TSURUGA

MODEL **3587**

Digital MΩ Tester

Operation Manual

I-02356

Contents

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1. Preface

The Model 3587 is a digital MΩ tester for insulation resistance test of the many types of household appliances, electronics equipment and parts.

We would like to thank you for your purchase of our MODEL 3587. For safety and proper use of this product, please carefully read this operation manual before the use.

This product should be handled by persons having good knowledge in electricity.

The following symbol marks are used in this manual for the safety use of the product.

⚠ Warning This is the warning to avoid danger. Severe injure or fatal accident may occur to the user in case the product is mishandled.

⚠ Caution This is the caution to avoid danger. Minor injury to the user or physical obstacle may occur in case the product is mishandled.

· High Voltage Danger

High voltage is applied in in the tester during test and never touch your hands in dangerous location.

⚠ Warning

- Do not open the case or modify the main body.
- Never touch the terminals when power is ON. There may be risk of electric shock.

⚠ Caution

- The instrument may be damaged if testing method not specified by manufacturer is used. Read the instruction manual carefully and understand the contents before the use.
- The rated data for warm up is specified for more than 30 minutes.
- To avoid break-down, malfunction or deterioration of life time, do not use this product 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.
  - ◆ where there is constant vibration or shock.
- Store this product at -20 to 70 ℃.
- Wipe off front panel and housing with dry soft cloth. If necessary, use close with small amount of synthetic detergent for cleaning. Do not use an organic solvent such as thinner, benzine for front panel or housing cleaning, which might damage shape and color of front panel and housing.

1.1 Preparations prior to use

●Unpacking
When the tester is delivered, please check whether it conforms to the required specifications and has not been damaged in transit. If there is any damage on the tester or it does no work in conformity with the specifications, please inform us of the model and product name.

●Storage
In case of storing the tester for a long time, store it at the place of low humidity and where it is not exposed to the direct sunlight.

1.2 Confirmation prior to use

● Power supply
Use the tester with the power source voltage within 90 to 250VAC and the frequency 50/60Hz. When connecting the power supply cable, confirm that the power supply switch is turned OFF.

⚠ Warning
●Set the power switch for the instrument where it can be used very easily.

●Power supply cable
The plug of power supply cable connected to the tester is for 100VAC use. When the tester is used with 200VAC, replace the plug with appropriate one for 200VAC use. Please connect the power supply cable to the power supply connector on the rear panel of the tester. The plug of power supply cable has 3 pins and the round shape pin in the center is for grounding.

1.3 Warning and caution during measurement

Electric shock accident or malfunction

⚠ Warning

- ●Check and confirm the cable condition and metal portion of the wire before use. There is a danger of electric shock if the measuring cable is broken or the metal portion of the wire is exposed. If some damage is found, stop using it immediately and replace the specified new one.
- ●In order to prevent the electric shock accident or the failure of this unit, do not apply voltage to the measurement terminal.
- ●In order to prevent the failure, conduct the measurement after turning off the power related to the measurement.
- ●A high voltage is passed through the measuring cable. Never touch the tip of the measuring cable to avoid the electric shock.
- ●In order to avoid electric shocks and to ensure the safety of the tester, protective earth connection is necessary. Connect the supplied power cord with ground insulating type bipolar outlet.
- ●When the tester is used, use the supplied power cord by the manufacturer only. If the power cord not specified by manufacturer is used, it may be the cause of fire.

Connection of the control cable and communication cable

⚠ Caution

- ●Use the specified cable size to connect the control terminal.
- ●Make sure that communication cable and control cable are connected surely. If the connection is not undertaken correctly, it may cause of the failure to satisfy specification or malfunction.
- ●Power supply must be turned off on each device before connection of communication cable and control cable. Failure to turn of the electric power cause the electric shock or malfunction.
- ●Do not change the logic switching (PNP / NPN) of the control terminal while the power supply is turned on. Set the logical switch (PNP / NPN) suitable to the external device.

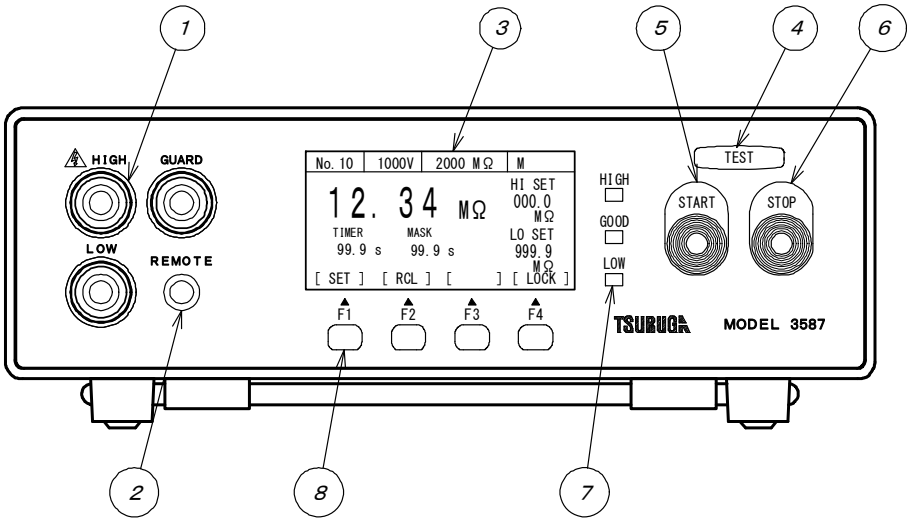
Other caution

⚠ Caution

- ●If power supply is done by UPS（Uninterruptible power supply device) or DC-AC inverter, do not use rectangular wave or pseudo rectangular wave output of UPS or DC-AC inverter. If used, this may cause the malfunction of the instrument.
- ●The power supply frequency setting is necessary to eliminate the induced voltage of power supply. Setting the suitable power frequency of the power supply in instrument before use.

2. Name of parts

2.1 Front panel



①Measuring terminal

HIGH: ＋Measuring terminal — When the sample to be measured is ground, it is to be connected to the grounded side of the sample.

LOW: －Measuring terminal — To be connected to the non-grounded side of the sample.

GUARD: LOW(Side) The terminal to guard the leak current of LOW

⚠ Caution
If the HIGH terminal is short circuited to the ground, the LOW terminal becomes high voltage, which is very dangerous. Do not touch the measuring terminal during the measurement (TEST lights up).

②Remote input — When the start input is set to REMORE 2, connect a probe with a switch (Option). It becomes effective during setting of REMORE 2 only. This is an input that controls ON / OFF of measurement voltage.

③Display Portion — This is green graphic display. It displays the measured value and various settings, etc.

④TEST LAMP — Test lamp lights up during measurement. It blinks during the automatic discharge function.

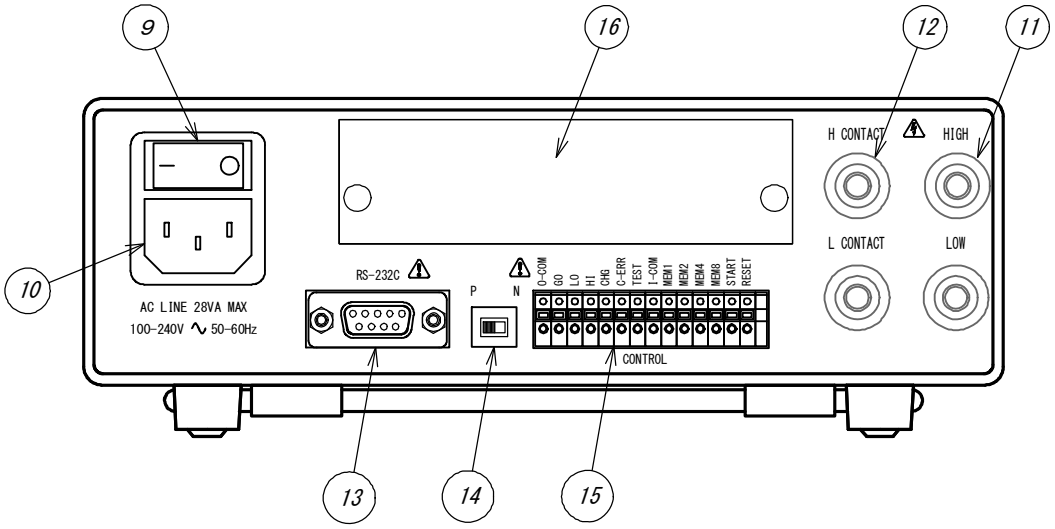
⑤START KEY — Start key is turned on to start the measurement.

⑥STOP KEY — Stop key is used to stop the measurement.

⑦Judgement lamp — HIGT: Red lamp is lit up when the measured value exceeds the high limit value. GOOD: Yellowish green lamp is lit up with a good judgement. LOW: Red lamp is lit up when the measured value exceeds the low limit value.

⑧Function key — F1 to F4 these keys are used to set various measurement conditions and comparators.

2.2 Rear panel



⑨Power supply switch　Power supply ON/OFF switch

⑩Power inlet　Connect the supplied power supply cord. Use the power supply voltage and frequency within the specified range.

⑪Rear measuring terminal

HIGH: ＋Measuring terminal　When the sample to be measured is ground, it is to be connected to the grounded side of the sample.

LOW: －Measuring terminal　To be connected to the non-grounded side of the sample.

⚠ Caution
If the HIGH terminal is short circuited to the ground, the LOW terminal becomes high voltage, which is very dangerous. Do not touch the measuring terminal during the measurement (TEST lights up).

⑫Connection check terminal　Terminal for checking the contact status of the contact probe.

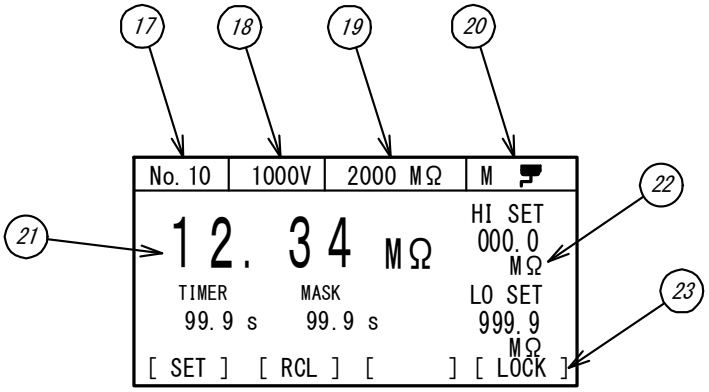
⑬RS-232C connecter　Connector for RS-232C communication

⑭P/N Selector switch　Switch to select the external control and BCD output of sink (NPN) and source (PNP)

⑮Input and output terminal　Terminals for external control

⑯Interface board mounting part
For BCD Interface board Installation part

2.3 Display panel



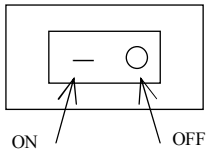
⑰Memory No.	Displays memory No. (No.1 to No.10)
⑱Measurement voltage	Displays the output voltage setting (25V to 1050V)
⑲Resistance range	Displays the resistance range (2MΩ, 20MΩ, 200MΩ, 2000MΩ, AUTO)
⑳Start/On line display	Displays the status of the start input and the online status of RS-232C Start input "M" : MANUAL "R1" : REMOTE 1 "R2" : REMOTE 2 Status of online "" : RS-232C communication function ON
㉑Measured value	Displays the measured value
㉒Comparator	Displays the measured value of HIGH and LOW comparator
㉓Function	Displays the function guide of F1 to F4. F4 displays the status of key lock. Key lock ON/OFF can be done by press for more than 3 s. Reverse display is shown during key lock condition.

3. Operation

3.1 Power supply

First confirm the power OFF of the switch located at the rear panel of the instrument and connect cord to the power supply. Then, ON the power supply switch. This instrument becomes in operation condition immediately but it is preferred for preheating 30 minute before the use.

As this instrument is equipped with a parameter holding function, following (1) to (4) status can be memorized even though the power supply is turned OFF.



(1)10 sets of memories (Measurement voltage, Resistance range, Comparator setting, Measurement condition of timer etc.)
(2)Key lock state
(3)Start input setting (REMOTE/MANUAL)
(4)Various types of setting

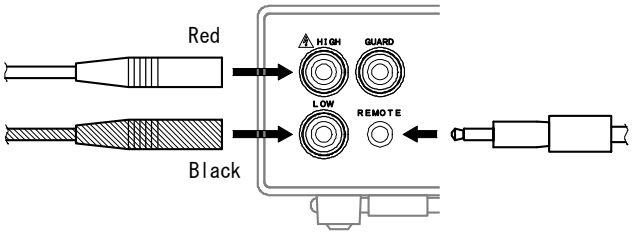
3.2 Connection of test leads

⚠ Caution

- **This tester comes under the measurement category 0. Do not use the tester for the measurement of the circuit having measurement category of Ⅱ, Ⅲ and Ⅳ.**
- **For the safety, please use the test lead prescribed by maker only.**
- **If the HIGH terminal is short circuited to the ground, the LOW terminal becomes high voltage, which is very dangerous. Do not touch the testing lead by hand during the measurement.**
- **It may cause electric shock during connection and disconnection of testing leads. Turn OFF the power supply to instrument.**

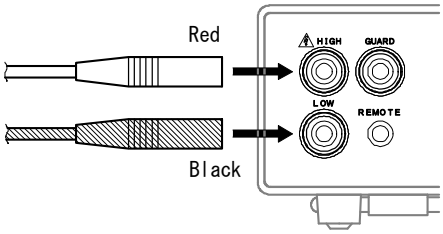
3.2.1 Probe with switch (Model name 5813-23：Option)

Remote measurement operation is performed with the switch built in probe.
Insert the red plug of the probe with switch to the HIGH terminal (red), the remote plug to the REMOTE terminal, and the black cable to the LOW terminal (black) respectively.



3.2.2 HIGH probe (Model name5813-22：Option), LOW probe (Model name5813-21:Option)

Insert HIGH probe into HIGH terminal (red) and LOW probe into LOW terminal (black) respectively.



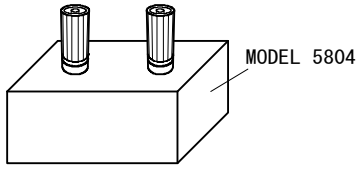
3.3 Pre-operation check (Correctness Confirmation of Digital MΩ tester)

The following pre-operation checks are recommended before the measurement start.

3.3.1 Preparation

Resistor : Calibration resistors MODEL 5804 Series (option) or any other resistor having same type of resistance designed for the calibration of Digital MΩ tester.

