546X
Transformer Tester

User Manual
V1.01

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Chapter 1 Notes

This instrument is not suitable for outdoor use, especially in humid or highly dusty locations. Improper use of this instrument may result in electric shocks. Please read the safety descriptions carefully before using this tester in order to avoid improper or wrongful use and causing accidents.

1.1 Safety Signs

The following safety signs may appear in this manual and this instrument.

: Note, please read this manual carefully for these contents.

: Protective ground terminal: Please ground this terminal properly before using this tester in order to avoid electrical shock accidents from coming in contact with the case with power leakages.

CAUTION : Warning sign: When the product is used improperly, it may cause improper results to this instrument or other DUT.

WARNING : Warning sign: When the product is used improperly, it may cause injuries or even death.

1.2 Electrification and Electric Shock

In order to prevent electric shocks, the wearing of insulating plastic gloves is recommended before using this tester to perform testing related tasks.

1.3 Static

This instrument uses components that are very sensitive to static.

- The desktop of the work table must be conductive material that is grounded.
- When the soldering iron and tools are not in use, their contact end must be in contact with grounded conductors.
- The maintenance staff must wear static bracelets with leakage resistance less than 1M .
- The components or assembly base board must be placed in cases with protection against static.

1.4 Ground

This is a safety ground terminal on the rear panel case of this tester. Please ground this terminal properly in order to prevent electrical shock accidents from occurring when touching the case.

1.5 Power

Power cables that comply with the local country specifications must be used, and connectors applicable to IEC320 connectors must be used for the connection of this instrument. Users must ensure that the ground cable is properly grounded. If a fuse is included in the power plug, use fuses that comply with 0.8 ampere safety regulations. Ensure that AC power is used before use and adjust the 115V/230V power selection switch on the rear panel so that the machine matches the local power voltage.

1.6 Warm Up

The tester can operate normally once the power is turned on; however, in order to achieve the accuracy within specification, please turn on the machine in advance and let it warm up for 30 minutes or more before use.

1.7 Machine Malfunction

If the tester malfunctions, such as: The voltage displayed on the voltmeter differs greatly from the voltage set, or that the high voltage output warning light remains on though there is no high voltage output etc., please stop using this machine immediately and contact our company or your dealer for repairs.

1.8 Test End

Please turn off the power switch when this tester is not in use.

1.9 Placement and Storage

The normal operating temperature and humidity range of this machine is 5 ºC ~ 40 ºC, 80% RH; the machine might malfunction if exceeded this range. The storage temperature and humidity range of this machine is -20 ºC ~ 70 ºC, 80% RH. In order to achieve accurate testing and for safety considerations, do not place this machine in environments with direct sunlight exposure, high temperature, high humidity, frequent vibrations, or excessive dust.

1.10 Emergency Handling

When there is electric shock or if the DUT or machine goes on fire, please switch off the power and unplug the power cable.

Chapter 2 General Descriptions

2.1 Features

- Frequency:
  - 5465 10Hz~200kHz
  - 5466 10Hz~500kHz
  - 5467 10Hz~1MHz
- Test voltage: AC/DC 10mV~2V.
- Basic measurement accuracy: 0.1%.

2.2 Introduction

- Measured using the absolute value (ΔAbs) or percentage difference (Δ%) relative to the nominal value.
- High precision measurement fixture with four-wire connection and grounding.
- Fixture reset (open circuit / short circuit).
- Bar display makes it easy to determine variable components.
- 7 inch LCD color monitor, 800x480 screen resolution.
- Intuitive user interface with complete measurement functions.

2.3 Communication Interface

- RS-232 (9600/19200/38400/56000/115200 bps)
- LAN
- Handle Interface

2.4 Package and Accessories

Standard accessories included in the 546x series transformer tester package should include the following items:

- 1 x 546x transformer tester
- 1 x 546x transformer tester manual
- 1 x power cable
- 1 x test report
- 1 x Meter mode test fixture

2.5 Frequency Range and Test Frequency Point

Frequency range	Test frequency point	Resolution
10Hz ≦ Freq ≦ 999.95Hz	10.00Hz、10.05Hz … 999.95Hz	0.05Hz
1kHz ≦ Freq ≦ 9.9999kHz	1.0000kHz、1.0001Hz … 9.9999kHz	0.1Hz
10kHz ≦ Freq ≦ 99.999kHz	10.000kHz、10.001Hz … 99.999kHz	1Hz
100kHz≦ Freq ≦ 200kHz	100.00kHz、100.01kHz … 200.00kHz	10Hz

Table 2-5-1 Frequency range and test points (5465)

Frequency range	Test frequency point	Resolution
10Hz ≦ Freq ≦ 999.95Hz	10.00Hz、10.05Hz … 999.95Hz	0.05Hz
1kHz ≦ Freq ≦ 9.9999kHz	1.0000kHz、1.0001Hz … 9.9999kHz	0.1Hz
10kHz ≦ Freq ≦ 99.999kHz	10.000kHz、10.001Hz … 99.999kHz	1Hz
100kHz≦ Freq ≦ 500kHz	100.00kHz、100.01kHz … 500.00kHz	10Hz

Table 2-5-2 Frequency range and test points (5466)

Frequency range	Test frequency point	Resolution
10Hz ≦ Freq ≦ 999.95Hz	10.00Hz、10.05Hz … 999.95Hz	0.05Hz
1kHz ≦ Freq ≦ 9.9999kHz	1.0000kHz、1.0001Hz … 9.9999kHz	0.1Hz
10kHz ≦ Freq ≦ 99.999kHz	10.000kHz、10.001Hz … 99.999kHz	1Hz
100kHz≦ Freq ≦ 1MHz	100.00kHz、100.01kHz … 1MHz	10Hz

Table 2-5-3 Frequency range and test points (5467)

2.6 Test Voltage and Resolution

Test voltage (Volt)	Resolution
10mV ≦ Volt ≦ 999mV	1mV
1.00V ≦ Volt ≦ 2.00V	10mV

2.7 Test Parameters

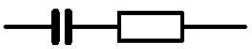
- Serial inductance (Ls) Parallel inductance (Lp)
- Serial capacitance (Cs) Parallel capacitance (Cp)
- Serial resistance (Rs) Parallel resistance (Rp)
- Reactance (X) Susceptance (B)(=1/X)
- Impedance (Z) Admittance (Y)(=1/Z)
- Dissipation factor (D) Quality factor (Q)(=1/D)
- Phase angle (θ)
- Conductance (G)
- Direct current resistance (Rdc)

2.8 Introduction to Basic Measurement Functions

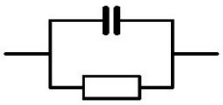
- **Serial and parallel modes:**
  Serial and parallel circuit models can be used to measure AC resistance, capacitance, inductance, reactance and susceptance.

