of resistance of insulation resistance test at 0.2MΩ.

Response When 8525 received the effective command setting.

ERROR=0 When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.30 ILOW? (read-out of low limit of resistance value)

Function Reads out the low limit of resistance value of insulation resistance test.

Structure ILOW?

Transmission

ILOW?

Response

ILOW=2.0MOHM Indicates the low limit value of resistance of insulation resistance test 2.0MΩ.

4.2.31 IMASK= (setting of mask time of insulation resistance test)

Function Makes the setting of mask time (mask timer) of insulation resistance test.

Structure IMASK=**Mask time**

Mask time 0.3~50.0sec. is to be set. It can not be set to OFF.

Note: Mask time can not be set longer than test time (ITIMER).

Transmission

IMASK=5.0s Sets the mask time of insulation resistance test at 5.0sec..

Response When 8525 received the effective command setting.

ERROR=0 When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.32 IMASK? (read-out of mask time of insulation resistance test)

Function Reads out the mask time of insulation resistance test.

Structure IMASK?

Transmission

IMASK?

Response

IMASK=0.5s Indicates the mask time of insulation resistance test 0.5sec..

4.2.33 ITIMER= (setting of test time of insulation resistance test)

Function Makes the setting of test time of insulation resistance test.

Structure ITIMER=[Test time]

Test time OFF or 0.5~999 sec. is to be set.

Note: Test time can not be set shorter than mask time (IMASK).

Transmission

ITIMER=60.0s Sets the test time of insulation resistance test at 60.0sec..

Response When 8525 received the effective command setting.

ERROR=0 When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.34 ITIMER? (read-out of test time of insulation resistance test)

Function Reads out the test time of insulation resistance test.

Structure ITIMER?

Transmission

ITIMER?

Response

ITIMER=10.0s Indicates the test time of insulation resistance test 10.0sec..

4.2.35 DISCHARGE= (setting of discharge function of insulation resistance test)

Function Makes the setting of discharge function of insulation resistance test.

Structure DISCHARGE=**ON/OFF**

ON : Discharge function is ON.

OFF : Discharge function is OFF.

Transmission

DISCHARGE=ON **C_RL_F** ... Sets the discharge function of insulation resistance test to ON.

Response When 8525 received the effective command setting.

ERROR=0 **C_RL_F** When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.36 DISCHARGE? (read-out of discharge function of insulation resistance test)

Function Reads out ON or OFF of the discharge function of insulation resistance test.

Structure DISCHARGE?

Transmission

DISCHARGE?**C_RL_F**

Response

DISCHARGE=ON **C_RL_F** When ON of the discharge function of insulation resistance test is read out.

4.2.37 JUDGE? (read-out of judgement result)

Function Reads out the judgement result of each test.
[Command to use after the finish of the test (READY status)]
 Judgement result is retained until the next start even if the RESET command is made or **STOP** switch is pressed.

Structure JUDGE?

Transmission

JUDGE?_R_F

Response

Type of judgement	Parameter	Content
Total judgement JUDGE= _R _R : Parameter	GOOD	Passed.
	NG	Failed.
	NULL	When the test is stopped by RESET command (STOP switch).
	PROTECT	Protective circuit is activated (PROTECTION) during the test.
Test mode WJUDGE= _R IJUDGE= _R _R : Parameter	GOOD	Passed/
	HIGH	Failed for high limit judgement.
	LOW	Failed for low limit judgement.
	NULL	When the test is stopped by RESET command (STOP switch).
	HIGH LOW	Protective circuit is activated (PROTECTION) during the test.

At the automatic test

Test mode	Judgement result and action during the test	Response
WI or IW	Passed W and I test.	JUDGE=GOOD, WJUDGE=GOOD, IJUDGE=GOOD _R _F
WI	W test failed for HIGH	JUDGE=NG, WJUDGE=HIGH, IJUDGE=NULL _R _F
	W test failed for LOW	JUDGE=NG, WJUDGE=LOW, IJUDGE=NULL _R _F
	I test failed for HIGH	JUDGE=NG, WJUDGE=GOOD, IJUDGE=HIGH _R _F
	I test failed for LOW	JUDGE=NG, WJUDGE=GOOD, IJUDGE=LOW _R _F
	Protection occurred during W test	JUDGE=PROTECT, WJUDGE=HIGH LOW, IJUDGE=NULL _R _F
	Protection occurred during I test	JUDGE=PROTECT, WJUDGE=GOOD, IJUDGE=HIGH LOW _R _F
IW	W test failed for HIGH	JUDGE=NG, WJUDGE=HIGH, IJUDGE=GOOD _R _F
	W test failed for LOW	JUDGE=NG, WJUDGE=LOW, IJUDGE=GOOD _R _F
	I test failed for HIGH	JUDGE=NG, WJUDGE=NULL, IJUDGE=HIGH _R _F
	I test failed for LOW	JUDGE=NG, WJUDGE=NULL, IJUDGE=LOW _R _F
	Protection occurred during W test	JUDGE=PROTECT, WJUDGE=HIGH LOW, IJUDGE=GOOD _R _F
	Protection occurred during I test	JUDGE=PROTECT, WJUDGE=NULL, IJUDGE=HIGH LOW _R _F
WI or IW	At RESET (stop)	JUDGE=NULL, WJUDGE=NULL, IJUDGE=NULL _R _F