Model	Resistance value
5804-11	1MΩ
5804-12	10MΩ
5804-13	100MΩ
5804-14	1000MΩ



Specification of recommended calibration resistor

Max. Circuit Voltage	DC1500V
Tolerance	± 1%
Temp. Coeff.	±50ppm/℃ But for 1000MΩ:±100ppm/℃
Connecting terminal	Johnson 12mm Terminal Red color

⚠ Caution

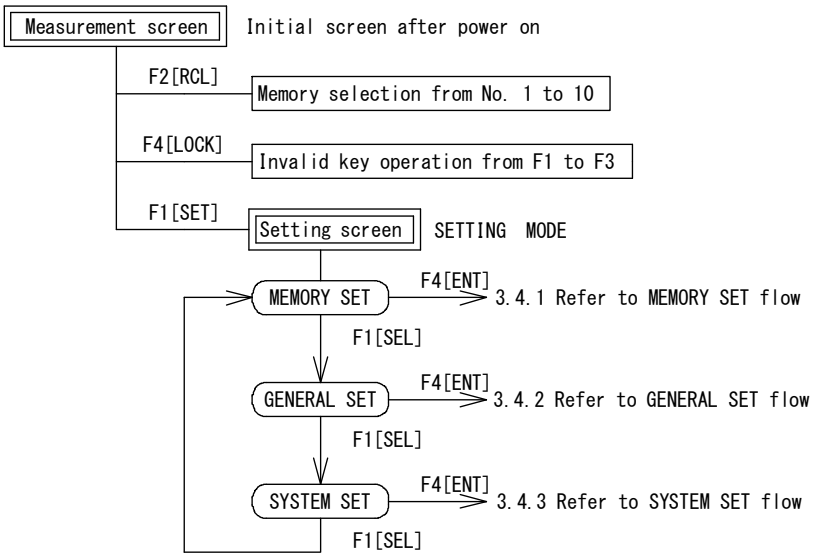
In case of commercially available resistor usage:
- Depending on the test voltage, if the rated voltage or power of the resistor is exceeded, the resistor may be damaged.
- It is recommended to use the resistor within approximately 50% of the rated power.

3.3.2 Confirmation Method

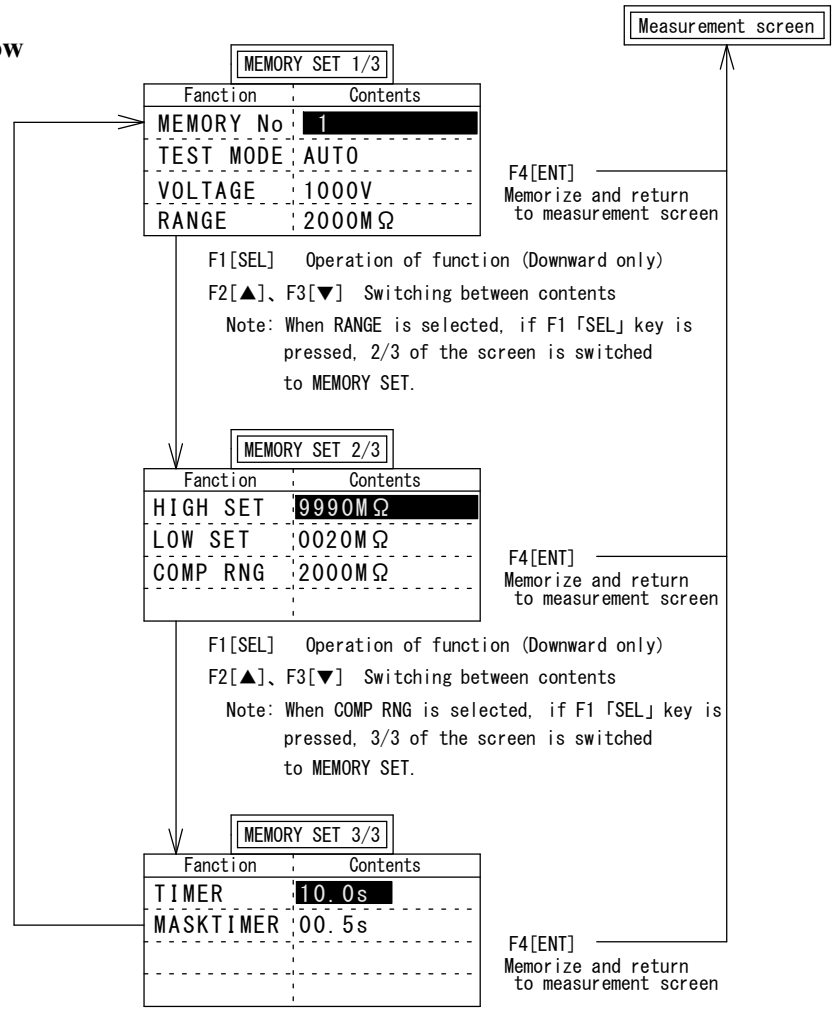
(1) Suitable resistor is selected.
(2) Set measurement voltage to 500V and measurement range to AUTO in Digital MΩ tester
(3) Connect the resistor and Digital MΩ tester by means of test lead.
(4) Measurement is started and make sure that the measured display value lies within the accuracy (Accuracy of the measurement instrument + tolerance of the resistor) of the resistor.

3.4 Setting flow

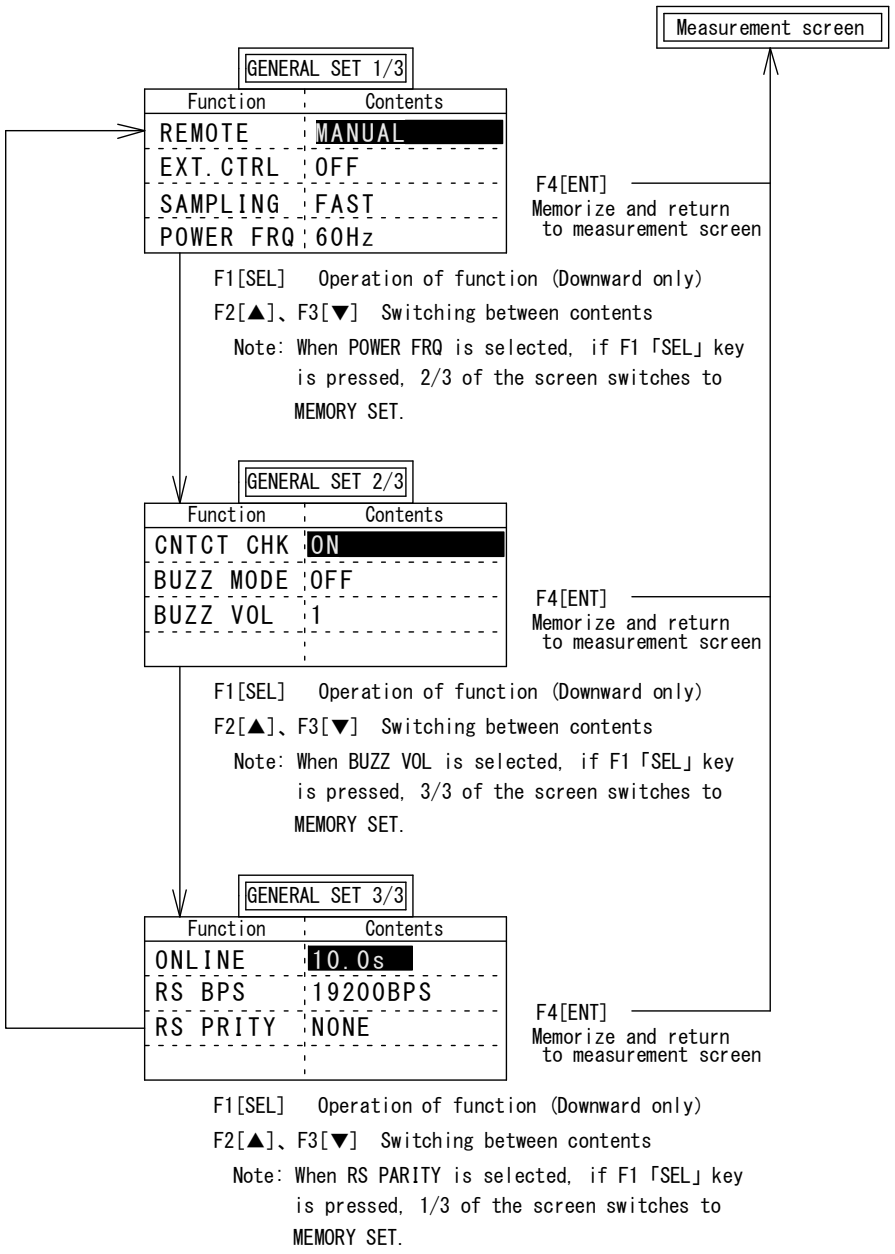
Measurement screen flow



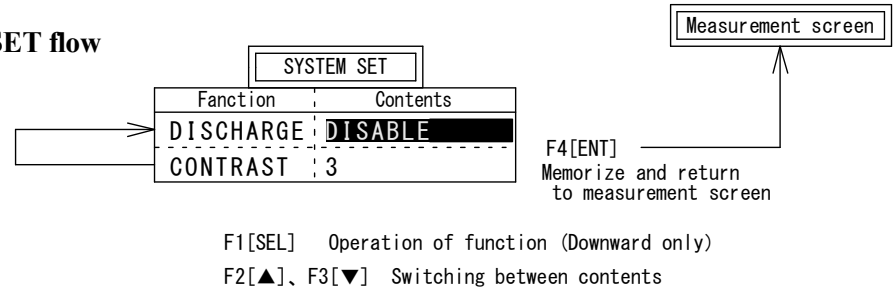
3.4.1 MEMORY SET flow



3.4.2 GENERAL SET flow

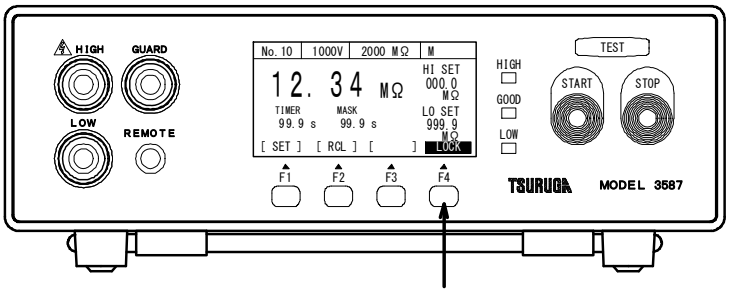


3.4.3 SYSTEM SET flow



3.5 Key lock

It is a switch that prohibits operation of the instrument from the front panel in order to avoid the measurement by unintentional change of setting. But, key lock can't be set in START key, STOP key and probe with switch. Display of the LOCK back ground changes during key lock condition. If other key are required to use during key lock condition, key lock must be released first to use the other keys.



●Key lock method

Press F4 [LOCK] key for more than 3 s.

Display of the back ground of LOCK changes which shows that instrument is in locked condition.

●Cancellation of key lock

During the key in locked condition, press F4 [LOCK] key for more than 3 s.

Key lock will be released.

3.6 Memory

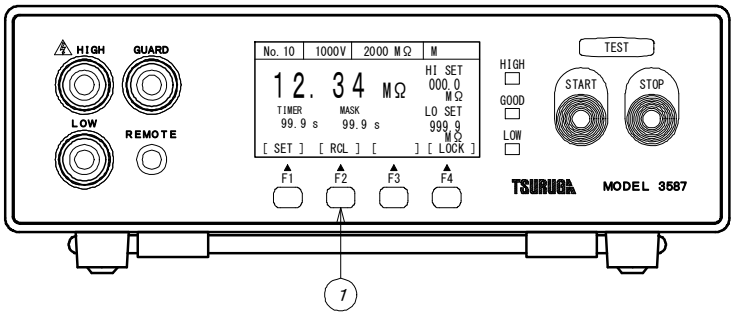
This instrument is equipped with 10 pairs of memories that store comparator and measurement conditions. The following 4 items, 8 types are available for memory storage.

- ・Measurement mode (AUTO, CONTINUE)
- ・Measurement range (Measurement voltage, Resistance range)
- ・Setting of comparator (Upper value and lower value, Range)
- ・Setting of timer (Timer, Mask timer)

Note: Setting can't be cone in ONLINE condition.
Memory selection signal can't be selected during valid period.
Selection can't be done during measurement.

[Selection of memory]

●Front panel method



Call

When F2 [RCL] key (①) is pressed in standby state, memory no. will increased and setting call will be displayed.
Memory from 1 to 10 can be selected.

●External control method

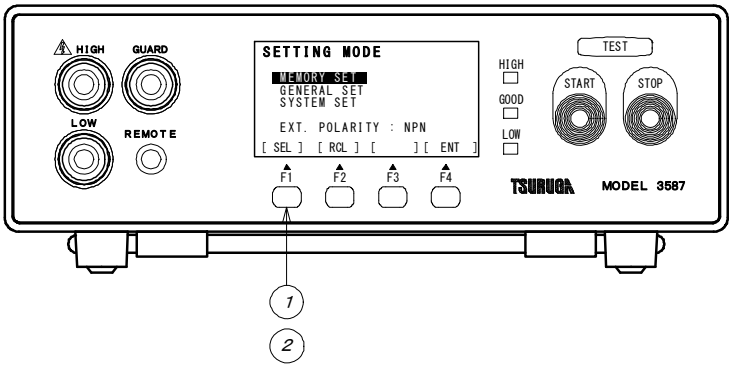
Refer to memory operation (5.1.5) for detail information.

[Memory registration]

After selecting the memory no. you want to register, select measurement mode, measurement range, comparator, timer etc. with MEMORY SET.

3.7 Memory setting

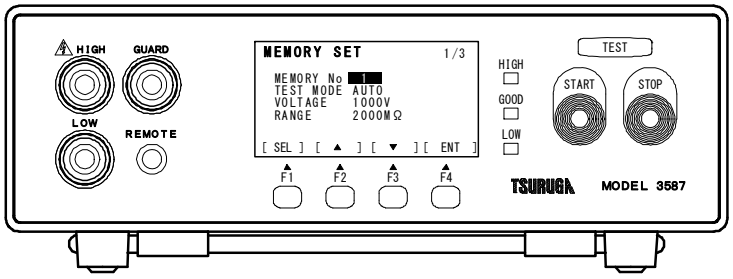
Input of MEMORY SET



① Press F1 [SET] key in standby state.
Display changes to SETTING MODE.
② Press F1 [SEL] key to select MEMORY SET.
Memory setting can be changed by pressing F4 [ENT] key.

