User's Manual

Multi-channel Series

HT3542-12H, HT3542-24H

DC Resistance Meter

2021-01-19

Version V2.4

Content

Introduction

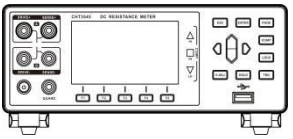
Thank you for purchasing 3542 precision resistance meter. This manual aims to explain the operating steps, precautions and maintenance of the instrument. To obtain maximum performance from this product, please read this manual first before operation, and keep it safe for future reference.

Checking Packing Contents

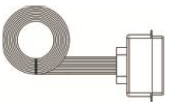
When receiving instrument, please check carefully to ensure that the instrument is not damaged during transit. In addition, special inspections of accessories, panel switches and connectors are required. If the instrument is found to be damaged or it fails to operate as described in the user manual, please contact us.

To transport this instrument, use the original packaging and wrap it in a double carton. Damage during transit is not covered by the warranty.

Packing List

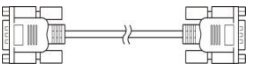


Multi-channel tester * 1 set



HT9600 handler cable*1pc

HT9344 test line*1pc



HT9800 communication cable*1pc

HT9366 temperature probe*1pc

User manual*1 copy

AC power cord*1pc

Safety Notes

The instrument is designed to comply with the IEC 61010 safety standard and has been thoroughly tested for safety before shipment from the factory. However, if it is used improperly, it may cause injury or death and damage the instrument. Be sure to read through this manual and its precautions before use. Our company does not assume any responsibility for accidents and injuries caused by improper operation or other reasons.

This manual marks the relevant signs for safe operation of the instrument. In order to ensure the safety of the instrument and its users, please read the following safety signs and operating precautions carefully before use.

Safety Signs

The sign in this manual is particularly important and should be read carefully before using the machine. Users must refer to the corresponding topics in the manual before using the corresponding functions.

Stands for DC (Direct Current)

Stands for fuse

Stands for ground terminal

Precautions for operation

Using Environment

- Operating temperature and humidity:
  0 to 40 ° C, below 80% RH (no condensation)

- Temperature and humidity range to ensure accuracy:
  -10-50℃，below 80% RH (no condensation)

- To avoid malfunction or damage to the instrument, do not place the tester in the following situations:
  - High temperature places with direct sunlight
  - May splash onto high temperature liquids or places where condensation occurs.
  - Exposed to dusty places.
  - Places filled with corrosive or explosive gases
  - Places with strong electromagnetic fields and radiation.
  - Places with frequent mechanical vibrations.

Checking before use

Before using this instrument, verify the operation is normal and there is no damage during storage or transportation. If you find any question, please contact us.

WARNING	Before using the instrument, make sure that the AC power cord and test lines are well insulated and the conductor is not exposed. Otherwise, there may be a risk of electric shock during use. To ensure personnel safety, please contact our company in a timely manner to replace the equipment

Handling Precautions

DANGER	Do not wet the instrument or operate with wet hands. Do not modify or disassemble it by yourself. Otherwise, it may cause fire, electric shock or other accidents.
WARNING	There are high pressure and high temperature pa inside the instrument during operation, do r disassemble instrument casing to avoid elect shock.
CAUTION	To avoid damage to the instrument, pay attenti to preventing physical impact or falling duri operation or handling.
NOTE	Be sure to turn the power off after using it.

Use of test lines

⚠ DANGER	To prevent electric shock accident, do not short-circuit the top of the test line and the line with voltage.
⚠ CAUTION	When testing, for your safety, please use the instrument's own test line option. To avoid damaging test lines, do not bend or stretch the test lines. To avoid damage to the test line, do not bend or stretch the test line, when inserting and unplugging test wires, hold the connector tightly. The probe at the front of the test line is sharp, taking care not to be scratched.

Accuracy

We use the f.s. (full range), rdg. (reading) and dgt. (resolution) values to define the measurement tolerances, which have the following meanings:

f.s. (Maximum display value or measurement range)

The maximum displayed value or measurement range is usually the currently selected range name.

rdg. (Reading or display value)

The current measured value and the value displayed on the instrument.

dgt. (Resolution)

The minimum display unit of a digital tester, that is, the input value that causes the digital display to show a “1”.

Chapter1 Overview

1.1 Introduction

The basic accuracy of HT3542 DC resistance tester is 0.01%, and the measurable range is 0.1μΩ～10MΩ. With high- speed testing line anomaly detection function and extremely short measurement cycle. The highest sorting speed is up to 1000 times/second, ensuring high-speed and reliable sorting every time. HT3542 can be freely configured for multi-stage sorting, and external control interface can be configured as NPN/PNP. It is suitable for various signal interfaces of automatic production line.

The precision resistance tester adopts a four terminal testing method to measure the winding resistance of motors and transformers, the contact resistance of relays and switches, the pattern resistance of printed circuit boards, and the DC resistance of various materials such as fuses, resistors, and conductive rubber at high speed and precision. Due to the temperature compensation function equipped with this instrument, it is most suitable for measuring objects whose resistance values change due to temperature. In addition, it is also equipped with comparator functions, communication,

external control, etc., which can be used for various situations such as development and production lines.

The precision resistance multi-channel scanning tester requires testing of PCB vias and wiring in fields such as aerospace and automotive electronics, and can scan and switch at a speed of 2ms per channel.

1.2 Characteristics

□ **Appearance**

- 3.5-inch high-resolution TFT LCD display, easy to operate
- Compact and powerful

□ **High technical specifications**

- 20mΩ~10MΩ，5.5 digits display, basic accuracy 0.01%
- The highest resolution is 0.1μΩ

□ **Quick Measurement**

- Minimum test cycle only needs 2.2ms

□ **Rich interface**

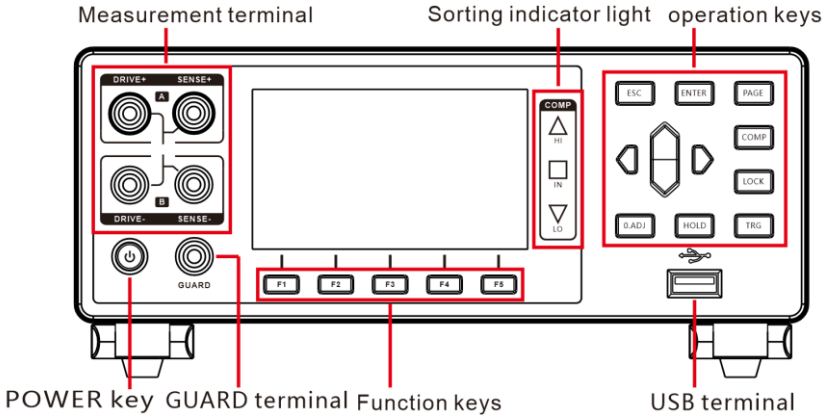
- External control I/O port
- RS-232 interface
- Ethernet interface
- Temperature test interface

□ **Powered by**

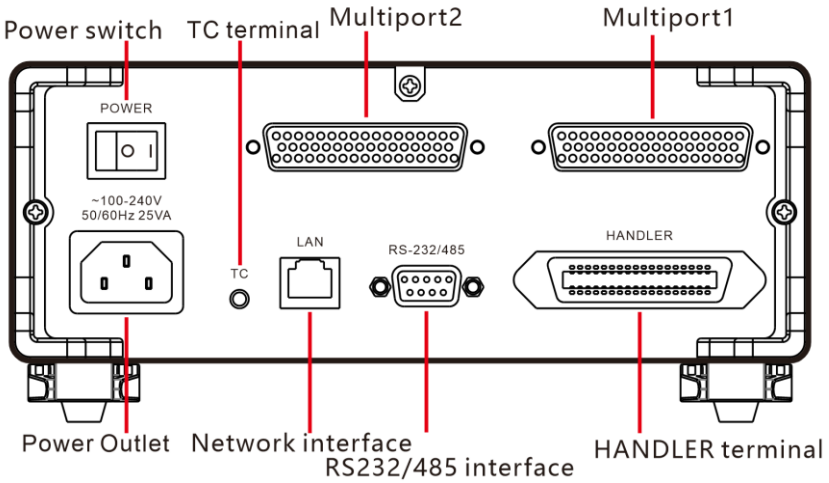
- 100~240V power supply
- Power frequency 50/60Hz

1.3 Name and Operation Summary of Each Part

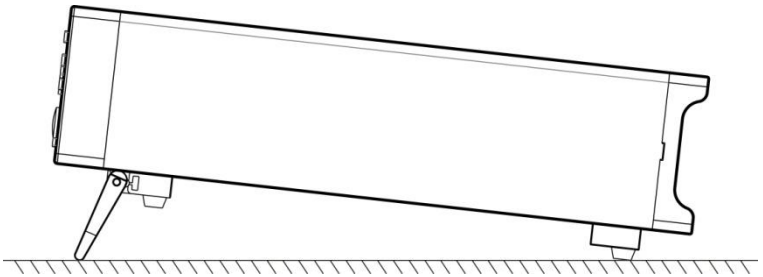
Front Panel



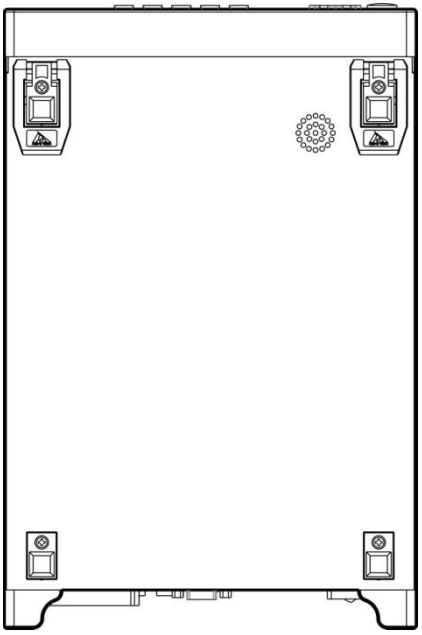
Rear Panel



Side View



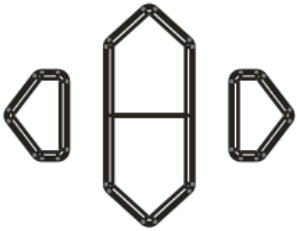
Bottom



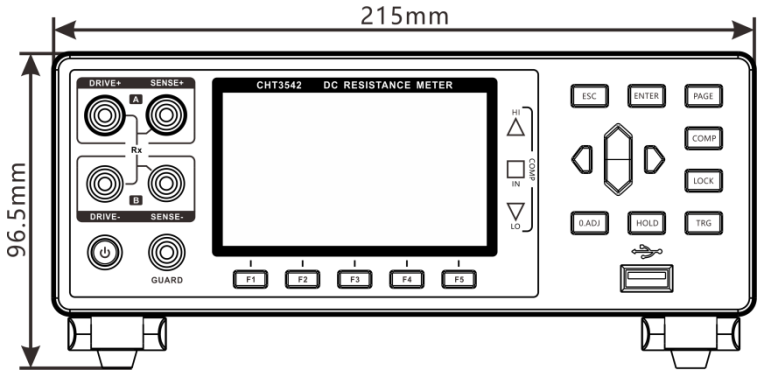
Keys

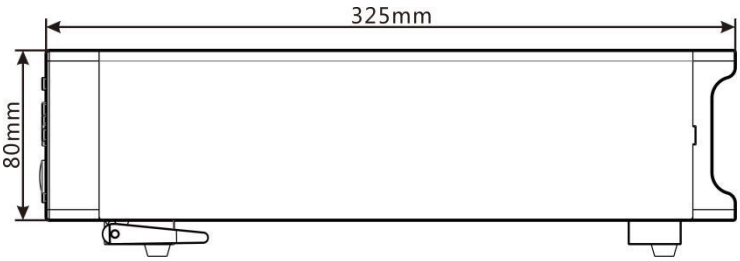
Keys	Description
	**Function key F1**
	**Function key F2**
	**Function key F3**

	**Function key F4**
	**Function key F5**
	**Function Esc key**
	**Function confirmation key**
	**[Page Switch] Switches [Measurement Page] <-> [Comparator Page] <-> [Setup Page] <-> [Panel Page] <-> [System Page] <-> [I/O Page]**
	**Comparator on/off button**
	**Lock key Short press [LOCK] key to lock the current page and the other keys get invalid. Long press to unlock.**
	**[0.ADJ] key Short press for clear zero function. Long press to release clear zero function**

	**[HOLD] key** **Hold the current measurement value during the test**
	**[Trigger] key** **Single trigger test of the instrument in manual trigger mode**
	**[Direction] key** **Select menu items or set values**

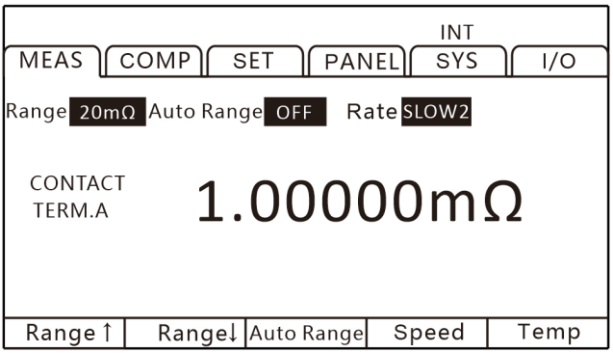
1.4 Dimension



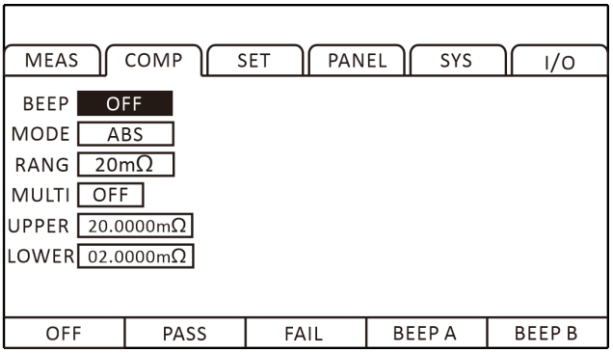


1.5 Screen Composition

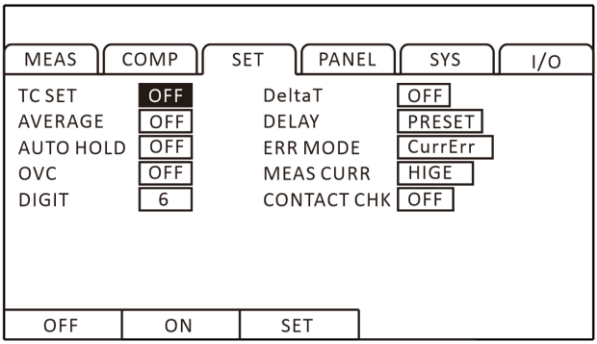
Measurement Display



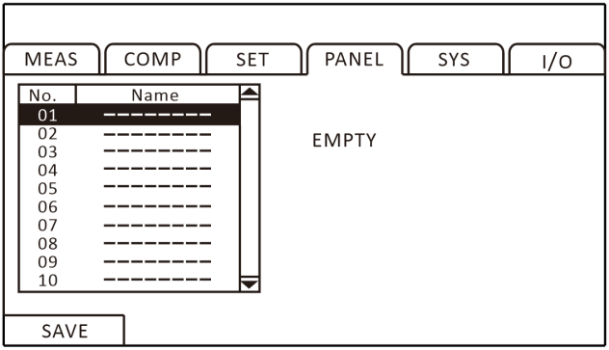
Comparator Display



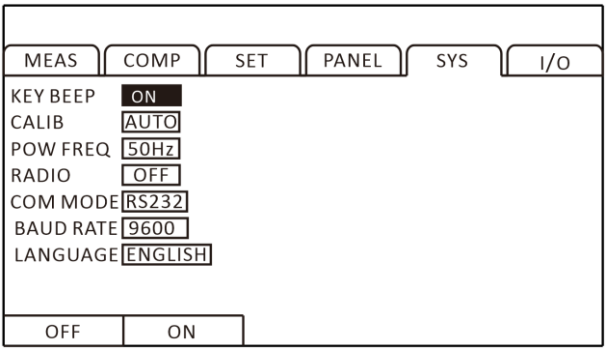
Measuring Parameter Setting Display



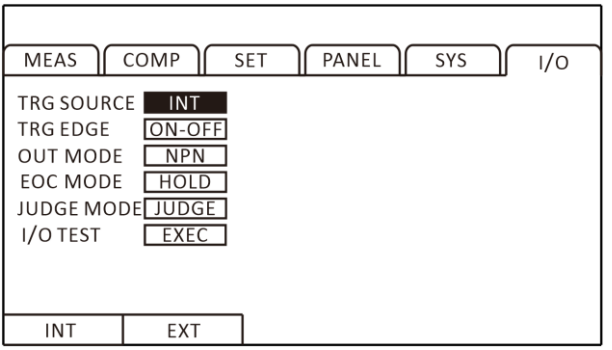
Parameter Saving Display



System Parameter Setting Display



I/O Setting Display

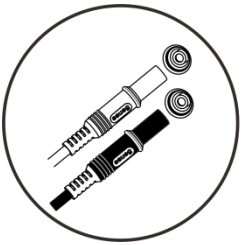


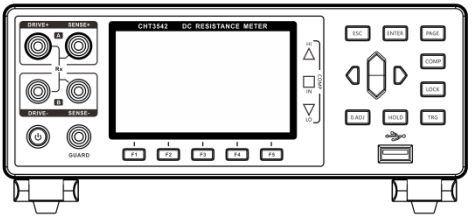
Chapter2 Preparation before testing

2.1 Measurement Process Overview

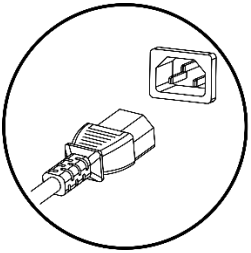
The instrument remains in the power off state, please prepare for testing according to the following steps.