◆ **C**：(Capacitance)

Serial mode:



Parallel mode:



Serial mode related formula:

$$C_s = C_p(1+D^2)$$

D = dissipation factor

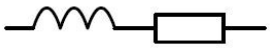
Parallel mode related formula:

$$C_p = \frac{C_s}{(1+D^2)}$$

D = dissipation factor

◆ **L**：(Inductance)

Serial mode:

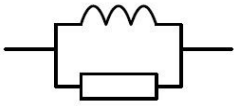


Serial mode related formula:

$$L_s = \frac{L_p}{\left(1+\frac{1}{Q^2}\right)}$$

Q = Quality Factor

Parallel mode:



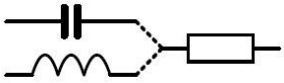
Parallel mode related formula:

$$L_p = L_s\left(1+\frac{1}{Q^2}\right)$$

Q = Quality Factor

◆ **X**：(Reactance)

Serial mode:

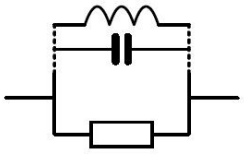


Serial mode related formula:

$$R_s = \frac{R_p}{\left(1+Q^2\right)}$$

Q = Quality Factor

Parallel mode:



Parallel mode related formula:

$$R_p = R_s\left(1+Q^2\right)$$

Q = Quality Factor

- **Resistance (R) and Conductance (G):**

Resistance(R) refers to the physical quantity that hinders charge flow in substances, which is the resistance value; its unit is "ohm"(Ω).
Conductance (G) refers to the measurement value of the ability to transmit current from a certain point to another point in an object or circuit; its unit is Siemens (S). It is the reciprocal of resistance (G=1/R).

◆ Resistance(R)

Measurement type:

1. Serial mode →Rs
2. Parallel mode →Rp
3. Direct current resistance →Rdc

Related formula:

$$R = \frac{V}{I} = \frac{1}{G} = Z_s - jX = Z_s - j\omega L = Z_s + \frac{j}{\omega C}$$

$$|Z_s| = \sqrt{(R^2 + X^2)}$$

$$|Z_p| = \frac{RX}{\sqrt{(R^2 + X^2)}}$$

$$R_s = |Z| \cos\theta$$

◆ Conductance (G)

Measurement type:

Serial mode → Gp

*Conductance is only applicable to parallel equivalent circuit models.

Related formula:

$$G_p = \frac{I}{V} = \frac{1}{R} = Y_p - jB = Y_p - j\omega C = Y_p + \frac{j}{\omega L}$$

$$|Y_s| = \frac{GB}{\sqrt{(G^2 + B^2)}}$$

$$|Y_p| = \sqrt{(G^2 + B^2)}$$

$$G_p = |Y| \cos\theta$$

- Capacitance：

Capacitance, refers to the charge reserve at a given potential difference. Capacitance is usually represented with the letter “C” and its international unit is Farad (F).

Measurement type:

1. Serial mode →Cs
2. Parallel mode →Cp

Related formula:

$$Z_s = R + jX = R + j\omega L = R - \frac{j}{\omega C}$$

$$Y_p = G + jB = G + j\omega C = G - \frac{j}{\omega L}$$

$$Q = \frac{\omega L_S}{R_S} = \frac{1}{\omega C_S R_S} \qquad \text{(series R, L, C values)}$$

$$Q = \frac{R_P}{\omega L_P} = \omega C_P R_P \qquad \text{(parallel R, L, C values)}$$

$$D = \frac{R_S}{\omega L_S} = \omega C_S R_S \qquad \text{(series R, L, C values)}$$

$$D = \frac{G_P}{\omega C_P} = \omega L_P G_P \qquad \text{(parallel G, L, C values)}$$

- Inductance **(L)**：

  Inductance is one of the properties of an electronic circuit or device; it refers to the electromotive force (EMF) generated that resists current change due to electromagnetic induction when current changes. Its unit is Henry and is abbreviated as (H).

  Measurement type:

  1. Serial mode→Ls
  2. Parallel mode→Lp

  Related formula:

$$Z_s = R + jX = R + j\omega L = R - \frac{j}{\omega C}$$

$$Y_p = G + jB = G + j\omega C = G - \frac{j}{\omega L}$$

$$Q = \frac{\omega L_S}{R_S} = \frac{1}{\omega C_S R_S} \quad \text{(series R, L, C values)}$$

$$Q = \frac{R_P}{\omega L_P} = \omega C_P R_P \quad \text{(parallel R, L, C values)}$$

$$D = \frac{R_S}{\omega L_S} = \omega C_S R_S \quad \text{(series R, L, C values)}$$

$$D = \frac{G_P}{\omega C_P} = \omega L_P G_P \quad \text{(parallel G, L, C values)}$$

- **Reactance (X) and Susceptance (B):**

Reactance (X), in the analysis of AC circuits, reactance is represented with"X"; it is the imaginary part of complex impedance used to represent the obstruction of inductance and capacitance to current. It is similar to the obstruction of resistance to current in a DC circuit; in AC circuits (such as serial RLC circuits), capacitance and inductance will also cause obstruction to current, and this effect is called resistance. Its unit is ohm (Ω). Susceptance(B) is defined as the reciprocal of reactance in power electronics; it is the imaginary part of admittance and can be divided into inductive susceptance and capacitive susceptance. It is the reciprocal of reactance (B=1/X) and its unit is Siemens, abbreviated as (S).

◆ Reactance(X)

Measurement type:

Serial mode → Xs

*Reactance is only applicable to serial equivalent circuit models.

Related formula:

$$X = \frac{1}{B} = |Z| \sin\theta$$

$$|Z_s| = \sqrt{(R^2 + X^2)}$$

$$|Z_p| = \frac{RX}{\sqrt{(R^2 + X^2)}}$$

$$X_s = |Z| \sin\theta$$

◆ Susceptance(B)

Measurement type:

Parallel mode → Bp

*Susceptance is only applicable to parallel equivalent circuit models.

Related formula:

$$B = \frac{1}{X} = |Y| \sin\theta$$

$$|Y_s| = \frac{GB}{\sqrt{(G^2 + B^2)}}$$

$$|Y_p| = \sqrt{(G^2 + B^2)}$$

$$B_p = |Y| \sin\theta$$

- **Impedance (Z) and Admittance (Y):**
  Impedance is the general term of the obstructions of resistance, inductance and capacitance to the AC circuit; its unit is ohm(Ω).
  Admittance is the general term for conductance and susceptance; admittance is defined as the reciprocal of impedance in power electronics. Its unit is Siemens and it is abbreviated as (S).

  - Impedance(Z)

    Related formula:

    $$Z = \frac{E}{I} = \frac{1}{Y}$$

    $$Z_s = R + jX = R + j\varpi L = R - \frac{j}{\varpi C}$$

    $$|Z_s| = \sqrt{(R^2 + X^2)}$$

    $$|Z_p| = \frac{RX}{\sqrt{(R^2 + X^2)}}$$

    $$R_s = |Z| \cos\theta$$

    $$X_s = |Z| \sin\theta$$

  - Admittance(Y)

    Related formula:

    $$Y = \frac{I}{E} = \frac{1}{Z} \qquad Y_p = G + jB = G + j\varpi C = G - \frac{j}{\varpi L}$$

    $$|Y_s| = \frac{GB}{\sqrt{(G^2 + B^2)}} \quad |Y_p| = \sqrt{(G^2 + B^2)}$$

    $$G_p = |Y| \cos\theta \quad B_p = |Y| \sin\theta$$

- **Quality Factor (Q) and Dissipation Factor (D):**
  Quality factor is used to measure the energy consumed for measuring relative frequency. Generally speaking, the higher the quality factor of a circuit the better the selectivity is.