Basic operation

Memory No., measurement mode, measurement voltage, resistance range, comparator, timer, mask timer can be set.

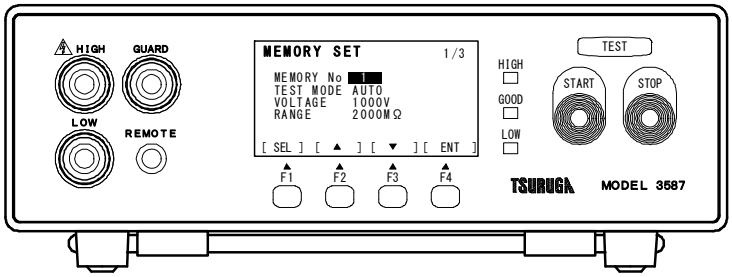


Operation key

F1 [SEL] : Selection of setting item.
The back ground of the display color of the selected item will be changed.
F2 [▲] : Change of setting values
F3 [▼] : Selection of setting from TEST MODE ,RANGE ,COMP RNG setting value can be increased or decreased by numerical setting.
F4 [ENT] : Memorize the setting and the display returns to measurement standby state.

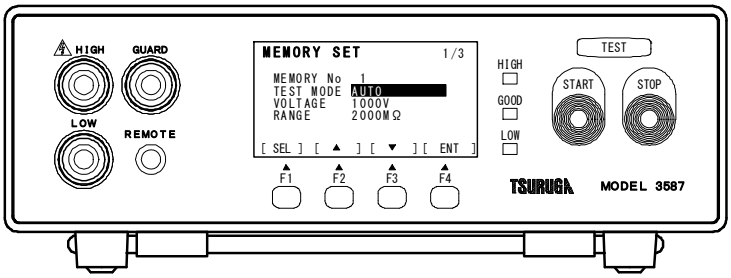
3.7.1 Selection of memory

① Press F1 [SEL] key to select the MEMORY No.
② Select the Memory No.by F2 [▲], F3 [▼] key.
③ Press F4 [ENT] to memorize the setting and the display returns to measurement standby state.
To continue the other setting, select the items that you want to change by pressing F1 [SEL]



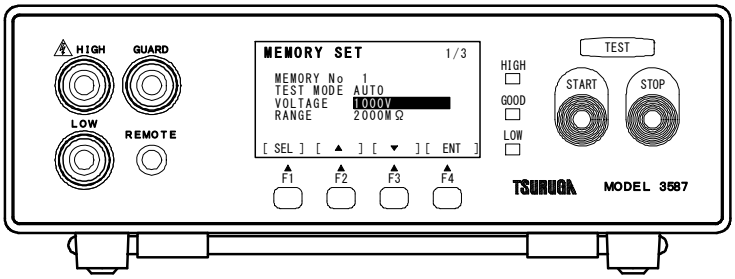
3.7.2 Setting of measurement mode

CONTINUE mode to undertake the measurement continuously and timer which measures the time can be selected by AUTO mode.



① Press F1 [SEL] key to select the MEMEORY SET and press F4 [ENT] key to enter it. Select TEST MODE by F1 [SEL] key.
② Press F2 [▲], F3 [▼] key.to select AUTO/CONTINUE.
③ Press F4 [ENT] to memorize the setting and the display returns to measurement standby state.
To continue the other setting, select the items that you want to change by pressing F1 [SEL]

3.7.3 Measurement voltage setting



① Press F1 [SEL] to select MEMEORY SET and press F4 [ENT] to enter it.
Select VOLTAGE by F1 [SEL] key.

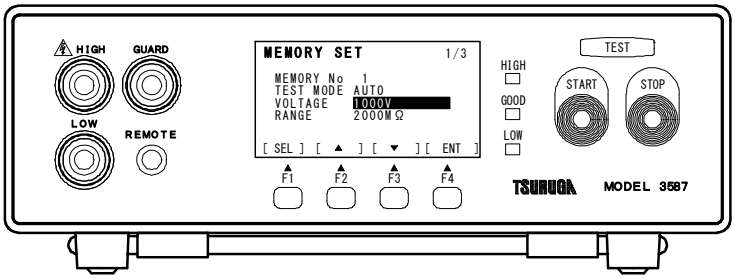
② Press F2 [▲], F3 [▼] key.to change the setting
If keys are pressed continuously, the speed of setting value changes in 3 steps.
Setting range 25V to 1050V

③ Press F4 [ENT] to memorize the setting and the display returns to measurement standby state.
When the measurement range is out of range, OUT OF RANGE is displayed for about 1 s and display returns to setting mode.
Set the measurement voltage or measurement range within the range of Table 3.1.
To continue the other setting, select the items that you want to change by pressing F1 [SEL].

Table 3.1 Voltage setting and resistance range

Measurement voltage setting	Resistance range
25V to 99V	2MΩ, 20MΩ, 200MΩ, AUTO
100V to 499V	2MΩ, 20MΩ, 200MΩ, 2000MΩ, AUTO
500V to 1050V	20MΩ, 200MΩ, 2000MΩ, AUTO

3.7.4 Selection of resistance range



① Press F1 [SEL] key to select MEMEORY SET and press F4 [ENT] key to enter it. Select RANGE by F1 [SEL] KEY.
② Press F2 [▲], F3 [▼] key to change the setting
③ Press F4 [ENT] to memorize the setting and display returns to measurement standby state.
When the resistance range is out of range, OUT OF RANGE is displayed for about 1 s and display returns to setting mode.
Set the measurement voltage or measurement range within the range of table 3.1.
To continue the other setting, select the items that you want to change by pressing F1 [SEL].

Table 3.2 Display range for resistance range

Measurement voltage	Resistance range	Display range	
25V to 99V	2.000MΩ	0.000 to 4.990	※ 1
	20.00MΩ	1.79 to 49.90	※ 2
	200.0MΩ	17.9 to 999.0	※ 3
100V to 499V	2.000MΩ	0.000 to 4.990	※ 1
	20.00MΩ	1.79 to 49.90	※ 2
	200.0MΩ	17.9 to 499.0	※ 2
	2000MΩ	179 to 9990	※ 3
500V to 1050V	20.00MΩ	0.00 to 49.90	※ 1
	200.0MΩ	17.9 to 499.0	※ 2
	2000MΩ	179 to 9990	※ 3

※ 1,2 When count is exceeded 4990, OVER is displayed.
※ 2,3 When the count is less than 179, UNDER is displayed.
※ 3 When count is exceeded 9990, OVER is displayed.

3.7.5 Range switching operation of auto range

Table 3.3 Range switching operation of auto range

500V to 1050V			100V to 499V			25V to 99V		
Range	DOWN	UP	Range	DOWN	UP	Range	DOWN	UP
2000MΩ	9990 ↓ 180 ↓	9990 ↑ 200 ↑	2000MΩ	9990 ↓ 180 ↓	9990 ↑ 200 ↑	200MΩ	999.0 ↓ 18.0 ↓	999.0 ↑ 20.0 ↑
200MΩ	179.9 ↓ 18.0 ↓	199.9 ↑ 20.0 ↑	200MΩ	179.9 ↓ 18.0 ↓	199.9 ↑ 20.0 ↑	20MΩ	17.99 ↓ 1.80 ↓	19.99 ↑ 2.00 ↑
20MΩ	17.99 ↓ 1.80 ↓ 0.00	19.99 ↑ 2.00 ↑ 0.00	20MΩ	17.99 ↓ 1.80 ↓	19.99 ↑ 2.00 ↑	2MΩ	1.799 ↓ 0.180 ↓ 0.000	1.999 ↑ 0.200 ↑ 0.000
			2MΩ	1.799 ↓ 0.180 ↓ 0.000	1.999 ↑ 0.200 ↑ 0.000			

3.7.6 Comparator

Digital comparator compares the display value and the upper limit, lower limit values.
Ten pairs of each upper and lower limit values set can be stored in memory
(No. 1 to No. 10).

Comparison condition

Display value ≧Upper limit set value(HIGH)	HIGH(HI)	output
Upper limit set value(HIGH) ＞Display value ＞Lower limit set value(LOW)	GOOD(GO)	output
Display value ≦Lower limit set value(LOW)	LOW(LO)	output
During over display(OVER)	HIGH(HI)	output
During Under display(UNDER)	LOW(LO)	output

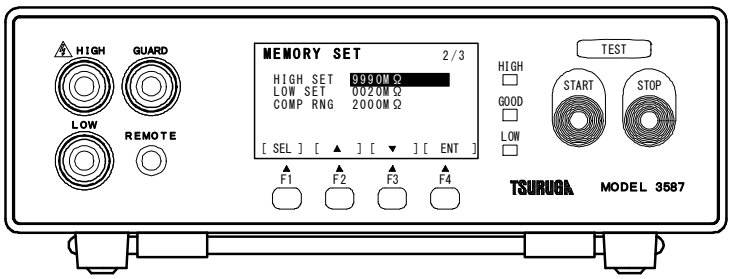
Comparison output

Output the open collector can be obtained from back side of terminal.
(Refer to section 5.1)
Display HIGH, LOW:Red
GOOD:Green

Setting range

Comparator can be set to 0000 to 9999/OFF.
Comparison operation can't be performed if it is set to OFF.

Setting method



① Press F1 [SEL] key to select MEMORY SET and press F4 [ENT] key to enter it
Select HIGH SET and LOW SET by F1 [SEL] key.
② Press F2 [▲], F3 [▼] key to change the setting values
If the key is pressed continuously, speed can be changed in 3 stages.
Setting range 0000 to 9999/OFF
③ Press F1 [SEL].to select COMP RNG(Comparator setting range)
④ Press F2 [▲], F3 [▼] KEY. to change the setting
⑤ Press F4 [ENT] to memorize the setting and the display returns to measuring mode.
To continue the other setting, select the items that you want to change by pressing F1 [SEL]

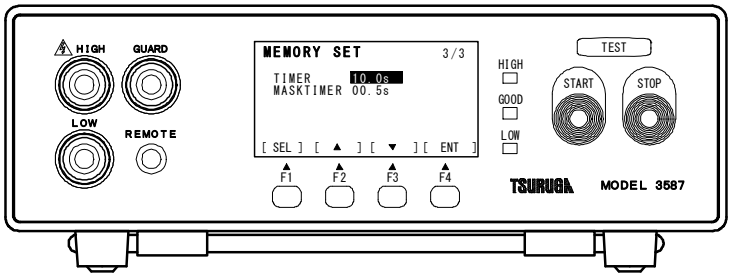
3.7.7 Timer/mask timer

Measurement time is set in timer when the measurement time is carried out in AUTO mode.
Mask timer is set when the measurement start and judgment are not carried out by AUTO mode.

Setting range

Timer is set to 00.2s to 99.9 s
The mask timer is set to 00.1s to 99.9 s /OFF
Mask timer can't be operated if mask time is set to OFF.

Setting method

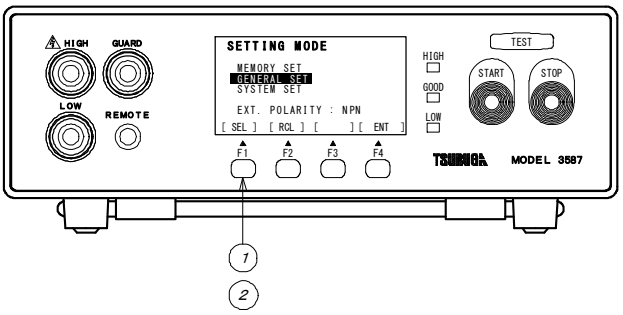


① Press F1 [SEL] key to select MEMORY SET and press F4 [ENT] key to enter it.
Select TIMER or MASKTIMSR by F1 [SEL] key.
② Press F2 [▲], F3 [▼] key to change the setting
If the key is pressed continuously, speed can be changed in 3 stages.
Setting range TIMER :00.2 to 99.9 s
MASK TIMER :00.2 to 99.9 s /OFF
③ Press F4 [ENT] to memorize the setting by displays returns to measurement mode.
When MASKTIME > TIMER, OUT OF RANGE is displayed for approximately 1 s and display returns to setting mode.
MASKTIME ≦ TIMER, Set the values.
To continue the other setting, select the items that you want to change by pressing F1 [SEL].

3.8 Equipment setting

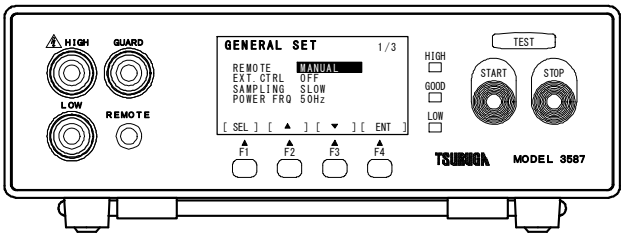
External control, sampling cycle, power supply frequency, connection check, buzzer setting can be done by equipment setting.

SELECT GENERAL SET



① Press the F1 [SET] key in the standby state.
Display changes to SETTING MODE.
② Press F1 [SEL] key.to select GENERAL SET
If F4 [ENT] is pressed, display changes to equipment setting.

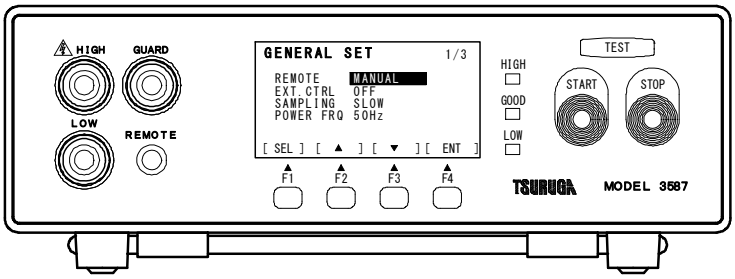
Basic operation



Operation key
F1 [SEL] : Select Setting Mode.
Back ground color of selected mode is changed.
F2 [▲], F3 [▼]: Setting can be changed.
F4 [ENT] : Memorize the setting and display returns to measurement mode.

3.8.1 Start input setting

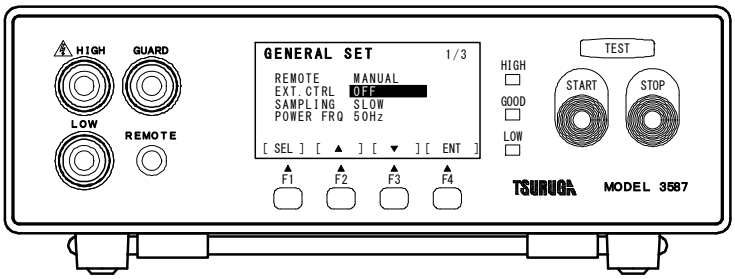
Measurement start methods are explained here.