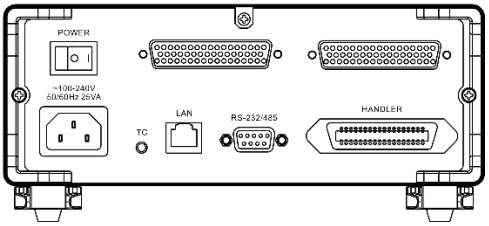
1. Turn off the instrument and connect the test lines.





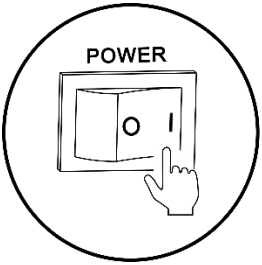
2. Plug AC power cord into the mains outlet

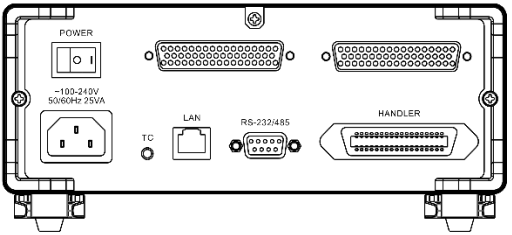




Ensure that the power cord is well grounded, which is conducive to the stability of the test.

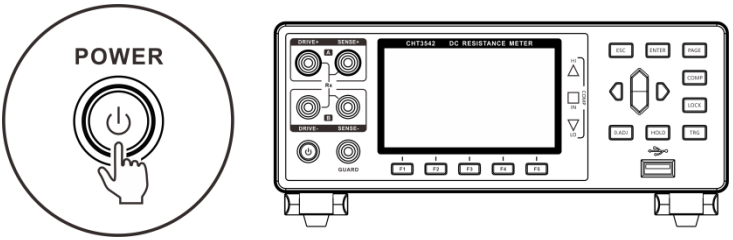
3. Turn on the power at back of instrument.





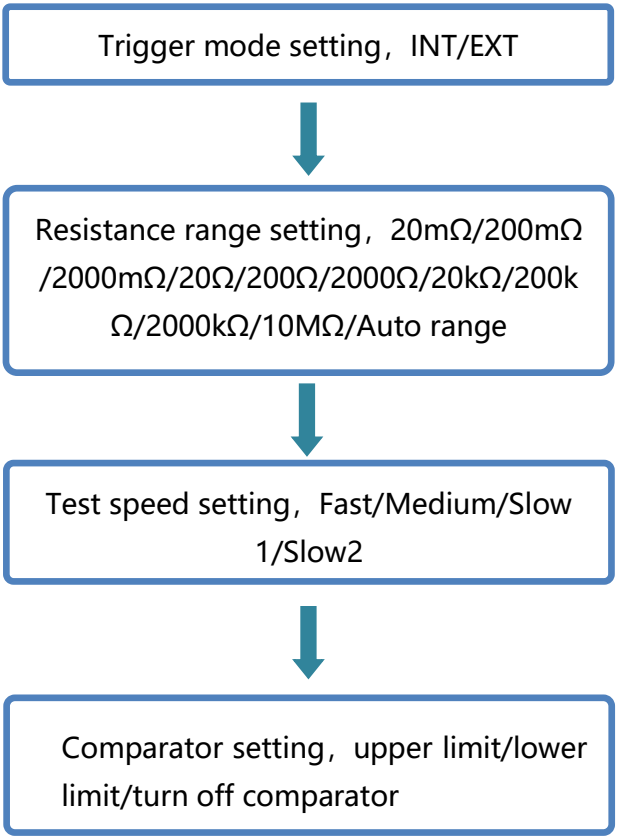
At the time being, internal power of the instrument has been turned on and the instrument is in standby mode.

4. Press and hold POWER button on panel to turn on the power.

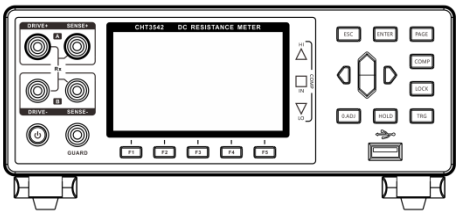


When instrument is in the standby mode, POWER button at panel light is red, long press POWER button, the power is turned on, the screen is lit, and light of button at panel turns green.

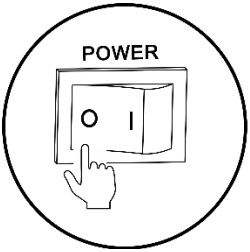
5. Setting test parameters

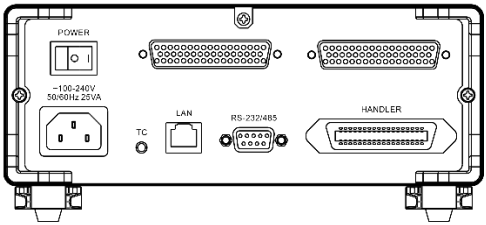


6.Start to test



7.Complete test, turn off the power





2.2 Pre-measurement Inspection

Before using the instrument, inspect it to verify that no damage has occurred during storage or transportation and it operates normally. If you find any damage, contact us.

Instrument and peripheral checking

Inspection item	Action
Is there any damage or a crack in the instrument? Are the internal circuits exposed?	If any damage is found, do not use it. Return it for repair.
Is there any dust or contamination, such as pieces of metal, on any terminals?	If dust or contamination is adhered to a terminal, clean the terminal with a swab.
Is the test line coating broken or is the metal exposed?	If the coating of a test line is broken, the measured value may become unstable or have an error. It is recommended to replace the intact wire.

Power-on checking

Inspection item	Action
After turn on the power on at the back of the instrument, check whether instrument POWER button lit or not?	Return the instrument for repair, if the POWER button is not lit.

When power is turned on, does the entire display turn on? the model name and measurement screen are displayed normally?	If the screen does not behave like this, the instrument may be damaged internally. Return it for repair.

2.3 Confirm the Measured Object

Please change the measurement conditions appropriately according to the object to be measured to reliably measure the resistance. Please refer to the recommended examples shown in the table below to start measurement after setting up instrument.

Measurement Object	Recommended setting			
	Test current	TC/△T	OVC	Contact detection
Motors, solenoids, chokes, transformers	High	TC	OFF	ON
Signal contact harness, connector, relay contact, switch	–	TC	–	OFF *3
Power contact harness, connector, relay contact, switch	High	TC	ON	ON
Fuse, resistor	Low *1	–	ON	ON
Conductive coating,	High	–	OFF	OFF

conductive rubber				
Other, common resistance measurement heaters, wires, welded parts	High	*2	ON	ON
Temperature rise test motor, choke, transformer	High	Δ T	OFF	ON

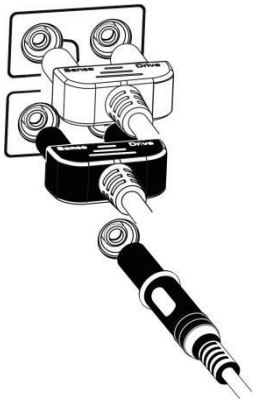
*1 When the rated power has a margin, select High
*2 When the temperature dependence of the measured object is large, use temperature compensation
*3 When there is margin for applying voltage, select ON

2.4 Connection method of test line

WARNING

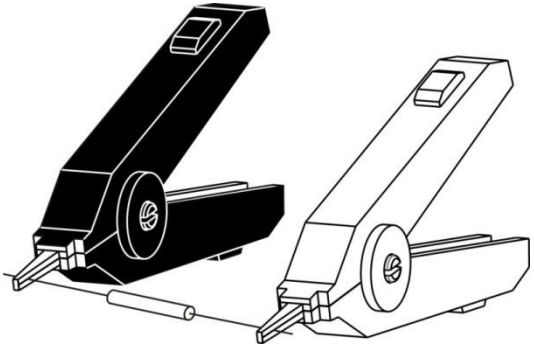
- The test lines port is sharp, taking care not to be scratched.
- For safety reasons, test leads supplied with the instrument should be used.
- To avoid electric shock, make sure the test leads are properly connected.

Front panel connection

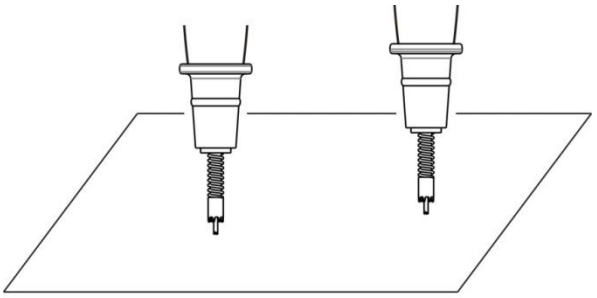


Test lines connection

1. 9344 Test clip type test line



2. 9363-B Test probe type test line



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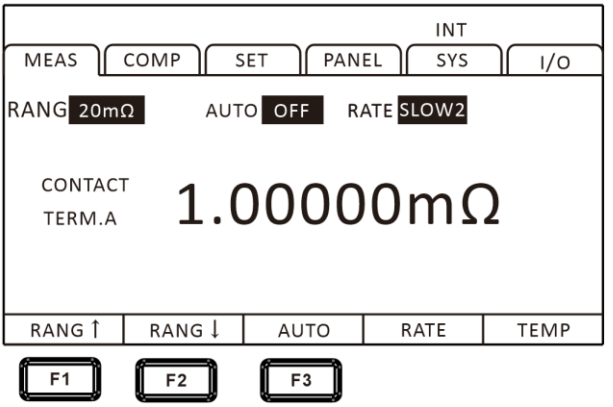
Chapter 3 Basic Settings

3.1 Setting Test Range

The range setting is divided into manual range and auto range. When auto range is selected, the instrument automatically selects an appropriate range to test based on the value of the measured resistance.



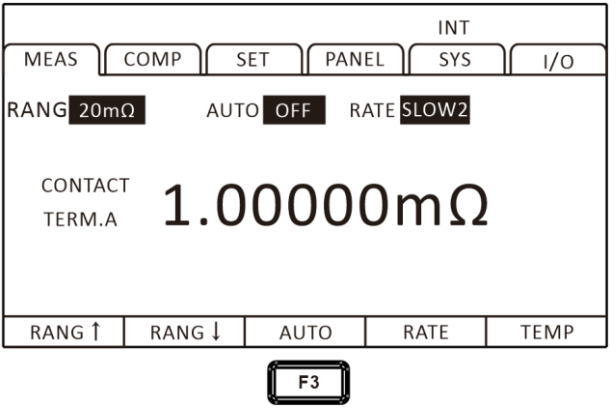
3.1.1 Manual Range Setting

Under measurement state, press [F1] or [F2] to switch the range. Even if auto range function is turned on, manual range switching is also valid (when the auto range is turned on, auto range function will be automatically turned off when the range is manually switched).

Range:

20mΩ ↔ 200mΩ ↔ 2000mΩ ↔ 20Ω ↔ 200Ω↔ 2000Ω ↔ 20kΩ↔200kΩ↔ 2000kΩ↔ 10MΩ

Under measurement state, press [F3] to switch to auto range.

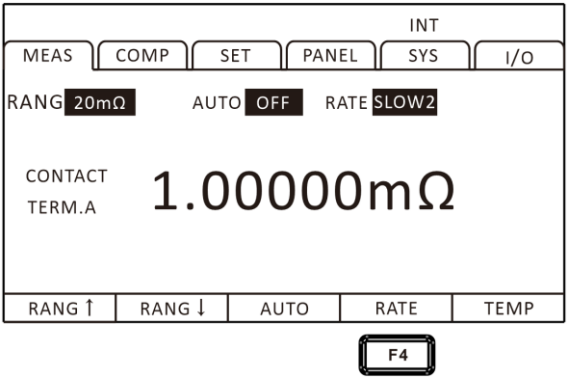


Note:

- If the range is changed while the auto range is ON, the auto range is automatically canceled and is changed to manual range.
- If the comparator function is set to ON, the range is fixed and cannot be changed (it cannot be switched to auto range). To change the range, set the comparator function to OFF or change the range in the comparator settings.
- The auto range may become unstable due to the measured object. In this case, manually specify the range or extend the delay time.

3.2 Setting Measurement Speed

The measurement speed is divided into four levels: fast, medium, slow 1, and slow 2. Press [F4] to switch. The test accuracy of medium speed, slow speed 1 and slow speed 2 is higher than fast speed and is not easily affected by the external environment. When it is susceptible to the external environment, please fully shield the test object from the test lines and wrap the cable.



Note:

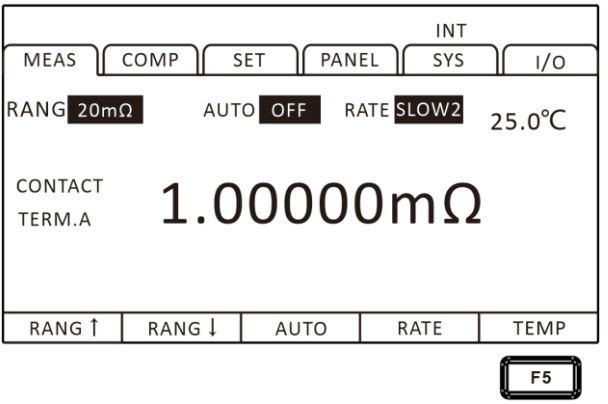
- When the measurement delay is set, the sampling period becomes slower.
- Test time includes ADC sampling, sorting output, and display time.
- In the test environment, when the electric field interference is relatively large, or when the test is difficult to stabilize, a slow test is recommended.

Perform a self-calibration of approximately 5ms between measurements. To shorten the measurement interval, set the

3.3 Temperature Setting

Press [F5] on measurement page to switch whether the current

temperature is displayed.



If temperature probe is not connected, temperature measurement is not possible. When the TC or Δ T is not used, there is no need to connect a temperature probe. If users do not want to display the temperature, please switch the display.

3.3.1 Temperature Compensation

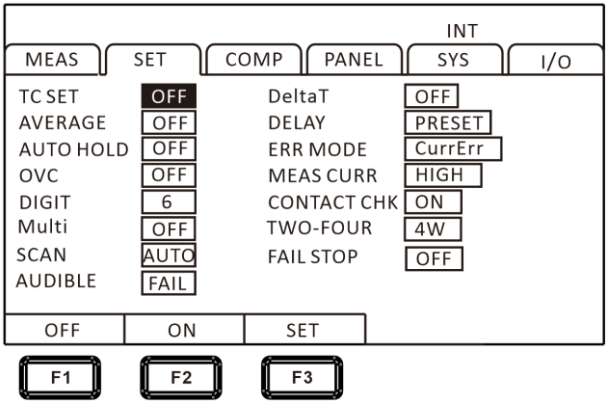
Resistance value is converted to reference temperature for display. When need compensating for temperature, please connect the temperature probe to the TC terminal on the rear panel of the instrument.

1. Select parameter setting page

2. Select related menu items

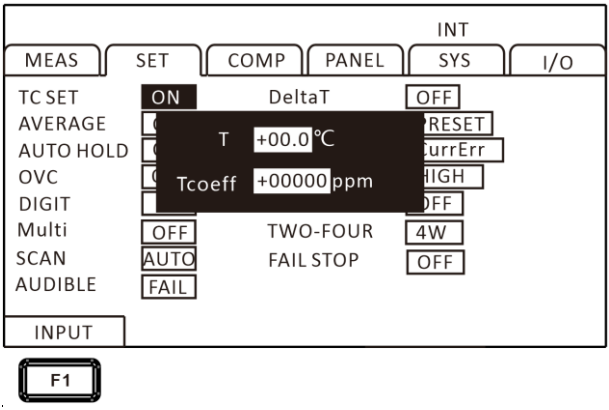
Press [F2] to turn on temperature compensation. After the temperature compensation is set to ON, users need to press

[F3] to set the reference temperature and temperature coefficient.

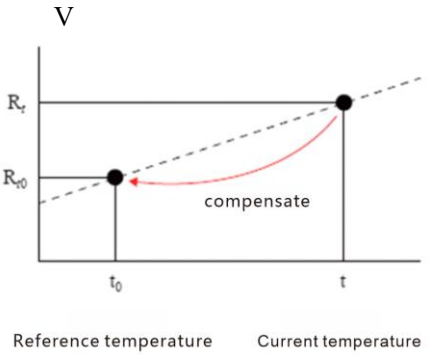


3. Related values setting

Press [F3] to enter reference temperature and temperature coefficient setting page, press [F1] to enter setting, use left and right cursor keys to move the cursor to the position to be set, and use the up and down cursor keys to change value.



The principle of temperature compensation is as follows:



$$R_{t0} = \frac{R_t}{1 + \alpha_{t0}(t - t_0)}$$

Rt ： Actual resistance value

Rt0 ： compensation resistance value

t: Measuring temperature

t0: Reference temperature （setting range from -10℃~99.9℃）

αt0: Temperature coefficient at t0 of the material being tested （setting range from -9999ppm/℃~9999ppm/℃）

Note:
When “t.error” is displayed, it indicates that the temperature probe is not connected; if temperature is displayed as ---.-, please confirm connection of the temperature probe.