  Dissipation factor is the reciprocal of quality factor. It refers to the signal angle loss between the capacitor (or inductor) and the operating frequency under fixed temperature. The phase shift generated by the time lag between the external voltage and generated current causes loss current and energy dissipation, and the current has two compositions at this time. One is the charging current (lc) that is 90 ° different from the voltage and the other is the loss current (IR) that is the same as the voltage; the total current (I) is the sum of the two. The angle δ between the total current and the charging current is called the loss angle, and tanδ is called the dissipation factor "D", as shown in the figure below:

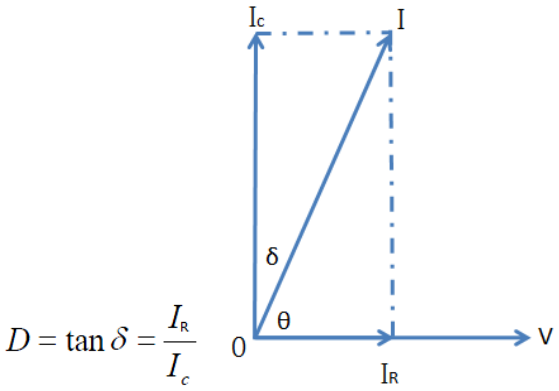


Figure 2-6-1 Actual phase change figure of the capacitor

◆ Quality factor(Q)

Related formula:

$$Q = \frac{R_P}{\omega L_P} = \omega C_P R_P \qquad \text{(parallel R, L, C values)}$$

$$Q = \frac{\omega L_S}{R_S} = \frac{1}{\omega C_S R_S} \qquad \text{(series R, L, C values)}$$

$$Q = \frac{1}{\tan(90-\theta)^\circ} = \frac{1}{D}$$

◆ Dissipation factor(D)

Related formula:

$$D = \frac{R_S}{\omega L_S} = \omega C_S R_S \qquad \text{(series R, L, C values)}$$

$$D = \frac{G_P}{\omega C_P} = \omega L_P G_P \qquad \text{(parallel G, L, C values)}$$

$$D = \tan(90-\theta)^\circ = \frac{1}{Q}$$

- **Angle (θ):**
  Angle: The phase angle is measured when measuring impedance (Z), admittance (Y), quality factor (Q) and dissipation factor (D) items.

  Related formula:

$$Z_s = R + jX = R + j\omega L = R - \frac{j}{\omega C}$$

$$Y_p = G + jB = G + j\omega C = G - \frac{j}{\omega L}$$

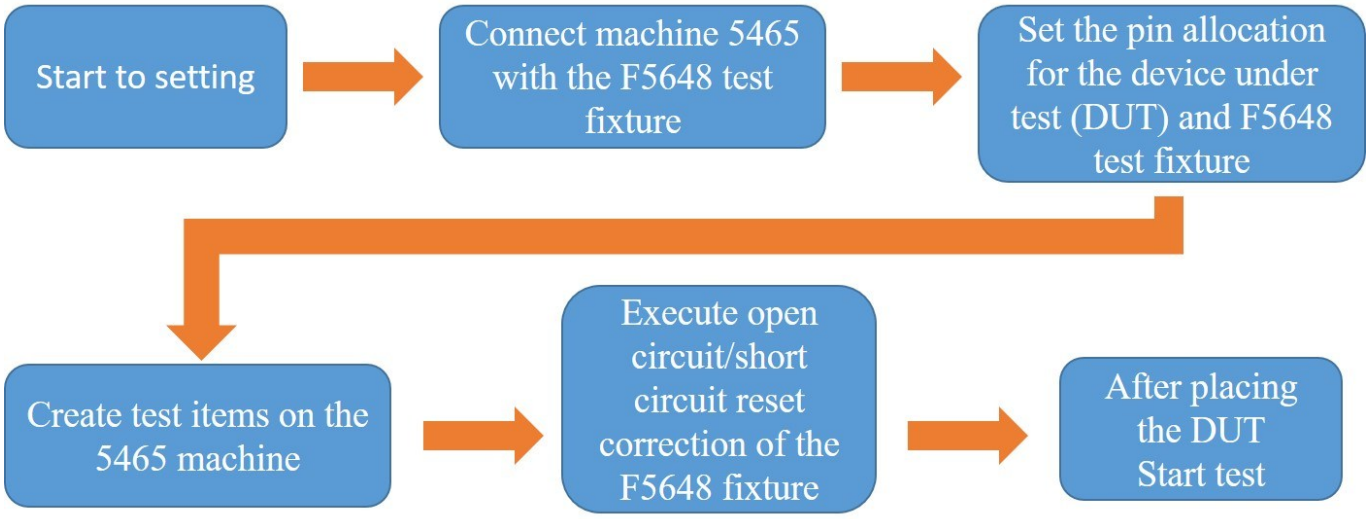
$$Y_p = G + jB = G + j\omega C = G - \frac{j}{\omega L}$$

$$Q = \frac{1}{\tan(90-\theta)^\circ} = \frac{1}{D} \qquad D = \tan(90-\theta)^\circ = \frac{1}{Q}$$

$$R_s = |Z| \cos\theta \qquad X_s = |Z| \sin\theta$$

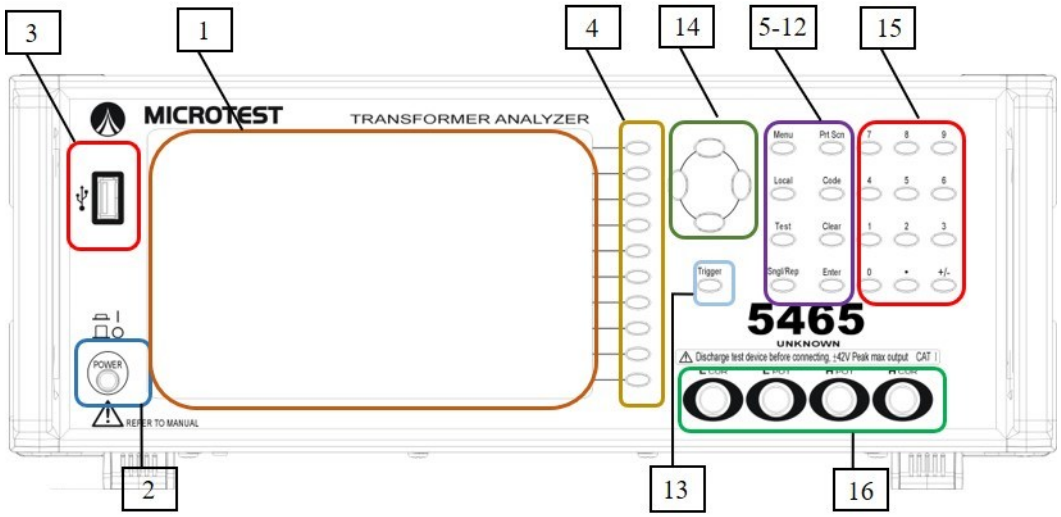
$$G_p = |Y| \cos\theta \qquad B_p = |Y| \sin\theta$$

2.9 Setting Process



2.10 Functions of the Front and Rear Panels

2.10.1 Front Panel



(1) **Monitor:** Resolution 800x480, LED backlight monitor.
(2) **POWER:** Power switch.
(3) **USB:** USB flash drive port; it can be used to access the setting file and save test data.
The saving path of the setting file is ("\TF_5465\SetFile\")
The saving path of the test data is ("\TF_5465\TestData\")
The saving path of captured screen images is ("\TF_5465\Screen\")
※ Supported format for USB flash drive is FAT32, with a capacity smaller than 64GB.
(4) **Function key:** Selects the functions on the right of the screen.
(5) **Menu:** Switches the screen to the Main Menu page.