① Press F1 [SEL] key to select GENERAL SET and press F4 [ENT] key to enter it. Select REMOTE by F1 [SEL] key.
② Press F2 [▲], F3 [▼] key to select MANUAL/ REMOTE 1/ REMOTE 2
MANUAL : Measurement can be started by pressing STRAT key located on front panel.
REMOTE 1 : Measurement can be started by START input of terminal located on rear side.
REMOTE 2 : Measurement can be started by the switch of the probe
③ Press F4 [ENT] to memorize the setting and the display returns to measuring mode. To continue the other setting, select the items that you want to change by pressing F1 [SEL]

3.8.2 Selection of memory setting by back side control

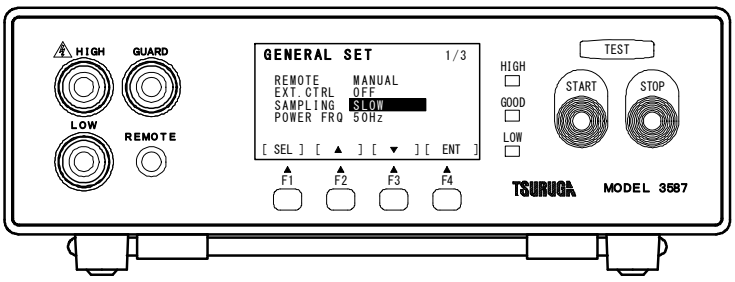
Rear terminal can be set for enable/disable of the memory selection function.



① Press F1 [SEL] key to select GENERAL and press F4 [ENT] key to enter it. Select EXT.CTRL by F1 [SEL] key.
② Press F2 [▲], F3 [▼] to select ON/OFF
OFF: Memory is selected by operation of the front panel F2 [RCL] key.
ON: Memory is selected by MEM1, MEM2, MEM4, MEM8 of rear terminal.
③ Press F4 [ENT] to memorize the setting and the display returns to measuring mode. To continue the other setting, select the items that you want to change by pressing F1 [SEL]

3.8.3 Sampling rate setting

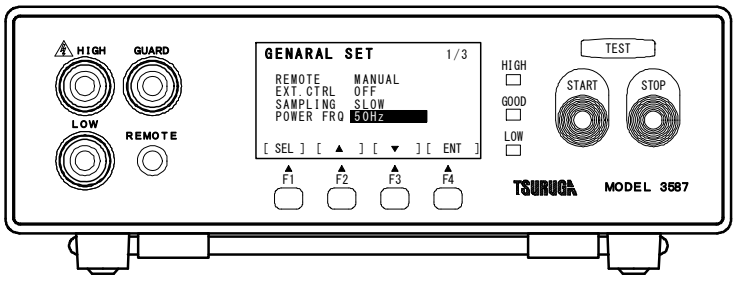
measurement cycle is set.



① Press F1 [SEL] key to select GENERAL SET and press F4 [ENT] key to enter it.
Press F1 [SEL] key to select the SAMPLING
② Press F2 [▲], F3 [▼] key.to select SLOW/FAST
SLOW : When measurement cycle is set to 100ms.
FAST : When measuring cycling is set to 20ms and 16.7ms during power supply frequency setting of 50Hz and 60Hz respectively.
Adjust the frequency setting according to the power supply mentioned on section 3.8.4
③ Press F4 [ENT] to memorize the setting and the display returns to measuring mode.
To continue the other setting, select the items that you want to change by pressing F1 [SEL]

3.8.4 Frequency setting of power supply

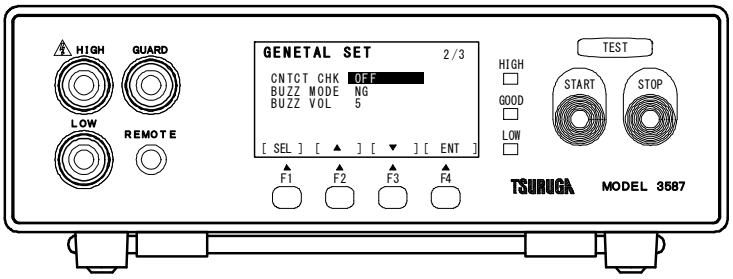
Frequency setting method in instrument according to power supply is explained here.



① Press F1 [SEL] key to select GENERAL SET by and press F4 [ENT] key to enter it.
Select POWER FRQ by F1 [SEL] key.
② Press F2 [▲], F3 [▼] key to select 50Hz or 60Hz.
60Hz : Set 60Hz when frequency of AC power supply is 60Hz.
50Hz : Set 50Hz when frequency of AC power supply is 50Hz.
Stable measurement can be obtained by choosing the right frequency according to the frequency of the supply power source.
③ Press F4 [ENT] to memorize the setting and the display returns to measuring mode.
To continue the other setting, select the items that you want to change by pressing F1 [SEL].

3.8.5 Connection check setting

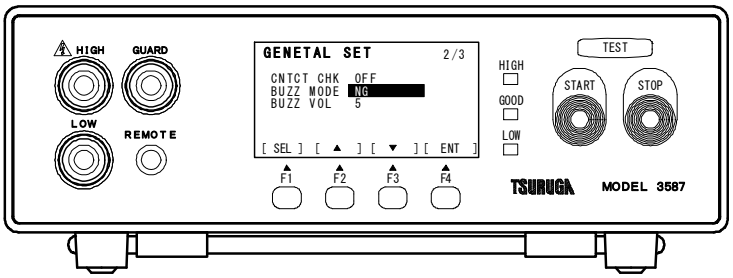
ON/OF connection check function method is explained here.



① Press F1 [SEL] KEY to select GENERAL SET and press F4 [ENT] key to enter into GENERAL SET
Select CNTCT CHK by F1 [SEL] key.
② Press F2 [▲], F3 [▼] key.to select ON/OFF
ON : Perform the connection check during start and end of measurement.
OFF : No connection check
③ Press F4 [ENT] to memorize setting and the display returns to measurement mode.
To continue the other setting, select the items that you want to change by pressing F1 [SEL].

3.8.6 Buzzer setting

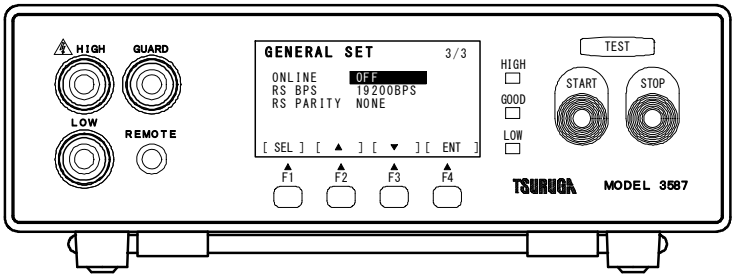
Buzzer operation and volume of sound setting are explained here.



① Press F1 [SEL] key to select GENERAL SET press F4 [ENT] key to and enter into GENERAL SET
Select BUZZ MODE or BUZZ VOL by F1 [SEL] key.
② Press F2 [▲], F3 [▼] key to select BUZZ MODE and BUZZ VOL as follow.
BUZZ MODE
GOOD : Ring the buzzer during GOOD JUDGMENT
NG : Ring the buzzer during HIGH or LOW judgment
OFF : No judgment buzzer
BUZZ VOL
Setting range : 1 to 9
③ Press F4 [ENT] to memorize the setting
To continue the other setting, select the items that you want to change by pressing F1 [SEL].

3.8.7 Communication setting

RS-232C communication setting is carried out here.
ON/OFF communication function is carried out by ONLINE setting.
Setting of communication speed by the RS BPS and setting of parity bit by RS PARITY are carried out here.
Communication speed and parity bit should be set according to the setting of higher level equipment of PC etc.



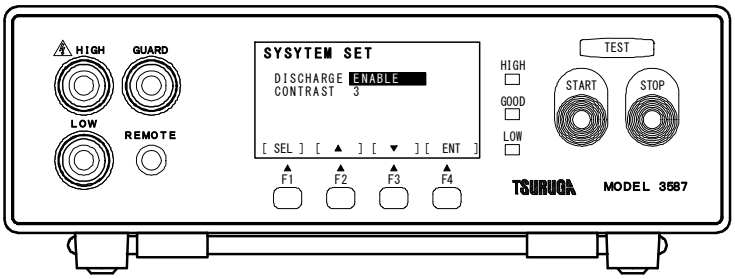
① Press F1 [SEL] key to select GENERAL SET and press F4 [ENT] key to enter into GENERAL SET
Selection of ONLINE, RS BPS, RS PARITY by F1 [SEL] key
② Press F2 [▲], F3 [▼] key to select setting of ONLINE, RS BPS, RS PARITY as below.
ONLINE : ON/OFF setting of the communication function
Output of RS-232C communication can be obtained with ON
RS BPS : Setting of communication speed
9600BPS, 19200BPS, 38400BPS
RS PARITY : Setting of parity bit of communication data
NONE
ODD
EVEN
③ Press F4 [ENT] to memorize the setting and display returns to measurement mode.
To continue the other setting, select the items that you want to change by pressing F1 [SEL].

3.9 System setting

Setting of automatic discharge function, display contrast are explained here.

3.9.1 Automatic discharge function setting

Change of validity/invalidity of the measuring terminal can be done by automatic discharge function.



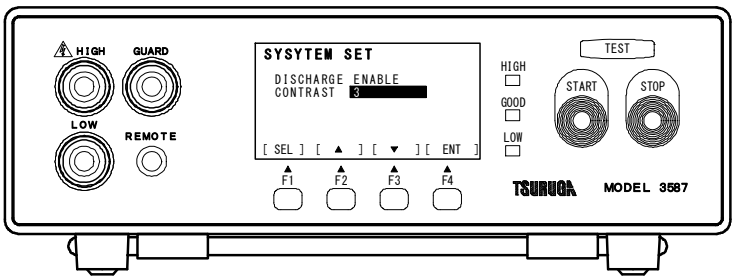
① Press F1 [SEL] key to select SYSTEM SET and press F4 [ENT] key to enter SYSTEM SET.
Select DISCHARGE by F1 [SEL] key.

② Press F1 [▲], F3 [▼] key.to select ENABLE/DISABLE
ENABLE : It makes enable automatic discharge function.
During standby state, HIGH measuring terminal is connected to the build-in discharge resistance.
DISABLE : It makes disable automatic discharge function.

③ Press F4 [ENT] to memorize the setting and the display returns to measuring mode.
To continue the other setting, select the items that you want to change by pressing F1 [SEL].

3.9.2 Contrast setting

Adjustment of the brightness of the display panel is explained here.



① Press F1 [SEL] key to select SYSTEM SET and press F4 [ENT] key to enter into SYSTEM SET
Press F1 [SEL] key to select the CONTRAST

② Press F2 [▲], F3 [▼] key for setting
Setting range : 1 to 5

③ Press F4 [ENT] to memorize the setting and the display panel returns to measuring mode.
To continue the other setting, select the items that you want to change by pressing F1 [SEL].

4. Measurement method

4.1 AUTO/CONTINUE mode

4.1.1 AUTO operation

This is the mode in which the judgement result and the display value are held, the measuring voltage is shut off and the measurement finishes when the NG judgement is obtained during the measurement.
It can be operated by MANUAL operation, REMOTE1 operation and REMOTE2 operation.

① To start the measurement during MANUAL operation, press the START KEY located on the front panel.
During REMOTE 1operation, ON the START input.
During REMOTE 2 operation（ON the Probe switch）, ON the REMOTE input.

② The measuring voltage is applied to measurement terminal, and the measurement and comparator action are started.

③ If the mask timer is set, the comparator does not make any judgement during the mask time.

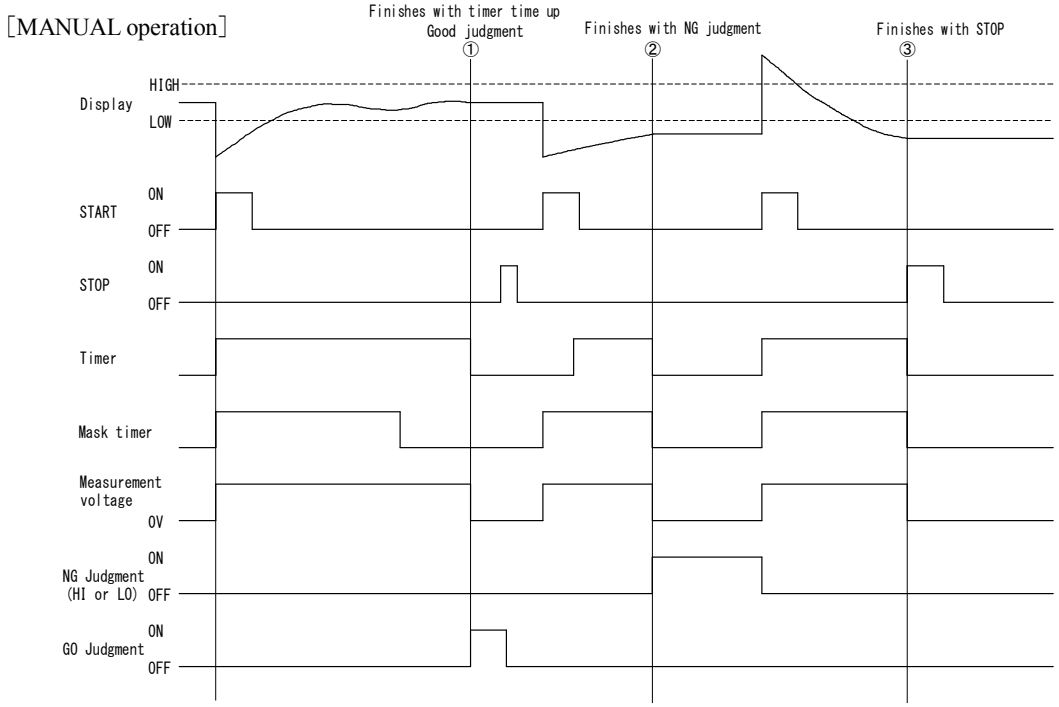
④ After passing the timer time, the measuring voltage is shut off and output of the measured value, judgement display and the judgement result are obtained. But in case that the judgement result becomes NG during the timer time, the measuring voltage is shut off at the moment when the NG is given, retaining the measured value, judgement display and the judgement result.

