MODEL 8528

Withstanding Voltage Tester

Instruction Manual

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 8528 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 8528 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

- ● **Hold the chassis (bottom plate) when the product is transported.**
  Do not carry the product holding its red bushing at high voltage output terminal section (refer to ⑥,⑲ of the article 3 Name of parts and functions).
  ※The bushing (red) may break, causing serious injury by the fallen 8528.
- ● **Minimize the mechanical shock or vibration when transporting the product.**
  ※It may cause the damage of internal mechanism or malfunction.

INTERLOCK

Model 8528 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 13.3 (P31) for the interlock function.

Contents

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 8528 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 ±5% of set value or ±50V, high and low leak current setting, timer function ensures highly accurate measurement.
- Large green LED of high visibility is employed for the display of test voltage, current and test time.
- A 9 memory is provided to write in and read out the test conditions regulated by the various standards or regulations.
- A 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 "judgment" is 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 10 Key lock.
Double action	OFF	For detail, please refer to the article 11 Special test mode.
GOOD hold	OFF	
Momentary	OFF	
FAIL mode	OFF	

Memory (Common for No.1~No.9)
At the delivery from factory, the following data is written in every memory No.1~9.
Keep pressing │ENTER│ key and │SHIFT│ key together, power on the tester, then the settings are reset to the initial ones at the time of delivery.

Test condition	
Test voltage range	:2.5kV
Referential voltage	:OFF (0.00kV)
High limit leak current	:10.0mA
Low limit leak current	:OFF (0.0mA)
Test time	:60.0s

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
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 5858-11-020 (9 pins – 9 pins / 2.0m) 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 8528 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 (Rear 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.

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(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 8528, put a rubber glove for prevention of electric shock.

3. Name of parts and functions

3.1●Front panel
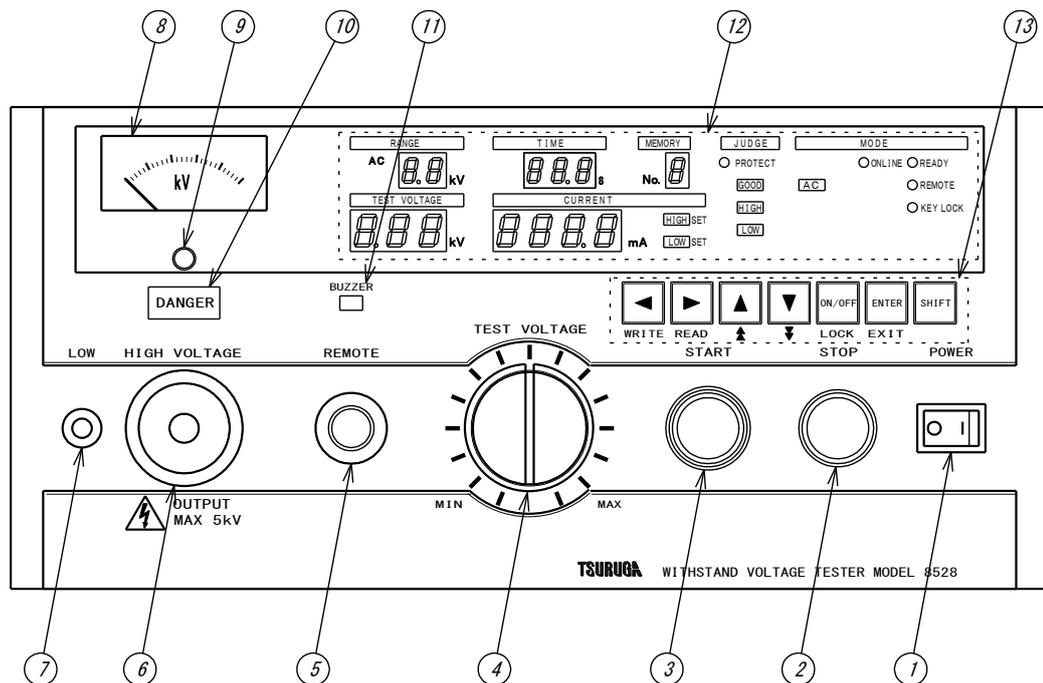
① [POWER]   Power supply switch.   Press right to turn ON and left to turn OFF.

② [STOP]   Switch to interrupt the test operation, 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 ㉒ or the [REMOTE/OUT] connector ⑱.

④ [TEST VOLTAGE]   Knob to adjust the test voltage.

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.
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   Aperture for the buzzer.

⚠ **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.**

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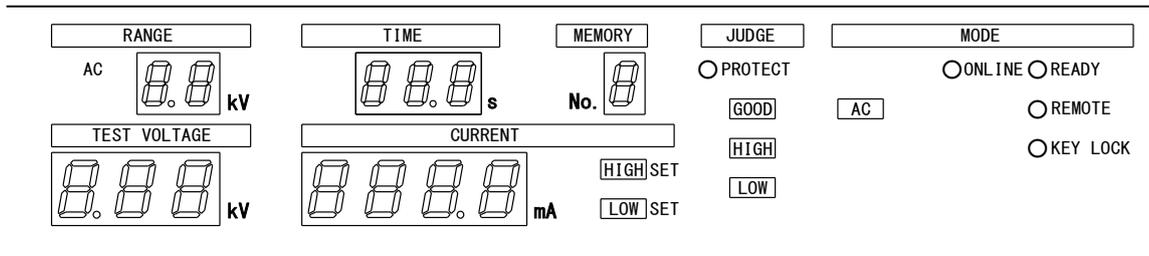
⑫ Display section

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.
ONLINE lamp	Lit up when the remote controlled by RS-232C interface.
AC lamp	Lit up in READY status.
Range display (RANGE)	Displays the voltage range of withstanding voltage test. (2.5kV or 5.0kV)
Voltage display of withstanding volt. test (TEST VOLTAGE)	During the setting of referential voltage, it displays the set value, and during the test, it displays the output voltage value.
Current display (CURRENT)	During the setting of high and low leak current, it displays the set value of leak current, and during the test, it displays the measured value.
Test time display (TIME)	Displays the test time of the withstanding voltage 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.
HIGH SET	Lit up at the setting of high limit leak current.
LOW SET	Lit up at the setting of low limit leak current.
GOOD	Lit up after the W-test, when the test result is acceptable
HIGH	Lit up after the W-test, when the test result is rejected for its high limit.
LOW	Lit up after the W-test, when the test result is rejected for its low limit.

Memory No. display   Displays memory number being set in the memory mode.
(MEMORY No.)

PROTECT lamp   Lit up when the PROTECTION is output.

◀ ▶ ▲ ▼   ON/OFF   ENTER   SHIFT

WRITE   READ   ⬆   ⬇   LOCK   EXIT
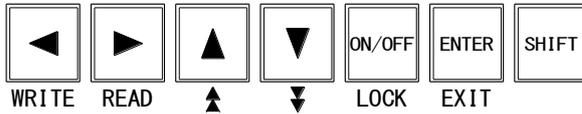
⑬ Setting keys   Keys to set the test condition such as referential voltage, leak current, test time etc. and to write in or read out the memory.

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

   ▶ key   Key to feed and select each setting item toward right.
   READ   (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   Key for selection to set or not to set each setting item.
     LOCK   (When pressed together with SHIFT key, it becomes LOCK key and is used to set/cancel the key lock.)

   ENTER key   Key to finish the setting of test condition or to decide in memory setting.
     EXIT   (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 potential 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
Optional	115V AC	
	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 13.1 (P30).

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)

㉒ | 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 12 (P27).

㉓ | STATUS OUT | Terminal blocks for status output.
For detail, refer to the article 14 (P33).

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 ⑧ 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 terminal ⑭ 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 ㉒, | REMOTE/OUT | connector ⑱ and | STATUS OUT | terminal ㉓.
For detail of connection, refer to the article 12~14 (P27~34).

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 ⑲and | LOW | terminal ⑳.
Use the attached high voltage cable or the cable appropriates to the voltage to use.

⚠ WARNING
● **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.
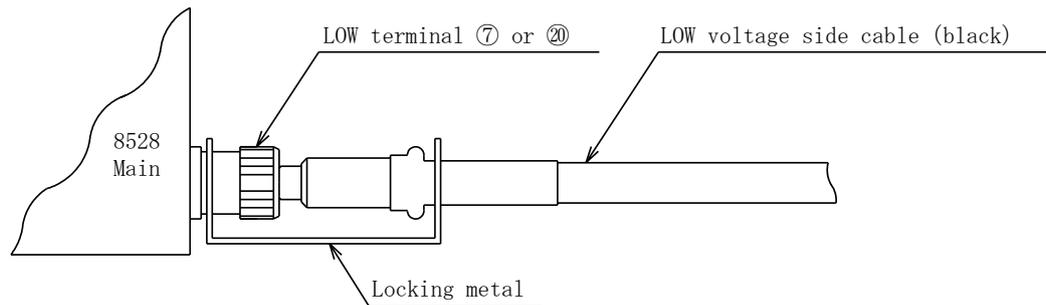
Fasten the U-shape ditch side to the LOW terminal of the tester main unit.

⚠ 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 ±10% of the nominal voltage.

4.6●Throw in and shut off of power source

Before turning ON the `POWER` switch ①, 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.

⚠ CAUTION

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.

Test condition is retained when the power is turned OFF and the same condition is restored when the power is turned ON next time.

4.7●Before the test

(1) Before turning ON the `POWER` switch ①, carefully read in the article 2.2 **Cautions for handling**.
(2) When the `POWER` switch ① is turned ON, a lamp test of the display is carried out.   And when the lamp test 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, after the lamp test, ⟦READY⟧ is lit up, and the tester enters into READY status.
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 5 items can be made.

⟦ Items to set ⟧
(1) Test condition   Refer to the article 7 (P12)
(2) Key lock   Refer to the article 10 (P25)
(3) Buzzer sounding   Refer to the article 16 (P36)
(4) Status output conditions Refer to the article 14.3 (P34)
(5) Special test mode   Refer to the article 11 (P26)
     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 ⟧
     ⟦ Test mode ⟧ → ⟦ Test condition ⟧
          Ref. art. 7 (P12)

5.3●Memory write-in mode

After setting the test condition in the test condition setting mode, press the ⟦WRITE⟧ key (⟦SHIFT⟧ and ⟦◀⟧ keys at a time), 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 5 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 ⟧
     ⟦ Test condition setting ⟧ → ⟦ Memory write-in (No.1) ⟧ → ⟦ Test condition setting ⟧ →
          Ref. art. 7 (P12)   Ref. art. 8.2 (P20)   Ref. art. 7 (P12)

→ ⟦ Memory write-in (No.2) ⟧ --→ ⟦ Test condition setting ⟧ → ⟦ Memory write-in (No.9) ⟧
     Ref. art. 8.2 (P20)   Ref. art. 7 (P12)   Ref. art. 8.2 (P20)

5.4●Memory read-out mode

In READY status, by pressing the ⟦READ⟧ key (⟦SHIFT⟧ and ⟦▶⟧ keys at a time) , a memory No. blinks and the tester becomes ready to read out the memory.   In the memory read out mode, one of the max. 9 memories written in [ref. art. 8.2 (P20)] 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. 8.3 (P21)

6. Flow of setting

```
┌─────────────┐
│READY status │
└──────┬──────┘
       │
       ▼
┌──────────────┐
│ ▶  or  ◀  Key│
└──────┬───────┘
       │
  ┌────┼──────────────────────────────────────────────────────────────────────────┐
  │    ▼                                                                            │
  │ ┌───────┐   ▶   ┌────────────┐   ▶   ┌────────────┐   ▶   ┌────────────┐   ▶   ┌──────────┐ │
  │ │ Range │ ←────→│ Referential│ ←────→│ High limit │ ←────→│ Low limit  │ ←────→│Test time │ │
  │ │       │   ◀   │  voltage   │   ◀   │leak current│   ◀   │leak current│   ◀   │          │ │
  │ └───┬───┘       └────────────┘       └────────────┘       └────────────┘       └──────────┘ │
  └─────┼───────────────────────────────────────────────────────────────────────────────────┘
        │
        ▼
    ◇─────────◇        YES      ┌─────────────────────────┐
   ╱ Memory of ╲ ──────────────→│   ENTER   key           │
   ╲  Setting  ╱                │  Set value is memorized  │
    ◇─────────◇                 └────────────┬────────────┘
        │ NO                                  │
        ▼                                     │
┌─────────────────────┐                       │
│    EXIT   key       │                       │
│( SHIFT + ENTER )    │                       │
└──────────┬──────────┘                       │
           │                                  │
           ▼                                  │
    ┌─────────────┐                           │
    │READY status │←──────────────────────────┘
    └─────────────┘
```

11
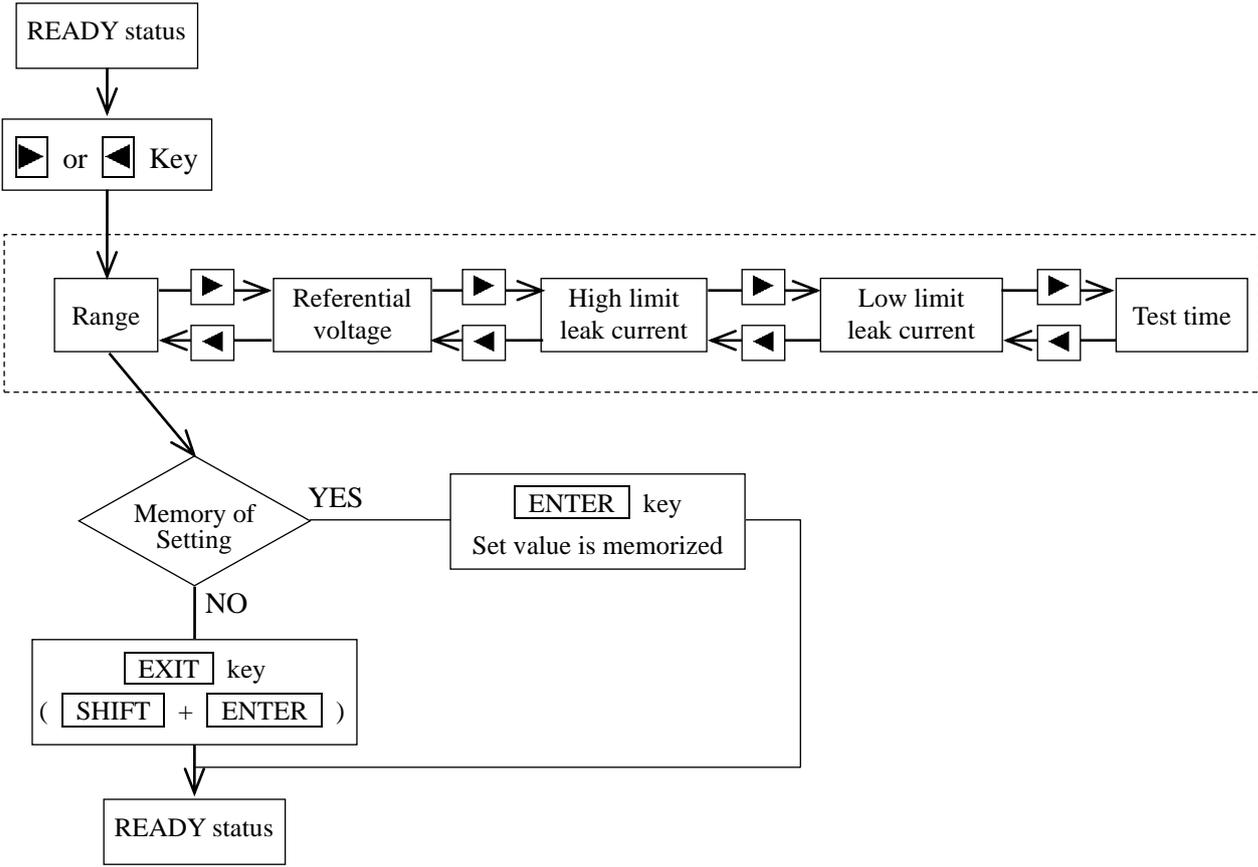
7. Setting of test condition for withstanding voltage test