At the signal withstanding voltage test

When the judgement result is GOOD JUDGE=GOOD, WJUDGE=GOOD _R_F
 When the judgement result is HIGH JUDGE=NG, WJUDGE=HIGH _R_F
 When the judgement result if LOW JUDGE=NG, WJUDGE=LOW _R_F
 At stop JUDGE=NULL, WJUDGE=NULL _R_F
 When the protection occurred JUDGE=PROTECT, WJUDGE=HIGH LOW _R_F

At the signal insulation resistance test

When the judgement result is GOOD JUDGE=GOOD, IWJUDGE=GOOD _R_F
 When the judgement result is HIGH JUDGE=NG, IJUDGE=HIGH _R_F
 When the judgement result if LOW JUDGE=NG, IJUDGE=LOW _R_F
 At stop JUDGE=NULL, IJUDGE=NULL _R_F
 When the protection occurred JUDGE=PROTECT, IJUDGE=HIGH LOW _R_F

4.2.38 DATA? (lump read-out of test result)

- Function** Reads out the detail data of test result.
[Command to use after the finish of the test (READY status)]
Judgement result and data are retained until the next start even if the RESET command is made or **STOP** switch is pressed.
- Structure** DATA?
- Transmission**
- DATA?
- Response**

[Example of response after the finish of automatic test]

Test mode	Judgement result and action during the test	Response
WI or IW	Passed W and I test.	JUDGE=GOOD, WJUDGE=GOOD, VOLT=1.51kV, CURRENT=1.23mA, IJUDGE=GOOD, RESISTANCE=123MOHM <input type="checkbox"/> <input type="checkbox"/>
WI	W test failed for HIGH	JUDGE=NG, WJUDGE=HIGH, VOLT=1.51kV, CURRENT=32.1mA, IJUDGE=NULL, RESISTANCE=0.00MOHM <input type="checkbox"/> <input type="checkbox"/>
	W test failed for LOW	JUDGE=NG, WJUDGE=LOW, VOLT=1.51kV, CURRENT=0.15mA, IJUDGE=NULL, RESISTANCE=0.00MOHM <input type="checkbox"/> <input type="checkbox"/>
	I test failed for HIGH	JUDGE=NG, WJUDGE=GOOD, VOLT=1.51kV, CURRENT=1.23mA, IJUDGE=HIGH, RESISTANCE=1234MOHM <input type="checkbox"/> <input type="checkbox"/>
	I test failed for LOW	JUDGE=NG, WJUDGE=GOOD, VOLT=1.51kV, CURRENT=1.23mA, IJUDGE=LOW, RESISTANCE=10.20MOHM <input type="checkbox"/> <input type="checkbox"/>
IW	W test failed for HIGH	JUDGE=NG, WJUDGE=HIGH, VOLT=1.51kV, CURRENT=32.1mA, IJUDGE=GOOD, RESISTANCE=12.34MOHM <input type="checkbox"/> <input type="checkbox"/>
	W test failed for LOW	JUDGE=NG, WJUDGE=LOW, VOLT=1.51kV, CURRENT=0.6mA, IJUDGE=GOOD, RESISTANCE=1234MOHM <input type="checkbox"/> <input type="checkbox"/>
	I test failed for HIGH	JUDGE=NG, WJUDGE=NULL, VOLT=0.00kV, CURRENT=0.00mA, IJUDGE=HIGH, RESISTANCE=1234MOHM <input type="checkbox"/> <input type="checkbox"/>
	I test failed for LOW	JUDGE=NG, WJUDGE=NULL, VOLT=0.00kV, CURRENT=0.00mA, IJUDGE=LOW, RESISTANCE=9.99MOHM <input type="checkbox"/> <input type="checkbox"/>
WI or IW	At RESET (stop) Note-1	JUDGE=NULL, WJUDGE=NULL, VOLT=0.00kV, CURRENT=0.00mA, IJUDGE=NULL, RESISTANCE=0.00MOHM <input type="checkbox"/> <input type="checkbox"/>
	At occurrence of PROTECT in W of WI mode Note-2	JUDGE=PROTECT, WJUDGE=HIGH LOW, VOLT=1.50kV, CURRENT=1.23mA, IJUDGE=NULL, RESISTANCE=0.00MOHM <input type="checkbox"/> <input type="checkbox"/>