⑤ During the manual operation, to reset the judgement output and the judgement display, press STOP key located on the front panel.
Make ON the STOP input during REMOTE 1 operation.
The measured value is continuously displayed until the next start signal.

⑥ To re-start the measurement, proceed from ① mentioned above. There is no need to reset.

Note 1 : In MANUAL and REMOTE 1 operation, when the STOP key is pressed during the timer operation, the timer operation stops its action, the measuring voltage is shut off and comparator does not operate.

Note 2 : In REMOTE 2 operation, if remote switch is turned OFF during the timer operation, the timer operation is stopped, the measuring voltage is shut off and comparator does not operate.



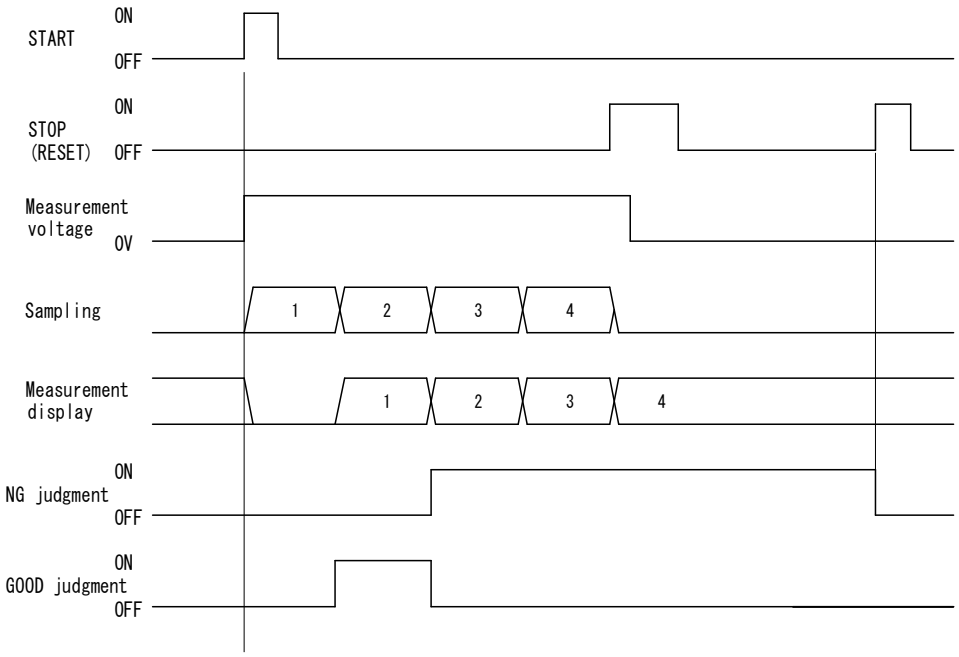
4.1.2 CONTINUE operation

This is the mode in which the measurement is continued without shutting of the measuring voltage even if the NG judgement is given during the measurement.

① To start the measurement in MANUAL operation, press the START key located on front side of the instrument.
During REMOTE 1operation, ON the START input.
Measurement is started by input detection from OFF to ON.
During REMOTE 2 operation（ON the probe switch）, ON the REMOTE input.
② The measuring voltage is applied in measuring terminal and, the measurement and comparator action are started.
③ The comparator outputs the judgement result from immediately after the start of measurement.
④ Press STOP key to finish the measurement. The measurement voltage is then shut off. The measured value is continuously displayed until the next start signal.
During REMOTE 1operation, ON the STOP input.
⑤ When the STOP key is pressed again, the judgement result is reset.
During REMOTE 1operation, judgement will be reset if STOP input is ON.

Note 1 : In REMOTE 2 operation, when the switch if turned OFF, the measurement operation is shut off and the judgement result is retained.
Note 2 : In CONTINUE operation, the timer and the mask timer do not work.

［MANUAL operation］



4.2 REMOTE / MANUAL

4.2.1 MANUAL operation (MANUAL)

In manual operation, the start and finish of the measurement are done by the START and STOP key located on the front panel.

① Press START key to start the measurement.
② As the measurement starts, the measuring voltage is applied to the measurement terminal and the TEST LAMP is lit up.
③ To finish the measurement, press STOP key or ON the RESET terminal.
In case that the measurement mode is AUTO operation, the measurement automatically finishes with the time up of the timer or NG judgement.

4.2.2 Remote 1 operation (REMOTE 1)

During REMOTE 1 operation, the start and finish of the measurement are done by the START and RESET terminals located on the rear side of the tester.

① To start the measurement, ON the START (minimum width 5ms).
② As the measurement starts. The measuring voltage is applied to the measuring terminal, and the TEST lamp is lit up.
③ To finish the measurement, ON the RESET terminal (minimum width 5ms), or press the STOP key.
In case that the measurement mode is AUTO operation, the measurement automatically finishes with the time up of the timer or NG judgement.

4.2.3 Remote 2 operation (REMOTE 2)

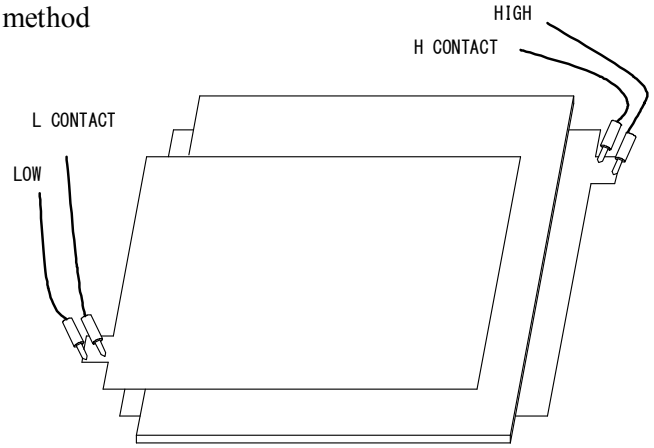
During REMOTE 2 operation, the start and finish of the measurement are done by ON and OFF of the probe switch (option) respectively.

① To start the measurement, press the probe switch continuously.
② As the measurement starts, measurement voltage is applied to the measurement terminals and TEST LAMP is lit up.
③ To finish the measurement, release the probe switch.
In case that the measurement mode is AUTO operation, the measurement automatically finishes with the time up of the timer or NG judgement.

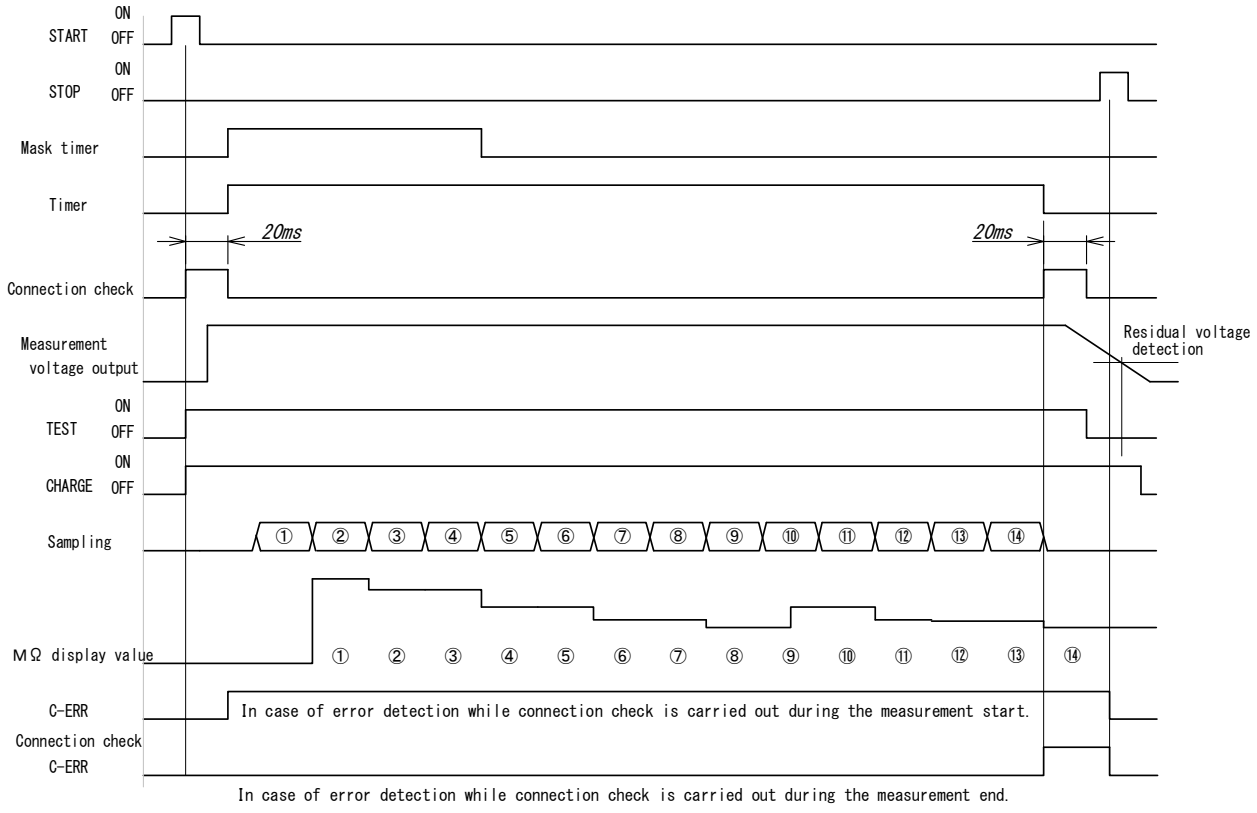
4.3 Connection check function

This is a function that detects whether the probe is in contact with the object to be measured or disconnection of the measuring cable.
Disconnection is detected by using the connection check terminals located rear side of the tester.
When the connection check function of equipment setting is ON, Connection check is undertaken during start and end of measurement.
Connection check time becomes 40 ms longer during measurement time.
When disconnection is detected during connection check, CERR is displayed on front panel and output of C-ERR ON is obtained from back terminal.
Connection check can be turned ON / OFF during Connection check setting of the tester (Section 3.8.5).

Connection method



Timing chart



Connection check time: 20ms

4.4 Automatic discharge function

If the specimen possesses capacitive components, it may be charged with the test voltage and remaining as residual voltage may cause an electric shock accident.
A discharging circuit (discharging resistance approximately 100KΩ) is built-in in this tester to discharge the residual voltage.

① Measurement is completed without removing the connection with specimen.
With the specimen being connected, the discharging circuit built-in tester discharges the residual voltage specimen

② During the discharging, TEST lamp blinks, and it turns off at voltage less than about 10V.
The discharging time becomes longer depending upon the volume of capacitive components.

Automatic discharge function can be turned ON / OFF by setting on automatic discharge function (Section 3.9.1) on system setting.

5. External control

Output signal of start / stop selection of memory, judgment and TEST etc. Can be obtained from the control terminal located at rear side of the tester.

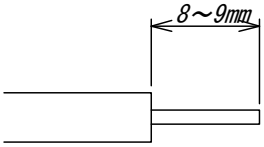
5.1 Control terminal

5.1.1 Terminal arrangement

No.	Signal name	Input/ output	Function
1	O-COM	—	Output common （ 2 to 7 Common ） It is internally connected with I-COM No.8.
2	GO	Output	Comparator It is output of GOOD judgment. Output of ON is obtained during GOOD judgment.
3	LO	Output	Comparator It is output of LOW judgment. Output of ON is obtained during LOW judgment.
4	HI	Output	Comparator It is output of HIGH judgment. Output of ON is obtained during HIGH judgment.
5	CHG	Output	ON output is obtained when the voltage of the HIGH measuring terminal become more than 10V.
6	C-ERR	Output	It is connection check measurement result output signal. ON output is obtained during NG result of connection check.
7	TEST	Output	It is output signal during measurement operation. During test voltage output, ON output of connection check is obtained.
8	I-COM	—	Input common（9 to 14 Common ） It is internally connected with O-COM No. 1.
9 10 11 12	MEM1 MEM2 MEM4 MEM8	Input	Memory is called by inputting memory No. Refer to the table of memory operation (Section 5.1.5) for selection of memory.
13	START	Input	Measurement start signal Measurement starts when input is ON during standby state. START signal operates if start input is set to REMOTE1.
14	RESET	Input	Stop measurement, return judgment signal If ON during measurement, measurement stops. When input is ON during standby state, reset (OFF) judgment is obtained.

5.1.2 Connection

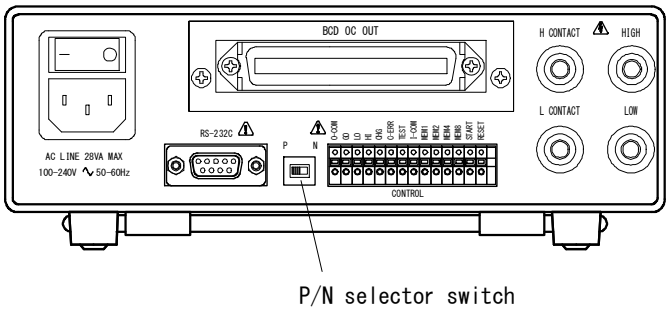
Compatible electrical wire: AWG26 to AWG20
Side of electrical wire is peeled off as shown in figure below and wire is inserted into the terminal by pressing the release button down with help of screwdriver.



Peel length＝8 to 9mm

5.1.3 PNP/NPN switching

Input / output signal of PNP (source) and NPN (sink) located at rear side of tester can be changed according to the interface to be connected.
Set the switch to P side during PNP.
Set the switch to N side during NPN



P/N selector switch

5.1.4 Input/output signal

Input signal
Input ON residual voltage : Less than 1V（ON current less than 30 mA ）
Response time : 5 ms (MAX)

Output signal
Signal : Open drain output (nonpolar)
Max. load : DC30V 30mA
Residual voltage : Less than 1V（During load current: 30mA）

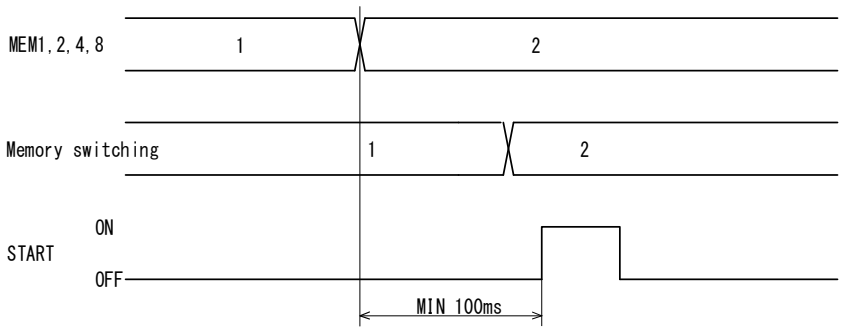
5.1.5 Memory operation

① Set the EXT.CTRL to ON at the panel of GENERAL set.
② Input the memory no. code.
Note: Memory can't be called except the memory no. code from 1 to 10.