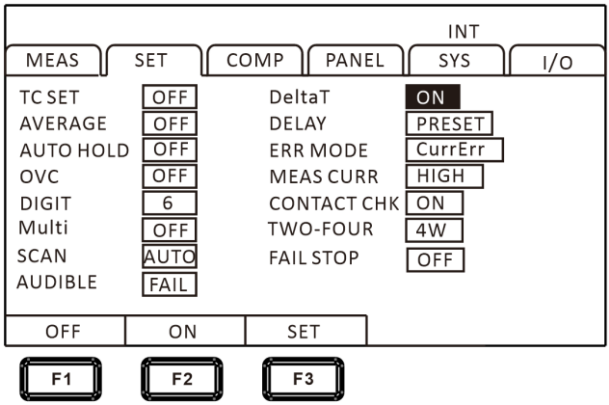
3.3.2 Temperature Conversion

When performing temperature conversion, connect temperature probe to TC terminal on rear panel of the instrument. The temperature rise value can be converted according to the principle of temperature conversion, and the temperature at time of energization stop can be estimated.

1. Select parameter setting page

2 . Select related menu items

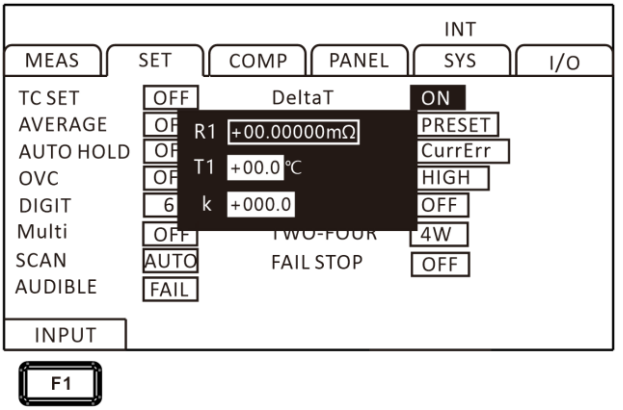
Press [F2] to turn on temperature conversion. After temperature conversion is set to ON, users need to press [F3] to set relevant value.



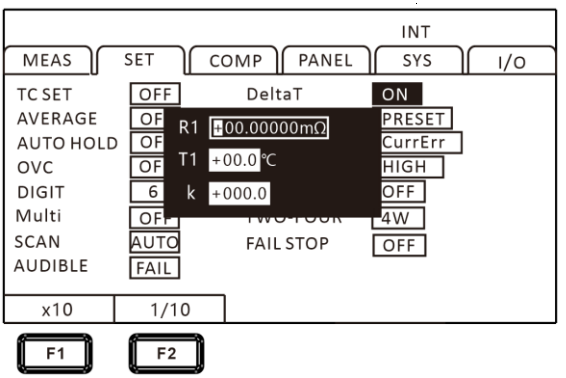
3. Related values setting

Press [F3] to enter setting page of initial resistance value

R1, initial temperature T1, and inverse of the temperature coefficient (K) at 0 °C.



Press [F1] input key to start setting, use left and right cursor keys to move cursor to the position to be set, and use up and down cursor keys to change the value.



Press the up, down, left and right keys to select the value to be set

Setting range:

Initial resistance： 0.001Ω ~ 9000.000 MΩ

Initial temperature： -10.0 ~ 99.9 ℃

Reference value of k:

The following values are recommended in the JIS C4034-1 standard.

• Copper: k =235

• Aluminum: k =225

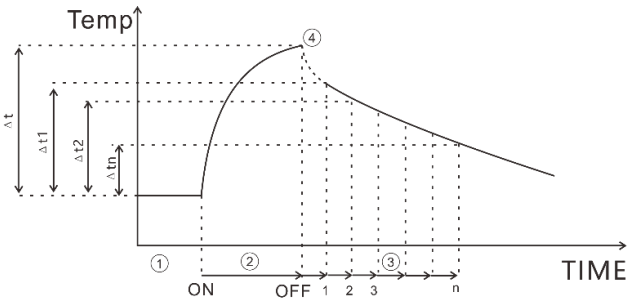
Temperature conversion test example:

① Make motor and coil fully adapt to room temperature, then measure resistance value (R1) and ambient temperature (t1) before power-on and input value into the instrument.

② Remove the test lines from the object under test.

③ After power is turned OFF, connect test leads to the object to be measured again, and measure the temperature rise value (Δ t1 ~ △ tn) at regular intervals.

④ Connect collected temperature data (△ t1 to Δ tn) and estimate maximum temperature rise value (Δ t).



Note:

• When Δ T is ON, comparator cannot be set to ON.

• If TC and multi-sorting functions are set to ON, Δ T will automatically turn into OFF status.

Average method	1st	2nd	3rd
Free measurement (moving average)	(D1+D2)/2	(D2+D3)/2	(D3+D4)/2
Non free measurement (simple average)	(D1+D2)/2	(D3+D4)/2	(D5+D6)/2

3.4 Average Number of Times Setting

Average multiple measurement values and display them. By using this function, the jumping of measured values can be reduced while also suppressing interference.

When triggered internally, (free measurement) is calculated through moving average.

When triggered externally, (non-free measurement) is a simple average.

Average number of times:

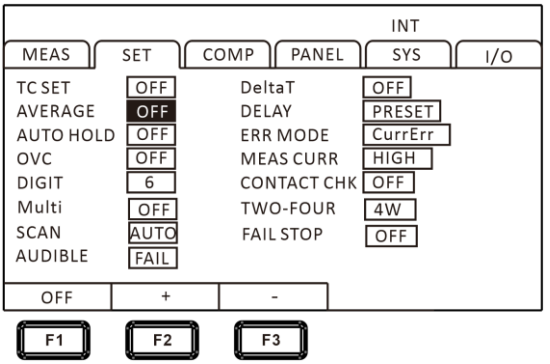
OFF ↔ 2 ↔ 3 ↔ 4 ↔ 5 ↔ 6 ↔ 7 ↔ 8 ↔ 9↔ 10

Set the average number of times to the average value of 2:

When the low current resistance measurement is ON and the testing speed is slow 2, even if the average function is set to OFF, the internal average processing is performed twice. When the average function is set to ON, the average processing is performed according to the set number of times.

1. Select parameter setting page

2. Select relevant menu items



Press the [F2] key to increase the average number of times, while press the [F3] key to decrease the average number of times. The maximum average number of times is 10, and the minimum is 2.

3.5 Measurement Delay Setting

Set the waiting time and adjust the measurement stability time after the OVC (thermoelectric potential compensation function) is turned on and the measurement current is changed in the automatic range. By using this feature. Even if the reactance component of the tested object is large, the measurement can start after the internal circuit stabilizes. The preset settings vary depending on the range or deviation voltage compensation function.

Delay settings can be selected from two types: preset (internal fixed value) and any set value.

(1) The preset (internal fixed value) values may vary depending on the range or OVC function.

Range	Test current	Delay(unit: ms)	
		OVC: OFF	OVC: ON
20 mΩ	–	75	25
200 mΩ	High	250	25
	Low	20	2
2000 mΩ	High	50	2
	Low	5	2
20 Ω	High	20	2
	Low	5	2
200 Ω	High	170	2
	Low	20	2
2000 Ω	–	170	2
20 kΩ	–	180	–
200 kΩ	–	95	–
2000 kΩ	–	10	–
10 MΩ	–	1	–

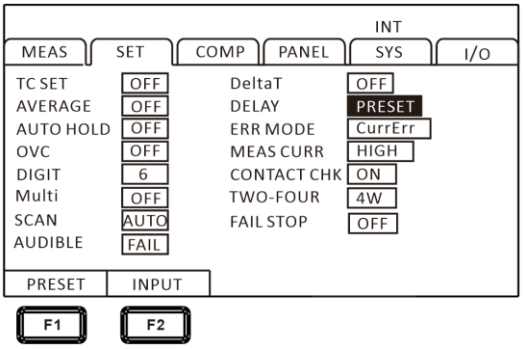
(2) Any setting value

Set the range to 0 ~ 9999 ms, which is the value set for all ranges.

1. Select parameter settings page

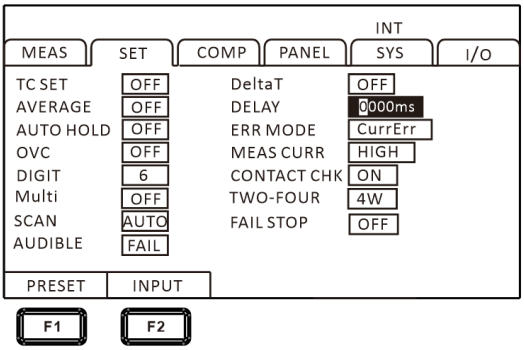
Press [PAGE] Button to select Parameter setting page

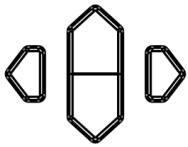
2. Select relevant menu items



Press the up, down, left and right keys to select the value to be set

3. Press the [F2] key to input the delay time





Press the up, down, left, and right keys to select the value to be set

Approximate calculation criteria for the delay time of inductive loads

• When the measurement current is applied to the inductive load and it takes some time to stabilize, and cannot be measured in the initial state (preset), please adjust the delay.

Please set the delay time approximately 10 times the calculated value as the standard, ensuring that the reactance components (inductance, capacitance) do not affect the measured value.

$$t = -\frac{L}{R} ln\left(1 - \frac{IR}{V_O}\right)$$

L : Inductance of the tested object

R : Resistance of the tested object+ wire resistance+ contact resistance

I : Measuring current

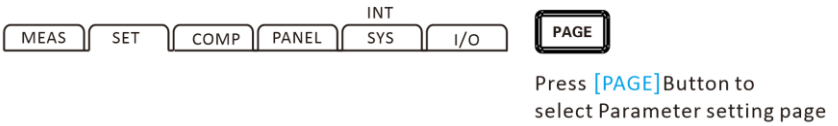
Vo : Open circuit voltage

- Initially, please set the delay time to be longer, then gradually shorten the delay time while observing the measured values.
- If the delay time is extended, the display update of the measured values will slow down.

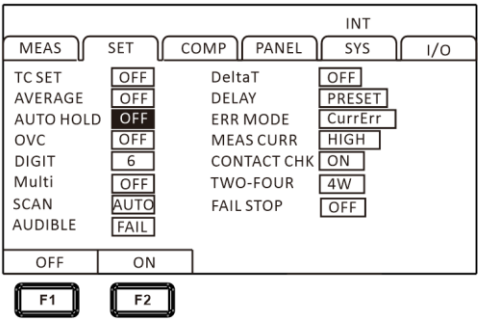
3.6 Auto Hold Settings

It is very convenient to use the hold function when confirming measurement values. When the measured value is stable, the buzzer will sound and automatically maintain it.

1. Select parameter setting page



2. Select relevant menu items



Press the up, down, left, and right keys to select the parameters to be set

About Auto Hold Release:

Moving the test line away from the tested object and making it contact the tested object again will automatically release the hold. Changing the range and measurement speed or pressing [ESC] can also release the hold. If the hold is released, the HOLD indicator light will turn off.

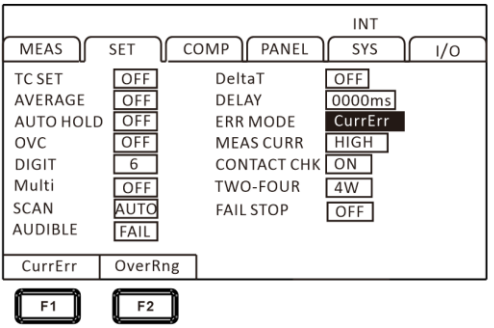
3.7 Abnormal Mode Setting

The abnormal mode can be set to [current abnormal] and [over range]

1. Select parameter setting page

Press [PAGE] Button to select Parameter setting page

2. Select relevant menu items



Press the up, down, left, and right keys to select the parameters to be set

Example of over range detection:

Overflow Detection	Measurement Example
When overrange	Measure 23 kΩ at a range of 20 kΩ
When the deviation display of the measured value (% display) exceeds the display range (999.999%)	500 Ω (+2400%) measured at a standard value of 20 Ω
When the result of clear zero operation is out of the display range	0.5 Ω zero adjustment in 1 Ω range → 0.1 Ω measurement → operation result -0.4 Ω, out of display range
When the input of the A/D converter is out of range during measurement	High-resistance measurement, etc. in environments with high external noise
When the current does not flow to the measured object normally (only when the current abnormal mode is set to over range output)	When the tested object has an open circuit and poor contact with the source-A terminal or source-B terminal, if the current abnormality is displayed as "------", please set the current abnormality mode to "current abnormality"

Example of abnormal current:

• Place the SOURCE A and SOURCE B probes in an open circuit state

• Tested object disconnection, etc. (open circuit components)

• Broken wiring and poor connection in SOURCE A and SOURCE B wiring

Attention:

• If the resistance of the SOURCE wiring exceeds the following values, a current anomaly will occur, making it impossible to measure. Under the measurement current range of 1 A, please control the contact resistance between the wiring resistance and the tested object as well as the test wire to a lower level.

3.8 OVC (thermoelectric compensation) Function

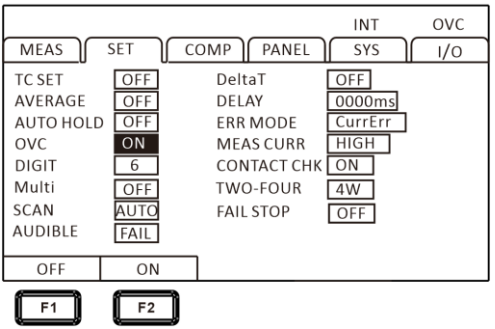
Setting

Automatically compensate for thermal potential or bias voltage within this instrument. (OVC : Offset Voltage Compensation)

1. Select parameter setting page

Press [PAGE] Button to select Parameter setting page

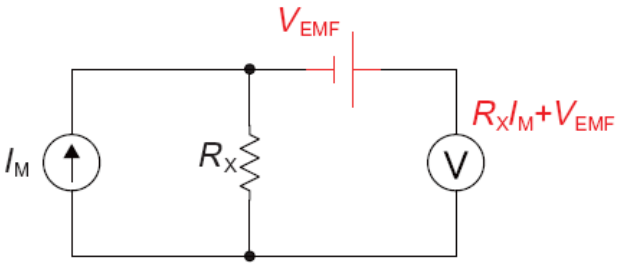
2. Select relevant menu items



Press the up, down, left, and right keys to select the parameters to be set

After the OVC function is turned on, the upper right corner of the interface will display OVC

Based on the measured value RP when flowing the measured current and the measured value RZ when not flowing the measured current, display RP-RZ as the true resistance value.



V_{EMF}: Thermoelectric potential, potential is generated when any metal comes into contact, and the magnitude of the potential is related to temperature.

R_X: Measured resistance

When the injection test current is IM, $V1 = V_{EMF} + R_X * I_M$

When IM=0, $V2 = V_{EMF}$, $V = V1 - V2 = R_X * I_M$

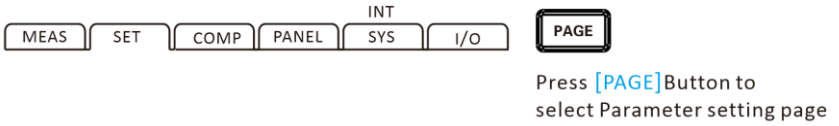
By performing simple subtraction operations, the influence of thermoelectric potential can be eliminated.

Attention:

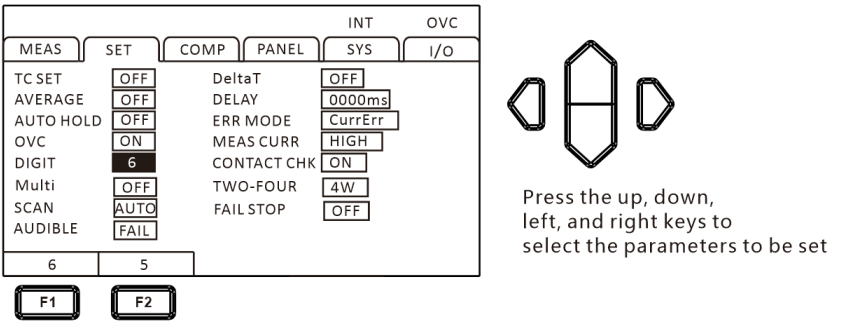
- When the bias voltage compensation function is ON (OVC indicator light is on), the display update of measured values will slow down.
- When measuring low current resistance as OFF, the bias voltage compensation function can be set to ON in the range of 20 mΩ to 2000Ω, and there is no OVC function in the range of 20kΩ to 10MΩ.
- When the bias voltage compensation function has been changed, the zero-adjustment function will be relieved.
- When the inductance of the tested object is large, the delay time needs to be adjusted. (Initially, please set the delay time to be longer, and then gradually shorten it while observing the measured values.)
- When the Heat capacity of the tested object is small, the effect of the bias voltage compensation function may not be seen.
- When the low current resistance measurement is ON, the bias voltage compensation function automatically changes to the ON state in all ranges, and this function

3.9 Display Digit Setting

1. Select parameter setting page



2. Select relevant menu items



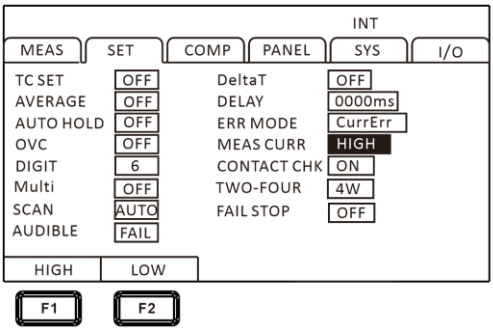
[F1] Key: 6 bits (1,000,00dgt.) (initial setting)

[F2] Key: 5 bits (100,00dgt.)