[Example of response after the finish of single withstanding voltage test]

Judgement result and action during the test	Response
W test passed	JUDGE=GOOD, WJUDGE=GOOD, VOLT=1.51kV, CURRENT=1.23mA <input type="checkbox"/> <input type="checkbox"/>
W test failed for HIGH	JUDGE=NG, WJUDGE=HIGH, VOLT=1.51kV, CURRENT=32.1mA <input type="checkbox"/> <input type="checkbox"/>
W test failed for LOW	JUDGE=NG, WJUDGE=LOW, VOLT=1.51kV, CURRENT=0.15mA <input type="checkbox"/> <input type="checkbox"/>
At RESET (Stop) Note-1	JUDGE=NULL, WJUDGE=NULL, VOLT=0.00kV, CURRENT=0.0mA <input type="checkbox"/> <input type="checkbox"/>
At occurrence of PROTECT Note-2	JUDGE=PROTECT, WJUDGE=HIGH LOW, VOLT=1.50kV, CURRENT=1.23mA <input type="checkbox"/> <input type="checkbox"/>

[Example of response after the finish of single insulation resistance test]

Judgement result and action during the test	Response
I test passed	JUDGE=GOOD, IJUDGE=GOOD, RESISTANCE=1234MOHM <input type="checkbox"/> <input type="checkbox"/>
I test failed for HIGH	JUDGE=NG, IJUDGE=HIGH, RESISTANCE=1234MOHM <input type="checkbox"/> <input type="checkbox"/>
I test failed for LOW	JUDGE=NG, IJUDGE=LOW, RESISTANCE=1.2MOHM <input type="checkbox"/> <input type="checkbox"/>
At RESET (Stop) Note-1	JUDGE=NULL, IJUDGE=NULL, RESISTANCE=0.00MOHM <input type="checkbox"/> <input type="checkbox"/>
At occurrence of PROTECT Note-2	JUDGE=PROTECT, IJUDGE=HIGH LOW, RESISTANCE=1234MOHM <input type="checkbox"/> <input type="checkbox"/>

Note-1: Data is 0.

Note-2: Responses with the data at the occurrence of PROTECT.
For the test which could not be performed, the data is 0.

4.2.39 SET: (setting of parameters of test condition)

Function Makes the setting of test mode and parameters in the lump.

Structure SET: **Parameter of test**

Parameter of test

MODE=**Test mode** W-I, I-W, W, I
 WVOLT=
 WLVEL=
 WHIGH=
 WLOW=
 WTIMER
 IVOLT=
 IHIGH=
 ILOW=
 IMASK=
 ITIMER=
 DISCHARGE=

Setting is made for the test mode which includes the withstanding voltage test. W-I, I-W, W
 For detail, refer to the articles 4.2.15 (P16), 4.2.17 (P17), 4.2.19 (P18), 4.2.21 (P19) and 4.2.23 (P20).
 Setting is made for the test mode which includes the insulation resistance test. W-I, I-W, I
 For detail, refer to the articles 4.2.25 (P21), 4.2.27 (P22), 4.2.29 (P23), 4.2.31 (P24), 4.2.33 (P25) and 4.2.35 (P26).

Note: In the single test (W, I), omit the test not to do.

Transmission

In the automatic test mode W-I. (Set MODE=IW when the mode is I-W)
 SET:MODE=WI, WVOLT=2.5kV, WLEVEL=1.50kV, WHIGH=20.0mA, WLOW=OFF,
 WTIMER=60.0s, IVOLT=0.5kV, IHIGH=OFF, ILOW=10MOHM, IMASK=1.0s,
 ITIMER=60.0s, DISCHARGE=ON

In the single test mode I (Set MODE=W when the mode is W)
 SET:MODE=I, IVOLT=0.5kV, IHIGH=OFF, ILOW=10MOHM, IMASK=1.0s,
 ITIMER=60.0s, DISCHARGE=ON

Response When 8525 received the effective command setting.

ERROR=0 When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.40 SET:? (lump read-out of parameters of test condition)

Function Reads out the test mode and each parameter in the lump.

Structure SET:?

Transmission

SET?

Response

In the automatic test mode I-W. (MODE=WI when the mode is WI)
 ○When FORMAT=ON
 SET:MODE=IW, WVOLT=2.5kV, WLEVEL=1.50kV, WHIGH=20.0mA, WLOW=OFF,
 WTIMER=60.0s, IVOLT=0.5kV, IHIGH=OFF, ILOW=10MOHM, IMASK=1.0s,
 ITIMER=60.0s, DISCHARGE=ON
 ○When FORMAT=OFF
 SET:WI, 2.5, 1.50, 20.0, OFF, 60.0, 0.5, OFF, 10, 1.0, 60.0, ON

In the single test mode W (MODE=I when the mode is I)
 ○When FORMAT=ON
 SET:MODE=W, WVOLT=2.5kV, WLEVEL=1.50kV, WHIGH=20.0mA, WLOW=OFF,
 WTIMER=60.0s
 ○When FORMAT=OFF
 SET:W, 2.5, 1.50, 20.0, OFF, 60.0

4.2.41 MEMORY= (setting of memory number)

Function Changes over to the test condition of designated memory No.