(6) **Local:** When the instrument is under remote control mode, this button can be pressed to release the key lock status. The RMT icon will be displayed on the top of the screen when the instrument is under remote control mode.

(7) **Test:** Enters the transformer test screen.

(8) **Sngl/Rep:** Allows switching of the measurement mode under Meter; it can switch between Single Trigger mode and Repeat Trigger mode. The MAN icon will be displayed on the top of the screen when the measurement mode is Single Trigger mode.

(9) **PrtScn:** Pressing this key will save the screen image into the USB flash drive.

a. Please insert a USB flash drive in advance when using this function; the image is in BMP format.

b. The path where 5465 saves the images is ("\TF_5465\Screen\").

(10) **Code:** Reserved key; it has no functions for now.

(11) **Clear:** Clear key; it can clear wrong numbers entered under edit mode.

(12) **Enter:** Confirm key; it conforms edited values or selections.

(13) **Trigger:** Measurement trigger key.

When under Meter Mode, if the measurement mode is Single Trigger mode, this key is the measurement trigger key; if the measurement mode is Repeat Trigger mode, then this key is the "Pause/Resume" measurement key. The HOLD icon will be displayed on the top of the screen when measurement stops.

Under transformer test mode, this key is the test trigger key; tests will begin once it is pressed.

(14) **Arrow keys:** Selects a single item or parameter.

(15) **Number keys:** Provided for entering numbers when editing.

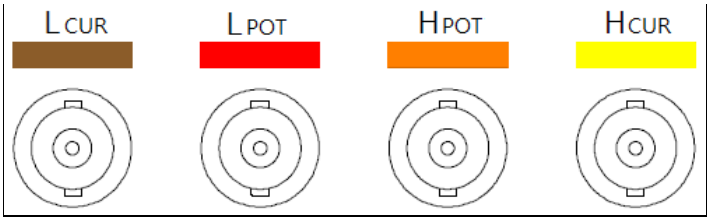
(16) **Measurement terminals:**

LCUR Receives the test current source; it is connected to the negative pole (-) of the DUT.

LPOT Negative terminal for voltage measurement; it is connected to the negative pole (-) of the DUT.

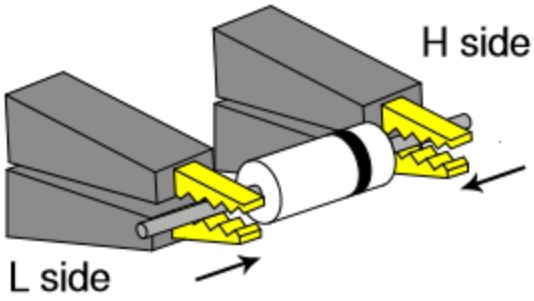
HPOT Positive terminal for voltage measurement; it is connected to the positive pole (+) of the DUT.

HCUR Receives the test current source; it is connected to the positive pole (+) of the DUT.

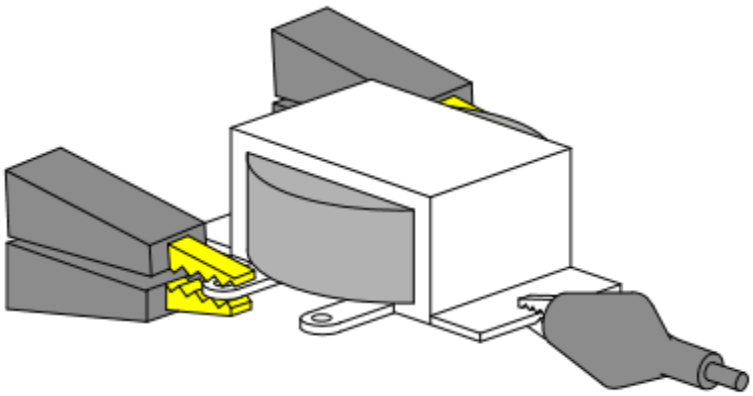


The figure above is a 546X four-wire measurement connector; please connect the four-wire measurement fixture head at the end of the fixture test line here.

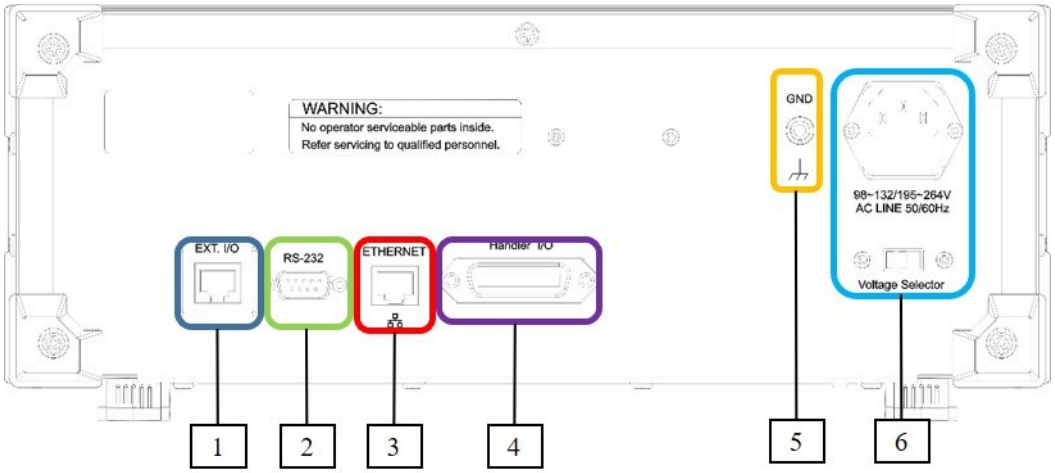
1. Please discharge the DUT properly before connecting the fixture.
2. Connect the fixture terminals to the BNC terminal on the front panel according to the different colors.
3. Connect the DUT to the fixture; if the DUT is directional, connect the H side of the fixture clip to the positive end of the DUT and the L side of the fixture clip to the negative end of the DUT. Please make sure that the position of the fixture clip is as close to the DUT itself as possible.



4. If the DUT is covered by an external casing and it isn't connected to any fixture clip, connect this external case to ground in order to reduce noise interference.



2.10.2 Rear Panel



(1) EXT. I/O: F5648 fixture control cable connection port; please connect the included RJ-45 cable from this terminal to the remote-control terminal of the F5648 fixture**.**

(2) RS-232: RS-232 serial communication interface.

(3) ETHERNET: LAN network communication interface.

(4) Handler I/O: Remote control interface.

(5) GND: Grounding terminal.

(6) AC INPUT: Input power jack. Please confirm whether the input voltage is 110V or 220V before connecting the plug, and flip the power switch by the **Voltage Selector** to the proper voltage position (110V/220V).

- **Complete figure of the transformer tester dedicated fixture box**
  - **F5648:** Transformer test fixture (pneumatic).