3.10 Test Current Setting

1. Select parameter setting page

2. Select relevant menu items



Press the up, down, left, and right keys to select the parameters to be set

Power of resistance value× (measuring current)^2 applied to the tested object, when worrying about the following issues due to measuring current, please set the measuring current to low current.

• The measured object is fusing

• The measured object heats up and the resistance value changes

• The measured object is magnetized and the inductance changes

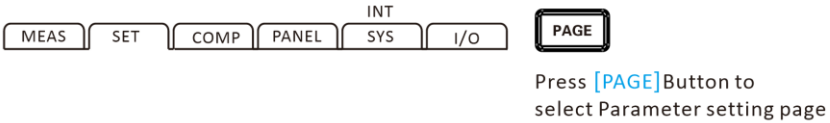
Range	high current		low current	
	measuring current	Power within the maximum measurement range	measuring current	Power within the maximum measurement range
20 mΩ	1 A	22 mW	–	
200 mΩ	1 A	220 mW	100 mA	2.2 mW
2000 mΩ	100 mA	22 mW	10 mA	220 μW

20 Ω	10 mA	2.2 mW	1 mA	22 μW
200 Ω	10 mA	22 mW	1 mA	220 μW
2000 Ω	1 mA	2.2 mW	–	
20 kΩ	500 μA	5.5 mW	–	
200 kΩ	50 μA	550 μW	–	
2000 kΩ	5 μA	55 μW	–	
10 MΩ	1 μA	12 μW	–	

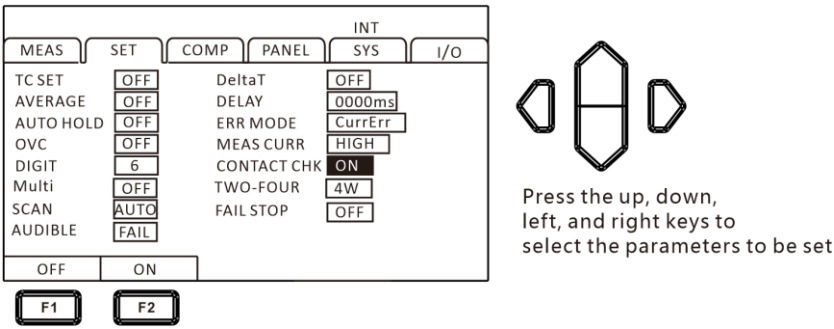
3.11 Contact Detection Settings

Detect poor contact between the tested object and the probe or the broken state of the test cable.

1. Select parameter setting page



2. Select relevant menu items



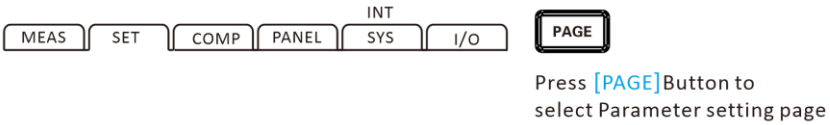
During the response time to measurement period, this instrument always monitors the resistance between SOUR

CE A - SENSEA and SOURCE B - SENSE B. When the resistance value exceeds the threshold, it is judged as a contact error. When a contact error occurs, display CONTACT TERM.A、 CONTACT TERM.B. Do not perform comparator judgment on measured values. When displaying this error, please confirm the contact of the probe and the disconnection of the test cable. When the measured objects are conductive coatings, conductive rubber, etc., and the resistance value between SENSE-SOURCE is too high, it will always be in an error state and cannot be measured. Please set the contact detection function to OFF at this time.

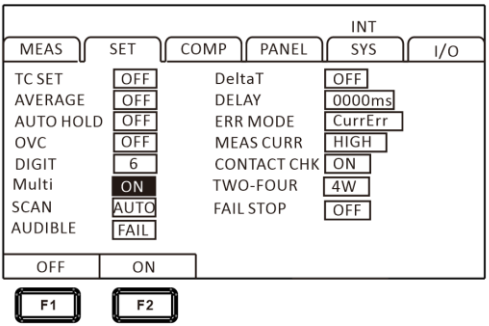
3.12 Multi-channel Settings

The multi-channel tester can perform both single and multiple tests. The multi-channel function is turned off, and it is in single channel testing mode; If the multi-channel function is enabled, switch to the multi-channel testing mode. The settings are as follows:

1. Select parameter setting page



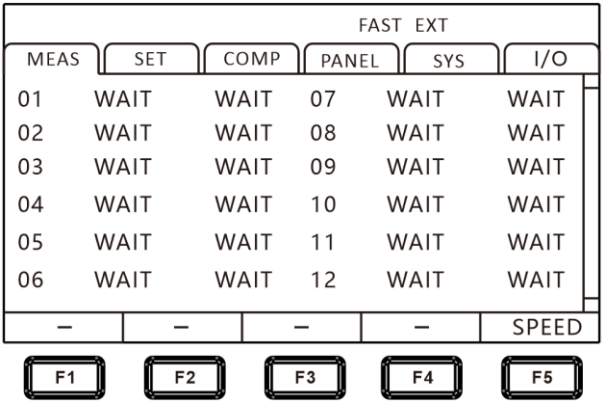
2. Select relevant menu items



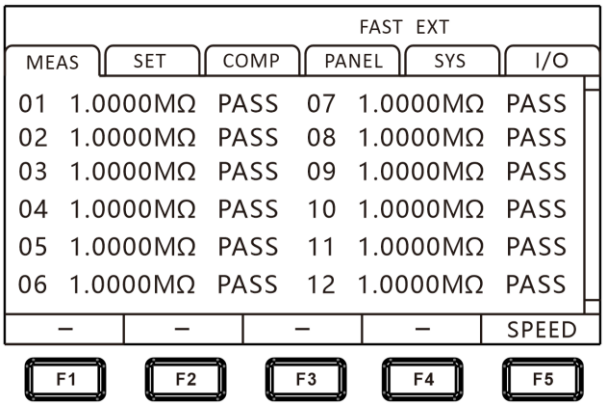
Press the up, down, left, and right keys to select the parameters to be set

Press [F1] OFF to perform single channel testing, and press [F2] ON to activate multi-channel testing;

3.【ESC】Return to the multi-channel test page



4. Test completion page


FAST EXT
MEAS
SET
COMP
PANEL
SYS
I/O
01 1.0000MΩ PASS 07 1.0000MΩ PASS
02 1.0000MΩ PASS 08 1.0000MΩ PASS
03 1.0000MΩ PASS 09 1.0000MΩ PASS
04 1.0000MΩ PASS 10 1.0000MΩ PASS
05 1.0000MΩ PASS 11 1.0000MΩ PASS
06 1.0000MΩ PASS 12 1.0000MΩ PASS
–
–
–
–
SPEED
F1
F2
F3
F4
F5

Chapter 4 Comparator Settings

4.1 Comparator Function

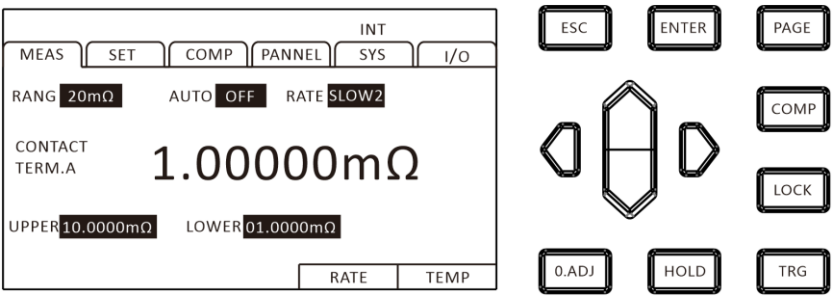
Before using the comparator function, when exceeding the range (displaying OverRng) and when testing abnormally (displaying CONTACT TERM or ------), the judgment display of the comparator is as follows.

Measurement value display	comparator judgment display (COMP indicator light)
+OvrRng	Hi
- OvrRng	Lo
CONTACT TERM or - - - - - - -	Extinguish (no judgment)

If the power is cut off during the setting period, the value being set becomes invalid and reverts to the previous setting value. To confirm the settings, press the [ENTER] key.

The initial setting sets the comparator function to OFF. When the function is set to OFF, even if the parameter value of the comparator is set, it is still an invalid value. Press the [COMP] key to turn the comparator on/off.

Measurement page when the comparator function is turned on

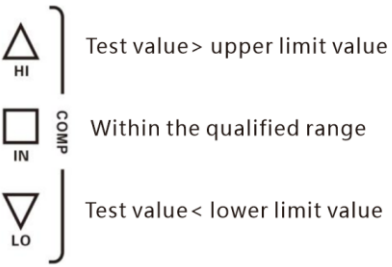


- If the ΔT or multi gear position sorting function is set to ON, the comparator function automatically changes to OFF.
- During the use of the comparator function, the range cannot be changed, please change the range in the comparator settings page. When using automatic range, please set the comparator function to OFF.

4.1.1 Comparison Result Signal Output Method

When the comparator function is turned on, the instrument provides three types of alarm outputs.

1. Panel LED light alarm

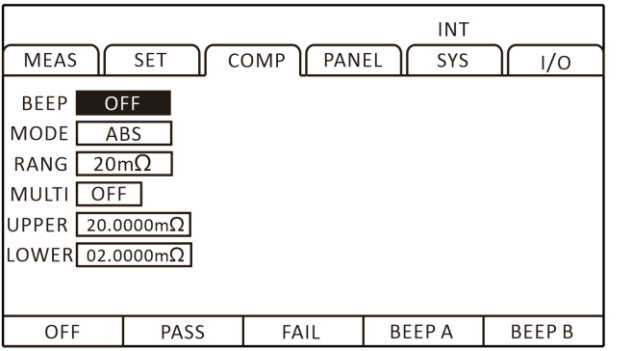


2. Beep alarm

2.1 Select comparator setting page

Press [PAGE] Button to COMP setting page

2.2 Select relevant menu items



3. External IO port, signal output (see Chapter 9)

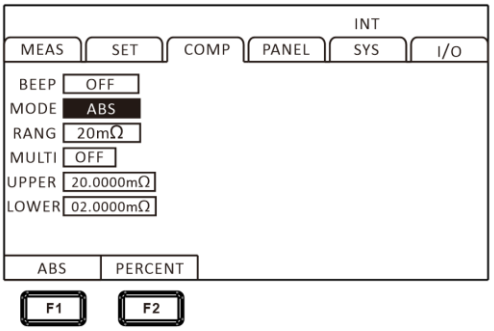
4.2 Comparison Mode

4.2.1 Absolute Value Mode

1. Select comparator setting page

Press [PAGE]Button to COMP setting page

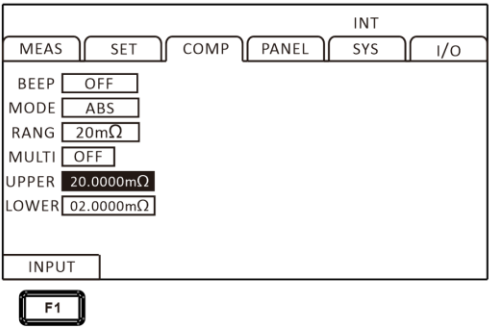
2. Select relevant menu items



Press the up, down, left, and right keys to select the parameters to be set

3. Upper limit setting

Press the [F1] input key, use the left and right cursor keys to move the cursor to the desired position, and use the up and down cursor keys to change the value.

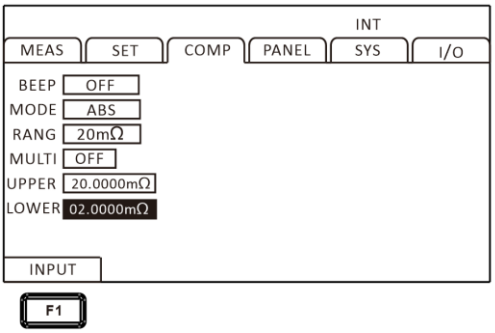


Press the up, down, left, and right keys to select the parameters to be set

4. Lower limit setting

Press the [F1] input key, use the left and right cursor keys to move the cursor to the desired position, and use the up and

down cursor keys to change the value.



Press the up, down, left, and right keys to select the parameters to be set

To interrupt the setting, press the [ESC] key to return to the original screen.

[Comparison of upper and lower limits]

Example:

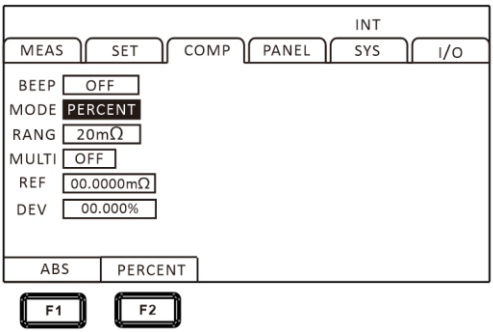
Absolute value mode	upper limit value	lower limit value	PASS	FAIL
comparison of upper and lower limits	100Ω	10Ω	10Ω≤ test value ≤ 100Ω	test value > 100Ω or test value < 10Ω

4.2.2 Percentage Mode

1. Select comparator setting page

Press [PAGE]Button to COMP setting page

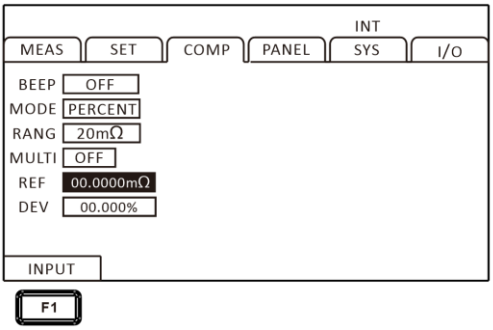
2. Select relevant menu items



Press the up, down, left, and right keys to select the parameters to be set

3. Standard value setting

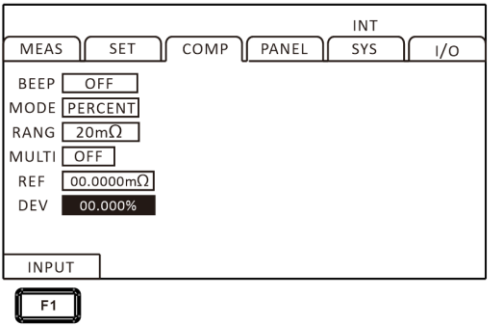
Press the [F1] input key, use the left and right cursor keys to move the cursor to the desired position, and use the up and down cursor keys to change the value.



Press the up, down, left, and right keys to select the parameters to be set

4. Deviation value setting

Press the [F1] input key, use the left and right cursor keys to move the cursor to the desired position, and use the up and down cursor keys to change the value.



Press the up, down, left, and right keys to select the parameters to be set

To interrupt the setting, press the [ESC] key to return to the original screen.

If the percentage mode is set, the measured value will become a deviation display (%).

$$\text{Deviation}=\left(\frac{\text{Measurement value}}{\text{Standard value}}-1\right)*100\%$$

Display Range: -99.999% ~ +99.999%

The standard value is 10 mΩ, set the allowable range relative to the standard value to ± 1%.

4.3 Multi-position Sorting Function

Compare and determine the upper and lower limits (absolute value mode) or standard deviation (percentage mode) of up to 10 groups in a single measurement through classification measurement, and display the measurement

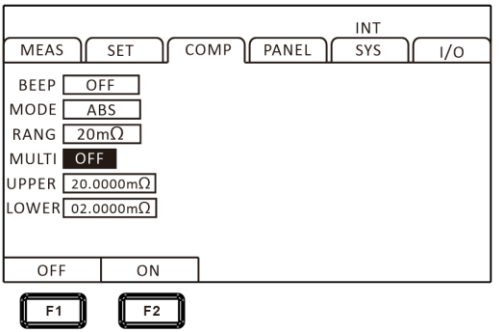
results. All items that are not included in the BIN are judged as NG. Sorting results can also be output through the EXT I/O terminal.

4.3.1 Sorting Function Turn on Settings

1. Select parameter setting page

Press [PAGE]Button to COMP setting page

2. Select relevant menu items



Press the up, down, left, and right keys to select the parameters to be set

Attention:

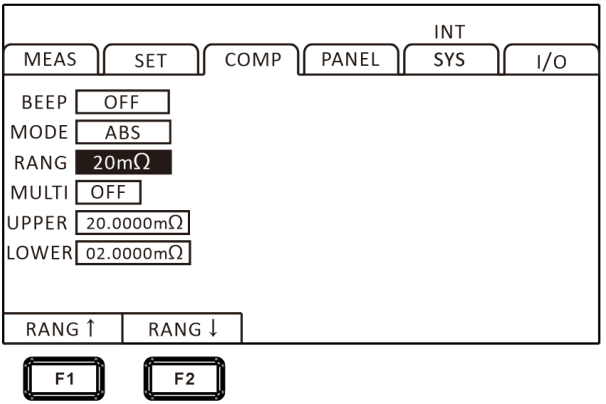
- When the multi gear sorting function is ON, the comparator cannot be set to ON
- If the ΔT is set to ON, the classification measurement function will automatically change to OFF.
- When using automatic range, please set the multi gear sorting function to OFF.