Structure MEMORY=
 : 1~9

Transmission

MEMORY=5 Changes the current test condition over to memory No.5.

Response When 8525 received the effective command setting.

ERROR=0 When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.42 MEMORY? (read-out of memory number)

Function Reads out the memory number currently selected.

Structure MEMORY?

Transmission

MEMORY?

Response

MEMORY=8 When the memory No.8 is read out.

MEMORY=OFF When the condition that no memory is selected is read out.

4.2.43 MEM[No]: (setting of test condition to memory)

Function	Makes the setting of test mode and parameters in the designated memory number.
Structure	MEM[No] : Parameter of test [No] : 1~9 Parameter of test Same as those at the article 4.2.39 (P30) SET: (setting of parameters of test condition)
Transmission	

In the automatic test mode W-I. (Set MODE=IW when the mode is I-W)
 MEM3:MODE=WI, WVOLT=2.5kV, WLEVEL=1.50kV, WHIGH=20.0mA, WLOW=OFF,
 WTIMER=60.0s, IVOLT=0.5kV, IHIGH=OFF, ILOW=10MOHM, IMASK=1.0s,
 ITIMER=60.0s, DISCHARGE=ON

In the single test mode I (Set MODE=W when the mode is W)
 MEM5:MODE=I, IVOLT=0.5kV, IHIGH=OFF, ILOW=10MOHM, IMASK=1.0s,
 ITIMER=60.0s, DISCHARGE=ON

Response	When 8525 received the effective command setting.
ERROR=0 <input type="checkbox"/> <input type="checkbox"/> When the Response Setting is ON.
No response	When the Response Setting is OFF.

4.2.44 MEM[No]:? (read-out memorized test condition)

Function	Reads out the designated memory number, test mode and each parameter in the lump.
Structure	MEM[No]:?
Transmission	[No] : 1~9

MEM3:?

Response

In the automatic test mode I-W. (MODE=WI when the mode is WI)
 ○When FORMAT=ON
 MEM3:MODE=IW, WVOLT=2.5kV, WLEVEL=1.50kV, WHIGH=20.0mA, WLOW=OFF,
 WTIMER=60.0s, IVOLT=0.5kV, IHIGH=OFF, ILOW=10MOHM, IMASK=1.0s,
 ITIMER=60.0s, DISCHARGE=ON
 ○When FORMAT=OFF
 MEM3:WI, 2.5, 1.50, 20.0, OFF, 60.0, 0.5, OFF, 10, 1.0, 60.0, ON

In the single test mode W (MODE=I when the mode is I)
 ○When FORMAT=ON
 MEM3:MODE=W, WVOLT=2.5kV, WLEVEL=1.50kV, WHIGH=20.0mA, WLOW=OFF,
 WTIMER=60.0s
 ○When FORMAT=OFF
 MEM3:W, 2.5, 1.50, 20.0, OFF, 60.0

4.2.45 BUZZ= (setting of buzzer sound)

Function Makes the setting of sound volume of GOOD and NG buzzer.

Structure BUZZ=OFF/1~5_①,OFF/1~5_②

①Buzzer sound volume parameter at passed (GOOD) judgement
OFF, 1, 2, 3, 4, 5

Sound volume: Small ←→ Big

②Buzzer sound volume parameter at failed (NG) judgement

OFF, 1, 2, 3, 4, 5

Sound volume: Small ←→ Big

Transmission

BUZZ=3, 5 _R_F Buzzer sound volume at GOOD (judgment passed) is set to 3 among 5 levels and the sound level at NG (judgment failed) is set to maximum sound volume.

Response When 8525 received the effective command setting.

ERROR=0 _R_F When the Response Setting is ON.

No response When the Response Setting is OFF.

4.2.46 BUZZ? (read-out of set value of buzzer sound)

Function Reads out the set value of buzzer sound for GOOD and NG.

Structure BUZZ?

Transmission

BUZZ?_R_F

Response

BUZZ=OFF, 3 _R_F
① ②

①Buzzer sound volume at passed (GOOD) judgement
..... Shows the sound is muted.

②Buzzer sound volume at failed (NG) judgement
..... Shows level 3 among 5.