MEM No.	MEM1	MEM2	MEM4	MEM8
1	○	—	—	—
2	—	○	—	—
3	○	○	—	—
4	—	—	○	—
5	○	—	○	—
6	—	○	○	—
7	○	○	○	—
8	—	—	—	○
9	○	—	—	○
10	—	○	—	○
	Can only operate in above condition.			

○ : ON（I-COM and connection)
－ : OFF (OPEN)

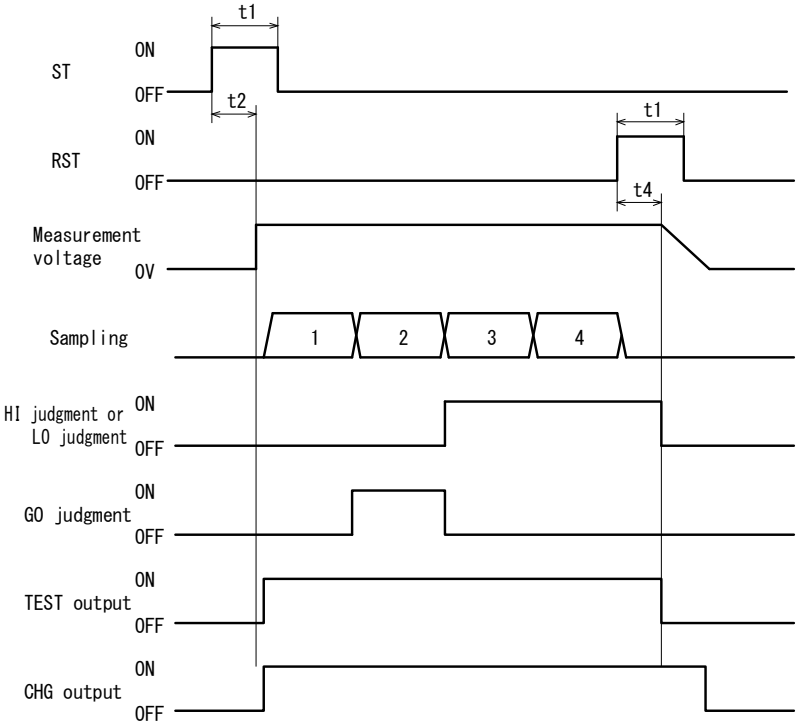
Memory switching timing chart



5.1.6 External control timing chart

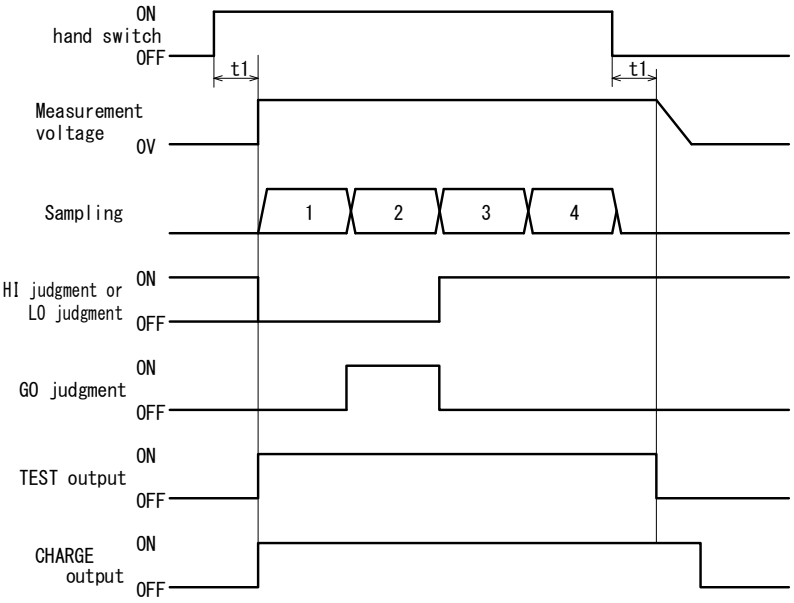
◆ **During CONTINUE mode**

REMOTE 1 operation



t1 : More than 5ms
t2、t4 : MAX 5ms

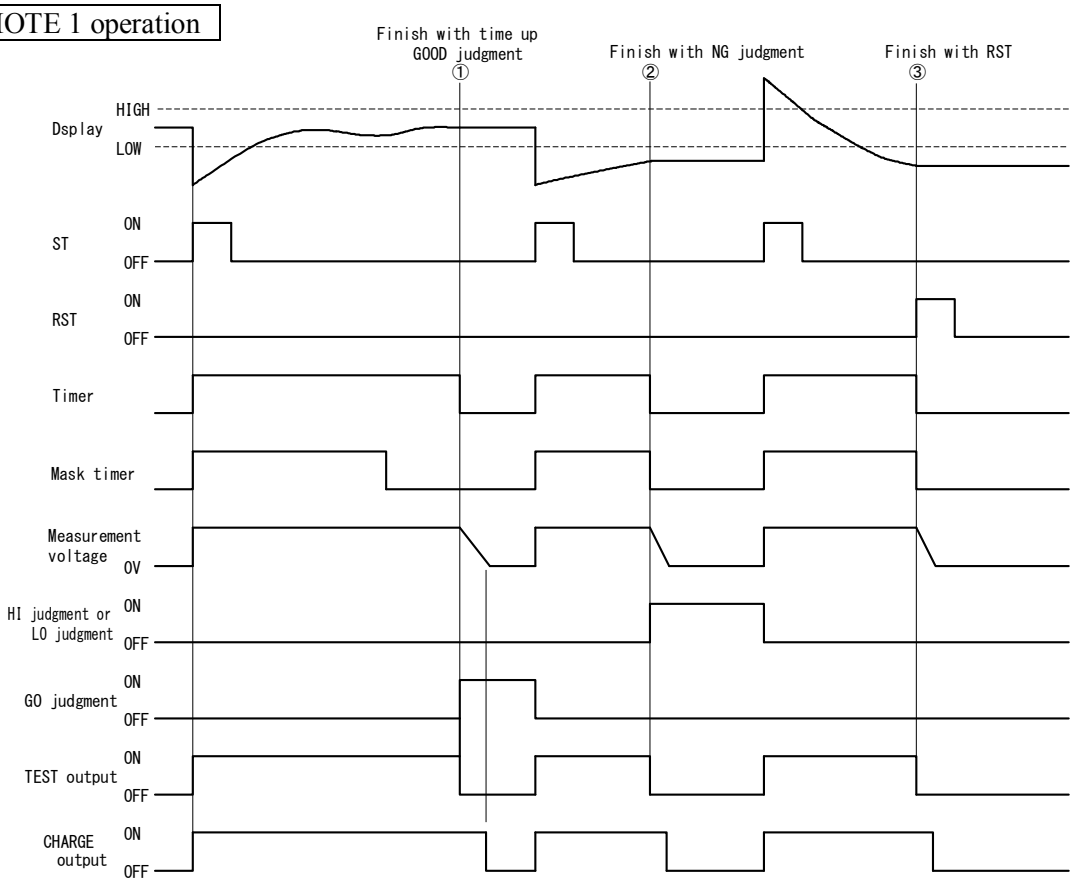
REMOTE 2 operation



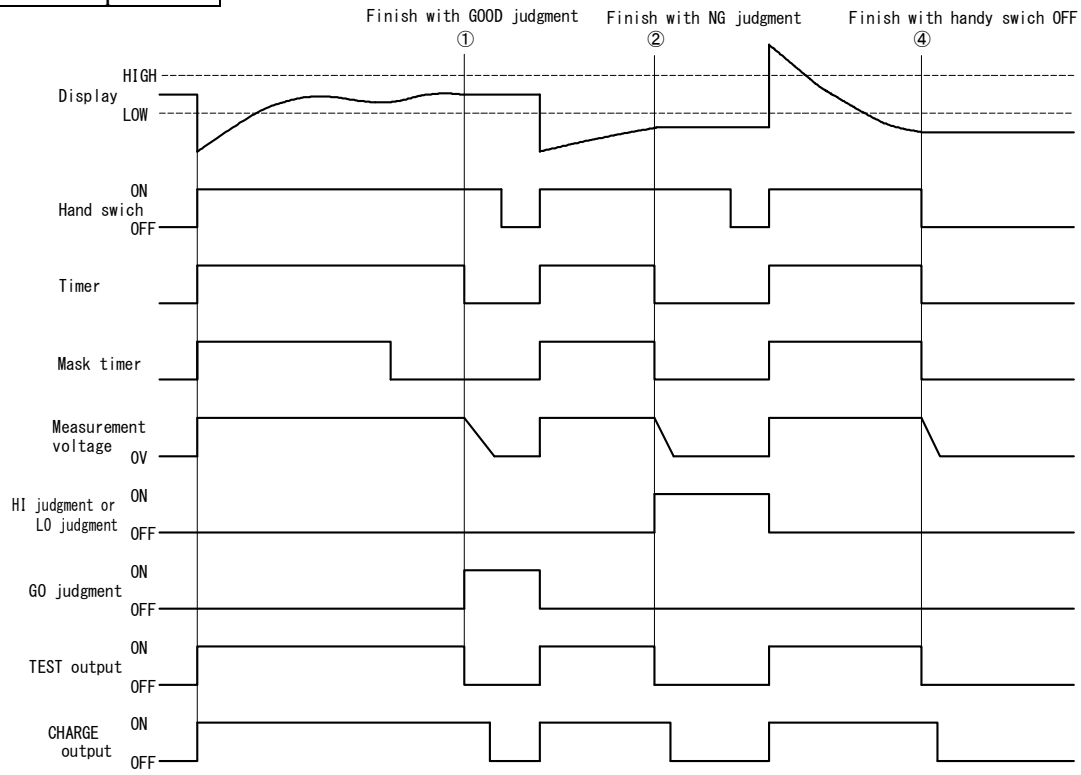
t1 : MAX 5ms

◆ AUTO mode

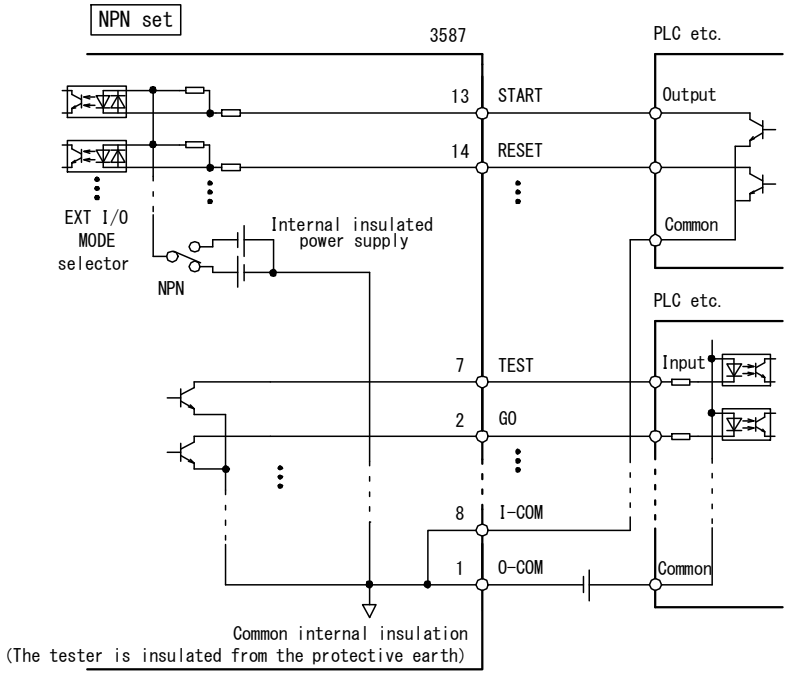
REMOTE 1 operation

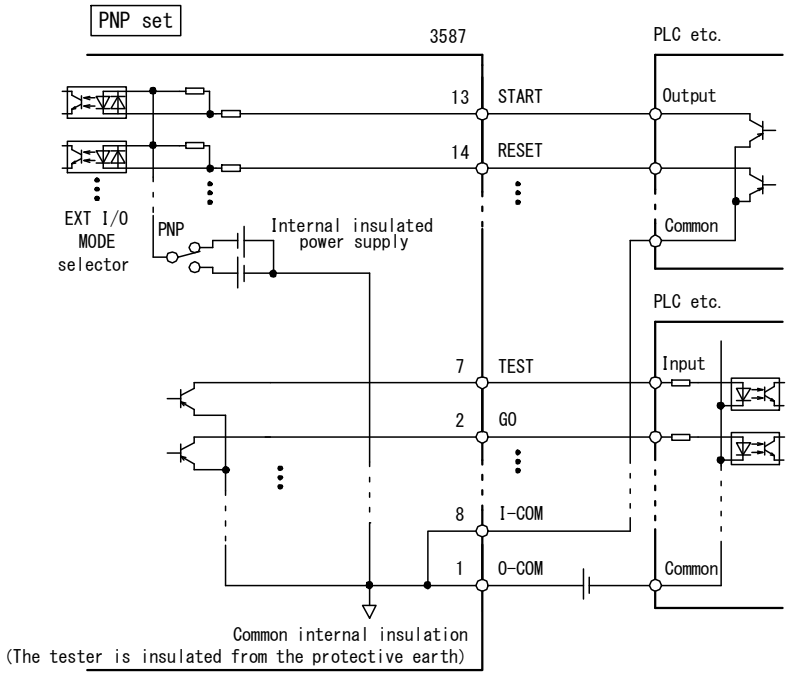


REMOTE 2 operation



5.1.7 Internal circuit configuration





6. Communication (RS-232C)

Output of start / stop measurement, control of memory selection, measurement data and judgment result can be obtained by RS - 232C communication.