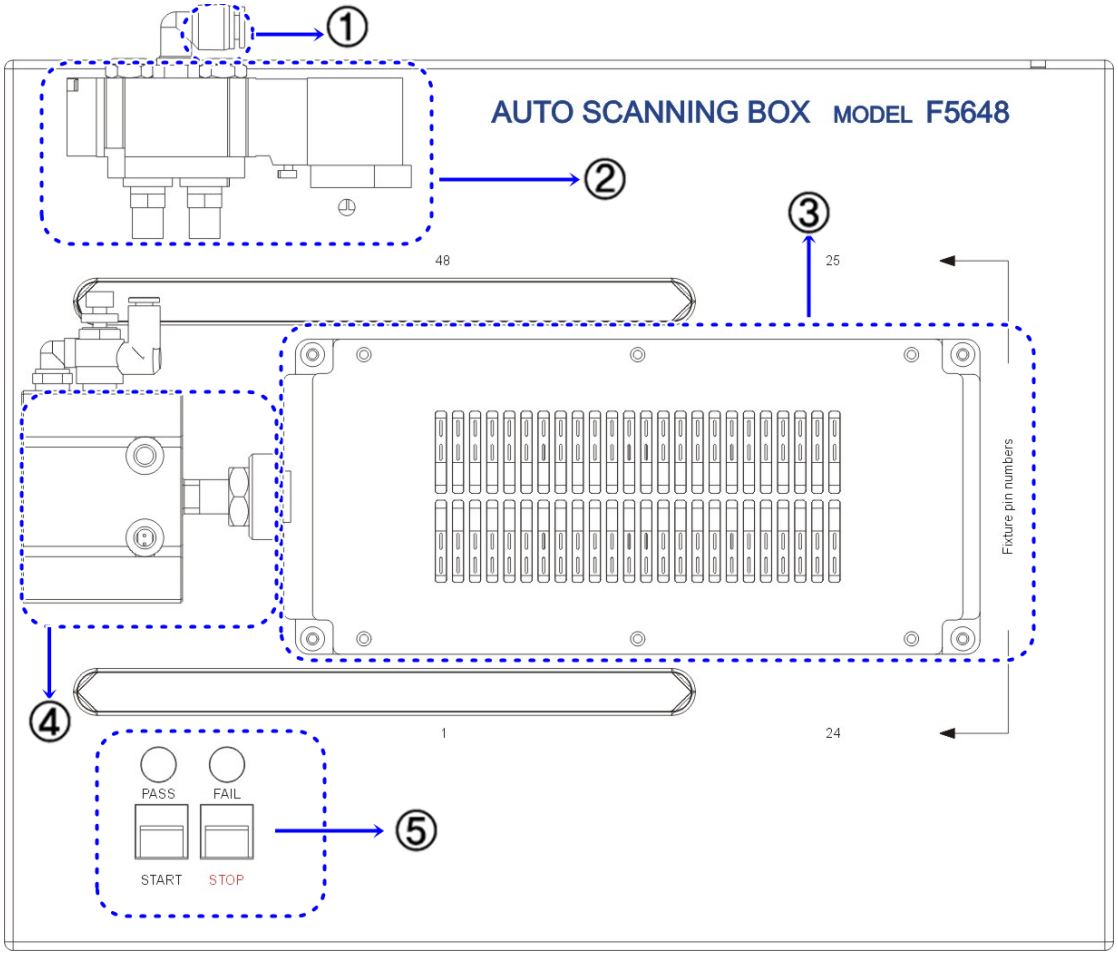
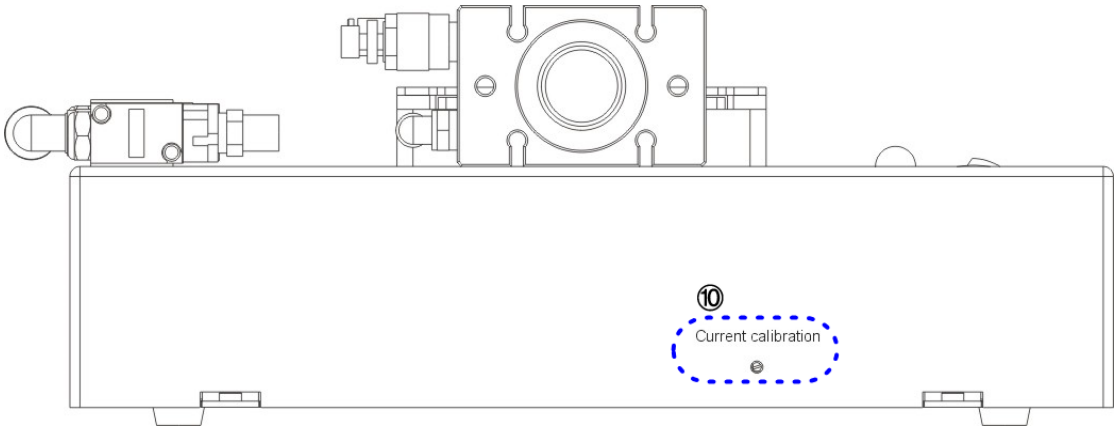


Figure 2-10-3 Top view of the F5648 transformer test fixture



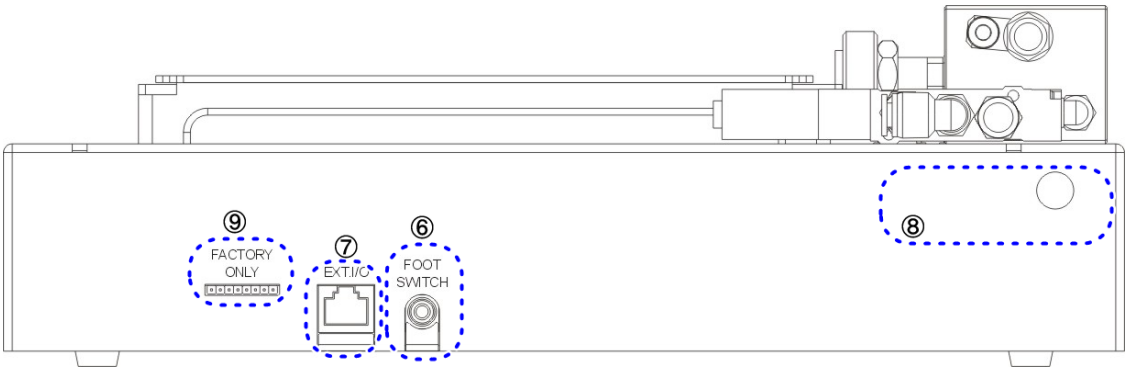


Figure 2-10-4 Complete side view of the F5648 transformer test fixture

F5648 fixture description: (Please refer to Figure 2-10-3 and Figure 2-10-4)

1. **Pneumatic fixture air inlet:** Please connect the high-pressure air to this air inlet using an air hose.
2. **Electromagnetic valve:** Used to control the push rod of the DUT.
3. **Transformer test slot:** DUT placement area; its fixture pin definitions are marked according to the fixture pin numbers. The order from the bottom-left corner to bottom-right corner is Pin1~Pin 10 respectively and the order from the top-right corner to the top-left corner is Pin 11~Pin 20 respectively.
4. **Pneumatic cylinder:** This push rod will be pushed forward during testing; it is used to fix the DUT in place.
5. **PASS, FAIL:** Good product (PASS) and defective product (FAIL) test signal.

   START, STOP: Start test (START) and stop test (STOP) buttons.