7.1●Status of display and expression in instruction manual

	Digital display	Flat display	LED lamp
Lit-up mode	$8.8.8$	**GOOD**	● KEY LOCK
Blinking mode	888	GOOD	◎ KEY LOCK
Turn-off mode		GOOD	○ KEY LOCK

7.2●Test range of withstanding voltage test

Range to set: 2.5kV or 5kV
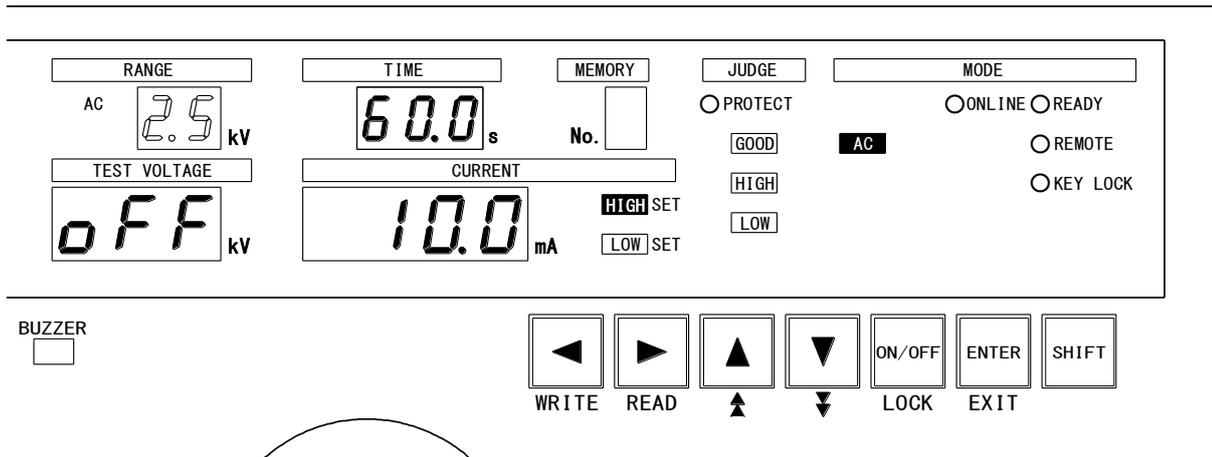
RANGE	TIME	MEMORY	JUDGE	MODE
AC 2.5 kV	60.0 s	No.	○ PROTECT	○ ONLINE ○ READY
TEST VOLTAGE	CURRENT		GOOD	AC ○ REMOTE
oFF kV	10.0 mA	HIGH SET LOW SET	HIGH LOW	○ KEY LOCK

BUZZER

◄ WRITE   ► READ   ▲   ▼   ON/OFF LOCK   ENTER EXIT   SHIFT

To enter setting mode

In READY status, press ► or ◄ key, then the display of test voltage range blinks.

Setting of test voltage range

Switch the test voltage to 2.5kV or 5kV with ▲ or ▼ key.

When the test voltage range is switched, the range display displays the voltage value having been switched to in blinking.

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 of referential voltage**.

Finish of setting

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

When the EXIT key (SHIFT and ENTER keys at a time) is pressed during the setting mode, the test condition setting mode is interrupted and the tester becomes READY status.

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

7.3●Referential voltage

Adjustable range: 0.00~5.00kV

[When turning OFF the setting of referential voltage]
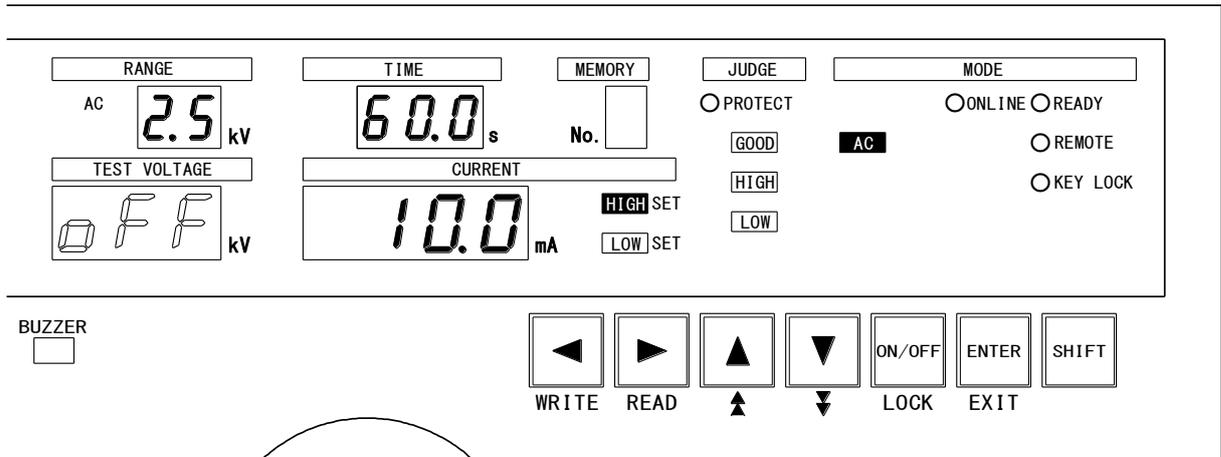
RANGE	TIME	MEMORY	JUDGE	MODE
AC **2.5** kV	**60.0** s	No.	○ PROTECT	○ONLINE ○READY
TEST VOLTAGE	CURRENT		GOOD AC	○REMOTE
o F F kV	**10.0** mA	HIGH SET LOW SET	HIGH LOW	○KEY LOCK

BUZZER □

◀ ▶ ▲ ▼ ON/OFF ENTER SHIFT
WRITE READ ▲ ▼ LOCK EXIT

| To enter setting mode |
In READY status, press ▶ or ◀ key, then the display of test voltage range blinks.

| To turn OFF the setting of referential voltage |
① During the setting mode, press ▶ or ◀ key and select the status that the test voltage display blinks.
② Then, press ON/OFF key and select the status that the display blinks with o F F (refer to the above figure).

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

| 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 the EXIT key (SHIFT and ENTER keys at a time) is pressed during the setting mode, the test condition setting mode is interrupted and the tester becomes READY status.
The test condition then is the condition before entering the test condition setting mode.

[When setting the referential voltage]
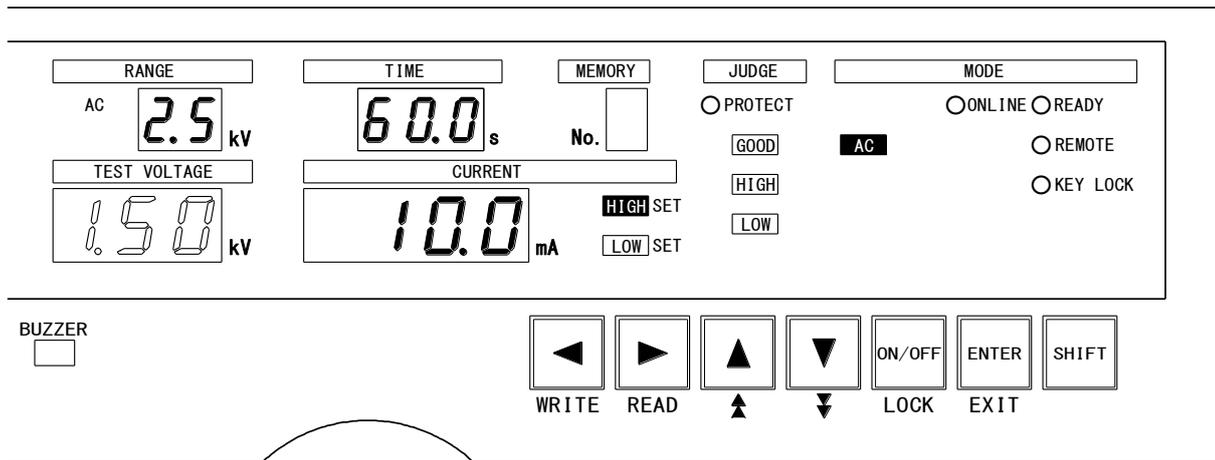
To enter setting mode

In READY status, press ▶ or ◀ key, then the display of test voltage range blinks.

Setting of referential voltage

① Press ▶ or ◀ key and select the blinking test voltage display.
② Press ON/OFF key and select the status that the display blinks with the numeral.
③ Press ▲ or ▼ key and set the referential voltage.
   Pressing of ▲ key (SHIFT and ▲ keys at a time) or ▼ key (SHIFT and ▼ keys at a time) allows the setting of second digit (the digit of 0.10kV) (refer to the above figure).
   Note: The referential voltage can be set within the range of 0.00~5.00kV.

To move to the previous setting

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

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 the EXIT key (SHIFT and ENTER keys at a time) is pressed during the setting mode, the test condition setting mode is interrupted and the tester becomes READY status.
The test condition then is the condition before entering the test condition setting mode.

7.4●High limit of leak current

Adjustable range: 0.1~110.0mA.

Note: The high limit value of the leak current can not be lower than that of low limit, so make the setting to conform to the following condition:

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.
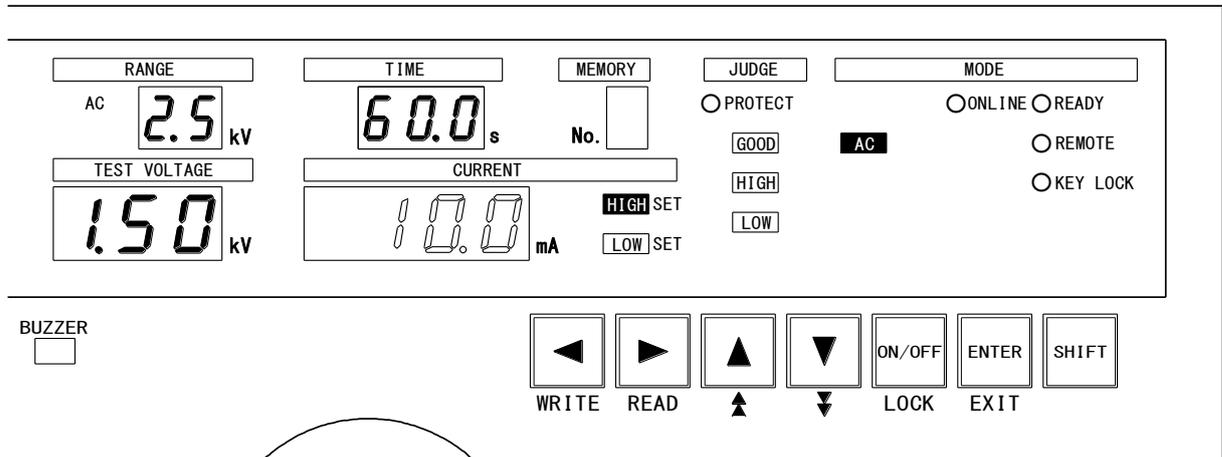
To enter setting mode

In READY status, press ▶ or ◀ key, then the display of test voltage range blinks.

Setting of high limit of leak current

① Press ▶ or ◀ key and select the status that the current display blinks and the HIGH SET is lit up.

② Press ▲ or ▼ key and set the high limit value of leak current.
Pressing of ⬆ key (SHIFT and ▲ keys at a time) or ⬇ key (SHIFT and ▼ keys at a time) allows the setting of second digit.

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.

When the EXIT key (SHIFT and ENTER keys at a time) is pressed during the setting mode, the test condition setting mode is interrupted and the tester becomes READY status.

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

7.5●Low limit of leak current

Adjustable range: 0.0~109.0mA, OFF.
Note-1: The low limit value of leak current can not be higher than that of high limit, so make the setting to conform to the following condition:
  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.
Note-2: 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.

**[When turning OFF the setting of low limit of leak current]**
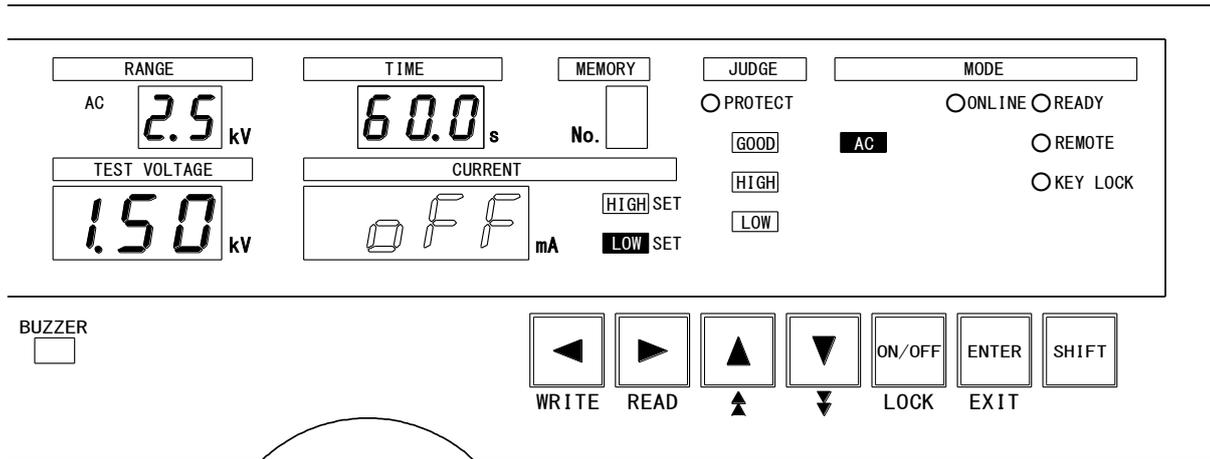
To enter setting mode

In READY status, press ▶ or ◀ key, then the display of test voltage range blinks.