4.3.2 Sorting Function Range Setting

On the multi gear sorting page, press the up and down keys to select the mode and change the range.

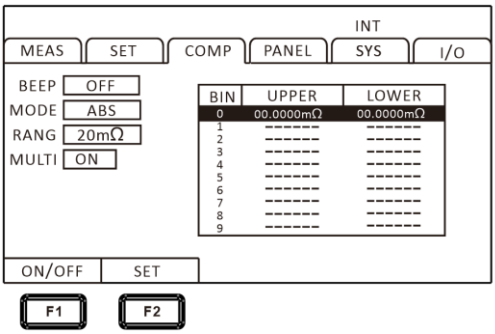
Range:

20mΩ ↔ 200mΩ ↔ 2000mΩ ↔ 20Ω ↔ 200Ω↔ 2000Ω ↔ 20kΩ↔200kΩ↔ 2000kΩ↔ 10MΩ

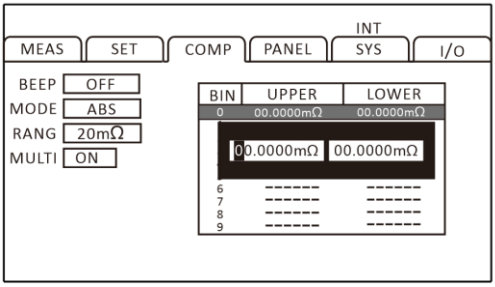


4.3.3 Sorting Function Upper and Lower Limit Settings

After selecting the absolute value mode and determining the range, the corresponding upper and lower limits can be set, and the units of the upper and lower limits are consistent with the range.



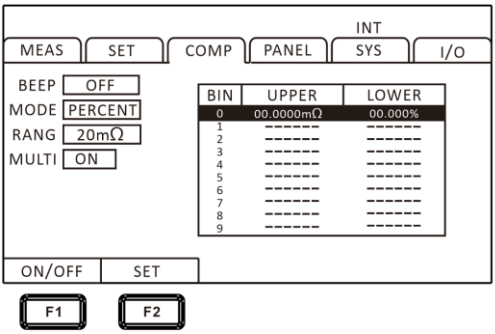
Press the up, down, left, and right keys to select the parameters to be set



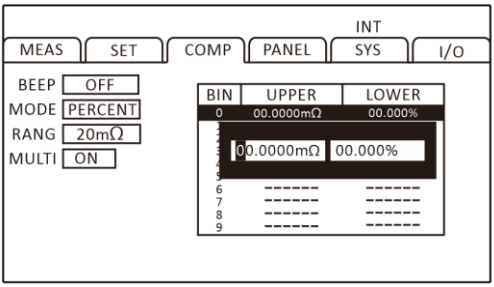
Press the up, down, left, and right keys to select the parameters to be set

4.3.4 Sorting Function Standard Difference Value Settings

After selecting the percentage mode and determining the range, the corresponding standard and deviation values can be set, and the units of the standard and deviation values are consistent with the range.



Press the up, down, left, and right keys to select the parameters to be set



Press the up, down, left, and right keys to select the parameters to be set

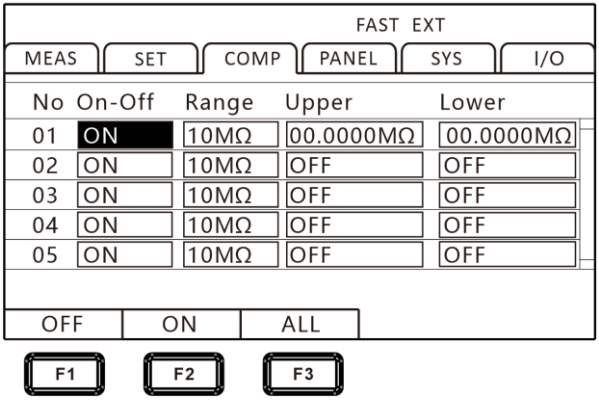
4.4 Multi-channel comparison settings

After the multi-channel function is turned on, you can switch to the comparator page and set each comparator.

1. Select parameter setting page

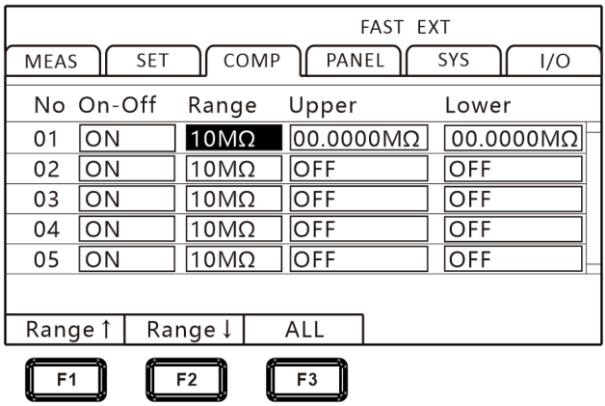
Press [PAGE]Button to COMP setting page

2. The multi-channel setting is turned on, and the comparator switches to the multi-channel setting page;



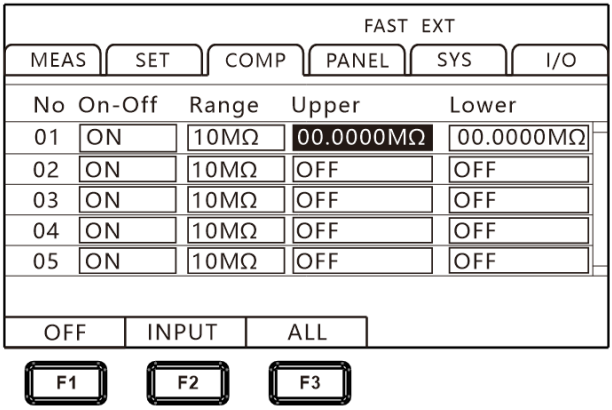
Press 【 F1 】 to turn off the comparator, 【 F2 】 to turn on the comparator, and 【 F3 】 to set all channels with one click;

3. Compare range switching



Press【 F1 】to increase the measurement range,【 F2 】to decrease the measurement range, select the desired comparison range, and 【 F3 】 to set all channels with one click;

4．Compare upper limit value settings

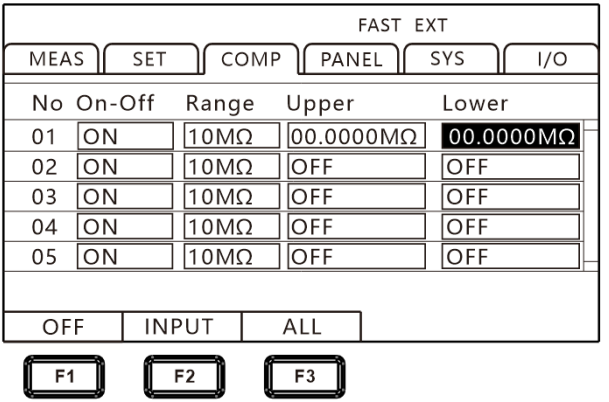


Press [F1] to close;

Press [F2] to input, and set the value with the up, down, left, and right keys;

Press [F3] to set all paths with one click;

5．Compare lower limit value settings



Press [F1] to close;

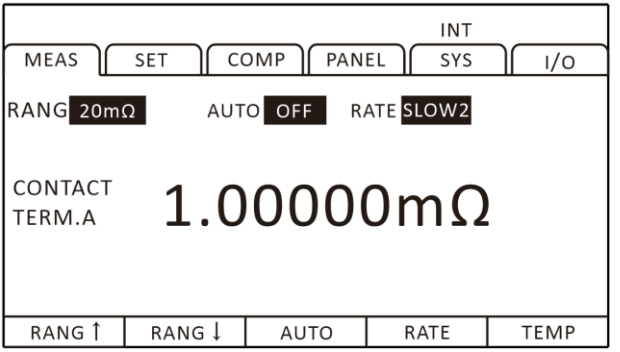
Press [F2] to input, and set the value with the up, down, left, and right keys;

Press [F3] to set all paths with one click;

Chapter 5 Measure

5.1 Start Test

1. Set relevant parameters
2. Connect the test line correctly
3. Start of testing



Trigger mode	significance
Internal trigger	instrument internal automatic trigger test
External trigger	Trigger test through external EXT IO end TRG signal

Attention:

• You cannot restart another test before the end of the test.

• When the EOC signal of the EXT I/O port is LOW, the test cannot be triggered.

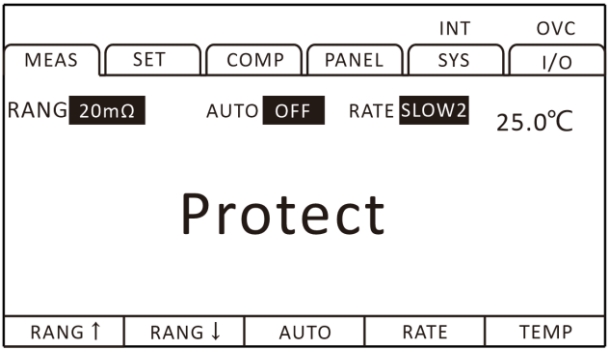
5.2 Measuring Value Display

The following is the range of the test range. Once it exceeds the following range, it will display "OF" (range up)
Test current and maximum display value of range:

Resistance range	Measuring current		Maximum display value	resolution
20mΩ	1 A		22.0000mΩ	0.1μΩ
200mΩ	High	1 A	220.000mΩ	1μΩ
	Low	100 mA		
2000mΩ	High	100 mA	2200.00mΩ	10μΩ
	Low	10 mA		
20Ω	High	10 mA	22.0000Ω	0.1mΩ
	Low	1 mA		
200Ω	High	10 mA	220.000Ω	1mΩ
	Low	1 mA		
2000Ω	1 mA		2200.00Ω	10mΩ
20kΩ	500 μA		22.0000kΩ	0.1Ω
200kΩ	50 μA		220.000kΩ	1Ω
2000kΩ	5 μA		2200.00kΩ	10Ω
10MΩ	1 μA		12.0000MΩ	0.1kΩ

5.3 Automatic Protection Function

If an overvoltage is input at the measurement terminal, the internal circuit protection function of this instrument will be activated. If an overvoltage is input incorrectly, please immediately remove the test wire from the tested object. During the operation of the protection function, measurements cannot be made. To remove the protection function, please contact the DRIVE+ of the test line with the DRIVE - or reconnect the power supply.



5.4 Perform zero adjustment

Please zero in the following situations:

- When improving testing accuracy

→ When zero adjustment is not performed due to range, including adding accuracy.

- When residual display content appears due to the influence of electromotive force

→ Adjust the display to zero.

- When 4-terminal wiring (Kelvin connection) is difficult

→ Cancel the remaining resistance of the 2-terminal wiring.

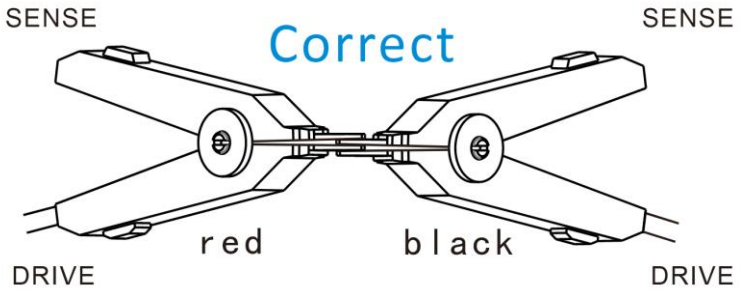
Attention:

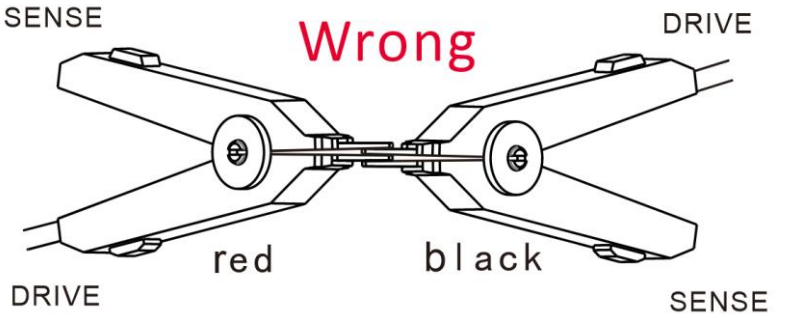
- After zeroing, if there is a change in ambient temperature or a change in the test line, please reset it again.
- Please perform zero adjustment within all ranges used. When manually measuring the range, only zero the current range; During automatic range adjustment, all ranges will be zeroed.
- When performing zero adjustment in automatic range, if the delay time is insufficient, the zero adjustment cannot be completed normally. At this point, please zero in the manual range.
- Even if the power is cut off, the zero setting value is saved internally and also saved in the panel. Sometimes it may not be possible to read the zero value from the panel.
- When switching the bias voltage compensation function (OVC) from ON to OFF, or from OFF to ON, the zero adjustment is released. Please zero again.
- Set the 0ADJ signal of EXT I/O to ON (short circuited to the ISO_COM terminal of the EXT I/O connector), and it can also be zeroed.
- Although the resistance of each range from -1%f.s. to 50%f.s. can be cancelled, please try to control it within the range of 1%f.s. as much as possible.

5.4.1 Perform zero adjustment

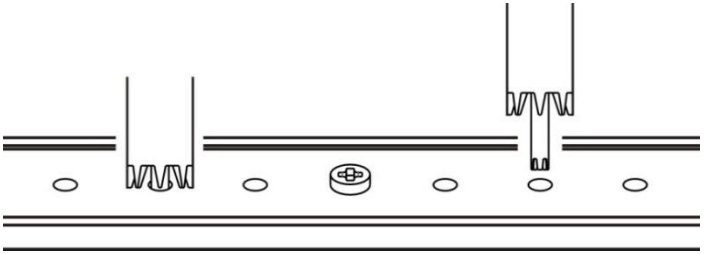
1. Short-circuit test line

HT9363-C test clip type test line



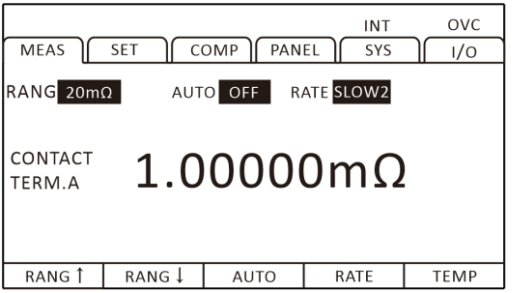


HT9363-B probe type test line

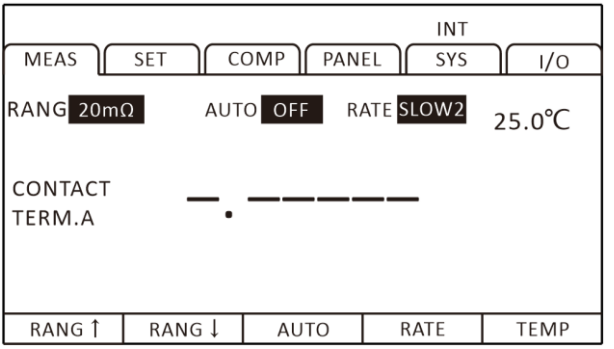


2. Confirm that the measured value is within 1%f.s.
   When the measured value is not displayed, please confirm whether the wiring of the test wire is correct

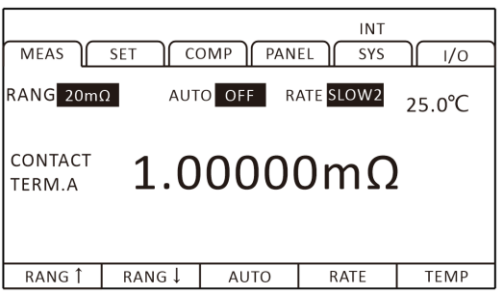
Screen when wiring is correct:

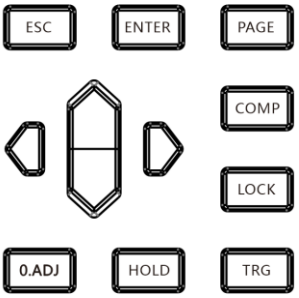


Screen when wiring is incorrect:



3. Press the [O.ADJ] key to perform zero adjustment





4. After performing zero adjustment

If the zero adjustment is successful, 0.ADJ will be displayed in the lower right corner of the measurement screen, and then return to measurement interface. If failed, 0.ADJ not displayed, return to measurement interface.

Zero adjustment failed

When zero adjustment is not possible, it may be due to the measurement value before zero adjustment exceeding ± 1% of each range, or being in an abnormal testing state. Please make the correct wiring again and reset to zero. When the resistance value of self-made cables is high, please reduce the wiring resistance because it cannot be adjusted to zero.

> **Attention:**
> When the zero adjustment fails, the zero adjustment of the current range will be released.

5. Unzero

On the measurement page, press and hold the [O.ADJ] key to release the zero adjustment value of the current range.