5. Error codes and hints to solve

Error code	Content of error and solution
ERROR=1	Command format is not recognizable. Erroneous letter. Example: RESSET, RST Correct the letters to RESET.
ERROR=2	Parameter is out of effective range. Example: ITIMER=9999 Set it within 0~999.9
ERROR=3	When the parameter is tried to be set in the condition that the setting is not allowed. Example: The command WVOLT=5.0kV etc. related to withstanding voltage test is transmitted in the test mode I. Transmit the command suit to the test mode.
ERROR=4	Operation is made in the course of initialization of 8525. When the test is in initialization such as powering on and does not become READY status, the command setting is not allowed.
ERROR=5	Operation other than RESET, STATUS is made during the test or judgement output. Example: Before making the setting, read out such information TEST, PROTECTION, READY etc. of STATUS?
ERROR=6	Ineffective operation is made when REMOTE=OFF. START command becomes ineffective when REMOTE=OFF. Do the operation after setting REMOTE=ON.
ERROR=7	Structural error has occurred in the lump setting at SET: and MEM□ : Example: When the transmission of command not defined by SET:, MEM□ :, such as buzzer sound volume (BUZZ=3, 3), is made.
ERROR=8	Transmission of command is made during the setting of test condition. Example: Transmission of command is not allowed while the setting is made on the front panel. Finish the setting and make READY lamp lit status.

When the protective function works (interlock, error display)

PROTECTION status		Solution
Err	CHRG	ERROR=3 is always transmitted to the host when the command is transmitted. It is the hardware problem. Inform us or the dealer whom you purchased.
Err	SSr	
Err	LoCK	If the No.5 pin of REMOTE / OUT connector (INTER LOCK) is open, ERROR=3 is transmitted when the command is transmitted. Making a short-circuit between the No.5 pin and COM, transmit RESET command or press STOP key.
Err	rNFE	Transmit RESET command or press STOP key. (For the content of error, refer to the article 19 Error messages in the instruction manual of tester main unit.)
Err	STrT	
Err	E-11	
Err	E-21	
Err	NoDE	
Err	E-40	

6. Cautions

About the case when the setting is operated by REMOTE=OFF, KEYLOCK=OFF in the condition of setting which is previously made by the RS-232C communication:

[When the EXIT key is pressed in the course of setting with key operation]

The value set by RS-232C does not remain. It returns to the set value of no memory number before entering the RS-232C communication mode.

[When the ENTER key is pressed in the course of setting with key operation]

Setting condition is memorized by key operation and the set value is retained even if the power source is re-thrown in.

7. Sample program

```
' ○Here is the sample program source for Microsoft Visual Basic of 8525 control.
'
' 1. When the form is loaded, setting of the communication of 8525 and the operational check
'    are done.
' 2. Click of the command1[SETTING] button makes a change of test condition, set value.
'
'    Content of the setting is as follows:
'
'          MODE          = WI
'          WVOLT         = 2.5kV
'          WLEVEL        = OFF
'          WHIGH         = 10.0mA
'          WLOW          = OFF
'          WTIMER        = 5s
'          IVOLT         = 0.5kV
'          IHIGH         = OFF
'          ILOW          = 100MOHM
'          IMASK         = 0.3s
'          ITIMER        = 5.0s
'          DISCHARGE     = ON
'
' 3. Click of command2[START] button starts the automatic test with the above set values.
' 4. The test can be stopped by the command3[STOP] button.
' 5. Sample program finishes with the command4[QUIT] button.
' 6. Data of communication content, test result and so on are occasionally displayed to
'    the text box(Text1).
'
' ○About the object to arrange on the form
' MSComm1 :Microsoft Comm Control Arrange the component (OCX) on the form.
' Text1   :TextBox ※. Set MultiLine property to True
' Command1 :CommandButton
' Command2 :CommandButton
' Command3 :CommandButton
' Command4 :CommandButton
```

```

' ----- Definition -----
Option Explicit

Private StopFlag As Boolean 'Flag to stop the test

' Wait, time out detection, for msec time, Windows API
Private Declare Function GetTickCount Lib "kernel32" ( ) As Long

' Definition of enumeration form of 8525 status
Private Enum STB8525_ID
    sTEST = &H1           'Test in operation
    sTEST_END = &H2       'Test ends
    sH_V_OUT = &H4        'High voltage being output
    sREADY = &H8          'In waiting
    sW_TEST = &H10        'Withstanding voltage test in operation
    sI_TEST = &H20        'Insulation resistance test in operation
    sGOOD = &H40          'Total judgement passed
    sNG = &H80            'Total judgement failed
    sW_HIGH = &H100       'Withstanding voltage test failed for high limit
    sW_LOW = &H200        'Withstanding voltage test failed for low limit
    sW_GOOD = &H400       'Withstanding voltage test passed
    sI_HIGH = &H800       'Insulation resistance test failed for high limit
    sI_LOW = &H1000      'Insulation resistance test failed for low limit
    sI_GOOD = &H2000     'Insulation resistance test passed
    sPROTECTION = &H4000 'Protective circuit activated
End Enum

' Definition of enumeration form of error code
Private Enum EER8525_ID
    eNo_Error = 0         'Normal
    eSyntax_Error = 1     'Command writing error
    eOut_Of_Range = 2     'Out of effective range
    eCondition = 3        'Setting condition error
    eInitializing = 4     '8525 in initialization
    eTesting = 5          'Test in operation
    eRemote_Off = 6       'REMOTE= is OFF status
    eSet_Construction = 7 'SET structural error
    eKey_Operating = 8    'Being set by key operation
End Enum