To turn OFF the setting of low limit of leak current

① Press ▶ or ◀ key and select the status that the current display blinks the LOW SET is lit up.

② Next, press ON/OFF key and select the status that the display blinks with oFF (refer to the above figure).

To move to the previous setting

Press ◀ key, then the setting 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 the EXIT key (SHIFT and ENTER keys at a time) is pressed during the setting mode, the test condition setting mode is interrupted and the tester becomes READY status.
The test condition then is the condition before entering the test condition setting mode.

[When setting the low limit of leak current]
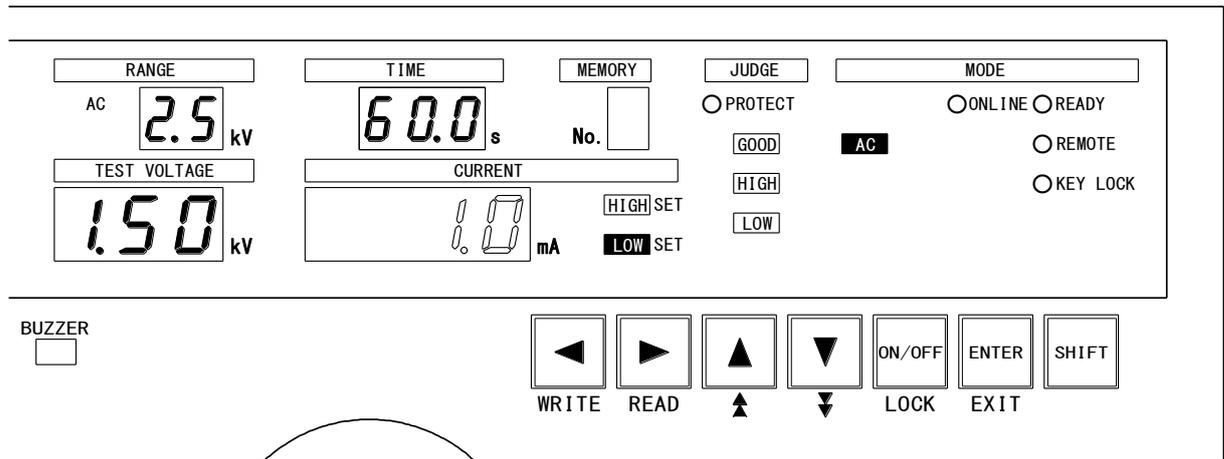
To enter setting mode

In READY status, press ▶ or ◀ key, then the display of test voltage range blinks.

Setting of low limit of leak current

① Press ▶ or ◀ key and select the status that the current display blinks and LOW SET is lit up.

② Next, press ON/OFF key and select the status that the display blinks with the numeral. (refer to the above figure).

③ Press ▲ or ▼ key and set the low limit of leak current.
   Pressing of ⬆ key (SHIFT and ▲ keys at a time) or ⬇ key (SHIFT and ▼ keys at a time) allows the setting of second .

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 the EXIT key (SHIFT and ENTER keys at a time) is pressed during the setting mode, the test condition setting is interrupted and the tester becomes READY status.
The test condition then is the condition before entering the test condition setting mode.

7.6●Test time

Adjustable range: 0.5~999s, OFF

[When turning OFF the setting of test time]

| To enter setting mode |

In READY status, press ▶ or ◀ key, then the display of test voltage range blinks.

| To turn OFF the setting of test time |

① Press ▶ or ◀ key and select the status that the test time display blinks.
② Next, press ON/OFF key and select the status that the display blinks with oFF (refer to the above figure).

| 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 **setting of with standing voltage test range**.

| Finish of setting |

Press the ENTER key, then the setting is memorized and returns to READY status.
When the EXIT key (SHIFT and ENTER keys at a time) is pressed during the setting mode, the test condition setting is interrupted and the tester becomes READY status.
The test condition then is the condition before entering the test condition setting mode.

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[When setting the test time]
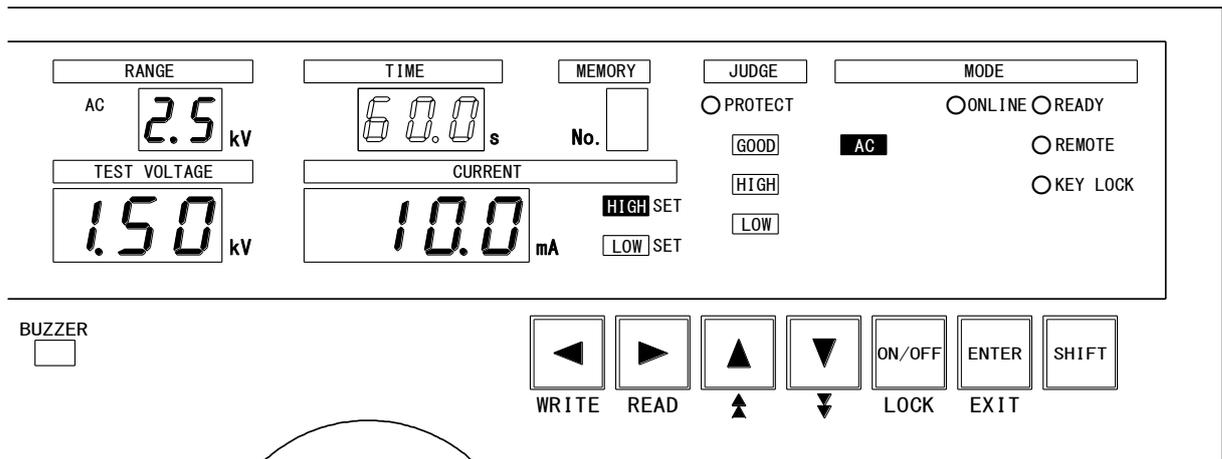
| RANGE | TIME | MEMORY | JUDGE | MODE |

AC **2.5** kV **60.0** s No.

○ PROTECT   ○ ONLINE ○ READY

GOOD   AC   ○ REMOTE

HIGH   ○ KEY LOCK

LOW

TEST VOLTAGE   CURRENT

1.50 kV   **10.0** mA   HIGH SET   LOW SET

BUZZER

◀ ▶ ▲ ▼ ON/OFF ENTER SHIFT

WRITE READ ⬆ ⬇ LOCK EXIT

To enter setting mode

In READY status, press ▶ or ◀ key, then the display of test voltage range blinks.

Setting of test time

① Press ▶ or ◀ key and select the status that the test time display blinks.
② Next, press ON/OFF key and select the status that the display blinks with the numeral (refer to the above figure).
③ 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.
The adjustable range is 0.5~99.9 seconds (resolution 0.1s) or 100~999s (resolution 1s).

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 **setting of withstanding voltage test range**.

Finish of setting

Press the ENTER key, then the setting is memorized and returns to READY status.
When the EXIT key (SHIFT and ENTER keys at a time) is pressed during the setting mode, the test condition setting is interrupted and the tester becomes READY status.
The test condition then is the condition before entering the test condition setting mode.

8. Memory function

This tester is provided with 9 program memories to memorize the setting of test mode and test condition.

8.1●Configuration of memory

A five items of the withstanding voltage test condition can be memorized per one memory. Refer to the following table for the content.

Setting of withstanding voltage test condition
↓

5 items
Range of test voltage
Referential voltage
High limit of leak current
Low limit of leak current
Test time

8.2●Memory write-in
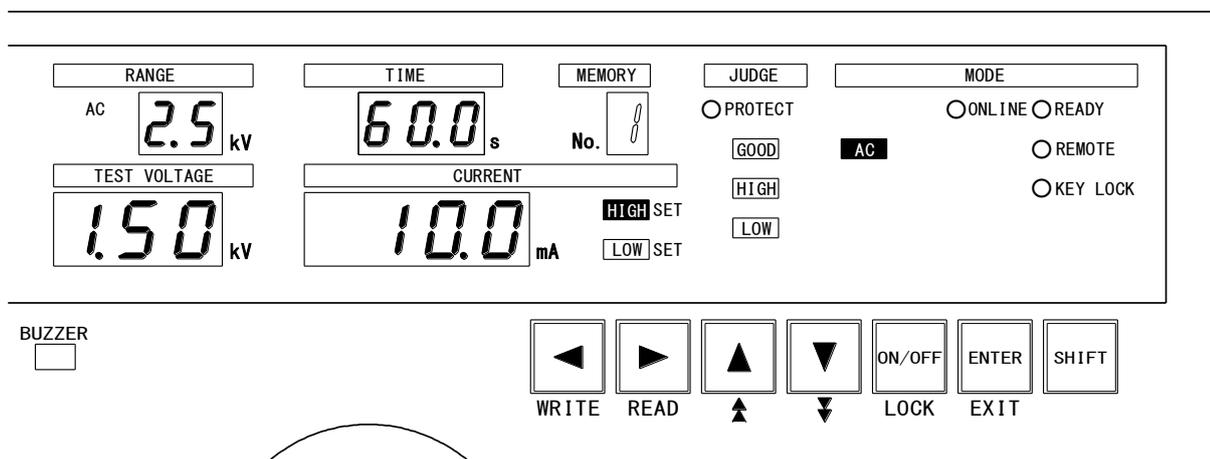
 Selection of memory No.

① Make the setting of test mode and condition required to be written in the memory, and make the tester READY status (ref. article 7).
② Press WRITE key (SHIFT and ◄ keys at a time).
Then, the numeral on the memory No. display blinks, entering into the memory write-in mode (refer to the above figure).
③ Select the memory No. to write in with ▲ or ▼ key.

 Finish of memory write-in
Press the ENTER key, then the setting is memorized and returns to READY status.
When the EXIT key (SHIFT and ENTER keys at a time) is pressed during the write-in mode, the memory write-in mode is interrupted and the tester becomes READY status.
The memory No. then is the No. before entering the memory write-in mode.

8.3●Memory read-out

RANGE	TIME	MEMORY	JUDGE	MODE

AC **5.0** kV | **5.0** s | No. **2** | ○ PROTECT | ○ONLINE ○READY

TEST VOLTAGE | CURRENT | | GOOD | AC | ○REMOTE

3.00 kV | **1.0** mA | HIGH SET | HIGH | ○KEY LOCK

| | | LOW SET | LOW |

BUZZER

◄ WRITE ► READ ▲ ▼ ON/OFF LOCK ENTER EXIT SHIFT
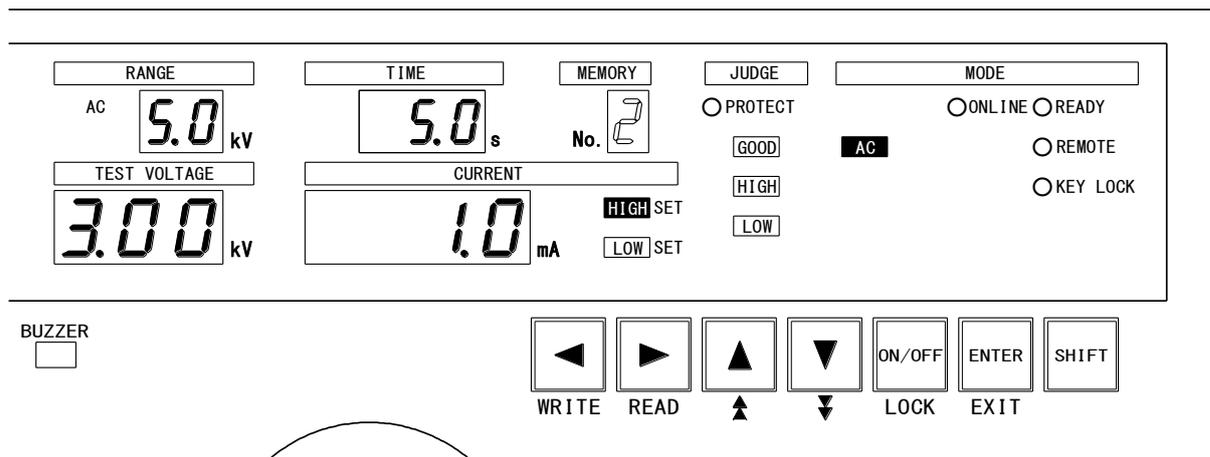
Selection of memory No.
① In READY status, press the READ key (SHIFT and ► keys at a time).
② Then, the numeral on the memory No. display blinks, entering into the memory read-out mode.
   Each display displays the content of setting of the memory No. in blinking.
③ Select the memory No. to read out with ▲ or ▼ key. (refer to the above figure).

Finish of read-out
Press the ENTER key, then the setting is memorized and returns to READY status.
When the EXIT key (SHIFT and ENTER keys at a time) is pressed while operating the read-out, the memory read-out mode is interrupted and the tester becomes READY status.
The memory No. then is the No. before entering the memory read-out mode.

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9. Test procedure (from start to judgement result)

9.1●Setting of test voltage (before starting test)

Adjustment of voltage for withstanding voltage test

① In READY status, press the ▶ key twice and make the status that the test voltage display blinks.

② Press the ON/OFF key and select the status that the display blinks with oFF.

③ Press the ▶ key twice and make the status that the current display blinks and LOW SET is lit up.

④ Press the ON/OFF key and select the status that the display blinks with oFF.

⑤ Press the ▶ key once and make the status that the test time display blinks.

⑥ Press the ON/OFF key and select the status that the display blinks with oFF.

⑦ Press the ENTER key and set to OFF the above three kinds of condition.

⑧ Press the START switch ③ and generate the test voltage.

⑨ Gradually turn the TEST VOLTAGE knob ④ clock-wise and set the test voltage.

⑩ Press the STOP switch ② and shut down the output voltage.

⑪ Press the ▶ key and enter into the test condition setting mode, restore the condition previously set to OFF by pressing the ON/OFF key and press the ENTER key.

⚠ WARNING

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.

9.2●Test operation

(1) Start
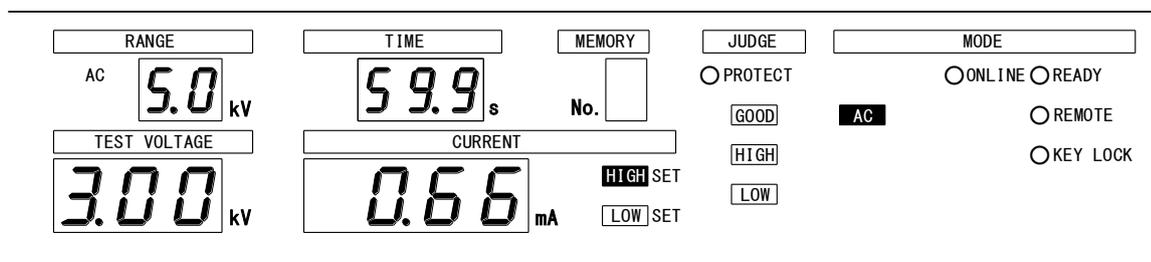
① Carry out the **Setting of test condition for withstanding voltage test** at article 7 and the **Setting of test voltage** at article 9.1

② Press the START switch ③, than the DANGER lamp ⑩ is lit up and the test starts.