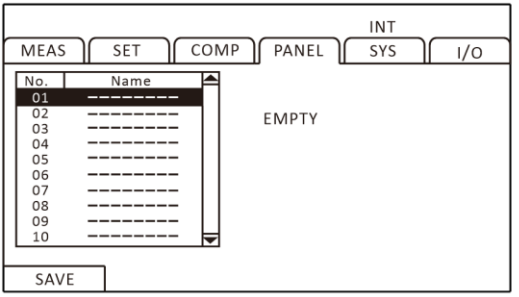
Chapter 6 Save Measurement Panel

All measurement conditions can be saved, retrieved, or deleted in the form of files. Press the [PAGE] key to select the panel save interface.

Press [PAGE]Button to PANEL page

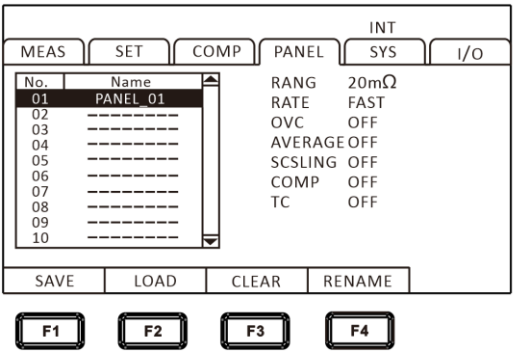
After entering the interface, press the up and down keys to view the saved records, and you can also save, load, clear, rename and other operations on the current record.

6.1 Save Panel Setting



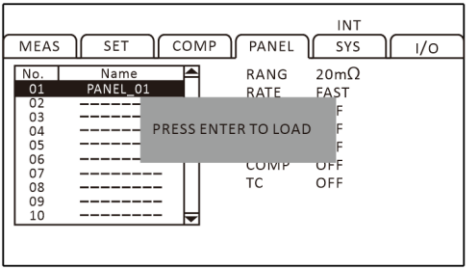
Press the up, down, left, and right keys to select the parameter to be set

Use the up and down keys to browse the current settings, and press the [F1] key to save the current settings.



Press the up, down, left, and right keys to select the parameter to be set

6.2 Retrieve Measurement Settings

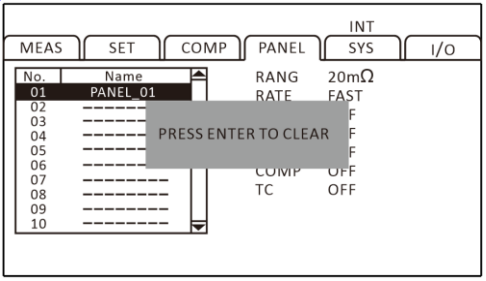


1 Press F2 to select load

2 Press ENTER to confirm loading

Use the up and down keys to browse the current settings, and press the load key to retrieve the current settings.

6.3 Delete Measurement Settings

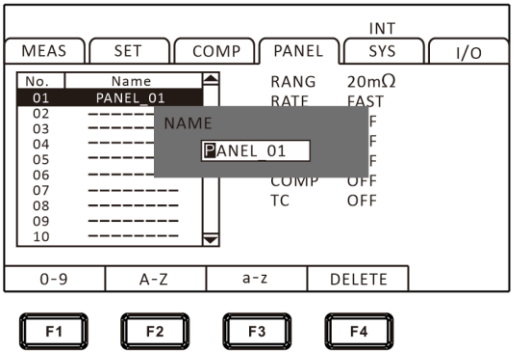


1 Press F3 to select clear

2 Press ENTER to confirm clear

Use the up and down keys to browse the current settings, and use the clear key to delete the current settings.

6.4 Rename Measurement Settings



Press the up, down, left, and right keys to select the parameter to be set

Use the up and down keys to browse the current settings, and press the rename key to modify the current file name.

Chapter 7 System Settings

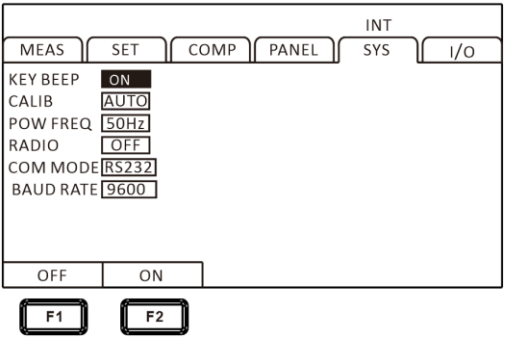
7.1 Button Sound Setting

When operating the instrument buttons, you can choose whether to turn on the button tone.

1. Select System Settings Page

Press [PAGE]Button to SYS page

2. Select relevant menu items



Press the up and down keys to select the parameter to be set

Press [F1] to turn off the button tone, press [F2] to turn on the button tone

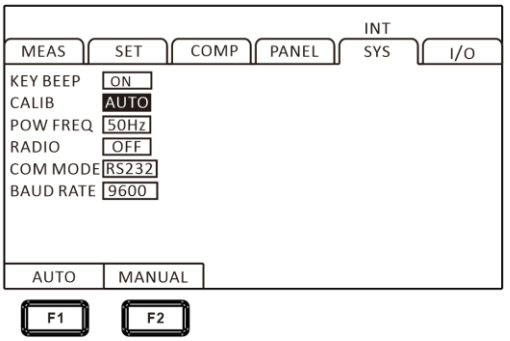
7.2 Self-calibration Function

In order to maintain testing accuracy, the self-calibration function compensates for the bias voltage and gain drift inside the circuit.

1. Select parameter settings page

Press [PAGE] Button to SYS page

2. Select relevant menu items



Press the up and down keys to select the parameter to be set

Press [F1] to set it to automatic. During TRG standby, perform self-calibration every 1 second for 5ms. During the 5ms self-calibration period, if a TRG signal is received, the self-calibration will be stopped and measurement will begin after 0.5ms. If there is a deviation in the measurement time, please set it to manual.

Press [F2] to set it to manual, with a calibration time of approximately 400ms. It can be executed at any time sequence and cannot be automatically executed at any time sequence

other than the predetermined one. When set to manual mode, if the temperature of the operating environment changes by more than 2 ℃, please be sure to perform self-calibration (accuracy cannot be guaranteed if not performed). When the temperature change in the operating environment is below 2 ℃, please perform self-calibration within 30 minute intervals.

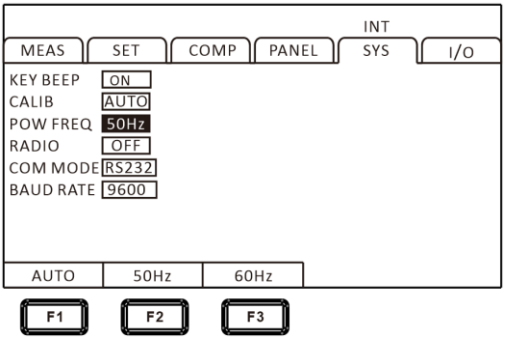
7.3 Power Frequency Setting

There are three power modes, [50Hz]/[60Hz]/[automatic]. The correct setting of the power frequency can effectively filter out the noise caused by the power frequency. If the power frequency is set incorrectly, it may lead to unstable measurement.

Please select the [Auto] option when unsure of the current power supply frequency. After selecting the [Auto] option, it must be restarted before it can take effect.

1. Select System Settings Page

2. Select relevant menu items



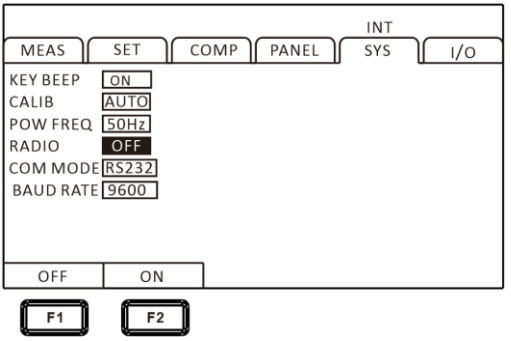
Press the up and down keys to select the parameter to be set

Attention:

When the power frequency is in [automatic] mode, sometimes the automatic capture of the power frequency may fail due to environmental noise, resulting in unstable measurement. In this case, it is recommended to manually select the power frequency instead.

7.4 Radio Mode Setting

Press [F1] to close, press [F2] to open.



Press the up and down keys to select the parameter to be set

7.5 Communication Mode

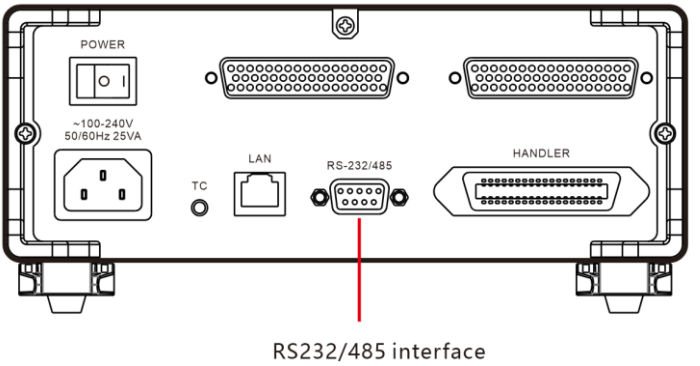
The communication mode is divided into RS232 and LAN (Ethernet protocol uses TCP protocol), both of which use SCPI protocol format. The communication instructions refer to the instruction set in the CD.

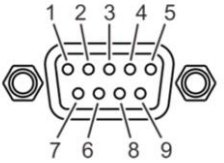
It is prohibited to connect the communication port with the testing port, otherwise it may damage the instrument.

7.5.1 RS232

RS232 adopts 3-wire communication mode

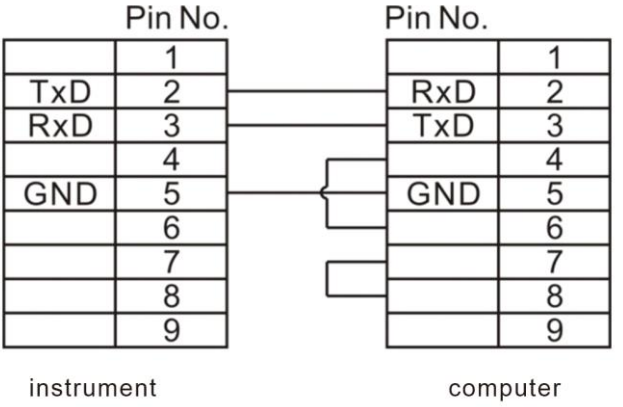
Interfaces and cables





9-pin D-Sub male terminal

RS232 Connection method

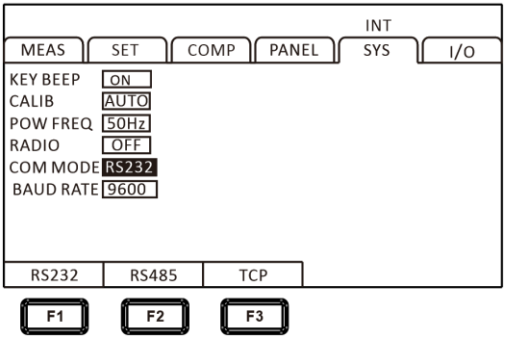


RS232 settings

1. Select System Settings Page

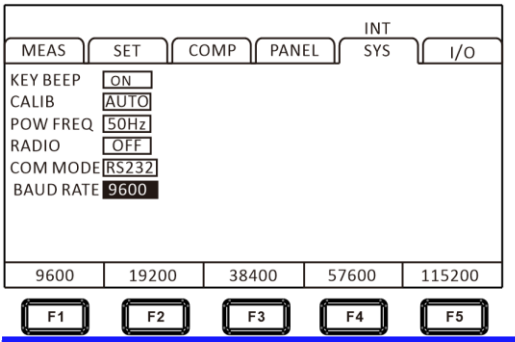
Press [PAGE]Button to SYS page

2. Select relevant menu items



Press the up and down keys to select the parameter to be set

3. Select communication Baud



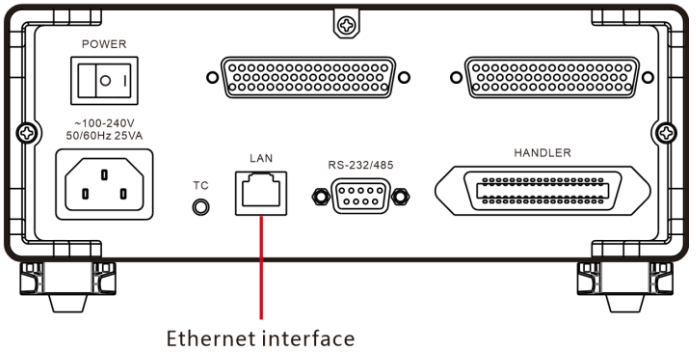
Press the up and down keys to select the parameter to be set

7.5.2 LAN Communication Protocol

LAN communication adopts TCP protocol communication

Interfaces and cables

The Ethernet interface adopts a standard RJ45 port, and the cable adopts a Category 5 or higher network cable.



Connection method

1. Instrument and computer connection

When connecting the instrument to the computer, the network cable adopts a crossover cable.

The A-terminal method adopts the 568B standard, while the B-terminal method adopts the 568A standard.

Orange White	Orange	Green White	Blue	Blue White	Green	Brown White	Brown

2. Instrument and router connection

When connecting the instrument to the router, the network cable is connected directly.

Both ends adopt 568B standard:

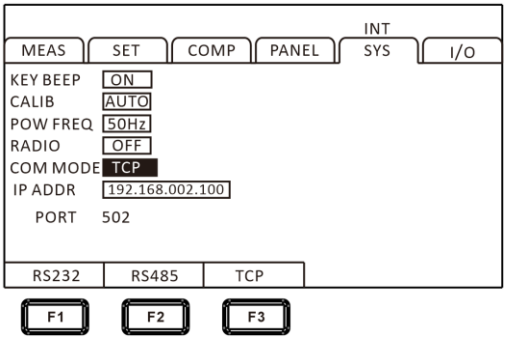
Orange White	Orange	Green White	Blue	Blue White	Green	Brown White	Brown

Setting

1. Select System Settings Page

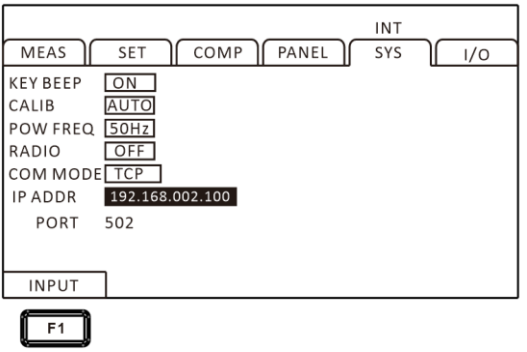
Press [PAGE] Button to SYS page

2. Select TCP communication mode



Press the up and down keys to select the parameter to be set

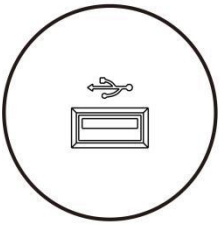
3. Set communication address

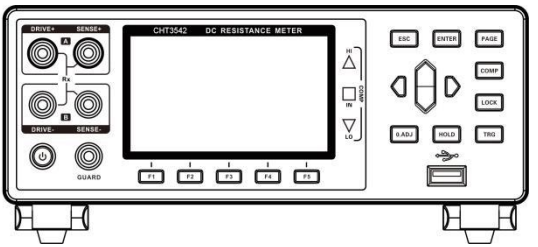


Press the up, down, left, and right keys to set the numerical value

7.6 USB interface

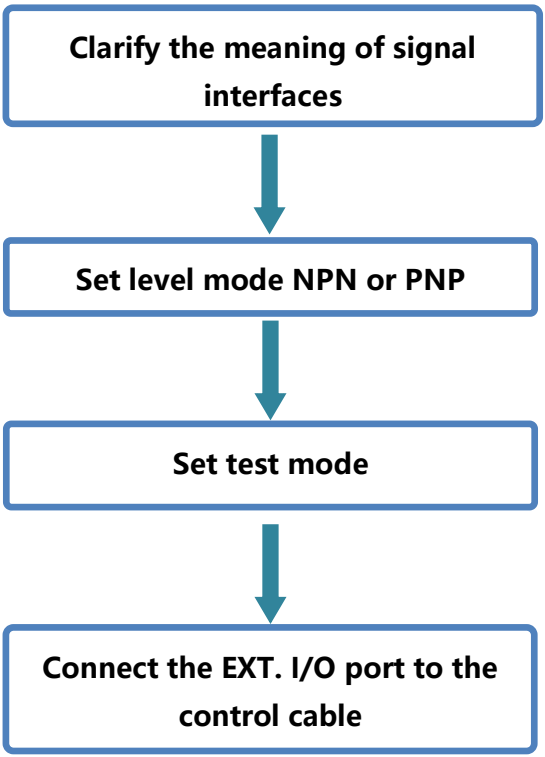
The front panel of this instrument is equipped with a USB interface, which is used for HOST function. After inserting a USB drive, it is used for upgrading programs and saving data.





Chapter 8 EXT I/O for external control

The EXT I/O terminal on the rear panel of the instrument supports external control, provides output for testing and comparison judgment signals, and accepts input TRG signals. All signals use Optical coupler. Through instrument panel settings, all input/output signals can be configured to (NPN) or (PNP) levels. Understanding the internal circuit structure and safety precautions is beneficial for better connecting control systems.