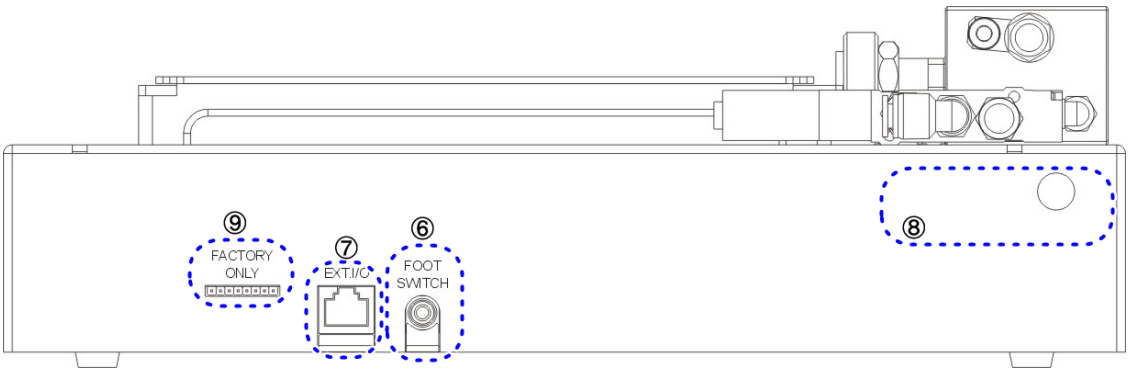
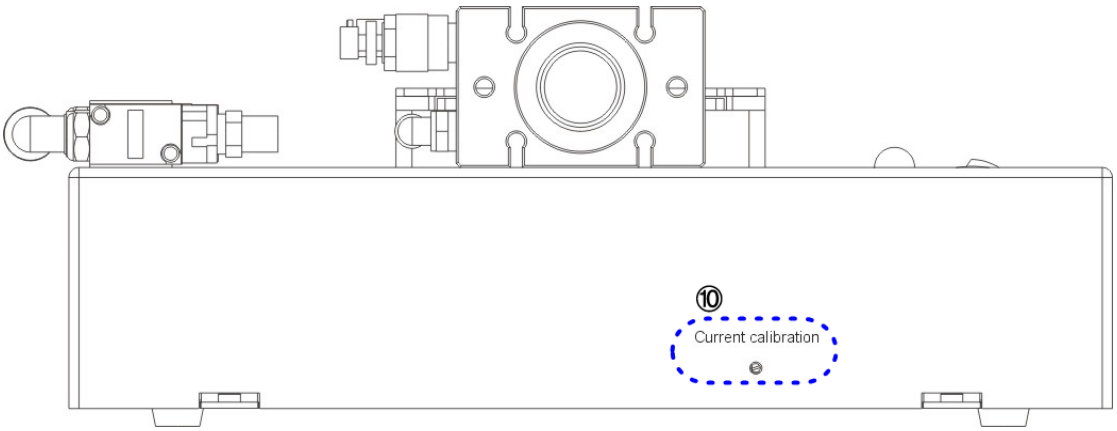


Figure 2-10-4 Complete side view of the F5648 transformer test fixture

6. **Foot Switch:** Foot switch connector port. (This can only be used by purchasing the dedicated foot switch from our company)
7. **EXT I/O:** Connect to EXT I/O port on 546X real panel.
8. **Test Line:** This is where the four-wire measurement fixture head of the F5648 fixture is connected; please connect this connector to the four-wire measurement port of 5465.
9. **Factory only:** Original factory change for maintenance and use.



10. **Current calibration:** To adjusting the constant current.

2.11 Precautions Before Powering ON

Before start operating the 546x series transformer testers, you must first confirm there is sufficient and steady AC voltage available for use.

Chapter 3 Function Setting

3.1 Main Menu

Press the **Menu** control key and the screen will enter the Main Menu screen.



- SYSTEM: Enters the system setting screen (System Setup).
- METER: Enters the meter measurement mode (Meter Mode).
- TRANS: Enters the transformer test setting function screen (Transformer Setting Menu).
- FILE: Enters the file management screen (File Management).

3.2 System Setting (SYSTEM)

Press the **Menu** control key to enter the Main Menu screen, and then select **SYSTEM** to enter the system setting screen.

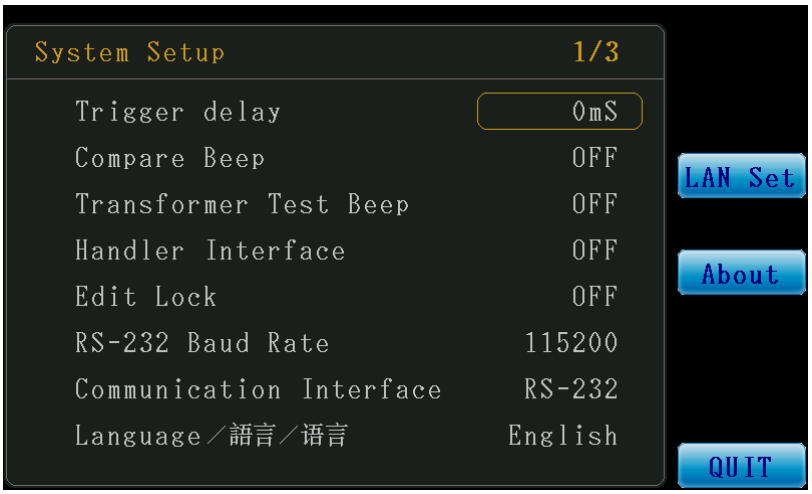


Figure 3-2-1 System Setup (1/3) screen

1. **Trigger delay (mS):** Sets the trigger delay time; the setting range is 0~5000 and the unit is mS. (This function is applicable for Meter Mode and transformer test mode.)

2. **Compare Beep:** Sets the time for the buzzer to prompt when the compare function is enabled in Meter Mode. The Select function key can be used to make selections.
   - **OFF:** Disable prompt.
   - NG: Prompt when any one item exceeded setting range (FAIL).
   - OK: Prompt only when all items with compare enabled are within the setting range (PASS).

3. **Transformer Test Beep**: Test result prompt setting when in transformer test mode; the Select function key can be used to make selections.
   - **ALL:** Prompt is enabled whether the test result is PASS/FAIL.
   - **OK:** Enable prompt only when the test result is PASS.
   - **NG:** Enable prompt only when the test result is FAIL.
   - **OFF:** Disable prompt.

4. **Handler Interface**: Sets Handler Interface function ON/OFF; the Select function key can be used to make selections.
   - **ON:** Enables the Handler Interface function.
   - **OFF:** Disables the Handler Interface function.

5. **Edit Lock**：Edit lock function, if there is a password, it will prompt to enter the password, and the setting value can be changed after confirming the old password.

   - **ON** ：Open the Edit Lock function.
   - **OFF**：Close the Edit Lock function.

   ※**If you want to set/change password, you can set it on right side function key[Set P/W].**

6. **RS-232 Baud Rate**: Sets the baud rate of the serial communication port; the Select function key can be used to make selections. The following baud rates can be selected: 115200/56000/384000/19200/9600 bps.

   Transmission format: 8/N/1 (8 Data Bit/ No Parity Bit/ 1 Stop Bit)

7. **Communication Interface**: Communication interface setting; select the communication interface to use RS-232/LAN.

8. **Language:** Language setting; the Select function key can be used to make selections. Three options are available for selection, including English, Traditional Chinese and Simplified Chinese.