③ During the test, respectively displayed are the measured output voltage on the test voltage display, the measured leak current on the current display, the remaining test time on the test time display.
Note: When the test time is set to oFF, the elapsed time is displayed during the test, and when exceeded 999s, the scroll of " ‒ ‒ ‒ " is displayed and the test is continued.

④ During the test, TEST/H.V. OUT and TEST are ON at the REMOTE/OUT connector⑱.

(2) Good judgement

RANGE	TIME	MEMORY	JUDGE	MODE
AC **5.0** kV	**0.0** s	No.	○ PROTECT	○ ONLINE ○ READY
TEST VOLTAGE	CURRENT		[GOOD]	[AC] ○ REMOTE
3.00 kV	**0.66** mA [HIGH]SET [LOW]SET		[HIGH] [LOW]	○ KEY LOCK
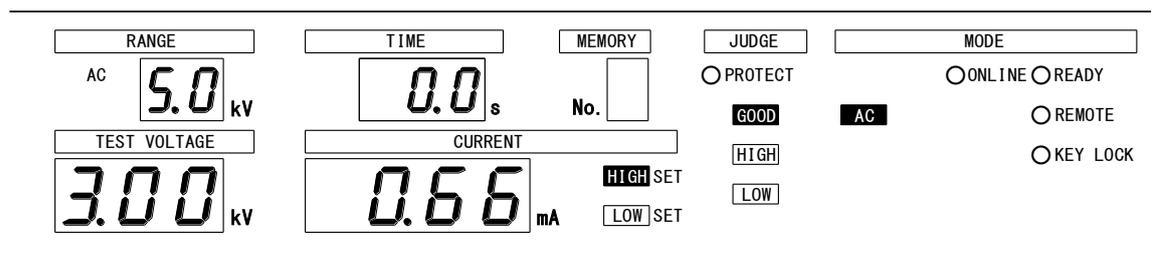
① When the leak current value of the test sample is within the range until the time reaches the set time, the good judgement is given.
Note: If the test time is set to _oFF_, no judgement is made.
② At the judgement, the test voltage display and the current display respectively displays the value at that time, while the test time display displays _0.0_ s.
③ At the time of judgement, GOOD and END are ON at the REMOTE/OUT connector ⑱.
Buzzer is also ON.
The sound level of the buzzer is adjustable or the buzzer can be turned OFF.
Make a setting referring to the article 16 Adjustment of buzzer sound.
④ After about 0.2 second, the above judgement result is resent and returns to READY status.
The good judgement can be continuously output. Make a setting referring to the article 11 Special test mode.

(3) NG judgement

RANGE	TIME	MEMORY	JUDGE	MODE
AC **5.0** kV	**5.7** s	No.	○ PROTECT	○ ONLINE ○ READY
TEST VOLTAGE	CURRENT		[GOOD]	[AC] ○ REMOTE
3.00 kV	**1.23** mA [HIGH]SET [LOW]SET		[HIGH] [LOW]	○ KEY LOCK
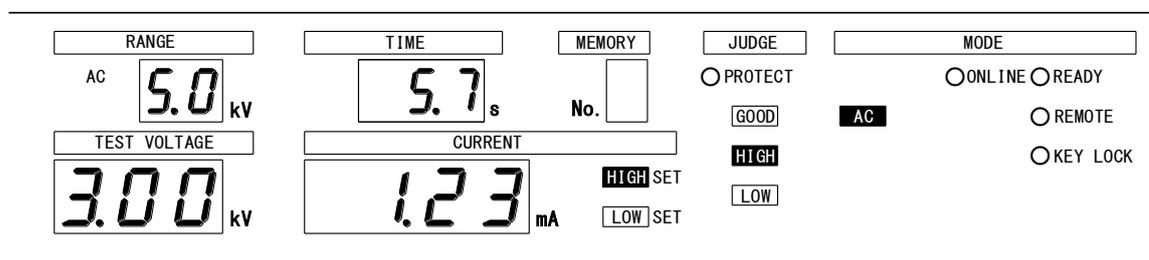
① When the measured leak current value becomes out of the range, the NG judgement is given.
② At the judgement, the test voltage display and the current display respectively displays the value at that time, while the test time display displays the remaining time when the time is set or the elapsed time when the time is set OFF.
③ At the time of judgement, when the measured leak current is higher than the high limit value, JUDGE HIGH is, and when it is lower than the low limit value, JUDGE LOW is lit up. And at the REMOTE/OUT connector ⑱, END, HIGH or LOW and the buzzer is also turned ON.
Buzzer is also ON.
The sound level of the buzzer is adjustable or the buzzer can be turned OFF.
Make a setting referring to the article 16 Adjustment of buzzer sound.
④ Press STOP switch ②, then the above judgement result is reset and the tester becomes READY status.

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

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

In case that the referential voltage is set and when the test voltage is not within the range of referential voltage (within 5% of the set value), the test is stopped.　(In case of the voltage less than 1000V, within +/-50V (+/-5 digit).)
When the test voltage is less than the range of referential voltage, the tester waits for 5 seconds, and when exceeded, the tester immediately stops the test.
Even if the referential voltage is set to OFF, the test is also immediately stopped if the test voltage becomes 6.00kV or higher.
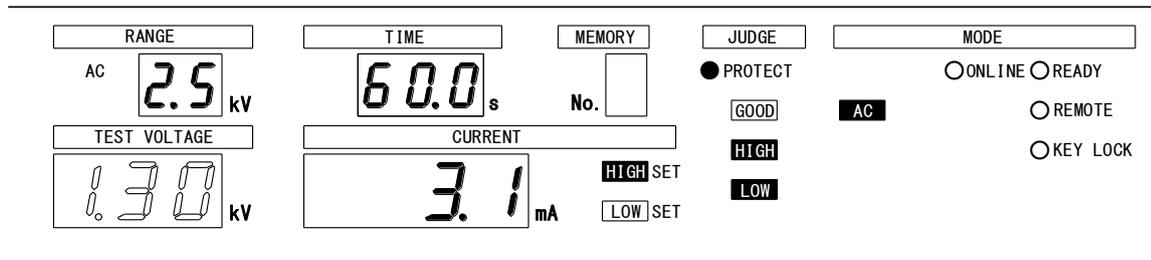
① Press START switch ③, then the DANGER lamp ⑩ is lit up and MODE AC is lit up if the test voltage is our of the range of referential voltage.
② During this sequence, the test voltage display displays the measured output voltage value and the current display displays the measured leak current value.　Also, if the test time is set, the test time displays the set value, and when the test time is set to OFF, the test time display displays $\mathit{0.0}$ s.
③ At the REMOTE/OUT connector⑱, TEST/H.V.OUT are ON.
④ When judged to be out of the referential voltage range and the test is stopped, the current display displays the value at that moment, and the test voltage display displays the value at that moment in blinking.
⑤ At this time, PROTECTION and END are ON at the REMOTE/OUT connector⑱.
⑥ Press STOP switch②, then the tester resets and becomes READY status.

9.3●Judgement waiting time for lead current

○ When the referential voltage is set, and the test voltage is lower than the referential voltage range, the tester waits for about 5 seconds.　This time is also the waiting time for the judgement of low leak current limit.
○ The judgement waiting time is provided for the judgement of low leak current limit, for about 0.3 second from applying the test voltage.

10. Key lock

In READY status, the 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.
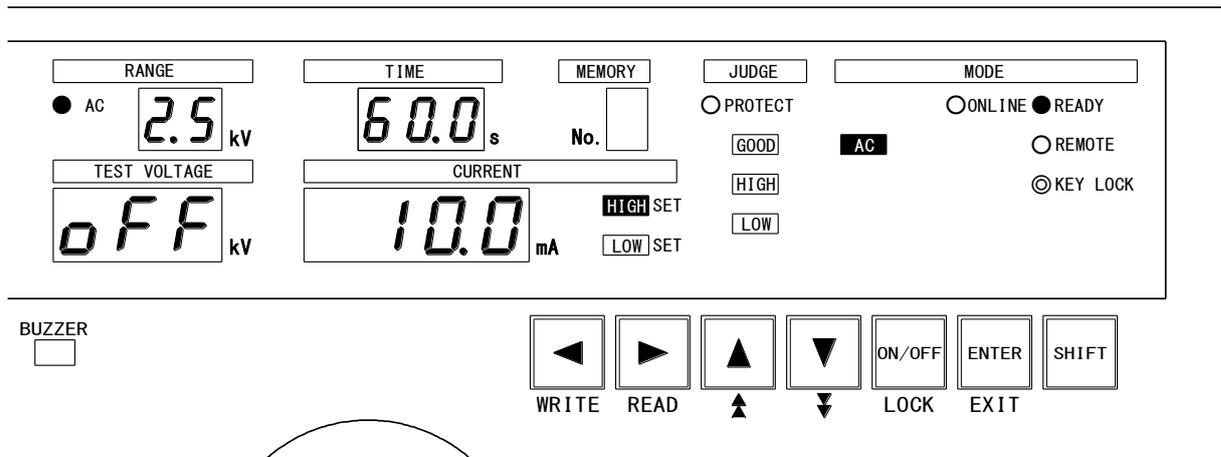
Setting procedure of key lock

① In READY status, keep pressing the LOCK key (SHIFT and ON/OFF keys at a time) for 3 seconds or more. While pressing the key, 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 the 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.

11. Special test mode

Model 8528 is able to set 4 special functions by means of the front panel key operation.

(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 related to the good judgement. The output remains continuous until the stop signal is input.

(3) Momentary start function
The test is done only while 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.
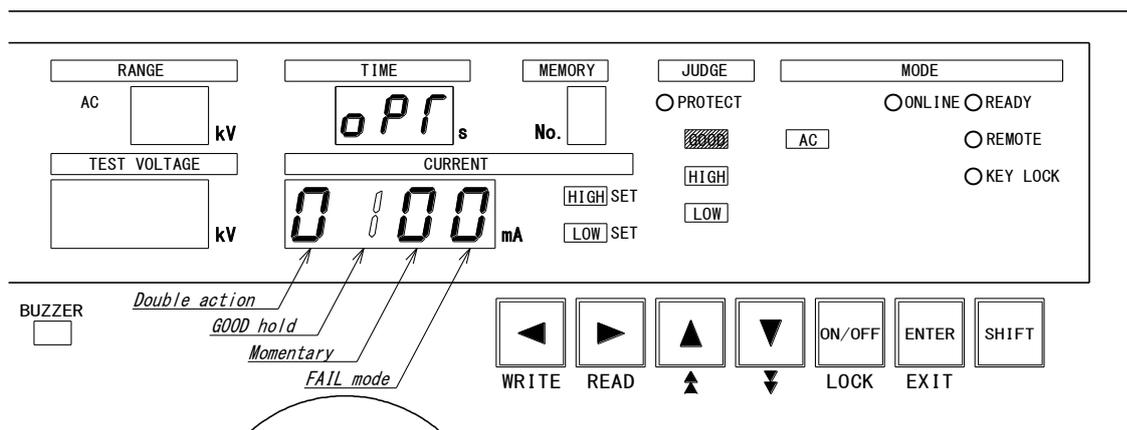
Setting procedure of special test mode

① In READY status, press ⟨SHIFT⟩ and ⟨STOP⟩ key together for 3 seconds or more.
READY lamp blinks and the test time display is lit up with "oPГ ".
The highest digit of the current display blinks.

② The item to set can be moved with ⟨►⟩ or ⟨◄⟩ key.

③ Refer to the following table for the items to select.
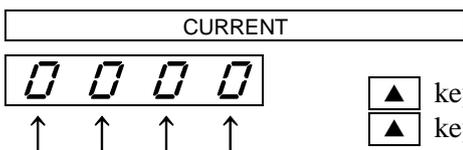
CURRENT					Lamps synchronously blinks at the setting
▲ key: Numeral increases.					
▲ key: Numeral decreases.					
0	-	-	-	Cancel of setting	READY lamp
1	-	-	-	Setting of double action start function	
	0	-	-	Cancel of setting	GOOD
	1	-	-	Setting of GOOD hold function Note: To re-start, the input of stop signal for one time 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	AC
		1	-	Setting of momentary start function	
			0	Cancel of setting	HIGH LOW
			1	Setting of FAIL mode	

Finish of setting

Press ⟨ENTER⟩ key, then the setting is memorized and returns to READY status.
When the ⟨EXIT⟩ key (⟨SHIFT⟩ and ⟨ENTER⟩ keys at a time) is pressed in the setting mode, the special test mode is interrupted and the tester becomes READY status.
The special test mode then is the condition before entering the special test mode.

12. Remote control

On the model 8528, a remote control is possible through REMOTE connector ⑤ on the front panel, REMOTE terminal ㉒ 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.

12.1●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.

12.2●Operation by REMOTE terminal

An equivalent operation to that through REMOTE connector ⑤ is also possible through the REMOTE terminal ㉒ 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 ㉒. Or alternatively, make a short-circuit between the pin No.2 of the REMOTE/OUT connector ⑱ and the COM (either one of pin No.19, 23 or 36) 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 ㉒.

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 internally, so they become "H" level at opening.
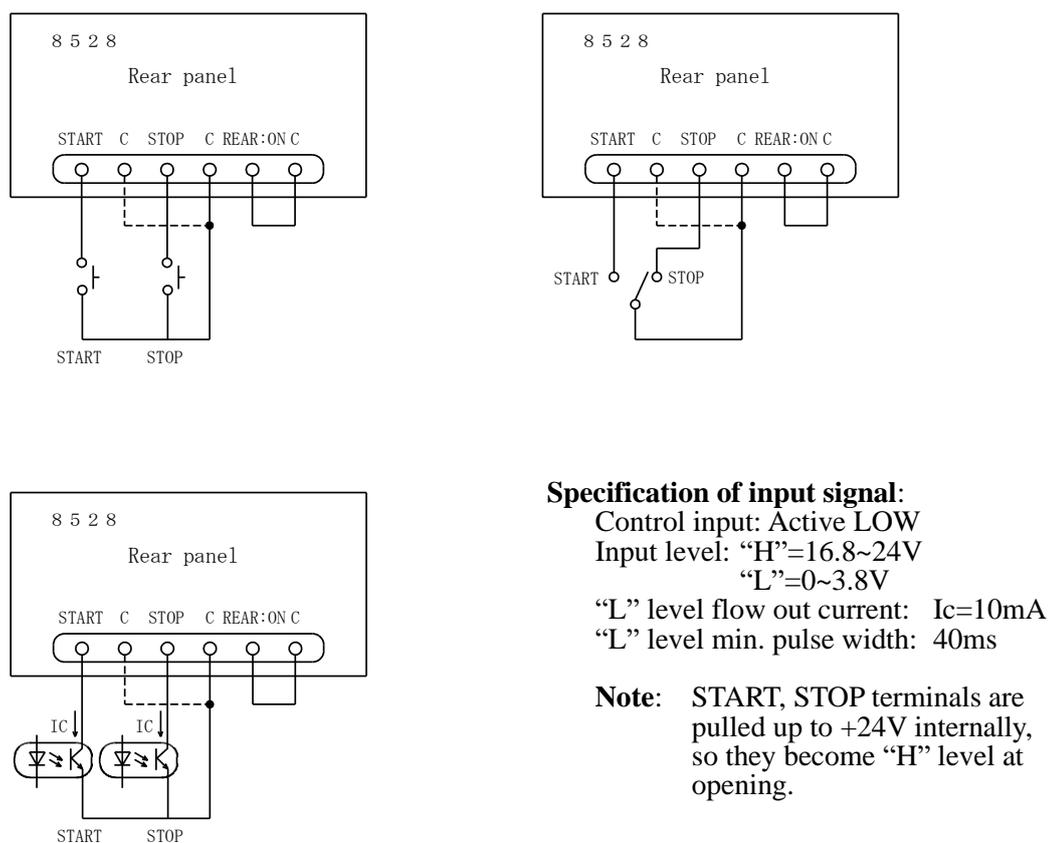
Fig.12.1 Connection examples of remote control terminals

⚠ CAUTION

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

12.3● 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 13.2 (P30).
The operation is same as the **operation by REMOTE terminal**, the article 12.2 (P27).