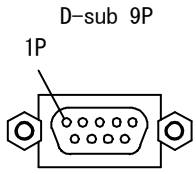
6.1 Specification

6.1.1 Communication specification

Transmission system	: Start-stop synchronization Full duplex
Transmission rate	: 9600, 19200, 34800bps (Factory setting 9600bps during delivery)
Data bit length	: 8 bit
Stop bit	: 1 bit
Parity bit	: None, even number, odd number (During shipment, set : None)
Delimiter	: LF (0AH)
Connecter	: D-sub9 Pin（Male）

6.1.2 Connecter pin arrangement

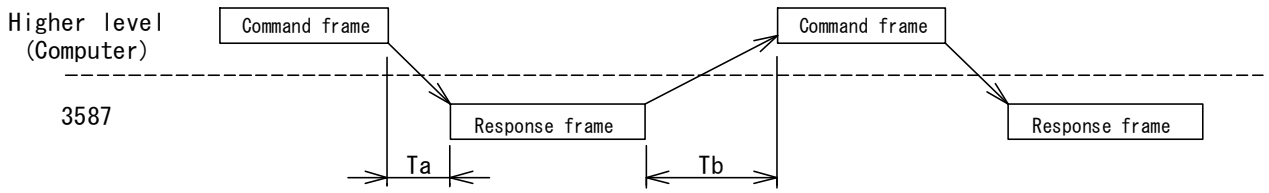
RS-232Cconnecter



RS-232C connecter arrangement

Pin No.	Instrument signal JIS (RS-232C)	Direction	Function
1			not used
2	RD (RXD)	Input	Received data
3	SD (TXD)	output	Transmission data
4			not used
5	SG (GND)		Ground signal
6			not used
7			
8			
9			

6.1.3 Operation



Ta Command Response time : MAX Approximately 5 ms
Tb After response, command prohibition time : RS-232C MAX 5 ms

Note: When data communication is undertaken, set ONLINE of GENERAL setting to ON. (Section 3.8.7) If the communication is undertaken at OFF condition of ONLINE, an error message is obtained except in read command.

6.2 List of communication command and response

Command	Response	Contents
DATA? Cr Lf	DATA=00.12MOHM,HIGH,R Cr Lf ① ② ③ ④ ⑤	Read measurement data ①Response ②Measured value ③Judgment result ④Operation condition ⑤Delimiter
	DATA=9990 MOHM,HIGH,R Cr Lf	Measured value 9990MΩ HIGH Judgment Stand-by (Measurement end)
	DATA=0.000MOHM,LOW ,R Cr Lf	Measured value 0.000MΩ LOW Judgment Stand-by (Measurement end)
	DATA=12.34MOHM,GOOD,R Cr Lf	Measured value 12.34MΩ GOOD Judgment Stand-by (Measurement end)
	DATA=OVERMOHM,NULL,R Cr Lf	Measured value OVER Judgment off Stand-by (Measurement end) ···Judgment OFF by STOP
	DATA=123.4MOHM,NULL,T Cr Lf	Measured value 123.4MΩ Judgment off Under measurement ···AUTO mode
	DATA=12.34MOHM,GOOD,T Cr Lf	Measured value 12.34MΩ GOOD Judgment Under measurement ···CONTINUE mode
TEST? Cr Lf	TEST=TEST Cr Lf ① ② ③	Read operation condition ①Response ②Operation condition ③Delimiter
	TEST=READY Cr Lf	Stand-by condition (Measurement end)
	TEST=TEST Cr Lf	Under measurement

Command	Response	Contents
COMP? Cr Lf	COMP=H12.34, L01.23Cr Lf ① ② ③ ④	Read the comparator of displayed memory no. ①Response ②HIGH set ③LOW set ④Delimiter
COMP=H9999 ,L0000 Cr Lf	COMP=H9999 , L0000Cr Lf	H=9999MΩ, L=0000 MΩ
COMP=H1.234,L0.123Cr Lf	COMP=H1.234, L0.123Cr Lf	H=1.234 MΩ, L=0.123 MΩ
COMP=H12.34,L01.23Cr Lf	COMP=H12.34, L01.23Cr Lf	H=12.34 MΩ, L=01.23 MΩ
COMP=H123.4,L012.3Cr Lf	COMP=H123.4, L012.3Cr Lf	H=123.4 MΩ, L=012.3 MΩ
COMP=H1.234,L0.123 Cr Lf	COMP=H12.34, L01.23Cr Lf ① ② ③ ④	Set the comparator of displayed memory no. ①Response ②HIGH set ③LOW set ④Delimiter
COMP=H9999 ,L0000 Cr Lf	COMP=H9999 , L0000 Cr Lf	Set H=9999MΩ, L=0000 MΩ
COMP=H1.234,L0.123Cr Lf	COMP=H1.234, L0.123Cr Lf	Set H=1.234 MΩ, L=0.123 MΩ
COMP=H12.34,L01.23Cr Lf	COMP=H12.34, L01.23Cr Lf	Set H=12.34 MΩ, L=01.23 MΩ
COMP=H123.4,L012.3Cr Lf	COMP=H123.4, L012.3Cr Lf	Set H=123.4 MΩ, L=012.3 MΩ
BUZZ? Cr Lf	BUZZ=GOOD, 03Cr Lf ① ② ③ ④	Read buzzer setting ①Response ②Operation condition ③Sound volume ④Delimiter
	BUZZ=GOOD, 01Cr Lf BUZZ=NG , 08Cr Lf BUZZ=OFF , 03Cr Lf	During GOOD Judgment operation, Sound volume 01 (Range of volume:01 to 10) During HIGH or LOW Judgment operation, Sound volume 08 Buzzer off (No operation)
BUZZ=GOOD,03Cr Lf	BUZZ=GOOD, 03Cr Lf ① ② ③ ④	Set buzzer ①Response ②Operation condition ③Sound volume ④Delimiter
BUZZ=GOOD,01Cr Lf BUZZ=NG ,08Cr Lf BUZZ=OFF ,03Cr Lf	BUZZ=GOOD, 01Cr Lf BUZZ=NG , 08Cr Lf BUZZ=OFF , 03Cr Lf	During GOOD Judgment operation, Sound volume 01 (Sound volume range:01 to 10) During HIGH or LOW Judgment operation, Sound volume 08 Buzzer off (No operation)

Command	Response	Contents
RANGE? CrLf	RANGE=2000MOHMCrLf ① ② ③	Read the setting measurement range of memory No. being displayed. ①Response ②Range set ③Delimiter
	RANGE=2000MOHMCrLf RANGE= 200MOHMCrLf RANGE= 20MOHMCrLf RANGE= 2MOHMCrLf RANGE=AUTO CrLf	2000MΩ range 200MΩ range 20MΩ range 2MΩ range Auto range
RANGE=2000MOHM	RANGE=2000MOHMCrLf ① ② ③	Set the memory range of memory No. being displayed. ①Response ②Range ③Delimiter
RANGE=2000MOHMCrLf RANGE= 200MOHMCrLf RANGE= 20MOHMCrLf RANGE= 2MOHMCrLf RANGE=AUTO CrLf	RANGE=2000MOHMCrLf RANGE= 200MOHMCrLf RANGE= 20MOHMCrLf RANGE= 2MOHMCrLf RANGE=AUTO CrLf RANGE=ERR CrLf	Set to 2000MΩ range Set to 200MΩ range Set to 20MΩ range Set to 2MΩ range Set to auto range Setting error During setting of voltage 25V to 99V at 2000MΩ During setting of voltage 500V to 1000V at 2MΩ
VOLT? CrLf	VOLT=1000VCrLf ① ② ③	Read the setting of measurement voltage of memory No. being displayed. ①Response ②Voltage set ③Delimiter
	VOLT= 25VCrLf VOLT= 100VCrLf VOLT= 500VCrLf VOLT=1000VCrLf	Set voltage DC 25V Set voltage DC100V Set voltage DC500V Set voltage DC1000V

Command	Response	Contents
VOLT=1000V□□	VOLT=1000V□□ ① ② ③	Set the measurement voltage at memory No. being displayed ①Response ②Set voltage ③Delimiter
VOLT= 25V□□	VOLT= 25V□□	Set voltage DC25V (Set voltage range 25V to 1000V, Step 1V)
VOLT= 100V□□	VOLT= 100V□□	Set voltage DC100V
VOLT= 500V□□	VOLT= 500V□□	Set voltage DC500V
VOLT=1000V□□	VOLT=1000V□□	Set voltage DC1000V
VOLT= 20V□□	VOLT=ERR □□	Out of voltage setting range error During setting of voltage 25 to 99V at measurement range of 2000MΩ, range changes to 200MΩ During setting of voltage 500 to 1000V at measurement range 2MΩ, range changes to 20MΩ
TIMER? □□	TIMER=10.0□□ ① ② ③	Read the setting of timer of memory No. being displayed ①Response ②Setting of timer ③Delimiter
	TIMER=00.2□□	Set timer 0.2 s
	TIMER=01.0□□	Set timer 1.0 s
	TIMER=99.9□□	Set timer 99.9 s
TIMER=10.0□□	TIMER=10.0□□ ① ② ③	Set the timer of memory No. being displayed. ①Response ②Setting of timer ③Delimiter
TIMER=00.2□□	TIMER=00.2□□	Set timer 0.2 s (Setting range 0.02 to 99.9 s, Step 0.1s)
TIMER=01.0□□	TIMER=01.0□□	Set timer 1.0 s
TIMER=99.9□□	TIMER=99.9□□	Set timer 99.9 s
TIMER=0.00□□	TIMER=ERR□□	Out of timer setting range error

Command	Response	Contents
MASK TIMER?Cr Lf	MASK TIMER=10.0Cr Lf ① ② ③	Read timer setting of memory No. being displayed. ①Response ②Mask timer setting ③Delimiter
	MASK TIMER=00.1Cr Lf	Mask timer setting 0.1 s
	MASK TIMER=01.0Cr Lf	Mask timer setting 1.0 s
	MASK TIMER=99.9Cr Lf	Mask timer setting 99.9 s
NASKTIMER=10.0Cr Lf	MASK TIMER=10.0Cr Lf ① ② ③	Set the mask timer of memory No. being displayed. ①Response ②Mask timer setting ③Delimiter
MASK TIMER=00.1Cr Lf	MASK TIMER=00.1Cr Lf	Set mask timer 0.1 s (Setting range 0.01 to 99.9 s , Step 0.1s)
MASK TIMER=01.0Cr Lf	MASK TIMER=01.0Cr Lf	Set mask timer 1.0 s
MASK TIMER=99.9Cr Lf	MASK TIMER=99.9Cr Lf	Set mask timer 99.9 s
MASK TIMER=0.00Cr Lf	MASK TIMER=ERRCr Lf	Out of mask timer setting range error Mask timer > Error is obtained even timer set is transmitted.
MODE? Cr Lf	MODE=CONTINUECr Lf ① ② ③	Read the setting of measurement mode of memory No. being displayed. ①Response ②Mode set ③Delimiter
	MODE=CONTINUECr Lf	CONTINUE mode
	MODE=AUTO Cr Lf	AUTO mode
MODE=CONTINUECr Lf	MODE=CONTINUECr Lf ① ② ③	Set the measurement mode of memory No. being displayed. ①Response ②Mode set ③Delimiter
	MODE=CONTINUECr Lf	CONTINUE mode
	MODE=AUTO Cr Lf	AUTO mode
	MODE=ABCDEFG Cr Lf	Error except AUTO/CONTINUE

Command	Response	Contents
MEM?	MEM=01Cr Lf ① ② ③	Read memory No. being displayed ①Response ②Memory No. ③Delimiter
	MEM=01Cr Lf MEM=10Cr Lf	Memory No.＝01 Memory No.＝10
MEM=CALL01Cr Lf	MEM=CALL01Cr Lf ① ② ③	Call the specified set No. ①Response ②Memory No. ③Delimiter
	MEM=CALL01Cr Lf MEM=CALL10Cr Lf MEM=CALL29Cr Lf	Memory No.＝01 (Setting range 01 to 10) Memory No.＝10 Error when out of setting range
WRITEMEMORYCr Lf		Write set memory 01 to 10 to EEPROM
	WRITE SUCCESSCr Lf WRITE ERRCr Lf	Successful EEPROM writing Failure of EEPROM writing
STARTCr Lf	STARTCr Lf START ERRCr Lf	Start the measurement ERR is obtained during REMOTE/MANUAL key setting to REMOTE (No measurement start)
STOPCr Lf	STOPCr Lf	Undergoing measurement cancellation During stand-by state, judgment result becomes clear (Make OFF)
ONLINE? Cr Lf	ONLINE=ON Cr Lf ① ② ③	Read online status ①Response ②State ③Delimiter
	ONLINE=ON Cr Lf ONLINE=OFFCr Lf	Online is ON Online is OFF
ONLINE=ON Cr Lf	ONLINE=ON Cr Lf ① ② ③	Set online ①Response ②State ③Delimiter
ONLINE=ON Cr Lf ONLINE=OFFCr Lf ONLINE=XYZCr Lf	ONLINE=ON Cr Lf ONLINE=OFFCr Lf ONLINE=ERRCr Lf	Set online to ON Set online to OFF Setting error of online

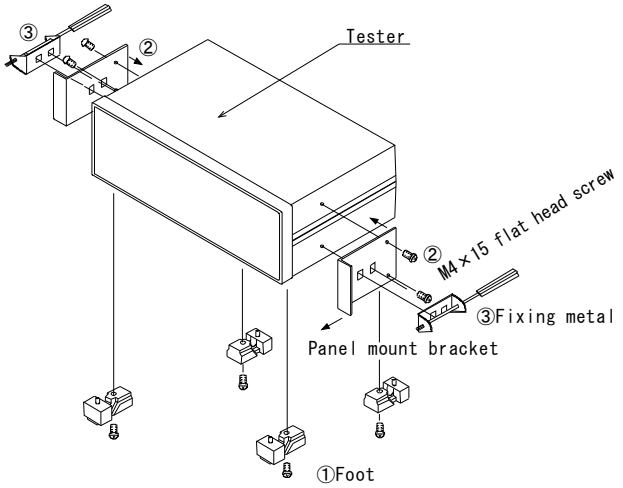
7. Error display

Display	Name	Description
OVER	Over	Over range of setting (Blinking or lighting Display)
UNDER	Under	Under range measurement
OUT OF RANGE	Setting error	When the set item is out of range, it displays for Approximately 1 s.
CERR	Connection error	Display during error of connection check

8 Use in panel-mount

8.1 Assembly drawing

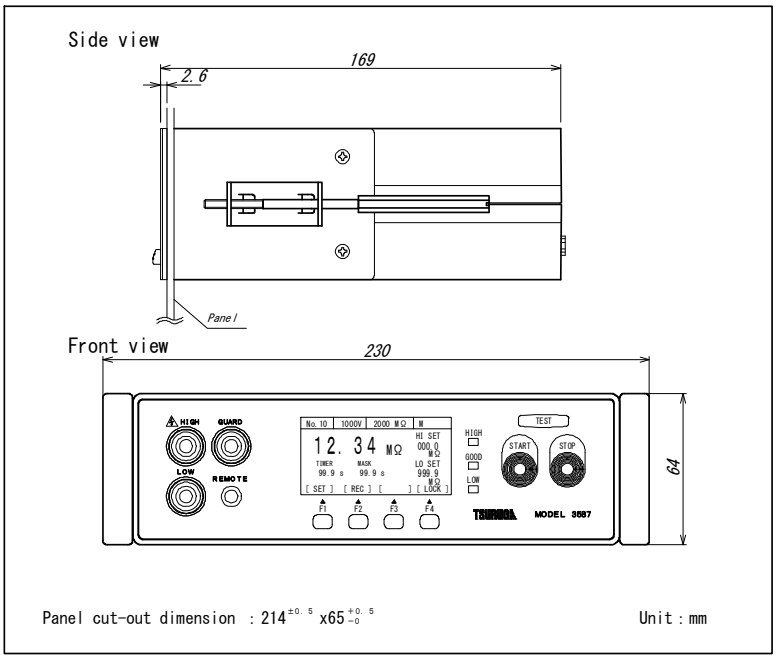
When the tester is used by panel-mounting, use the optional panel-mount bracket.