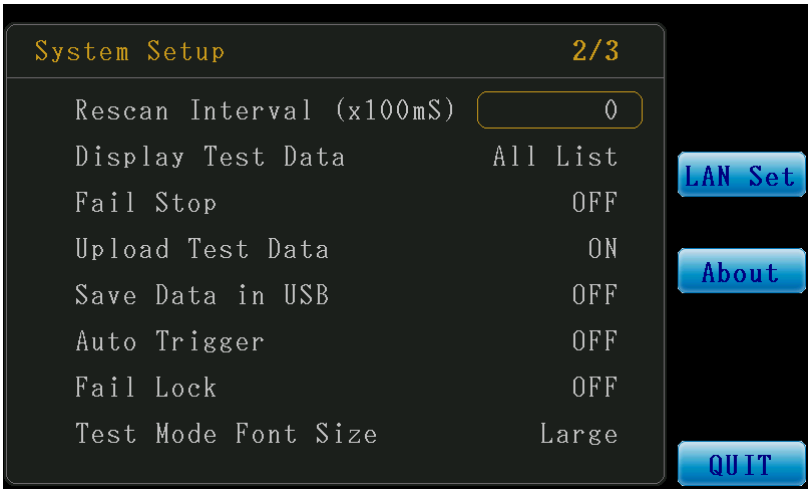


Figure 3-2-2 System Setup (2/3) screen

9. **Rescan Interval (x100mS)**: Sets the time for continual test and continual test intervals in transformer test mode; the setting range is between 0~100.

   - When the value is set as 0, the continual test function is disabled.
   - When the value is set between 1~100, the continual test function is enabled and the time for continual test intervals is the value set x100mS.

   Example:

   When the value is set as 5, the time for the continual test interval is 500mS. (5x100mS=500mS)

10. **Display Test Data:** Sets the display method of the transformer test data.
    - **ALL List:** Display on the screen whether the test data is PASS/FAIL.
    - **NG List:** Only display FAIL data on the screen.

11. **Fail Stop:** Sets whether to turn the test fail stop function ON/OFF under transformer test mode.
    - **ON:** Enables test stop function. (When an item is tested as FAIL, the test stops)
    - **OFF:** Disables test top function.

12. **Upload Test Data:** Sets whether to turn the data upload function ON/OFF under transformer test mode.
    - **ON:** Enables the test data upload function. When the test is complete, the test data will be automatically uploaded through the communication port (RS-232/LAN) set.
    - **OFF:** Disables the test data upload function.

13. **Save Data in USB:** Sets whether to turn the save test data to USB flash drive function ON/OFF under transformer test mode.
    - **ON:** Enables the save test data to USB flash drive function; once test is completed, the test data will be saved into the USB flash drive.
    - **OFF:** Disables the save test data to USB flash drive function.

      ※When this function is enabled, please ensure that a USB flash drive is connected to the machine.

14. **Auto Trigger：In the Trans test mode, turn on/off to set the auto trigger function.**
    - **ON**：Open the auto trigger function.
    - **OFF**：Close the auto trigger function.

＊WARNING：To avoid cut your hands, please do not using when the fixture is working by cylinder.

15. **Fail Lock**：If you need to lock the device when the test result is “fail”.
    - **ON**：Open the fail lock function.
    - **OFF**：Close the fail lock function.

16. **Test Mode Font Size**：To set the font display large/small in the test mode.
    - **Large**：Test mode font display Large(Default).

- **Small**：Test mode font display small.



Figure 3-2-3 System Setup (3/3) screen

17. **Handler Interface Mode**：Use the select function key to set the output signal of Handler Interface are “Pass” or “Fail” in the both of test mode and multi-DUT mode.
    - **PASS**：Will output when each DUT test result is "Pass".
    - **FAIL**：Will output when each DUT test result is "Fail".

    (The HANDLER INTERFACE pin define can refer the 3.9 **Handler Interface**)

18. **About**: Displays the version information and serial number of the machine.

19. **LAN Set**: Local area network (LAN) communication interface setting.
    - To allow the instrument to communicate through the local area network (LAN), the network cable must be connected and its IP address must be configured.

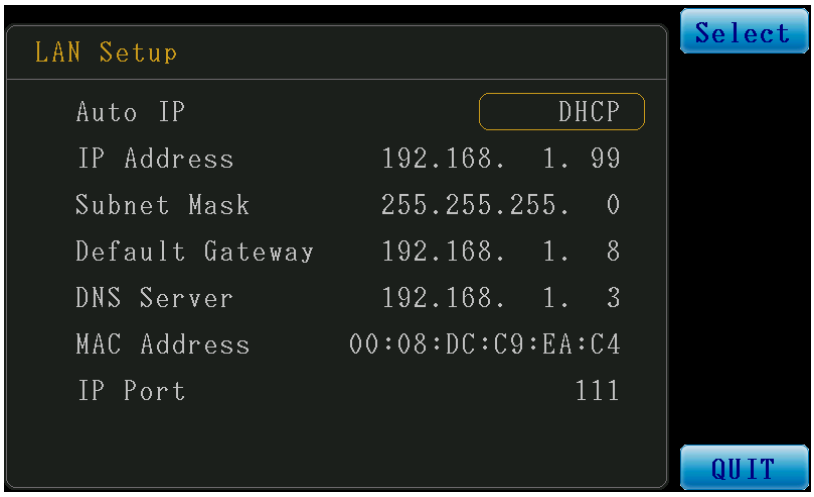


Figure 3-2-4 LAN Setup screen

- Auto IP: Sets whether to acquire IP automatically or configure manually.
  - ■ DHCP: Acquire available IP address automatically though the DHCP server.
    - ※ When this setting is used, no other fields need to be set, and therefore the cursor cannot move down.
  - ■ OFF: Configure the IP address, subnet mask and default gateway etc. manually.
- IP Address: IP address setting field.
- Subnet Mask: Subnet mask setting field.
- Default Gateway: Default gateway setting field.
- DNS Server: DNS server setting field.
- MAC Address: MAC address display.
- IP Port: Communication port; currently it is fixed at 111.



Figure 3-2-5 Set P/W

20. **Set P/W**：Set password function to avoid the Edit Lock function can be modifying arbitrarily.

    The following sets the password according to different situations:

- **Set new password:** This state is that you never set the password, if you want to select the password, please follow the steps as below,

  Enter new password >> Confirm password >> Enter the same password twice to complete.

- **Change password** ：This state is you have done set the password and you want to change the password, please follow the steps as below,

  Enter the current password >> Enter the new password >> Confirm password >> Enter the same password twice to complete.

- **Clean password**： This state is you have done set the password and you want to clean the password, please follow the steps as below,

  Enter the current password >> Enter the new password (Enter nothing)>> Confirm password (Enter nothing again) >> Enter the same password (Enter nothing) twice to complete.

3.3 Meter Mode

Press the **Menu** control key and the screen will display the Main Menu; then press **METER** to enter the main screen (Meter Mode).