12.4●REAR:MEM operation

Features of REAR:MEM

1. The content of memory setting can be read out by a relay, sequencer etc. and the test can be performed.
2. Since the tester is used by the external control, the tester becomes key lock condition during the setting.
3. The start signal is decided depending upon the setting condition of the remote control.
4. An interruption of the test is possible from the STOP switch ②, STOP terminal ㉒, on the rear panel and STOP Pin No.4 of the REMOTE/OUT connector.

To start, reading out the memory

(1) Make a short-circuit between the Pin No.20 (REAR:MEM) of the REMOTE/OUT connector ⑱ on the rear and COM (either 19, 23 or 36) of the same connector⑱. Then *0* 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.
(4) If the pin No.20 of the connector ⑱ is opened, the tester returns to the test condition before entering the operation by REAR:MEM.

Remote control which can be jointly used with REAR:MEM

When the REAR:MEM is set, 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 (START) of the REMOTE/OUT connector ⑱ is also possible.
For the priority of remote control, refer to the article 12.5.

[Possible error at the REAR:MEM]

Blinking display of Err $rMrE$	For a likely cause and solution, refer to the article 17 Error messages.

12.5●Priority of each remote control

On the model 8528 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	RS232C connector ⑰	(rear panel)	1
B	REMOTE connector ⑤	(front panel)	2
C	REMOTE/OUT connector ⑱	(rear panel)	3
D	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 from C or D.

13. External control

13.1●Control by REMOTE/OUT connector

From the REMOTE/OUT connector ⑱ on the rear panel, the remote of start/stop, the setting of interlock to secure the safety, and the output signals corresponding to each condition of the 8528 can be output by open collector.
The input and output signals are isolated from the internal circuit by photo-coupler.
Also, the 8528 is provided with the power source of DC24V 0.1A, which can be utilized as power supply for the external control.