① Remove the feet (4 parts) at the bottom of the tester.
② Fix the panel-mount bracket to both side of the tester (M4×15flat head screw)
③ Insert the tester from the front of the panel and fix it to the panel with the fixing metal.

Note: In case that the tester is installed to the chassis, utilizing the bottom screw taps of the testers, keep the length of screw at 6mm + thickness of chassis (mm).

8.2 External dimensions when fitted with panel-mount bracket



⚠ Warning
●Set the power switch near the instrument when it is used in panel mount.

9. Maintenance

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. Do not use cleaners containing thinner, benzene, alcohol, acetone, ketone, ether or petroleum based detergent as they may deform or discolor the case.

Calibration

The regular calibration is needed to obtain correct measurement result within the range of specified accuracy.
The cycle of calibration depends on actual usage condition and environment of customers. We recommend for regular calibration at TSURUGA ELECTRIC CORPORATION depending on the condition of tester used by customers.

Transportation

During transportation of this tester, be careful of not to damage it by using proper packing box.
The damage on transportation cannot be guaranteed.
During repair request, attach the detail of trouble information.

10 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.	• Is power supply connected to socket properly?
Key is not operable.	• Isn't the LOCK lamp lit up? Cancel the key lock referring to the section 3.5.
Measurement cannot be started, though START switch is pressed.	• Confirm 'M' display on 'Start/Online' display. START switch becomes invalid during the remote control ('R1','R2'). Refer to the section 3.8.1. to set to Manual ('M').

For the repair, please, contact our nearest sale office.

11. Specifications

11.1 Model name

Model name	Description
3587-X	No data output
3587-04	With BCD output (Open collector)

11.2 Measuring range and accuracy

◆ Measuring range, accuracy

Rated measurement voltage	Resistance range	Resistance measuring range	Resolution	Accuracy
DC25V to DC99V	2.000 MΩ	0.000 to 2.000MΩ	1kΩ	± (2% of rdg.+3digit)
		2.010 to 4.990MΩ	10kΩ	± 30% of rdg.
	20.00 MΩ	1.80 to 20.00MΩ	10kΩ	± (2% of rdg.+3digit)
		20.10 to 49.90MΩ	100kΩ	± 30% of rdg.
	200.0 MΩ	18.0 to 100.0MΩ	100kΩ	± (2% of rdg.+3digit)
		100.1 to 200.0MΩ	100kΩ	± 5% of rdg.
		201.0 to 999.0MΩ	1MΩ	± 30% of rdg.
DC100V to DC499V	2.000 MΩ	0.000 to 2.000MΩ	1kΩ	± (2% of rdg.+3digit)
		2.010 to 4.990MΩ	10kΩ	± 30% of rdg.
	20.00 MΩ	1.80 to 20.00MΩ	10kΩ	± (2% of rdg.+3digit)
		20.10 to 49.90MΩ	100kΩ	± 30% of rdg.
	200.0 MΩ	18.0 to 100.0MΩ	100kΩ	± (2% of rdg.+3digit)
		100.1 to 200.0MΩ	100kΩ	± 5% of rdg.
		201.0 to 499.0MΩ	1MΩ	± 30% of rdg.
	2000 MΩ	180 to 2000 MΩ	1MΩ	± 5% of rdg.
		2010 to 5000 MΩ	10MΩ	± 30% of rdg.
		5010 to 9990MΩ		-
DC500V to DC1000V	20.00 MΩ	0.00 to 20.00MΩ	10kΩ	± (2% of rdg.+3digit)
		20.10 to 49.90MΩ	100kΩ	± 30% of rdg.
	200.0 MΩ	18.0 to 200.0MΩ	100kΩ	± (2% of rdg.+3digit)
		201.0 to 499.0MΩ	1MΩ	± 30% of rdg.
	2000 MΩ	180 to 1000 MΩ	1MΩ	± (2% of rdg.+3digit)
		1001 to 2000 MΩ	1MΩ	± 5% of rdg.
		2010 to 9990 MΩ	10MΩ	± 30% of rdg.

Accuracy: Defined at 23℃±5℃, 45 to 75%RH.

11.3 General specifications

◆ **Standard specifications**

Output voltage : DC25 to 1050V
Open voltage : ± (1% + 5V) of output voltage
Rated measuring current : 1mA
Short circuit current : Less than 1.5mA
Display : 0 to 9990 Green OLED
Zero suppress function
When the input is over-range or open, 'OVER' is displayed.
When the input is under-range, 'UNDER' is displayed.
Auto-range: Resolution within the measuring range is automatically switched. Switching of resolution at 2000 when rising and at 179 when falling.
Sampling rate : S 10 times/s.
F 50 times/s. or 60 times/s. (Depends on the power supply frequency)
Response speed (When NG Judgement) : Fixed range :
Display response and judgement time : Approx. 0.05s.
: Auto-range :
Display response and judgement time : Approx. 0.2sec.
Note: The time required to reach the measurement terminal from open to specified resistance within its accuracy.

Sampling F, when 'Contact check ' is off

Range	Resistance value	Voltage
2MΩ	500kΩ	25V, 50V, 100V
20MΩ	5MΩ	25V,50V, 100V, 250V, 500V, 1000V
200MΩ	50MΩ	25V, 50V, 100V, 250V, 500V, 1000V
2000MΩ	500MΩ	250V, 500V, 1000V
AUTO	50MΩ (Range of 200MΩ)	25V, 50V, 100V
		250V, 500V, 1000V

Parameter retention : Memorized in EEPROM
Re-writable for 100,000 times, retainable for about 10 years.
Erroneous input protection : Less than 1.2 times of the measurement voltage, max. 600V (Peak) for less than 10s
Insulation resistance : Terminal blocks / Case More than 500V DC 100MΩ
Withstand voltage : Power supply terminal / Case 2000V AC for 1 minute
Power source / Measuring terminals, Control input & output terminals. 1500V AC for 1 minute
Power supply voltage : 100V AC to 240V AC 50 - 60Hz
Power supply voltage tolerance range : 90V AC to 250V AC
Power consumption : 28 VA MAX
Working ambient temperature : 0 to 50℃
Working ambient humidity : Less than 80% RH (No condensation)
Storage temperature : -20 to 70℃, Less than 70%RH (No condensation)
Use environmental conditions: Indoor use
Altitude: Less than 2000 m
Overvoltage category: OVC Ⅱ
Pollution degree: 2
Transient overvoltage present on main supply: 1000V (1μs)
External magnetic field : Less than 400mA/m
Dimension : 205(W) × 64(H) × 169(D) mm
Weight : Approx. 1 kg.
Accessories : Power supply cord for AC 100V 1 piece
Instruction manual 1 copy

11.4 Adaptability

This product is in conformity with the following standards ;

EN61010-1 2010
Pollution degree 2
Overvoltage category OVC Ⅱ
Measurement category CAT 0

EN61326-1 :2013 Table2*1
EN55011:2009+A1:2010
EN61000-4-2:2009
EN61000-4-3:2006+A1:2008+A2:2010
EN61000-4-4:2012
EN61000-4-5:2014
EN61000-4-6:2014
EN61000-4-8:2010
EN61000-4-11:2004
EN50581:2012

*1 In Industrial Locations

Influence

± (3% of rdg +10digit)	DC25V-DC499V	Range of 2.000MΩ	1kΩ Resolution
		Range of 20.00MΩ	10kΩ Resolution
		Range of 200.0MΩ	100kΩ Resolution
	DC500V-DC1000V	Range of 20.00MΩ	10kΩ Resolution
		Range of 200.0MΩ	100kΩ Resolution
		Range of 2000MΩ	1MΩ Resolution

Configuration

BCD output :BCD Cable is shield type
:with ferrite core(GRFC-9) 1 turn
:BCD connector shell is connected to ground

11.5 Table of factory setting

◆ **Memory setting**

Item	Setting range	Contents	Initial setting	User setting
Memory No.	01 to 10	Memory number	1	
TEST MODE	AUTO	Automatic measurement	AUTO	
	CONTINUE	Continuous measurement		
VOLTAGE	25 to 1050v	Measuring voltage	25V	
RANGE	2MΩ 20MΩ 200MΩ 2000MΩ	Resistance range	200MΩ	
	AUTO	Auto		
HIGH SET	0-9999, OFF	Comparator, Upper-limit	9000	
LOW SET	0-9999, OFF	Comparator, Lower-limit	1000	
COMP RAG	2MΩ 20MΩ 200MΩ 2000MΩ	Comparator range	200MΩ	
TIMER	0.2 to 99.9	Timer	1.0	
MASKTIMER	0.1 to 99.9, OFF	Mask timer	0.2	

◆ **Tester setting**

Item	Setting range	Contents	Initial setting	User setting
REMOTE	MANUAL	Manual mode	Manual	
	REMOTE1	Remote1(Terminal on rear-panel)		
	REMOTE2	Remote2(Remote-Connector)		
EXT.CTRL	OFF	Select memory on Front-panel key	OFF	
	ON	Select memory by terminal on rear-panel		
SAMPLING	FAST	50 times/s. or 60 times/s.	FAST	
	SLOW	10 times/s.		
POWER FRQ	50Hz	Fixed at 50Hz	50 Hz	
	60Hz	Fixed at 60Hz		
CNTCT CHK	OFF	No contact check	OFF	
	ON	Do contact check		
BUZZ MODE	OFF	Buzzer off	OFF	
	GOOD	With buzzer by GOOD judgement		
	NG	With buzzer by NG judgement		
BUZZ VOL	1 to 9	Volume of buzzer	5	
ONLINE	OFF	Communication control disabled (Readout enabled)	OFF	
	ON	Communication control enabled		
RS BPS	9600bps	Baud rate setting of RS-232C	9600bps	
	19200bps			
	38400bps			
RS PARITY	NONE	OFF: RS-232C parity	NONE	
	EVEN	Even: RS-232C parity		
	ODD	Odd: RS-232C parity		

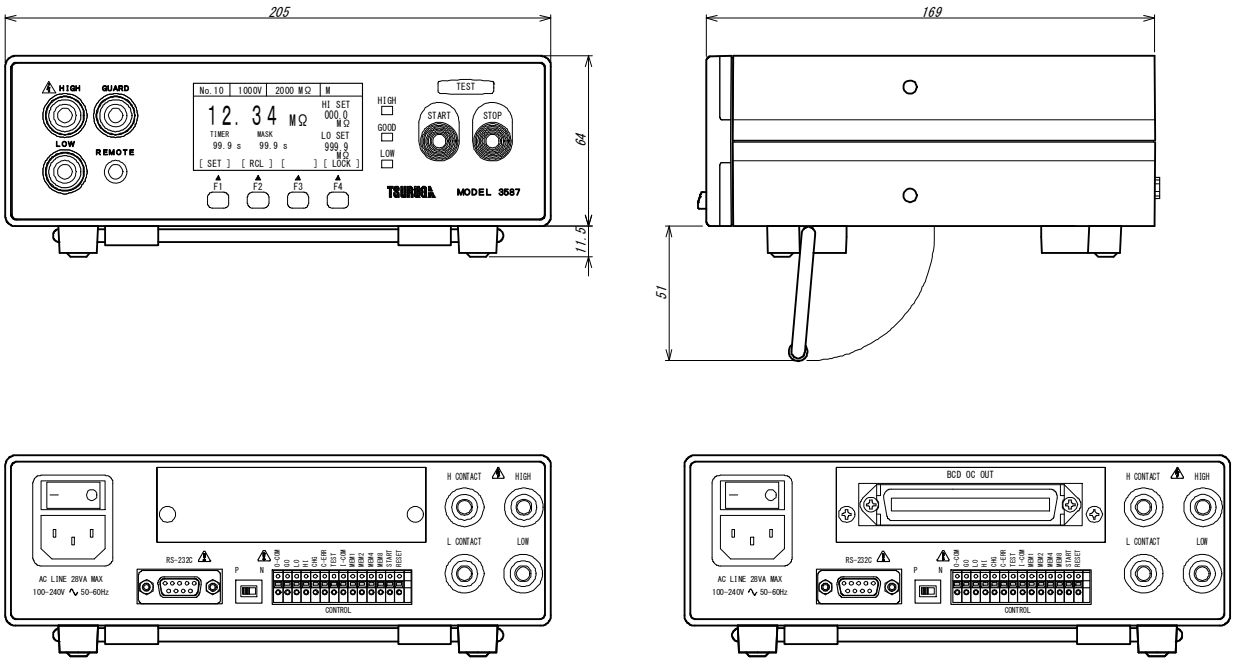
◆ **System setting**

Item	Setting range	Contents	Initial setting	User setting
DISCHARGE	ENABLE	Automatic discharge enabled, after measurement.	ENABLE	
	DISABLE	Automatic discharge disabled, after measurement.		
CONTRAST	1 to 5	Brightness of front-panel	3	

◆ **Other setting**

Item	Setting range	Contents	Initial setting	User setting
LOCK	ON, OFF	Key locking, Enable/Disable of operating by keys	OFF	

11.6 External dimensions



With BCD output

Unit: mm

11.7 Option

Panel-mount bracket : Model 5811-31
LOW probe : Model 5813-21
HIGH probe : Model 5813-22
Probe with switch : Model 5813-23
Power supply cord for AC 200V : Model 5880-23-030

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