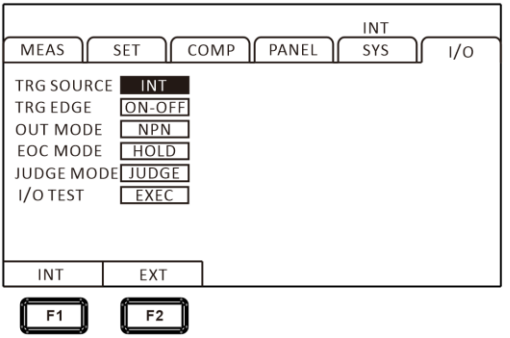


8.1 Trigger Source Settings

1. Select I/O page

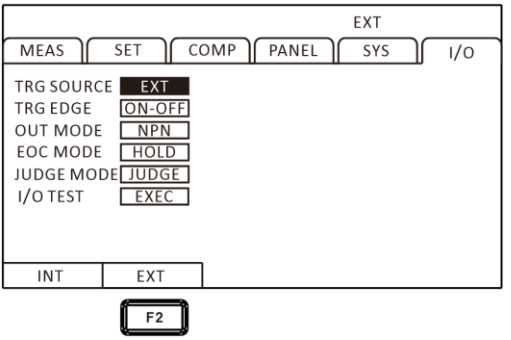
Press [PAGE]Button to I/O page

2. Select relevant menu items



Press the up and down keys to select the parameter to be set

3. Press [F2] to select EXT



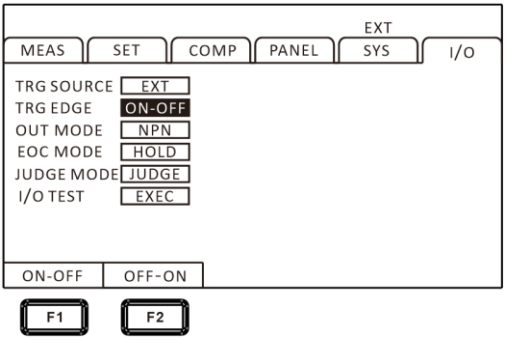
Press the up and down keys to select the parameter to be set

8.2 Trigger Level Setting

1. Select I/O page

Press [PAGE]Button to I/O page

2. Select relevant menu items



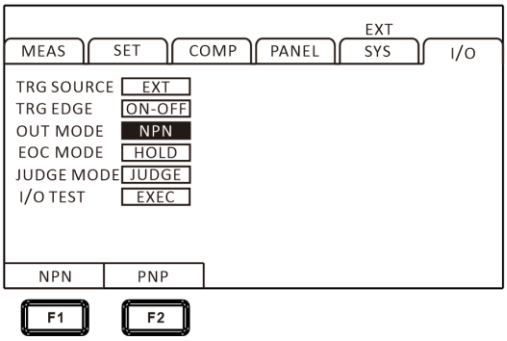
Press the up and down keys to select the parameter to be set

8.3 Level Mode Setting

1. Select I/O page

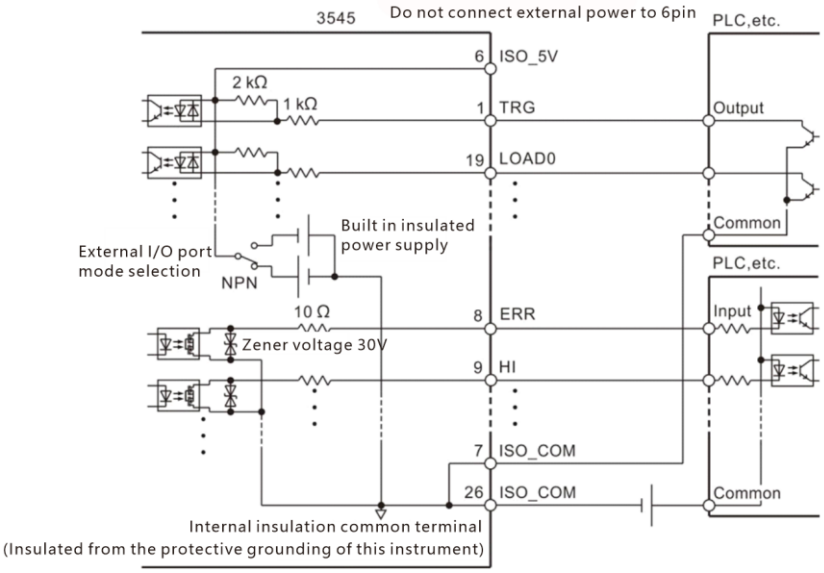
Press [PAGE]Button to I/O page

2. Select the level mode, press [F1] to set it to NPN, and press [F2] to set it to PNP

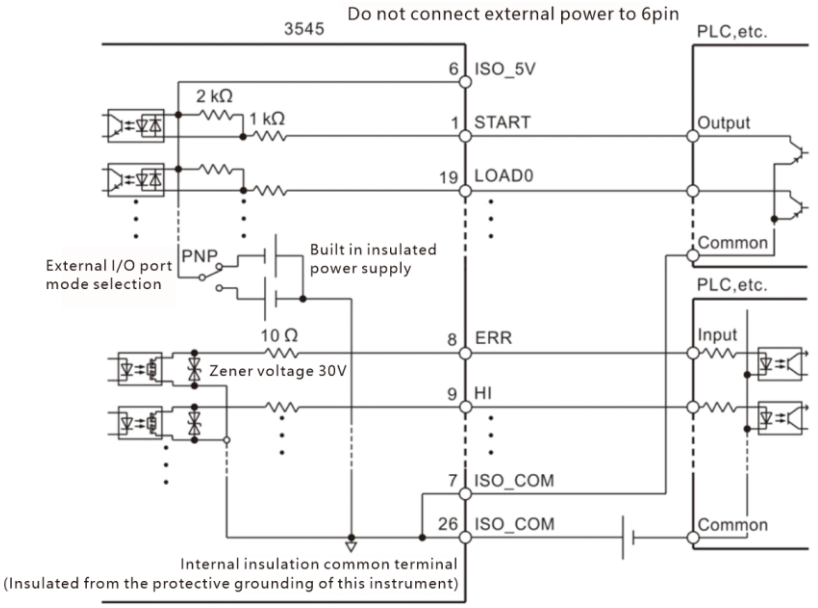


Press the up and down keys to select the parameter to be set

8.3.1 NPN Wiring Method



8.3.2 PNP Wiring Method

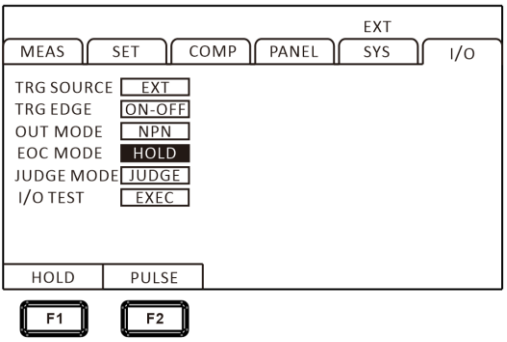


8.4 EOC Mode Setting

1. Select I/O page

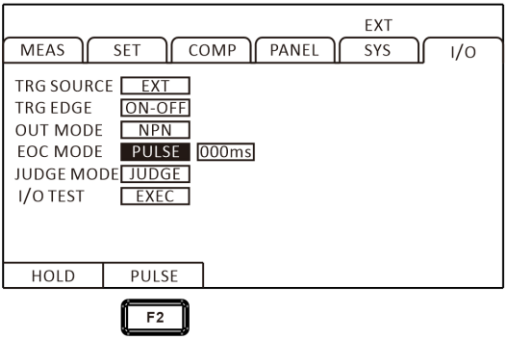
Press [PAGE] Button to I/O page

2. Select relevant menu items



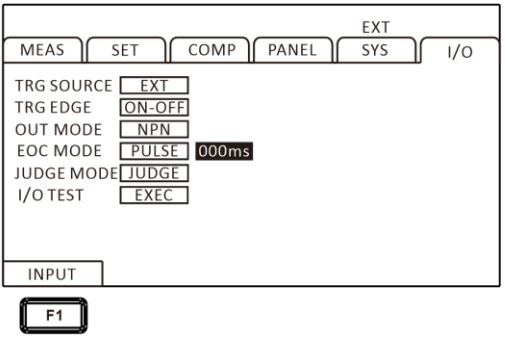
Press the up and down keys to select the parameter to be set

3. Press [F2] to select a pulse



Press the up and down keys to select the parameter to be set

4. Press [F1] to enter the time



Press the up and down keys to select the parameter to be set

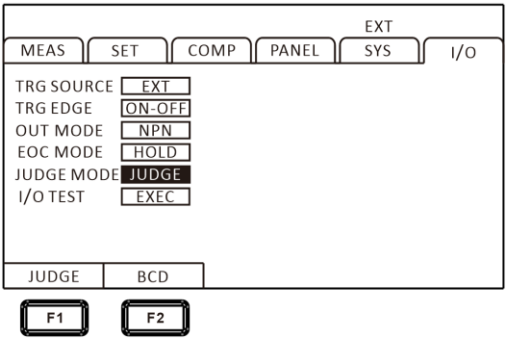
8.5 Output Mode Setting

The output signal includes judgment mode and BCD mode. When using and not using a multiplexer, the output signals of the judgment mode are different. The BCD mode combines other functions through high and low bits (and range information).

1. Select I/O page

Press [PAGE]Button to I/O page

2. Select relevant menu items



Press the up and down keys to select the parameter to be set

Terminal function in judgment mode

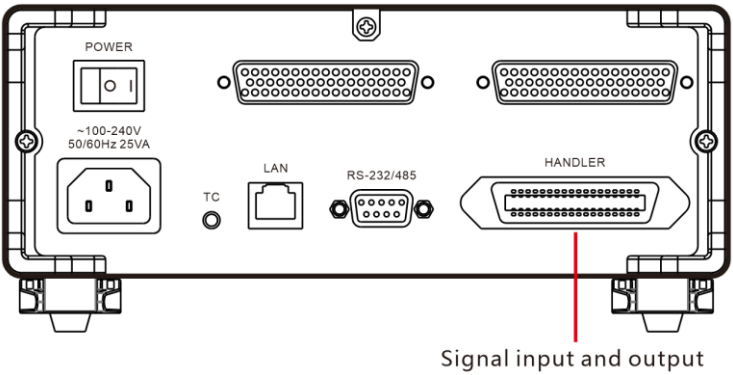
Needle	Function
9	ISO_COM
10	ERR
11	HI
12	LO
13	BIN0
14	BIN2
15	BIN4
16	BIN6
17	BIN8
18	OUT0
19	OUT2
28	EOC
29	INDEX
30	IN
31	OB
32	BIN1
33	BIN3
34	BIN5
35	BIN7
36	BIN9
37	OUT1

Terminal function in BCD mode

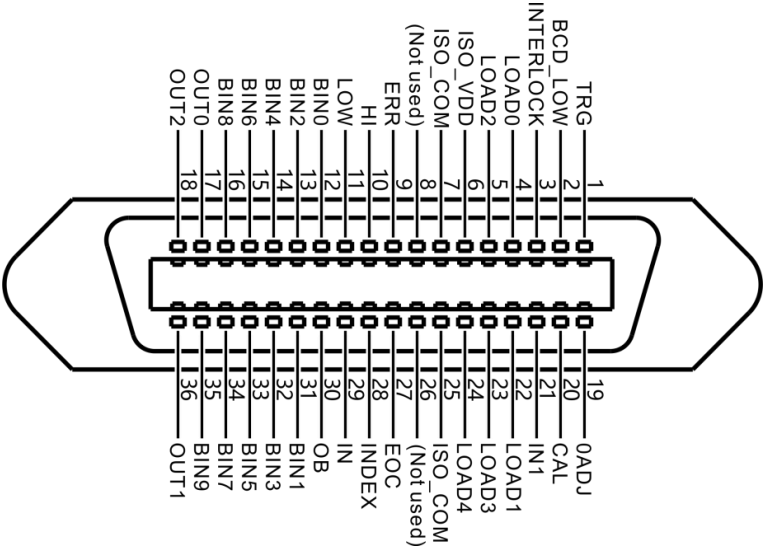
Needle	BCD_LOW	
	OFF	ON
9	ISO_COM	
10	ERR	
11	HILO	
12	BCD4-1	RNG_OUT1
13	BCD4-3	RNG_OUT3
14	BCD5-1	BCD1-1
15	BCD5-3	BCD1-3
16	BCD6-1	BCD2-1
17	BCD6-3	BCD2-3
18	BCD7-1	BCD3-1
19	BCD7-3	BCD3-3
28	EOC	
29	BCD4-0	RNG_OUT0
30	IN	
31	BCD4-2	RNG_OUT2
32	BCD5-0	BCD1-0
33	BCD5-0	BCD1-2
34	BCD6-0	BCD2-0
35	BCD6-2	BCD2-2
36	BCD7-0	BCD3-0
37	BCD7-2	BCD3-2

8.6 Port Signal Details

8.6.1 Port and Signal Description



8.6.2 Port Diagram



(Instrument end)

PIN	Signal	Function	I/O	Logical organization
1	TRG	External trigger	I	edge
2	BCD_LOW	BCD low byte output	I	level
3	INTERLOCK	Key lock	I	level
4	LOAD0	Panel selection, channel designation	I	level
5	LOAD2	Panel selection, channel designation	I	level
6	ISO_VDD			
7	ISO_GND			
8	Not used	--	--	--
9	ERR	Abnormal test	O	level
10	HI	Comparator judgment	O	level
11	LOW	Comparator judgment	O	level
12	BIN0	Sort P0 gear	O	level
13	BIN2	Sort P2 gear	O	level
14	BIN4	Sort P4 gear	O	level
15	BIN6	Sort P6 gear	O	level
16	BIN8	Sort P8 gear	O	level
17	OUT0	Universal output	O	level
18	OUT2	Universal output	O	level
19	0ADJ	Zero	I	edge
20	CAL	Perform self-calibration	I	edge
21	IN1	Universal input	I	edge
22	LOAD1	Panel selection, channel designation	I	level
23	LOAD3	Panel selection, channel designation	I	level
24	LOAD4	Panel selection, channel designation	I	level

25	IOS_GND			
26	Not used	--	--	--
27	EOC	End of measurement	O	level
28	INDEX	End of simulation measurement	O	level
29	IN	Comparator judgment	O	level
30	OB	Sort NG gear	O	level
31	BIN1	Sort P1 gear	O	level
32	BIN3	Sort P3 gear	O	level
33	BIN5	Sort P5 gear	O	level
34	BIN7	Sort P7 gear	O	level
35	BIN9	Sort P9 gear	O	level
36	OUT1	Universal output	O	level

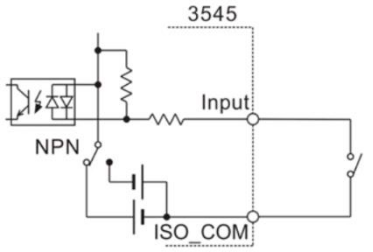
8.6.3 Port Signal Connection Method

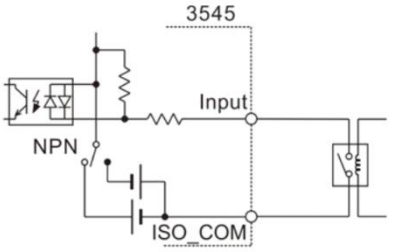
Electrical performance parameters

Input signal	input format	Optical coupler insulation voltage free contact input (Corresponding to current injection/pulling output)
	Input ON	residual voltage 1 V (input ON current 4 mA (reference value))
Output signal	Input OFF	OPEN (cut-off current below 100 A)
	Output form	Optical coupler insulation drain electrode open circuit output (no

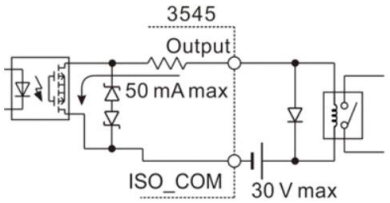
		polarity)
	Maximum load voltage	DC30 VMAX
	Maximum output current	50 mA/ch
	Residual voltage	Below 1 V (load current 50 mA) / below 0.5 V (load current 10 mA)
Built in insulated power supply	Output voltage	correspond to reverse output: 5.0 V ± 10% 、 correspond source output: -5.0 V ± 10%
	Maximum output current	100 mA
	Insulation	Insulation with protective grounding potential and measuring circuit
	Insulation rating	Voltage to ground below DC50 V、 AC33 Vrms、 AC46.7 Vpk

8.6.4 Input Circuit Connection

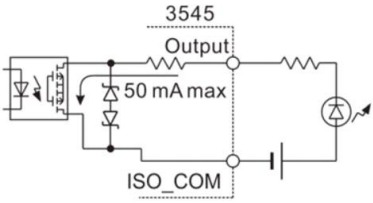




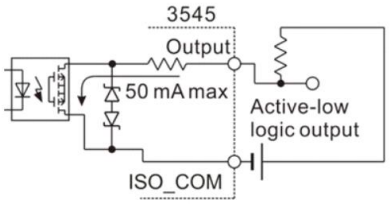
8.6.5 Output circuit connection



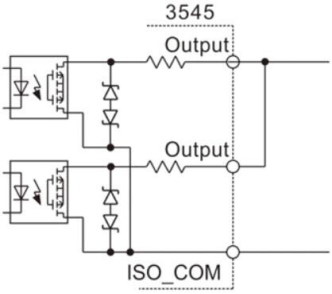
Drive relay



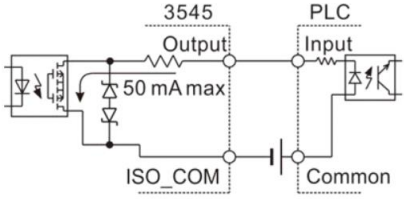
Drive LED light



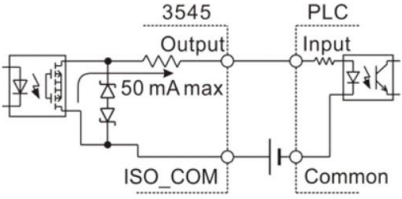
Logic level output



Level or operation



PN input of PLC



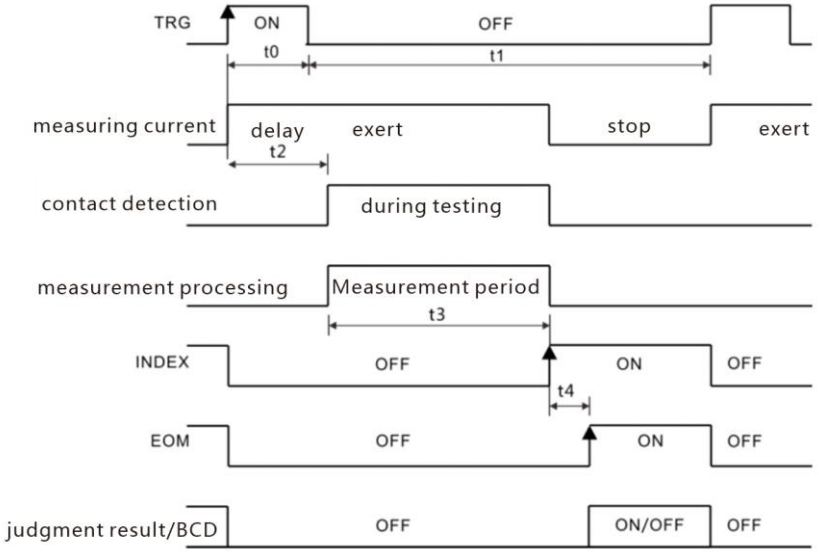
NP input of PLC

8.7 Timing Diagram

The level of each signal represents the ON/OFF state of the contact, and the set value of the pull-in current (PNP) is the same as the voltage level of the EXT I/O terminal. The voltage level High and Low in the current injection (NPN) setting are opposite.