13.2●Arrangement and function of connector pins

I/O	Signal name	Pin No.	Function
	+24V	1	Output of the power 24V DC for external control. (Capacity 0.1A)
I	REAR:ON	2	Change-over signal for remote control. Ref. article 12.3 for detail.
	START	3	Input signal for start.
	STOP	4	Input signal for stop.
	INTER LOCK	5	Signal for interlock.
	MEM SET 1	6	BCD code input for read out of memory.
	MEM SET 2	7	(Effective at the setting of REAR:MEM)
	MEM SET 4	8	Effective for No.1~No.9. A~F code are ineffective.
	MEM SET 8	9	No memory can be read.
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 13.4 for detail.
	GOOD	13	Output at good judgement.
	HIGH	14	Output at NG judgement for high limit.
-	NC	15	Vacant pin (do not use it as relay terminal).
	NC	16	Vacant pin (do not use it as relay terminal).
	NC	17	Vacant pin (do not use it as relay terminal).
	NC	18	Vacant pin (do not use it as relay terminal).
COM	COM	19	Common (common with 23, 26)
I	REAR:MEM	20	Change-over signal for memory read out from the rear panel.
-	NC	21	Vacant pin (do not use it as relay terminal).
	NC	22	Vacant pin (do not use it as relay terminal).
COM	COM	23	Common (common with 19, 36)
-	NC	24	Vacant pin (do not use it as relay terminal).
	NC	25	Vacant pin (do not use it as relay terminal).
O	TEST	26	Output during the test. Not output while AC 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.
	LOW	32	Output at NG judgement for low limit.
-	NC	33	Vacant pin (do not use it as relay terminal).
	NC	34	Vacant pin (do not use it as relay terminal).
	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
```
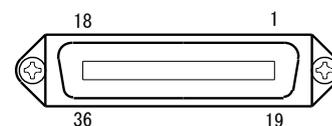
Connector used: 36P Anphenol

Note: When externally remote controlled, REAR:ON and COM are short-circuited.
The operation is same as the **operation by REMOTE terminal**, the article 12.2 (P27).

13.3●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, $Err LoCH$ is displayed in blinking, the output of 8528 is shut off and the operation of all the switches are disabled (PROTECT lamp is lit up).

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.

$Err LoCH$ 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
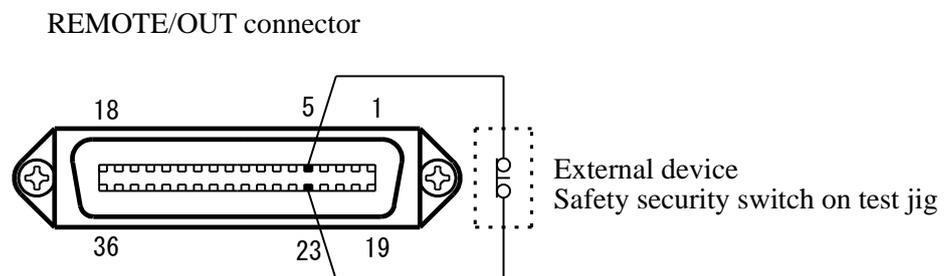
Fig.13.1 Interlock connection example

13.4●Protective function (PROTECTION)

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

- 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.
- When the test voltage becomes out of the referential voltage range and the test is stopped.

13.5●Output signals and power supply for control

It is possible to take out each condition of the 8528 as output signal.
The power supply of 24V DC for control is provided, so the relay etc. can be directly driven.

(1) Specification of output signal (Pin No.10~14, 26, 28, 31, 32)
　　　Signal type　　　　　　　: Open collector output
　　　Max. load voltage　　　　: 30V DC
　　　Max. output current　　　: 30mA DC
　　　Isolation system　　　　　: Isolated from the internal circuit by photo-coupler
　　　Output saturation voltage : 1.6V DC or less
(2) Specification of control power source (Pin No.1)
　　　Output voltage　　　　　　: 24V DC
　　　Current capacity　　　　　: 0.1A DC
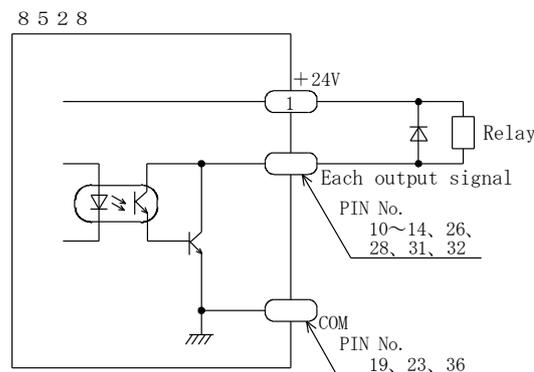
**Fig.13.2**　Connection example of relay drive
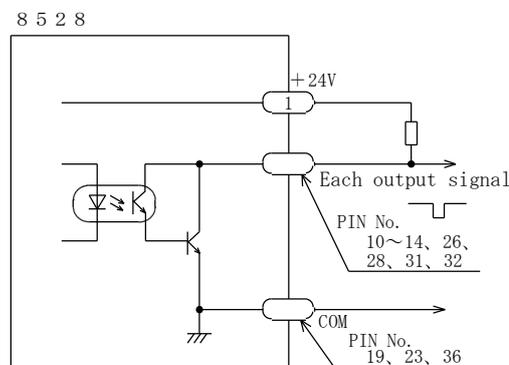

Fig.13.3　Example to obtain a signal level

⚠ CAUTION

● **Use the output signal with 30V and 30mA DC or less.**
● **In case of controlling an inductive load like relay, connect a capacitor in parallel with the coil to absorb the reverse electricity.**

14.Status output

14.1●Name of STATUS OUT and condition for output

The relay contact is output from the STATUS OUT ㉓ on the rear panel. In case that the plural outputs are selected, the output is given when either one of the conditions 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.
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.
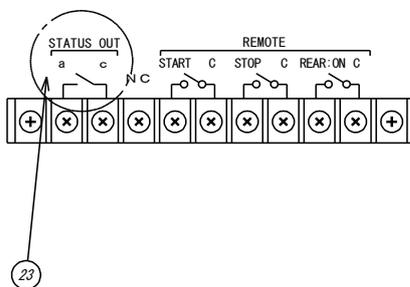
It can be connected to the optional buzzer unit (5858-05) and so on.
Plural numbers of output names for status output can be selected (it is OR selection).

14.2●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 status output. It will cause a break-down of this tester.

14.3●Setting of condition for status output

Setting procedure of condition for status output

① In READY status, press ON/OFF key and ▲ key at a time for 3 seconds or more.
 DANGER blinks and the test time display is lit up with "$5\Gamma H$ ".
The highest digit of the voltage display blinks.

② The item to set can be moved with ▶ or ◀ key.

③ Refer to the following table for the items to select.

"$\mathit{0}$ " or "I " blinks at selection of each item.
 I : To select $\mathit{0}$: 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
I						TEST/H.V. OUT	DANGER
	I					TEST	AC
		I				GOOD	GOOD
			I			NG	HIGH LOW
				I		READY	READY lamp
					I	REMOTE	REMOTE lamp
					I	POWER ON	————

Finish of setting

Press ENTER key, then the setting is memorized and returns to READY status.
When the EXIT key (SHIFT and ENTER keys at a time) is pressed, the setting mode of the status output condition is interrupted and the tester becomes READY status. The mode of the status output condition then is the condition before entering the special test mode.

15. Timing chart

START
STOP
READY
TEST/H.V.OUT (DANGER)
TEST
GOOD
HIGH NG
LOW NG
BUZZER
END
PROTECTION
Setting of referential voltage
Waiting of referential voltage

①GOOD action ②HIGH NG action ③LOW NG action ④Test voltage NG action ⑤Half way stop action

TIME UP
Continue -able
OK OK OK NG OK

16. 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.

RANGE		TIME	MEMORY	JUDGE	MODE

AC kV
$bU\overline{\Xi}$ s
No.
○ PROTECT
GOOD   AC
HIGH
LOW
○ ONLINE ○ READY
○ REMOTE
○ KEY LOCK

TEST VOLTAGE
CURRENT

$Go-\overline{J}$ kV   mA

HIGH SET
LOW SET

BUZZER

◄ WRITE   ► READ   ▲   ▼   ON/OFF LOCK   ENTER EXIT   SHIFT
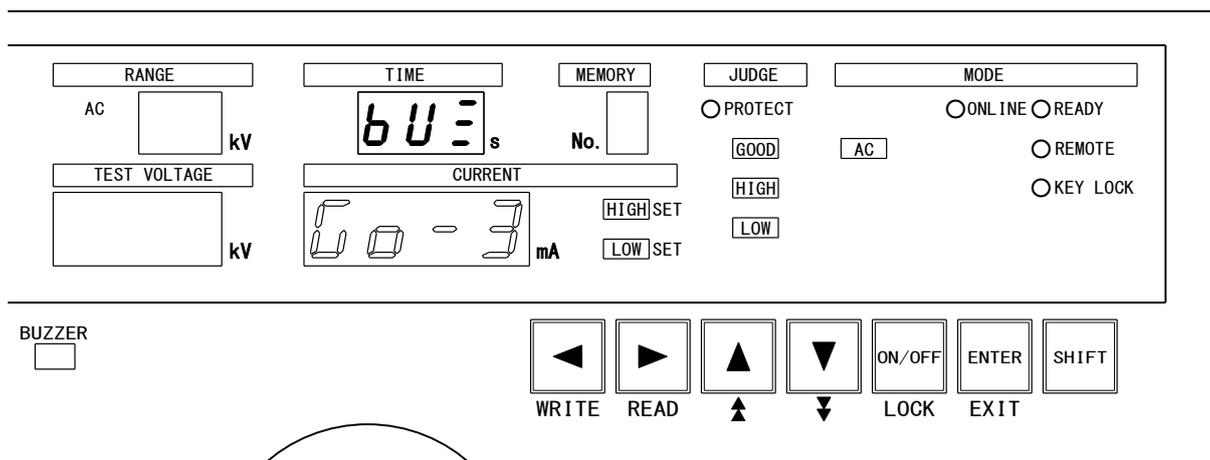
To enter the setting of buzzer sound

In READY status, press ON/OFF key and ▼ key at a time for 3 seconds or more.
The test time display displays "$bU\overline{\Xi}$ ".

Adjustment of buzzer sound at the GOOD judgement

① The current display blinks with "$Go - \Box$".
The adjustment of buzzer sound at GOOD judgement can be made while "$Go - \Box$" is blinking.

② The sound volume can be set with ▲ or ▼ key.   Refer to the table below.

Adjustment of buzzer sound at the NG judgement

① The current display blinks with "$Go - \Box$".

② Switch over with the ► or ◄ key to "$nG - \Box$" which is for the adjustment of buzzer sound at NG judgement.

③ The sound volume can be set with ▲ or ▼ key.   Refer to the table below.

Finish of setting

Press ENTER key, then the setting is memorized and returns to READY status.
When the display of "$bU\overline{\Xi}$ " is lit up and the EXIT key (SHIFT and ENTER keys at a time) is pressed, the buzzer sound setting is interrupted and the tester becomes READY status.
The buzzer sound level then is the level before entering the setting of buzzer sound.

[Buzzer sound level]

Adjustable range		Volume
For GOOD judgement	For NG judgement	
$Go-5$	$nG-5$	Max
$Go-4$	$nG-4$	↑
$Go-\overline{J}$	$nG-\overline{J}$	
$Go-\overline{c}$	$nG-\overline{c}$	↓
$Go-1$	$nG-1$	Min
$Go-0$	$nG-0$	OFF

Buzzer can be sounded by pressing STOP switch ② for confirmation.

17. Error message

When the error occurs, the message is displayed as the following table.
Take proper action and work after confirming the error message.

TEST VOLTAGE	CURRENT
Err kV	$LoCY$ mA

TEST VOLTAGE	CURRENT	Cause	Solution	
Err	$55r$	When the voltage output does not drop after passing 10 sec.	A	※
Err	$LoCY$	When the interlock input turns OFF.	B	※
Err	$rNrE$	When the remote status is changed during the test.	C	※
Measured value	$uuuu$	When the abnormal current is detected during withstanding voltage test. (Becomes NG for high limit of leak current.)	D	
Err	$5rrr$	When the time to retain the start signal is less than 40ms.	E	
Err	$E-11$	When the start signal turns OFF in momentary action, during the withstanding voltage.	F	

※ PROTECTION is output from REMOTE/OUT connector ⑱.

Solutions:
A : Turn OFF the power supply immediately.   The 8528 main unit may be faulty. Consult us or our dealer.
B : Interlock input is turned OFF.   Review the connection and sequence, and make a correct connect of the interlock input.
   Press STOP switch ② and make READY status.
C : The error is given when the remote connection is ON and OFF, or the memory number is changed during the test.   Press STOP switch ② etc. 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 8528 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 the correct one, press STOP switch ② and make READY status.
E : Press STOP switch ② and make READY status.
   When the ON time is less than 40ms, the error is displayed.
   Take care to secure the start sequence 40ms or more.
F : Press STOP switch ② and make READY status.
   Make a connection so that the start signal an not be OFF during the test, or review the sequence.

18. Maintenance

18.1●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 water thinned by neutral cleaner 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.

18.2●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.	● Isn't the power supply plug out of the socket? ● Isn't the fuse burnt out? 　Replace fuse referring to the art. 18.3 (P38).
$Err\ LoCH$ is displayed.	● Interlock functions. 　Cancel the interlock referring to the art. 13.3 (P31).
Key is not operable.	● Isn't the KEY LOCK lamp lit up? 　Cancel the key lock referring to the art. 10 (P25)
Test can not be started, though START switch is pressed.	● 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 12 (P27) for remote control.

18.3●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.
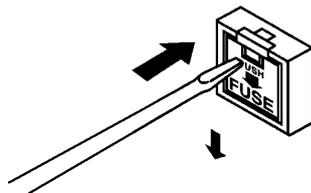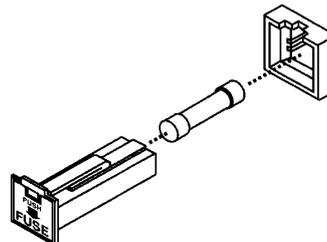
(Fig.1)　　　　　　　　(Fig.2)

19. Specifications

19.1 Test voltage

19.1.1 AC withstanding voltage output

(1)	Output voltage	0~2.5kV / 0~5kV AC
(2)	Output capacity	500VA (5kV, 100mA) at the rated power source voltage.
		For the output current 50mA or more, 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 $\Rightarrow$ max. load)
(5)	Voltage apply system	Zero-cross throw switch.
(6)	Setting of output voltage	Manual setting by volt slider.

19.2 Voltage measurement

19.2.1 Analog

(1)	Scale	0~5kV AC
(2)	Accuracy	$\pm$5% of F.S
(3)	Indication	Effective average rectification value indication
(4)	Unit	"kV"

19.2.2 Digital

(1)	Measuring range	0.00~6.00kV AC
(2)	Display	Digital display in 3 digits, green LED, character height 10mm
(3)	Accuracy	$\pm$1.5% of F.S (F.S 2.5kV/5kV)
(4)	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.
		Referential voltage is displayed at READY.
(5)	Indication	Effective average rectification value indication

19.3 Current measurement

(1)	Display range	0.01~199.9mA (2 ranges, joint change-over with high limit value)
(2)	Display	Digital display in 3 1/2 digits, green LED, character height 10mm
(3)	Resolution	0.01mA (0.1~9.9mA) Note: ( ) shows the high limit set value.
		0.1mA (10.0~110.0mA)
(4)	Accuracy	$\pm$(5%+20μA) of the high limit set value.
(5)	Current display	Leak current value is displayed during the test.
		Leak current value at the judgement is retained at the finish of the test.
		High limit value is displayed at READY.
(6)	Indication	Effective average rectification value indication

19.4 Judgement of test result

(1)	Judgement system	High limit : Analog comparator. (For short-circuit detection,
		set value internally fixed.)
		High and low limit : Digital comparator.
(2)	Adjustable range	High limit : 0.1~110.0mA (low limit + 1 digit or more)
		Resolution : 0.1mA (0.1~110.0mA)
		Low limit : 0.0~109.0mA (high limit – 1 digit or less)
		Resolution : 0.1mA (0.0~109.0mA)
		Note: Low limit setting can be ON/OFF.
(3)	Judgement condition	High limit value $>$ Leak current $>$ Low limit value … GOOD
		High limit value $\leqq$ Leak current ………………………. HIGH NG
		Low limit value $\geqq$ Leak current ………………………. LOW NG

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	10μA	20μA	30μA	37μA	47μA

19.5 Test time
    (1) Setting range   0.5~999s, with timer 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.

                          A set value is displayed at READY.
    (4) Accuracy $\pm$20ms (0.5~99.9s) / $\pm$200ms (100~999s)

19.6 Input/output signal
    (1) Connector   36P Anphenol connector on the rear panel.
    (2) Output signal   Open collector 30V DC, 400mA MAX (TOTAL)
    (3) Name of output signal

TEST	In test.
END	Finish.
TEST/H.V. OUT	High voltage is output at the output terminal.
READY	In waiting.
GOOD	At good judgement (0.2s / continuous changeable).
NG	At NG judgement (continuous).
HIGH NG	At NG judgement for high limit (continuous).
LOW NG	At NG judgement for low limit (continuous).
PROTECTION	When the protective function is activated.

    (4) Power source for
                 output signal 24V DC, 0.1A
    (5) Input signal   H=16.8~24V, L=0~3.8V
                          1c=10mA, L level minimum pulse width=40ms
    (6) Name of input signal

START	Start signal
STOP	Stop signal
REAR:ON	Change-over signal for remote control
INTER LOCK	Interlock signal
REAR:MEM	Memory read-out signal
MEM SET1	Memory read-out signal, BCD code 1
MEM SET2	Memory read-out signal, BCD code 2
MEM SET4	Memory read-out signal, BCD code 4
MEM SET8	Memory read-out signal, BCD code 8

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

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	

19.8 Voltage monitor output
    Monitor output for output voltage of withstanding voltage test.

Output terminal	:	One piece each of red and black terminal on the rear panel.
Output voltage	:	0~5V DC (to 0~5kV AC)
Tolerable error	:	$\pm$1.5% of F.S

19.9 RS232C 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

19.10 Remote control

Following remote control is possible by and through REMOTE connector (DIN5P) on the front panel, REMOTE terminal or REMOTE/OUT connector on the rear panel.
Also, the remote control by RS-232C is possible.

(1)	START	Start of test.
(2)	STOP	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.
		It is possible to remote control with no-voltage contact or logic element from the REMOTE terminal or REMOTE/OUT connector on the rear panel.
(3)	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 used, the change of setting is not allowed (key lock status).

19.11 Other functions

|		
(1)	Interlock	Locking condition when the INTER LOCK pin ⑤ on the rear connector is open.
		When locked, $Err\ LocH$ is displayed.
(2)	Memory function	9 kinds of setting content (test voltage range, referential voltage, high and low limit of leak current, test time) 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 ±5% of the set value.
		Note: When the set voltage is 1000V or less, it is within ±50V (±5digit). In case that the voltage comes out of the set value during the test, the test is stopped and HIGH LOW NG is displayed. (The function can be turned ON/OFF. When turned OFF, oFF is displayed on the voltage display at the time of setting.)
(4)	Key lock	When locked, operation of the switches other than stop is disabled. (KEY LOCK 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)	DANGER display	Lit up when the test voltage is output.
		When the voltage remains at the output terminal after the finish of test, it is continuously lit up.
		Low voltage detection level: 100V AC
(7)	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
		a) "GOOD" judgement is continuously output until the stop signal is input. In this case, re-start is not allowed until the stop signal is input.
		b) In the above condition a), if the start signal is input, the judgement is cancelled and the re-start is possible.
		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.

19.12 General specifications

    (1) Power supply   100V AC 50/60Hz