```

```

' ----- Procedures -----
' MSCOMM1      Defines the port and open it.

Private Function OpenComm(Optional PortNumber As Integer) As Boolean
Dim nPort As Integer

    On Error GoTo Err_OpenComm

    nPort = 1

    If PortNumber <> 0 Then nPort = PortNumber

    With MSCOMM1

        If .PortOpen = True Then .PortOpen = False

        . CommPort = nPort           ' Port number
        . Settings = "9600,n,8,1"    ' Communication setting
        . InBufferSize = 256         ' Receiving buffer size
        . OutBufferSize = 256        ' Transmission buffer size

        Call FlashBuffer             ' Flash of receiving and transmission buffer

        . Handshaking = comNone      ' Hand shake
        . DTREnable = True           ' DTR
        . NullDiscard = True         ' Discard of NULL letter
        . RThreshold = 0             ' No receiving event
        . ParityReplace = "?"        ' Parity error replacement letter
        . RTSEnable = True           ' RTS
        . SThreshold = 0             ' No transmission event
        . EOFEnable = False          ' EOF
        . InputMode = comInputModeText ' ASCII communication

        . PortOpen = True            ' Port open

    End with

Exit_OpenComm:
    OpenComm = True
    ShowLog "OpenComm", "No." & nPort & " 9600,n,8,1 OK"
    Exit Function

Err_OpenComm:
    OpenComm = False
    ShowLog "OpenComm", "NG"
    MsgBox "An error occurred in OpenComm.", vbCritical
    Exit Function
End Function

```

```
'MSCOMM1      Close the port.
Private Sub CloseComm ()
    On Error GoTo Exit_CloseComm
    With MSComm1
        If .PortOpen = True Then
            . PortOpen = False      'port close
            Call FlashBuffer        'flash of buffer
            . RTSEnable = False
            . DTREnable = False
        End if
    End With

    ShowLog "CloseComm", "OK"
Exit_CloseComm:
    Exit Sub
End Sub

'MSCOMM1      Flash of receiving buffer
Private Sub FlashBuffer ()
    With MSComm1
        . InBufferCount = 0
        . OutBufferCount = 0
    End With
End Sub

'Text1        Log display letters
Private Sub ShowLog(Optional ByVal dat1 As Variant, Optional ByVal dat2 As Variant)
    With Text1
        If Len(. Text) >= . MaxLength Then . Text = Right(. Text, 256)
        . SelStart = Len(. Text)
        . SelText = dat1 & ":" & dat2 & vbCrLf
    End With
End Sub
```

```

'MSCOMM1      Transmission of command and receiving of response

Private Function SendComm(ByVal sSendCommand As String, Optional ByRef sRecvBuffer As
String) As Boolean
Dim sSend As String          'Transmission letters
Dim sRecv As String          'Receiving letters buffer
Dim nTMO As Long             'Time out

    On Error GoTo Err_SendComm

    'Receiving time out is set to 1sec.
    nTMO = GetTickCount + 1000

    'Transmission letter is half pitch + CRLF
    sSend = StrConv(sSendCommand, vbNarrow)
    ShowLog "Send", sSend
    sSend = sSend & vbCrLf

    With MSCOMM1
        FlashBuffer
        . Output = sSend          ' transmission of letters
    End With

    Do

        DoEvents

        sWait 0.1 'Weight of 100ms

        With MSCOMM1
            If . InBufferCount > 0 Then          'Receiving buffer (port) includes letters
                sRecv = sRecv & . Input          'Receiving letters stored in buffer
                'Debug.Print sRecv
            End If
        End with

        If InStr(sRecv, vbCr) > 0 then          'Receiving letters buffer includes delimiter
            sRecv = Left(sRecv, InStr(sRecv, vbCr) - 1) 'delimiter and after is left
            ShowLog "Recv", sRecv
            Exit Do
        End If

        If GetTickCount >= nTMO Then          ' time out condition
            ShowLog "SendComm", "TMO Error"
            GoTo Err_SendComm:
        End If

    Loop

Exit_SendComm: 'Normal end
    sRecvBuffer = sRecv
    SendComm = True
    Exit Function

Err_SendComm: 'Abnormal end
    sRecvBuffer = ""
    SendComm = False
    MsgBox "An error occurred in SendComm.", vbCritical
    Exit Function
End Function