8.7.1 Timing diagram when triggered externally

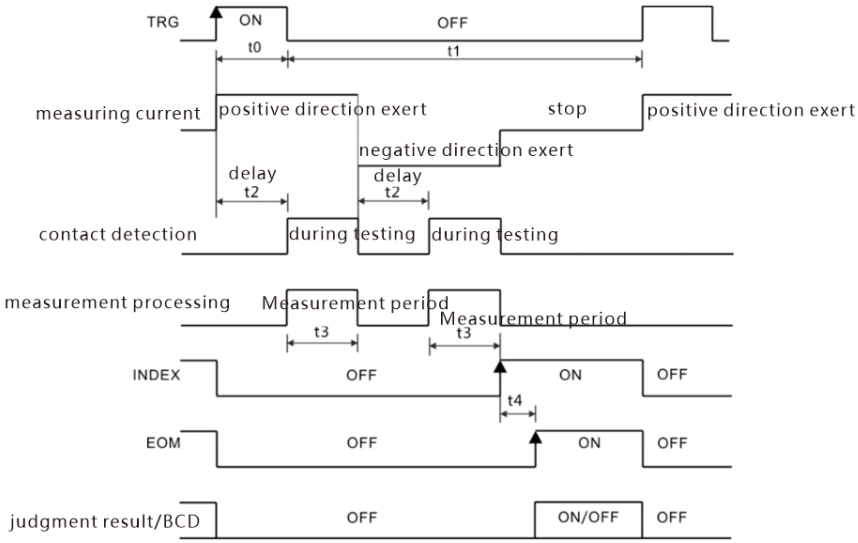
(1) External trigger [EXT] setting (EOM output HOLD)
When OVC is OFF



Judgment result /BCD :

HI、 IN、 LO、 ERR、 BCDm-n、 RNG_OUT0 ~ 3

When OVC is ON

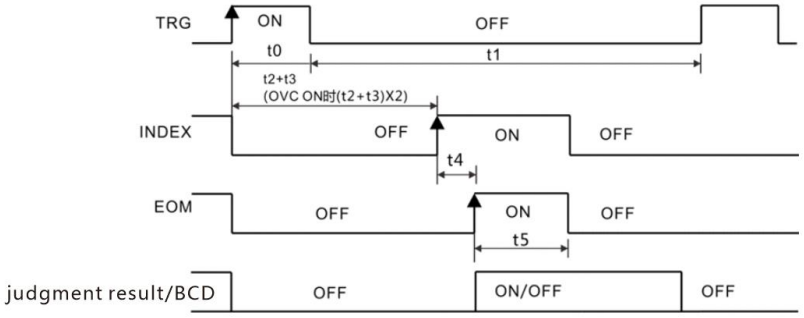


Judgment result /BCD :

HI、 IN、 LO、 ERR、 BCDm-n、 RNG_OUT0 ~ 3

(2) External trigger [EXT] setting （EOM output PULSE）

At the end of the measurement, the EOM signal becomes ON, and if it passes through the time set to EOM pulse width (t5), it returns to OFF.



Judgment result /BCD :

HI、 IN、 LO、 ERR、 BCDm-n、 RNG_OUT0 ~ 3

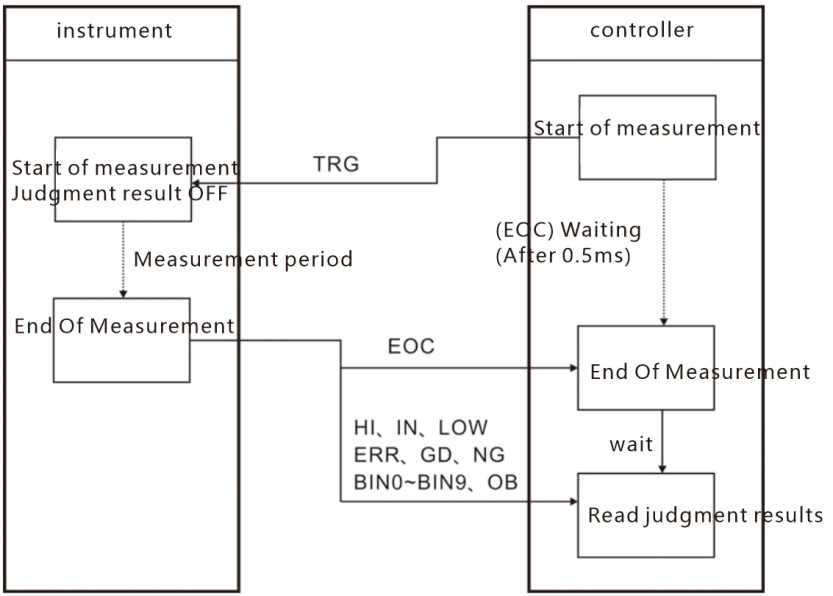
Explanation of each time in the timing diagram

Project	Content	Time	Remarks
t0	trigger pulse ON time	above 0.1 ms	can select ON/OFF edge
t1	trigger pulse OFF time	above 1 ms	
t2	delay	0 ~ 100 ms	according to settings
t3	reading processing time	integration time+ internal waiting time	
t4	operation time	0.3 ms	Delay when statistical calculation and storage functions are ON
t5	EOM pulse width	1 ~ 100 ms	according to setting

8.7.2 Read process when triggered externally

The following is the process of obtaining measurement values from the start of measurement when using external triggering.

After determining the judgment results (HI, IN, LOW, ER, GD, NG), this instrument immediately outputs an EOC signal. When the response of the controller input circuit is slow, it takes a waiting time from detecting the ON of the EOC signal to reading the judgment result.



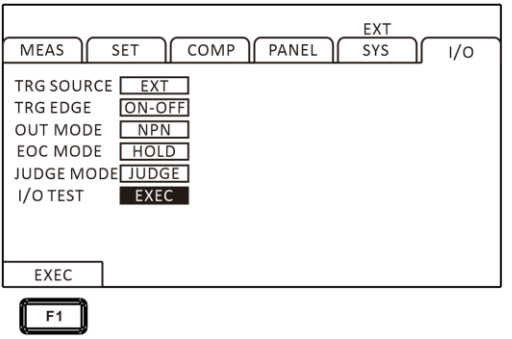
8.8 Timing Diagram External Control Confirmation

The level of each signal represents the ON/OFF state of the contact, and the set value of the pull-in current (PNP) is the same as the voltage level of the EXT I/O terminal. The voltage level High and Low in the current injection (NPN) setting are opposite.

1. Select I/O page

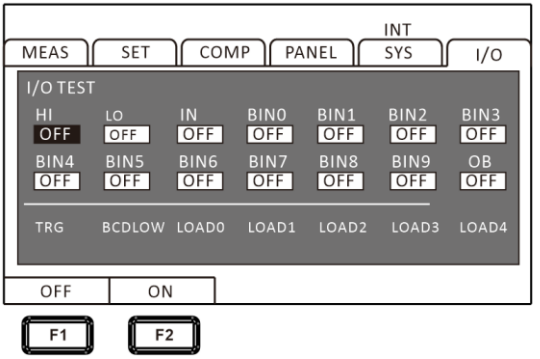
Press [PAGE] Button to I/O page

2. Select I/O test



Press the up and down keys to select the parameter to be set

3. Select I/O test page

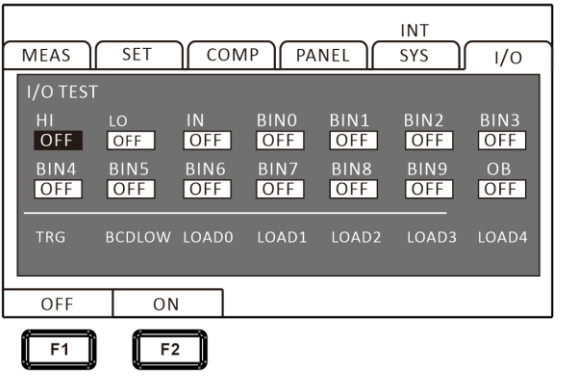


Press the up, down, left, and right keys to select the parameter to be set

Output signal, operable signal (OFF: close output, ON: open output)

Input signal, display the status of the signal (ON: reverse display, OFF: normal display)

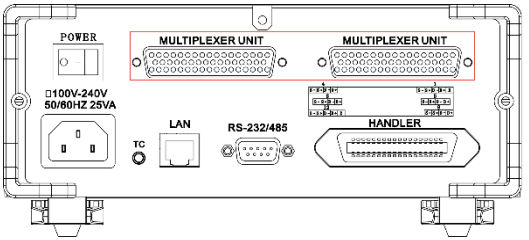
4. Exit the I/O test page

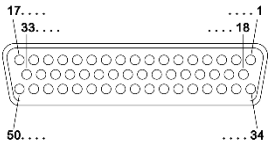


Return to the I/O settings page

Chapter 9 Multi-channel test lines

9.1 Configuration of connectors and terminals





Four wire test port

NO.	Terminal name	NO.	Terminal name
1	reserve	26	D7+
2	D1+	27	D7-
3	D1-	28	S7+
4	S1+	29	S7-
5	S1-	30	D8+
6	D2+	31	D8-
7	D2-	32	S8+
8	S2+	33	S8-
9	S2-	34	D9+
10	D3+	35	D9-
11	D3-	36	S9+
12	S3+	37	S9-
13	S3-	38	D10+
14	D4+	39	D10-
15	D4-	40	S10+
16	S4+	41	S10-
17	S4-	42	D11+
18	D5+	43	D11-
19	D5-	44	S11+

20	S5+	45	S11-
21	S5-	46	D12+
22	D6+	47	D12-
23	D6-	48	S12+
24	S6+	49	S12-
25	S6-	50	reserve

9.2 Definition of multi-channel test lines

Line 1

NO.	2	3	4	5	6	7	8	9
color	brown	Brown white	orange	Orange white	green	Green white	blue	Blue white
function	D+	D-	S+	S-	D+	D-	S+	S-

Line 2

NO.	10	11	12	13	14	15	16	17
color	brown	Brown white	orange	Orange white	green	Green white	blue	Blue white
function	D+	D-	S+	S-	D+	D-	S+	S-

Line 3

NO.	18	19	20	21	22	23	24	25
color	brown	Brown whit	orange	Orange white	green	Green whit	blue	Blue whit

		e				e		e
function	D+	D-	S+	S-	D+	D-	S+	S-

Line 4

NO.	26	27	28	29	30	31	32	33
color	brown	Brown white	orange	Orange white	green	Green white	blue	Blue white
function	D+	D-	S+	S-	D+	D-	S+	S-

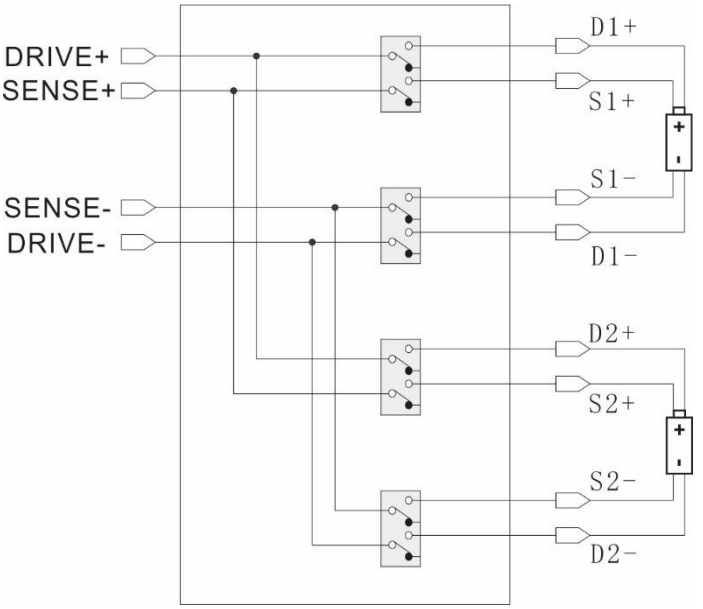
Line 5

NO.	34	35	36	37	38	39	40	41
color	brown	Brown white	orange	Orange white	green	Green white	blue	Blue white
function	D+	D-	S+	S-	D+	D-	S+	S-

Line 6

NO.	42	43	44	45	46	47	48	49
color	brown	Brown white	orange	Orange white	green	Green white	blue	Blue white
function	D+	D-	S+	S-	D+	D-	S+	S-

9.3 Internal circuit composition



Chapter 10 Parameter

10.1 General Parameters

HT3542	
Test parameters	DC resistance
Test Range	Range 0.1μΩ～10 MΩ, 10 ranges
Measuring Current	<DC 1A～1μA
Test Speed	Fast speed (2.2ms); medium speed (50Hz: 21ms, 60Hz: 18ms); Slow speed 1 (102ms); slow speed 2 (202ms)
OVC	Thermoelectric culling function
Input Terminal	Banana plug
Operation Key	Rubber key
Display	3.5-inch TFT
Basic Accuracy	±0.01%rdg.±0.001%f.s.
Precision Guarantee Humidity Range	<23℃±5℃，80RH
Precision Guarantee Period	1 year
Power Supply	AC 100～240 V, 50/60 Hz, rated power: 40 VA
Size and Weight	325mm(length) x 215mm (width) x 96 mm (height) 4Kg

10.2 Accuracy

LP：OFF

Range	Maximum measurement range	Test accuracy (%rdg.+%f.s.)			
		Fast	medium	slow1	slow2
20 mΩ	22.0000mΩ	0.060+0.050 (0.060+0.015)	0.060+0.020 (0.060+0.002)		0.060+0.020 (0.060+0.001)
200mΩ	220.000mΩ	0.060+0.0100 (0.060+0.003)	0.060+0.010 (0.060+0.001)		0.060+0.010 (0.060+0.001)
		0.014+0.050 (0.014+0.015)	0.014+0.020 (0.014+0.002)		0.014+0.020 (0.014+0.001)
2000mΩ	2200.00mΩ	0.012+0.010 (0.012+0.003)	0.012+0.008 (0.012+0.001)		
		0.008+0.050 (0.008+0.015)	0.008+0.020 (0.008+0.002)		
20 Ω	22.0000 Ω	0.008+0.010 (0.008+0.003)	0.008+0.008 (0.008+0.001)		
		0.008+0.050 (0.008+0.015)	0.008+0.020 (0.008+0.002)		
200 Ω	220.000 Ω	0.007+0.005 (0.007+0.005)	0.007+0.002 (0.007+0.001	0.007+0.001 (0.007+0.001)	
		0.008+0.010 (0.008+0.003)	0.008+0.010 (0.008+0.001)		
2000 Ω	2200.00 Ω	0.007+0.005 (0.007+0.005)	0.006+0.002 (0.006+0.001	0.006+0.001 (0.006+0.001)	
20 kΩ	22.000 0kΩ	0.008+0.005	0.007+0.002	0.007+0.001	
200 kΩ	220.000kΩ	0.008+0.005	0.007+0.002	0.007+0.001	
2000kΩ	2200.00 kΩ	0.015+0.005	0.008+0.002	0.008+0.001	
10 MΩ	12.000 0MΩ	0.030+0.005	0.030+0.002	0.030+0.001	