    (2) Power supply voltage
                tolerance range   90~110V AC

    (3) Power consumption   Approx. 650VA at the rated load, approx. 16VA with no load (READY)

    (4) Operating ambient temp. 0~40℃

    (5) Operating ambient hum.   20~80%RH (no dew condensation)

    (6) Storage temp. and hum.   -20~70℃, 90%RH or less (no dew condensation)

    (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) Optional accessories   Remote control box   Model 5858-07

                               Both-hands remote   Model 5858-07W
                                 control box

                               Foot switch   Model 5858-04

                               Communication cable   Model 5881-11-020
                               (RS-232C cable, 9 pins – 9 pins / 2.0m)

                               Rack mount bracket   Model 5871-03-014

                               Relay unit   Model 5858-08

19.13 Optional specification (factory option, to be designated at ordering)

    (1) Non-standard power   115V AC   / Suffix: -P115

          supply voltage   200V AC   / Suffix: -P200

                            220V AC   / Suffix: -P220

                            240V AC   / Suffix: -P240   are available on request.

19.14 External dimensions
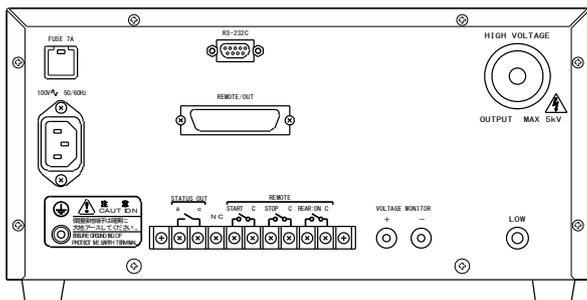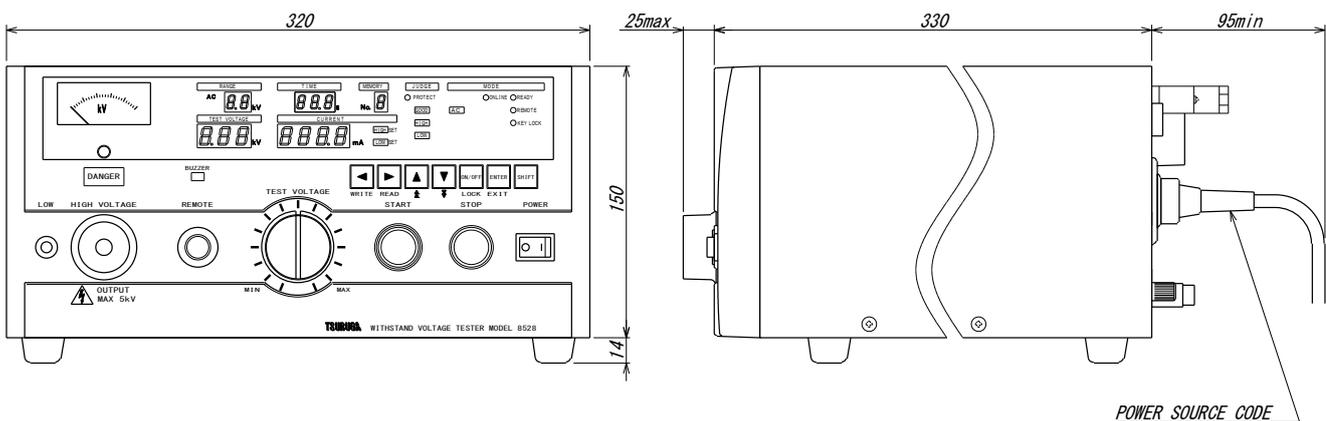
Unit: mm

Contact Information
Tsuruga Electrical Corporation Osaka Sale office / Overseas Trade Department Taiyo Seimei Osakaminami Building 5F 1-10-6, Abikohigashi, Sumiyoshi-ku, Osaka, Japan, 558-0013 *Tel: + 81-(0)6-4703-3874 / Fax: + 81-(0)6-4703-3875* E-mail: ft.info@tsuruga.co.jp

RS-232C Interface for Model 8528

Instruction Manual

TSURUGA ELECTRIC CORPORATION

Contents

1. Specifications

The model 8528 is provided standard with the RS-232C interface for communication as a standard, 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	Test condition Memory No. Buzzer sound
Output	Test condition Test result Status Memory No. Buzzer sound

[Note] The ON/OFF of supply power source, 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	RS232C 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, key lock, remote etc., return to the condition before being set by the RS-232C.

2. Connection

2.1 Connectors and signals

8528
connector
D-sub 9 pin
Pin 1

Male side
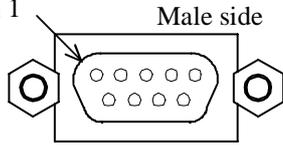
Connector: D-sub 9 pin plug type

Pin 1

Female side
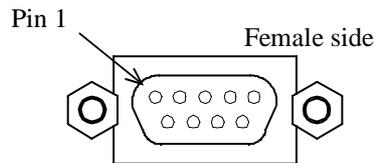
Recommended connector : XM2D-0901 (OMRON)
Recommended lock screw : XM2S-0913 (OMRON) Inch screw
Note) Connector and cable for external connection,
Model 5881-11-018, 9 pins – 9 pins/1.8m (option),
are also provided.

Pin No.	8528 JIS (RS-232C)	Direction	Name
	NC		Not in use
	RD (RXD)	Host	Receiving data
	SD (TXD)	Host	Transmission data
	ER (DTR)	Host	Data terminal ready
	SG (GND)		Ground for signal
	NC		Not in use 1
	RS (RTS)	Host	Request for transmission
	CS (CTS)	Host	Transmittable
	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.

Host side

D-sub 25pin
male

D-sub 9pin
female

8528 tester side

D-sub 9pin
female

SHELL ——————— SHELL

D-sub 9 pin
or 25 pin

Host

D-sub 9 pin
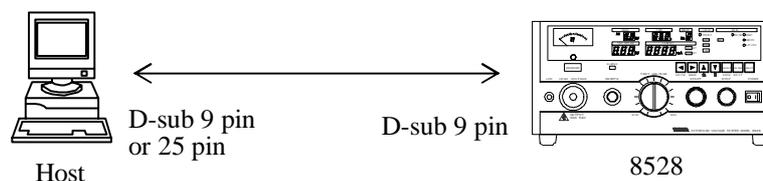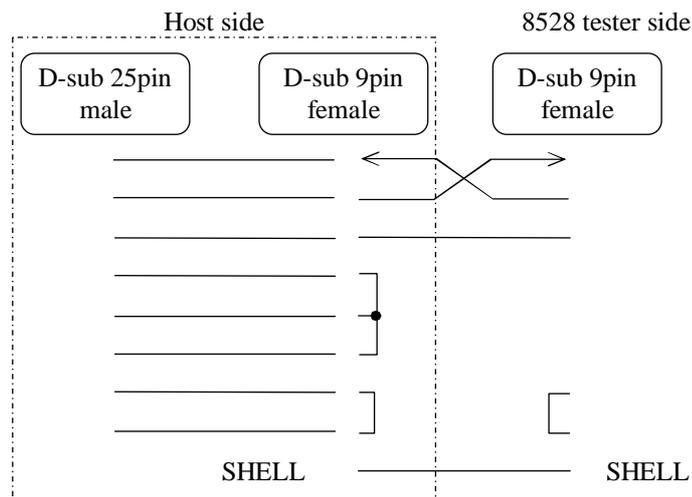
8528

Make a connection of 8528 and host by cable.

3. Explanation of communication method

3.1 Communication method for command

Command →
Response ←

Host   8528
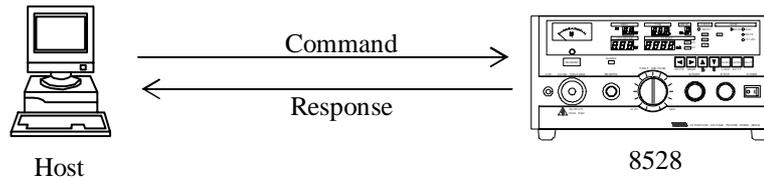
Command is sent from the host.
When the 8528 received an effective command, it makes the corresponding transaction.
After completion of command transaction, a response is transmitted to the host.
The host transmits the next command after confirming the response.

Example of sequence (* is the normal data string of characters.)

Host side (Command)		8528 side (Response)	Test condition
[RESPONSE=ON]	→	Transmits the response when the command is effective.	READY
	←	Transmits [ERROR=0] OK	
[REMOTE=ON]	→	START command by RS-232C is possible	
	←	Transmits [ERROR=0] OK	
[SET: AVOLT=*, , ATIMER=*]	→	Setting in the lump of parameters.	
	←	Transmits [ERROR=0] OK	
[START]	→	Starts the test.	
	←	Transmits [ERROR=0] OK	
[STATUS?]	→	Reads out the status data.	
	←	Transmits the status data [STATUS=****].	
		Note: The command which can be used during the test is RESET or STATUS only.	In test
DATA?	→	Read-out in the lump of test result.	
	←	[JUDGE=*, AJUDGE=*, VOLT=*, CURRENT=*] Transmission in the lamp of test result.	Test fishes

[A] Configuration of command

| Command | + | Parameter | + | Delimiter |

Example   AVOLT=5.0kV $\boxed{C_R}\boxed{L_F}$
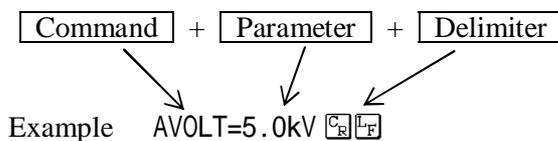
1. Command   The command to control 8528.
                        It does not a matter whether the command is in capital or small letter.
2. Delimiter   It means the division of transmission data.
3. JIS 8 bit code is used for the command, parameter and delimiter.
4. Command and parameter is divided by "=".
5. In case that there is no parameter, transmit the delimiter following the command.
   Example: RESET $\boxed{C_R}\boxed{L_F}$
6. 8528 responses even if a unit is not included in the parameter.

| Caution at the transmission of command |

Transmit the set command (=) when the 8528 is in READY status.
When the set command is transmitted from the host during the test, 8528 transmits an error to the host.

B Configuration of response
When the host transmits the command to 8528, 8528 analyzes and transact the command, and transmits the response to the host.
In case that the command transmission is unconformable, 8528 transmits an error code to the host.
Also provided on 8528 is the Response Setting to set whether or not to transmit the normal response from 8528 when the received transmission of command is normal.
(Refer to the article 4.2.7 (P10) RESPONSE.)

[When the Response Setting is set ON]
    For the effective setting and operation command, 8528 certainly transmits ERROR=0 to the host.
    Example 3.1 Effective command: START [CR][LF],
                   Response: ERROR=0 [CR][LF]
    Example 3.2 Effective command: ATIMER=60.0s [CR][LF],
                   Response: ERROR=0 [CR][LF]
                  The test time of withstanding voltage test is set to 60.0s.

    For the ineffective setting and operation command, 8528 certainly transmits ERROR=code to the host.
    Example 3.3 Ineffective command: RST [CR][LF] (incorrect spell of the test stop command)
                   Response: ERROR= Error No. [CR][LF]

[When the Response Setting is set OFF]
    8528 does not transmit ERROR=0 to the effective setting and operation command.
    Example 3.4 Effective command: START [CR][LF],
                   Response: No response
    Example 3.5 Effective command: ATIMER=60.0s [CR][LF],
                   Response: No response.

    For the ineffective setting and operation command, 8528 certainly transmits ERROR=code, 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, 8528 transacts it as read-out command. To the read-out command, 8528 adds "= parameter" to the command letters and transmits it to the host.

Command from the host side : Command letters?
Response from 8528 to the host : Command letters = parameter
In case of error, 8528 transmits the error code to the host.
Refer to the article 5 (P24) **Error codes**.

Example 3.6 Command: ALOW?⌷F⌷F Reads out the low limit value of leak
current of withstanding voltage test.
Response: ALOW= 5. 0mA⌷R⌷F

3.3 Basic format of setting and operation

When the " = " is added to the letters of setting command from the host side, 8528 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: AVOLT=5. 0kV⌷R⌷F Test voltage range is set to 5.0kV
Response: ERROR=0 ⌷R⌷F 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: START⌷R⌷F Starts the test.
Response: ERROR=0 ⌷R⌷F 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 [note] time (ms)	Expla- nation page
ON/OFF selection of remote control	REMOTE=/REMOTE?	23/19	7
Key lock	KEYLOCK=/KEYLOCK?	27/23	8
ON/OFF selection to suffix command name and unit to the transmission to the host	FORMAT=/FORMAT?	27/23	9
ON/OFF selection of response	RESPONSE=/RESPONSE?	32/24	10
Start of test	START	10~15	11
Stop of test and judgement reset	RESET	10~15	11
Read-out of status	STATUS?	5~13	12
Read-out of tester identification	IDNT?	12	13
Test voltage range of withstanding voltage test	AVOLT=/AVOLT?	19/15	13
Referential voltage of withstanding voltage test	ALEVEL=/ALEVEL?	28/16	14
Setting of high limit of leak current of withstanding voltage test	AHIGH=/AHIGH?	25/16	15
Setting of low limit of leak current of withstanding voltage test	ALOW=/ALOW?	32/15	16
Test time of withstanding voltage test	ATIMER=/ATIMER?	29/26	17
Read-out of judgement result	JUDGE?	20	18
Read-out in the lump of test result and data	DATA?	16	19
Parameter of test condition	SET:/SET:?	340/30	20
Change-over of memory No.	MEMORY=/MEMORY?	32/14	21
Parameter of test condition including memory No.　　:1~9	MEM:/MEM:?	420/20	22
Buzzer sound volume	BUZZ=/BUZZ?	23/15	23

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 8528.

Host　　　　　　　　Command+$C_R$$L_F$

8528　　　　　　　　　　　　　　　　Response+$C_R$$L_F$

　　　　　　　　　　　　　　　Response time
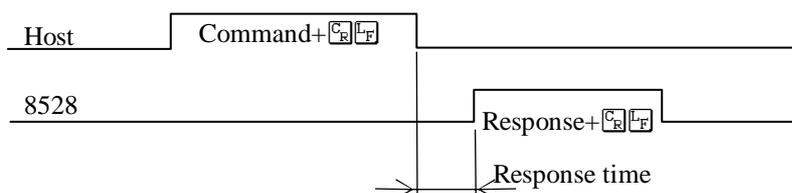
4.2   Explanation of each command

4.2.1   REMOTE=   (setting of remote control)

| Function | By setting the remote control, ONLINE lamp and REMOTE lamp are lit up and the tester enters in the keylock status (KEYLOCK lamp lit up). |

| Structure | REMOTE= ON/OFF |

ON/OFF : Becomes the status of remote control by the host with "ON".
Key lock setting is also turned "ON" without condition.
START command becomes effective.
Remote control status is cancelled with "OFF".
Setting for the keylock at that time is retained.

Transmission

REMOTE=ON[CR][LF]   …….……   Makes the remote control setting ON.

REMOTE=OFF [CR][LF]   ….………   Makes the remote control setting OFF.

| Response | When 8528 received an effective command setting. |

ERROR=0 [CR][LF]   ………..…….   When the response setting is ON.

No response   ………………...   When the response setting is OFF.

⚠ **WARNING**

The keylock function can be cancelled by KEYLOCK=OFF command of RS-232C.   Do not use the RS-232C remote control by KEYLOCK=OFF.

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

| Function | Reads out the setting of remote control, ON or OFF. |

| Structure | REMOTE? |

Transmission

REMOTE?[CR][LF]

Response

REMOTE=ON[CR][LF]   ………….....   When the remote control setting is ON.

REMOTE=OFF [CR][LF]   ………….....   When the remote control setting is OFF.

4.2.3 KEYLOCK= (setting of key lock)

| Function | Lock or cancel the key operation other than START and STOP of the REMOTE/OUT connector on the front panel (KEYLOCK lamp is lit up). |

Structure   KEYLOCK=ON/OFF

ON/OFF : Becomes key lock status with " ON ".

Cancels the key lock status with " OFF ".

Transmission

KEYLOCK=ON C_R L_F   ……….… Makes the key lock setting ON.

KEYLOCK=OFF C_R L_F   ……… Makes the key lock setting OFF.

Response   When 8528 received an 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 key lock 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 key lock status)

Function   Reads out ON or OFF of the key lock setting.

Structure   KEYLOCK?

Transmission

KEYLOCK? C_R L_F

Response

KEYLOCK=ON C_R L_F   ..……..... When the key lock setting ON.

KEYLOCK=OFF C_R L_F   ……….. When the key lock setting OFF.

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/OFF|: Adds command name and unit to the data sent to the host with "ON".
Does not add command name and unit to the data sent to the host with "OFF".

|Transmission|

FORMAT=ON℃ℒ℉   ………... Adds command name and unit to the response.

FORMAT=OFF ℃ℒ℉   …….… Does not adds command name and unit to the response.

|Response| When 8528 received an effective command setting.

ERROR=0 ℃ℒ℉   ……….……. 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 the setting of response format, ON or OFF.

|Structure| FORMAT?

|Transmission|

FORMAT?℃ℒ℉

|Response|

FORMAT=ON℃ℒ℉   ………... Setting of response format to the host is ON.

FORMAT=OFF ℃ℒ℉   ……….. Setting of response format to the host 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 the effective command is transmitted to 8528, 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/OFF : Certainly transmits the response with "ON".
When 8528 receives the effective command, it transmits ERROR=0 to the host.
For the ineffective command, it transmits ERROR=No. .
When 8528 received the effective command with "OFF", it does not transmit the response to the host.
When the command is ineffective, ERROR=No. is transmitted regardless of ON/OFF of the Response Setting.
Note: ERROR=No. is refer to the article 5 (P24) **Error codes**.

Transmission

RESPONSE=ON⌃R⌃F   ……….. Makes the response setting ON.

RESPONSE=OFF ⌃R⌃F   ……..… Makes the response setting OFF.

| Response | When 8528 received the effective command setting. |

ERROR=0 ⌃R⌃F   ……….….…. When the response setting is ON.

No response   ……….……….. When the response setting is OFF.

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

| Function | Reads out the setting of response, ON or OFF. |

| Structure | RESEPONSE? |

Transmission

RESPONSE?⌃R⌃F

Response

RESPONSE=ON⌃R⌃F ……………. When the response setting is ON.

RESPONSE=OFF ⌃R⌃F …………… When the response setting is OFF.

4.2.9 START (start of test)

> | Function | Starts the test.
>
> > **Note:** When the special test mode - GOOD hold function is 2 on 8528 main unit side, re-start with START command is also possible.
>
> | Structure | START
>
> | Transmission |
>
> START C_R L_F
>
> | Response | When 8528 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.

4.2.10 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 judgement is reset.
>
> | Structure | RESET
>
> | Transmission |
>
> RESET C_R L_F
>
> | Response | When 8528 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.

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4.2.11 STATUS? (read-out of status)

| Function | Reads out the status of 8528.

It corresponds to the open collector output of REMOTE/OUT connector   (refer to the instruction manual of 8528 main unit).

Note: It has no relation with the relay output of STATUS OUT terminal on the rear of 8528 under status output condition (refer to P34 of instruction manual of the tester main unit).

| Structure | STATUS?

| Transmission |

STATUS?$^{C}_{R}$$^{L}_{F}$

| Response |

STATUS= $^{C}_{R}$$^{L}_{F}$
                     : Numeral in 4 digits (hexadecimal form)

[Example]

STATUS=0015 $^{C}_{R}$$^{L}_{F}$ ……...   In test.
                             TEST/HVOUT, TEST (AC-TEST) are being output.
STATUS=0042 $^{C}_{R}$$^{L}_{F}$ ……...   At the finish of test.
                             GOOD, END are being output.

Kinds of parameter

Name of output	Condition of output	Weight of data (hexagonal)
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
(AC-TEST)	In the course of withstand' voltage test. **Note-1**	0010
GOOD	Total judgement passed.	0040
NG	Total judgement failed.	0080
HIGH	Withstanding voltage test failed for high limit of leak current.	0100
LOW	Withstanding voltage test failed for low limit of leak current.	0200
PROTECTION	Protective circuit is activated. **Note-2**	4000

Note-1: There is no open collector output from the REMOTE/OUT connector   .
Note-2: "Protective circuit is activated" means that the tester is in the status of interlock, error display and etc.

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4.2.12   IDNT?   (read-out of tester identification)

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

| Structure | IDNT?

| Transmission |

IDNT?CRLF

| Response |

IDNT=TSURUGA_8528_ROM No.478_Ver.1.00.00 CRLF

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

4.2.13   AVOLT=   (setting of test voltage range of withstanding voltage test)