```

```

'Display message depending upon content of response
'At error message : False
Private Functin ErrorHandler(ByVal sResponse As String) As Boolean
Dim nError As EER8525_ID

'Error response
If sResponse Like "ERROR=*" Then

    If sResponse <> "ERROR=0" Then 'Error

        nError = CLng(Right(sResponse, 1))

        Select Case nError
        Case eNo_Error ' 0
            ShowLog "ERROR", "No Error."
        Case eSyntax_Error ' 1
            ShowLog "ERROR", "eSyntax error."
        Case eOut_Of_Range ' 2
            ShowLog "ERROR", "Out of range."
        Case eCondition ' 3
            ShowLog "ERROR", "Condition error of the parameter."
        Case eInitializing ' 4
            ShowLog "ERROR", "Being initialized."
        Case eTesting ' 5
            ShowLog "ERROR", "Testing."
        Case eRemote_Off ' 6
            ShowLog "ERROR", "Remote Off."
        Case eSet_Construction ' 7
            ShowLog "ERROR", "Construction error of an order for a SET or MEM."
        Case eKey_Operating ' 8
            ShowLog "ERROR", "Being set up by the key operation."
        Case Else
            ShowLog "ERROR", "Undefined Error"
        End Select

        GoTo Err_ErrorHandler:

    End If

End if

Exit_ErrorHandler:
    ErrorHandler = True
    Exit Function

Err_ErrorHandler:
    ErrorHandler = False
    Exit Function
End Function

'sec weight procedure
Private Sub sWait(ByVal sngSec As Single)
Dim lngStart As Long, lngEnd As Long
    If sngSec = 0 Then Exit Sub
    lngStart = GetTickCount ( )
    lngEnd = lngStart + (sngSec * 1000)
    Do While GetTickCount ( ) < lngEnd
        DoEvents
    Loop
End Sub

```

```

' Read in form
Private Sub Form_Load ( )

    With Text1
        .MultiLine = True
        .MaxLength = 4096
        .Text = ""
    End With

    Command1. Caption = "&SETTING"
    Command2. Caption = "&START"
    Command3. Caption = "&STOP"
    Command4. Caption = "&QUIT"

End Sub

' Perform when form is active
Private Sub Form_Activate ( )
Static MeActive As Boolean

    If MeActive Then Exit Sub

    MeActive = True

Dim szBuf As String

' No.1 port open
If OpenComm(1) = False Then GoTo Err_Form_Activate:

' 8525 Response ON
If SendComm ("RESPONSE=ON", szBuf) = False Then GoTo Err_Form_Activate:
If ErrorHandler (szBuf) = False Then GoTo Err_Form_Activate:

' 8525 Remote control ON
If SendComm ("REMOTE=ON", szBuf) = False Then GoTo Err_Form_Activate:
If ErrorHandler (szBuf) = False Then GoTo Err_Form_Activate:

' 8525 Response format OFF
If SendComm ("FORMAT=3", szBuf) = False Then GoTo Err_Form_Activate:
If ErrorHandler (szBuf) = False Then GoTo Err_Form_Activate:

' 8525 Obtaining tester identification
If SendComm ("IDNT?", szBuf) = False Then GoTo Err_Form_Activate:
If ErrorHandler (szBuf) = False Then GoTo Err_Form_Activate:

    Command1. Enabled = True
    Command2. Enabled = False
    Command3. Enabled = False
Exit_Form_Activate:
    Exit Sub

Err_Form_Activate:
    Command1. Enabled = False
    Command2. Enabled = False
    Command3. Enabled = False
    Exit Sub
End Sub