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

| Structure | AVOLT= Test voltage range

Test voltage range   2.5kV or 5.0kV is to be set

| Transmission |

AVOLT=5.0kV CRLF   ……...   Sets the range of withstanding voltage test at 5.0kV.

| Response | When 8528 received the effective command setting.

ERROR=0 CRLF   ……..……   When the response setting is ON.

No response ……………..   When the response setting is OFF.

4.2.14   AVOLT?   (read-out of test voltage range of withstanding voltage test)

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

| Structure | AVOLT?

| Transmission |

AVOLT?CRLF

| Response |

AVOLT=2.5kV CRLF   ……..   Indicates the test voltage range of withstanding voltage test 2.5kV.

4.2.15 ALEVEL= (setting of referential voltage of withstanding voltage test)

| Function | Makes the setting of referential voltage of withstanding voltage test. |

| Structure | ALEVEL= | Referential voltage |

| Referential voltage | OFF or 0.00~5.00kV is to be set.

| Transmission |

ALEVEL=1. 50kV C_R L_F ….. Sets the referential voltage of withstanding voltage test at 1.50kV.

| Response | When 8528 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.

4.2.16 ALEVEL? (read-out of referential voltage of withstanding voltage test)

| Function | Reads out the referential voltage of withstanding voltage test. |

| Structure | ALEVEL?

| Transmission |

ALEVEL? C_R L_F

| Response |

ALEVEL=1. 50kV C_R L_F ….. Indicates the referential voltage of withstanding voltage test 1.50kV.

4.2.17 AH GH= **(setting of high limit of leak current of withstanding voltage test)**

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

Structure   AH GH= 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

AH GH=10.0mA Cᴿ Lꜰ ….....…   Sets the high limit of leak current of withstanding voltage test at 10.0mA.

Response   When 8528 received the effective command setting.

ERROR=0 Cᴿ Lꜰ ……..………   When the response setting is ON.

No response ……………….   When the response setting is OFF.

4.2.18 AH GH? **(read-out of high limit value of leak current of withstanding voltage test)**

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

Structure   AH GH?

Transmission

AH GH? Cᴿ Lꜰ

Response

AH GH=10.0mA Cᴿ Lꜰ ……...   Indicates the high limit of leak current of withstanding voltage test 10.0mA.

4.2.19 ALOW **(setting of low limit of leak current of withstanding voltage test)**

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

| Structure | ALOW 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 |

ALOW2.0mA 🄲🅁🄻🄵 …….…... Sets the low limit of leak current of withstanding voltage test at 2.0mA.

| Response | When 8528 received the effective command setting.

ERROR=0 🄲🅁🄻🄵 ………….. When the response setting is ON.

No response …………….. When the response setting is OFF.

4.2.20 ALOW? **(read-out of low limit value of leak current of withstanding voltage test)**

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

| Structure | ALOW?

| Transmission |

ALOW? 🄲🅁🄻🄵

| Response |

ALOW2.0mA 🄲🅁🄻🄵 ………... Indicates the low limit 2.0mA of leak current of withstanding voltage test.

4.2.21 ATTMER= (setting of test time of withstanding voltage test)

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

Structure   ATTMER=|Test time|

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

Transmission

ATTMER=60.0s C̲R̲ L̲F̲ ……...   Sets the test time of withstanding voltage test at 60.0sec.

Response   When 8528 received the effective command setting.

ERROR=0 C̲R̲ L̲F̲   …….…….   When the response setting is ON.

No response   ……………..   When the response setting is OFF.

4.2.22 ATTMER? (read-out of test time of withstanding voltage test)

Function   Reads out the test time of withstanding voltage test.

Structure   ATTMER?

Transmission

ATTMER? C̲R̲ L̲F̲

Response

ATTMER=10.0s C̲R̲ L̲F̲ ……...   Indicates the test time of withstanding voltage test 10.0sec..

4.2.23 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?CRLF

Response

Type of judgement	Parameter	Content
Total judgement JUDGE= : 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.
Judgement result AJUDGE= : Parameter	GOOD	Passed.
	HIGH	Failed for high limit judgment.
	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.

Example of response:
When the judgement result is GOOD	JUDGE=GOOD, AJUDGE=GOODCRLF
When the judgement result is HIGH	JUDGE=NG, AJUDGE=HIGHCRLF
When the judgement result if LOW	JUDGE=NG, AJUDGE=LOWCRLF
At stop	JUDGE=NULL, AJUDGE=NULL CRLF
When the protection occurred	JUDGE=PROTECT, AJUDGE=HIGH LOWCRLF

4.2.24 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 is retained until the next start even if the RESET command is made or STOP switch is pressed. |

| Structure | DATA? |

| Transmission |

DATA?[CR][LF]

| Response |

[Example of response after the finish of test]

Judgement result and action during the test	Response
Withstanding voltage test passed	JUDGE=GOOD, AJUDGE=GOOD, VOLT=1. 51kV, CURRENT=1. 23mA[CR][LF]
Withstanding voltage test failed for HIGH	JUDGE=NG, AJUDGE=HIGH, VOLT=1. 51kV, CURRENT=32. 1mA[CR][LF]
Withstanding voltage test failed for LOW	JUDGE=NG, AJUDGE=LOW, VOLT=1. 51kV, CURRENT=0. 15mA[CR][LF]
At RESET (stop) **Note-1**	JUDGE=NULL, AJUDGE=NULL, VOLT=0. 00kV, CURRENT=0. 0mA[CR][LF]
When protective function operated **Note-2**	JUDGE=PROTECT, AJUDGE=HIGH LOW, VOLT=1. 50kV, CURRENT=1. 23mA[CR][LF]

Note-1: The data becomes 0.
Note-2: The data when the protective function is in operation is responded.
The data of the items which have not been done becomes 0.

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4.2.25　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 |

At the withstanding voltage test.

AVOLT=
ALEVEL=　┐
AHIGH=　├　For detail, refer to the articles 4.2.13 (P13),
ALOW=　│　4.2.15 (P14), 4.2.17 (P15), 4.2.19 (P16) and 4.2.21 (P17).
ATIMER=　┘

| Transmission |

SET: AVOLT=2. 5kV,　ALEVEL=2. 00kV,　AHIGH=10. 0mA,　ALOW=5. 0mA,　ATIMER=60. 0s
[C_R][L_F]

| Response | When 8528 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.

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

| Function | Reads out each parameter in the lump. |

| Structure | SET: ? |

| Transmission |

SET: ?[C_R][L_F]

| Response |

When FORMAT=ON
　SET: AVOLT=2. 5kV,　ALEVEL=1. 50kV,　AHIGH=20. 0mA,　ALOW=OFF,
　ATIMER=60. 0s [C_R][L_F]
When FORMAT=OFF
　SET: 2. 5,　1. 50,　20. 0,　OFF,　60. 0[C_R][L_F]

4.2.27 MEMORY= (setting of memory number)

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

| Structure | MEMORY=

       : 1~9

| Transmission |

MEMORY=5 [C̲R̲][L̲F̲] ..……....... Changes the current test condition over to memory No.5.

| Response | When 8528 received an effective command setting.

ERROR=0 [C̲R̲][L̲F̲] …….…….. When the response setting is ON.

No response …………….. When the response setting is OFF.

4.2.28 MEMORY? (read-out of memory number)

| Function | Reads out the memory number currently selected.

| Structure | MEMORY?

| Transmission |

MEMORY?[C̲R̲][L̲F̲]

| Response |

MEMORY=8 [C̲R̲][L̲F̲] ……….... When the memory No.8 is read out.

MEMORY=OFF [C̲R̲][L̲F̲] …...... When the condition that no memory is selected is read out.

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4.2.29 MEM No. : **(setting of test condition to memory)**

| Function | Makes the setting of parameters in the lump to the designated memory number. |

Structure   MEM No. : Parameter of test

No. : 1~9

Parameter of test
Same as those at the article 4.2.25 (P20) SET: (setting of parameters of test condition)

Transmission

MEM5: AVOLT=5.0kV, ALEVEL=1.00kV, AHIGH=100.0mA, ALOW=OFF, ATIMER=60.0s [CR][LF]

Response   When 8528 received the effective command setting.

ERROR=0 [CR][LF] ……………. When the response setting is ON.

No response ……………….. When the response setting is OFF.

4.2.30 MEM No. :? **(read-out memorized test condition)**

| Function | Reads out the designated memory number and each parameter in the lump. |

Structure   MEM No. : ?

No. : 1~9

Transmission

MEM3: ? [CR][LF]

Response

When FORMAT=ON
MEM3: AVOLT=2.5kV, ALEVEL=1.50kV, AHIGH=20.0mA, ALOW=OFF, ATIMER=60.0s [CR][LF]
When FORMAT=OFF
MEM3: 2.5, 1.50, 20.0, OFF, 60.0 [CR][LF]

4.2.31   BUZZ=   (setting of buzzer sound)

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

| Structure | BUZZ= OFF/1 ~ 5 , OFF/1 ~ 5 |

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

Buzzer sound volume parameter at failed (NG) judgement
OFF, 1, 2, 3, 4, 5
Sound volume: Small   Big

| Transmission |

BUZZ=3, 5 $^{C}_{R}$ $^{L}_{F}$ …….……... Buzzer sound volume at GOOD (judegment passed) is set to 3 among 5 levels and the sound level at NG (judgement failed) is set to maximum.

| Response | When 8528 received an effective command setting. |

ERROR=0 $^{C}_{R}$ $^{L}_{F}$ ……..………. When the response setting is ON.

No response ………………….. When the response setting is OFF.

4.2.32   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? $^{C}_{R}$ $^{L}_{F}$

| Response |

BUZZ=OFF, 3 $^{C}_{R}$ $^{L}_{F}$

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

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

5. Error codes

Error code	Content of error and solution
ERROR=1	Command format not recognizable. Erroneous letter. Example: RESSET, RST Correct the letters to RESET.
ERROR=2	Parameter is out of effective range. Example: ATIMER=9999 Set it to OFF or within 0.5~999.9s
ERROR=3	When the parameter is tried to be set in the condition that the setting is not allowed. Example: Command was sent when the interlock function is in operation. Cancel the interlock and send a command.
ERROR=4	Operation is made in the course of initialization of 8528. 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 as 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 at 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: Command can not be sent while the setting is made on the front panel. Finish the setting and make READY lamp lit status.

For the errors in the following table, refer to the article 18 Error Message of the tester main unit.

Error message	Solution
Err 55r	It is the hardware problem. Inform us or the dealer whom you purchased.
Err LoCH	If the No.5 pin (INTERLOCK) of REMOTE / OUT connector is open, ERROR=3 is transmitted to the host even if the command is transmitted. Short-circuit the No.5 pin and COM, and transmit RESET command or press STOP switch.
Er rMrE Err Srr Err E-11	Transmit RESET command or press STOP switch.

6. Cautions

About the case when the setting is operated by REMOTE=OFF, KEYLOCK=OFF in the status set 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 8528 control.
'
' 1. When the form is loaded, setting of the communication of 8528 and the operational check are done.
' 2. Click of the command1[SETTING] button makes a change of test condition of withstanding voltage
'   test, set value.
'
' Content of the setting is as follows:
'
' AVOLT   = 2.5kV
' ALEVEL   = OFF
' AHIGH   = 10.0mA
' ALOW   = OFF
' ATIMER   = 5s
'
' 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 CommControl   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 for test interruption

' Wait, time out detection, for msec time, Windows API
Private Declare Function GetTickCount Lib "kerne132"( ) As Long

' Definition of enumeration form of 8528 status
Private Enum STB8528_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
    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
    sPROTECTION = &H4000    ' Protective circuit activated
End Enum

' Definition of enumeration form of error code
Private Enum EER8528_ID
    eNo_Error = 0            ' Normal
    eSyntax_Error = 1       ' Command writing error
    eOut_Of_Range = 2       ' Out of effective range
    eCondition = 3          ' Setting condition effor
    eInitializing = 4       ' 8528 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 --------------------------------------

'MSCOMM          Defines the port and open it.

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

    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
        .InFufferSize = 256            ' Receiving buffer size
        .OutBufferSize = 256           ' Transmission buffer size

        Call FlashBuffer               ' Flash of receiving and transmission buffer

        .Hnadshaking = 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  ' ASCI 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
```

```
' MSCOMM       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 = Flasee

        End if
    End With

    ShowLog "CloseCommi", "OK"

Exit_CloseComm:
    Exit Sub

End Sub

' MSCOM        Flash of transmission and receiving flash
Private Sub FlashBuffer ( )

    With MSComm1
        . InBufferCount = 0
        . OutBufferCount = 0
    End With

End Sub

'   Text1                          Log display letters
Private Sub ShowLog(Optional ByVal dar1 As Variant, Optional ByVal dat2 As Variant)

    With Text1
        If Len(.Text) >= .MaxLength Then .Text = Right(.Text, 256)
        . SelStart = Len(. ext)
        . SelText = dat1 & ":" & dat2 & vbCrLf

    End With

End Sub
```

```
' MSCOMM          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 string
Dim sRevc As String                      ' Receiving letters buffer
Dim nTMO As Long                         ' time out

    On Error GoTo Err_SendComm

    ' Receiving time out is set to 1s
    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 EER8528_ID

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

        If sResponse Like < > "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", "Syntax 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 Singple)
Dim IngStart As Long, IngEnd As long
    If sngSec = 0 Then Exit Sub
    IngStart = GetTickCount ( )
    IngEnd = IngStart + (sngSec * 1000)
    Do While GetTickCount ( ) < IngEnd
        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_Active ( )
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:

    ' 8528 Response ON
    If SendComm("RESPONSE=ON", szBuf) = False Then GoTo Err_Form_Activate:
    If ErrorHandler (szBuf) = False Then GoTo Err_Form_Activate:

    ' 8528 Remote control ON
    If SendComm("REMOTE=ON", szBuf) = False Then GoTo Err_Form_Activate:
    If ErrorHandler (szBuf) = False Then GoTo Err_Form_Activate:

    ' 8528 Response format OFF
    If SendComm("FORMAT=OFF", szBuf) = False Then GoTo Err_Form_Activate:
    If ErrorHandler (szBuf) = False Then GoTo Err_Form_Activate:

    ' 8528 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 8528 to local at finish of form
    If Command1. Enabled Then
        Call SendComm("RESET")
        Call SendComm("KEYLOCK=OFF")
        Call SendComm("REMOTE=OFF")
    End If

    Call CloseComm                          ' Close port

    End

End Sub

' Start of test
Private Sub Command2_Click ( )
DimszBuf As String, nSTB As STB8528_ID

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

    ' 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 500ms
```

```
        ' 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 ThenGoTo 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 "A_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 8528
Private Sub Command1_Click
Dim szBuf As String, nSTB As STB8528_ID
Dim Sets As String

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

    ' STATUS? 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_Command_Click:
    End If

    ' Construction of SET: command
    Sets = "SET: " & "AVOLT=2.5kV"
    Sets = Sets & "," & "ALEVEL=OFF"
    Sets = Sets & "," & "AHIGH=10.0mA"
    Sets = Sets & "," & "ALOW=OFF"
    Sets = Sets & "," & "ATIMER=5s"

    ' 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
```

Contact Information	
Name : Tsuruga Electric Corporation	
Address : 1-3-23 Minami-Sumiyoshi, Sumiyoshi-ku, Osaka-shi	
558-0041 Japan	