```

```
Private Sub Form_QueryUnload (Cancel As Integer, UnloadMode As Integer)

    If Not Command4. Enabled Then
        Cancel = True
        Exit Sub
    End If

    'Reset 8525 to local at finish of form
    If Command1. Enabled Then
        Call SendComm ("RSET")
        Call SendComm ("KEYLOCK=OFF")
        Call SendComm ("REMOTE=OFF")
    End If

    Call CloseComm 'Close port

End

End Sub

'Start of test
Private Sub Command2_Click ( )
Dim szBuf As String, nSTB As STB8525_ID

    StopFlag = False
    Command1. Enabled = False
    Command2. Enabled = False
    Command3. Enabled = True
    Command4. Enabled = False

    'Confirm status before start
    If SendComm ("STATUS?", szBuf) = False Then GoTo Exit_Command2_Click:
    If ErrorHandler (szBuf) = False Then GoTo Exit_Command2_Click:

    szBuf = "&H" & szBuf
    If IsNumeric (szBuf) = False Then GoTo Exit_Command2_Click:
    nSTB = CLng (szBuf)
    If (nSTB And sREADY) = 0 Then
        MsgBox "Can not START.", vbCritical
        GoTo Exit_Command2_Click:
    End If

    'RESET command
    If SendComm ("RESET", szBuf) = False Then GoTo Exit_Command2_Click:
    If ErrorHandler (szBuf) = False Then GoTo Exit_Command2_Click:

    'START command
    If SendComm ("START", szBuf) = False Then GoTo Exit_Command2_Click:
    If ErrorHandler (szBuf) = False Then GoTo Exit_Command2_Click:

Do

    DoEvents

    sWait 0.5 'weight of 500msec.
```

```

' STOP button is pressed
If StopFlag Then
    If SendComm ("RESET", szBuf) = False Then GoTo Exit_Command2_Click:
    If ErrorHandler (szBuf) = False Then GoTo Exit_Command2_Click:
    GoTo Exit_Command2_Click:
End If

' Status confirmation during test
If SendComm ("STATUS?", szBuf) = False Then GoTo Exit_Command2_Click:
If ErrorHandler (szBuf) = False Then GoTo Exit_Command2_Click:

nSTB = CLng ("&H" & szBuf)

' Protective action exists
If nSTB And sPROTECTION Then
    ShowLog "STATUS", "PROTECTION"
    GoTo Exit_Command2_Click:

End If

If nSTB And sI_TEST Then Debug. Print "I_TESTING"
If nSTB And sW_TEST Then Debug. Print "W_TESTING"

' At completion of test action
If (nSTB And sH_V_OUT) = 0 Then Exit Do ' Voltage is shut down / test stops

Loop

' Obtain judgement at completion of test action
If SendComm ("JUDGE?", szBuf) = False Then GoTo Exit_Command2_Click:
If ErrorHandler (szBuf) = False Then GoTo Exit_Command2_Click:
' ✖Received letters are log displayed to text box.

' Obtain judgement and measured data at completion of test action
If SendComm ("DATA?", szBuf) = False Then GoTo Exit_Command2_Click:
If ErrorHandler (szBuf) = False Then GoTo Exit_Command2_Click:
' ✖Received letters are log displayed to text box.

' Do reset
If SendComm ("RESET", szBuf) = False Then GoTo Exit_Command2_Click:
If ErrorHandler (szBuf) = False Then GoTo Exit_Command2_Click:

Exit_Command2_Click:
    StopFlag = False
    Command1. Enabled = True
    Command2. Enabled = True
    Command3. Enabled = False
    Command4. Enabled = True
    Exit Sub
End Sub

Private Sub Command3_Click ( )
    StopFlag = True
End Sub

```

```

' Initial setting of 8525
Private Sub Command1_Click ( )
Dim szBuf As String, nSTB As STB8525_ID
Dim Sets As String

Command1.Enabled = False
Command2.Enabled = False
Command3.Enabled = False

' SET: Command transmission
If SendComm ("STATUS?", szBuf) = False Then GoTo Exit_Command1_Click:
If ErrorHandler (szBuf) = False Then GoTo Exit_Command1_Click:

szBuf = "&H" & szBuf
If IsNumeric (szBuf) = False Then GoTo Exit_Command1_Click:
nSTB = CLng (szBuf)
If (nSTB And sREADY) = 0 Then
    MsgBox "It is not the condition which can be setup.", vbCritical
    GoTo Exit_Command1_Click:
End If

' Construction of SET: command
Sets = "SET:" & "MODE=WI"
Sets = Sets & ", "& "WVOLT=2.5kV"
Sets = Sets & ", "& "WLEVEL=OFF"
Sets = Sets & ", "& "WHIGH=10.0mA"
Sets = Sets & ", "& "WLOW=OFF"
Sets = Sets & ", "& "WTIMER=5s"
Sets = Sets & ", "& "IVOLT=0.5kV"
Sets = Sets & ", "& "IHIGH=OFF"
Sets = Sets & ", "& "ILOW=100OHM"
Sets = Sets & ", "& "IMASK=0.3s"
Sets = Sets & ", "& "ITIMER=5.0s"
Sets = Sets & ", "& "DISCHARGE=ON"

' SET: command transmission
If SendComm (Sets, szBuf) = False Then GoTo Exit_Command1_Click:
If ErrorHandler (szBuf) = False Then GoTo Exit_Command1_Click:

' RESET command transmission
If SendComm ("RESET", szBuf) = False Then GoTo Exit_Command1_Click:
If ErrorHandler (szBuf) = False Then GoTo Exit_Command1_Click:

Command2.Enabled = True
Command3.Enabled = True

Exit_Command1_Click:
Command1.Enabled = True
Exit Sub

End Sub

' Finish button
Private Sub Command4_Click ( )
    Unload Me
End Sub

```

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