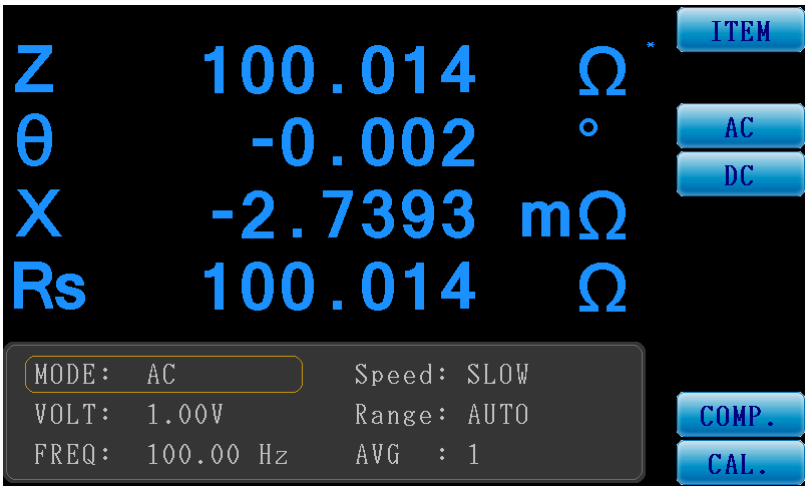


Figure 3-3-1 Meter Mode screen

3.3.1 Basic Measurement Settings

- **MODE:** Measurement mode, AC (alternating current mode) / DC (direct current mode).
  ※ **DC mode is only available for Rdc (direct current impedance) measurement.**

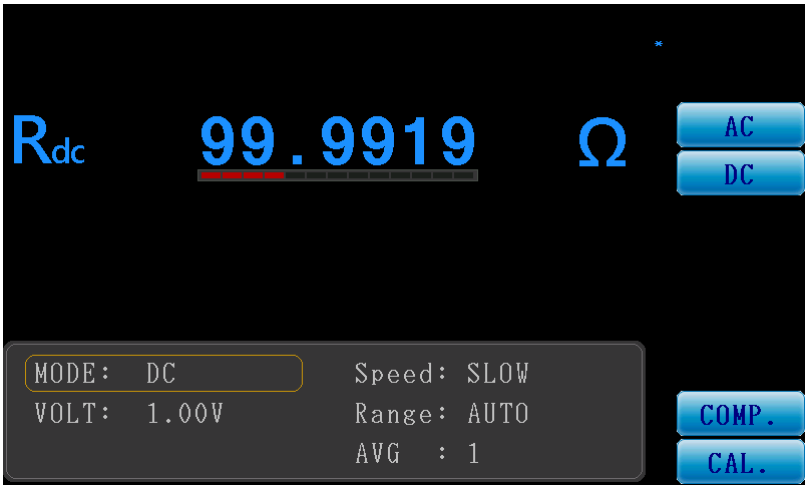


Figure 3-3-3-1 DC MODE screen (ONLY Rdc test)

- **VOLT:** Measures voltage.
- **FREQ:** Measures frequency; this item can only be set under AC mode.

- **Speed:** Measures speed; there are four options available: MAX (fastest) / FAST (fast) / MED (medium speed) / SLOW (slow).
    - **Measurement time (not including display update):**

      MAX ： 10mS

      FAST ： 25mS

      MED ： 100mS

      SLOW： 250mS

- **Range:** Measures gear position; available options include: AUTO (automatic) / HOLD (hold current gear position) / 1 (gear 1) / 2 (gear 2) / 3 (gear 3).
- **AVG:** Average number of times; the setting range is between 1~64.

3.3.2 ITEM (Measurement Parameter Settings)

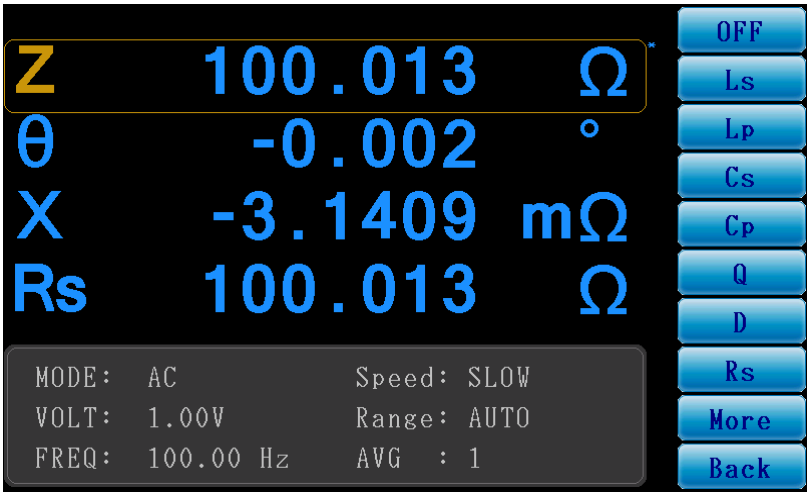


Figure 3-3-2-1 choose parameter screen (1/2)

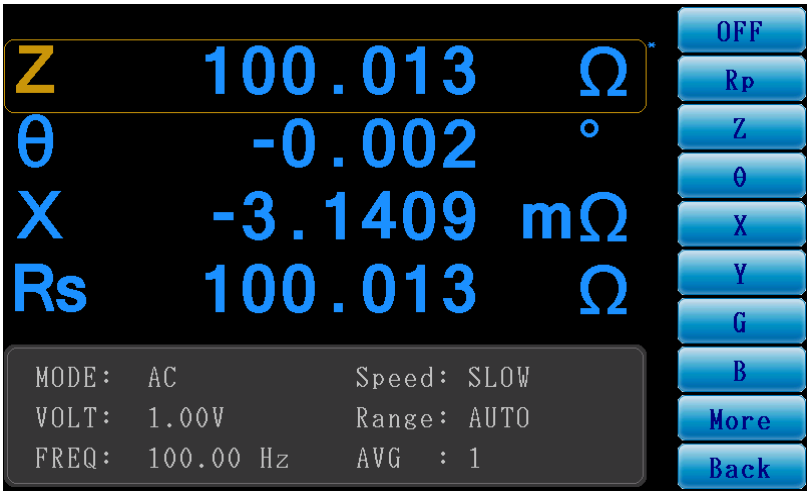


Figure choose parameter screen (2/2)

- **Up, Down direction keys:** Used to move the yellow frame; used to select the test parameter item to change.

- **Left, right direction keys:** Used to change the measurement parameter selected with the yellow frame; available selections include:
  OFF/Ls/Lp/Cs/Cp/Q/D/Rs/Rp/Z/θ/X/Y/G/B.

- **Function Menu:**
  OFF: Disables this measurement function. (Cannot be set as all four items disabled)
  Ls: Set this item as measure Ls (Serial inductance).
  Lp: Set this item as measure Lp (Parallel inductance).
  Cs: Set this item as measure Cs (Serial capacitance).
  Cp: Set this item as measure Cp (Parallel capacitance).
  Q: Set this item as measure Q (Quality factor).
  D: Set this item as measure D (Dissipation factor).
  Rs: Set this item as measure Rs (Serial resistance).
  Rp: Set this item as measure Rp (Parallel resistance).
  Z: Set this item as measure Z (Impedance).
  θ**:** Set this item as measure θ (Phase angle).
  X: Set this item as measure X (Reactance).
  Y: Set this item as measure Y (Admittance).
  G: Set this item as measure G (Conductance).
  B: Set this item as measure B (Susceptance).
  More: Switch to the next page of the menu.
  Back: Return to the measurement screen.

3.3.3 COMP. (Compare Function)

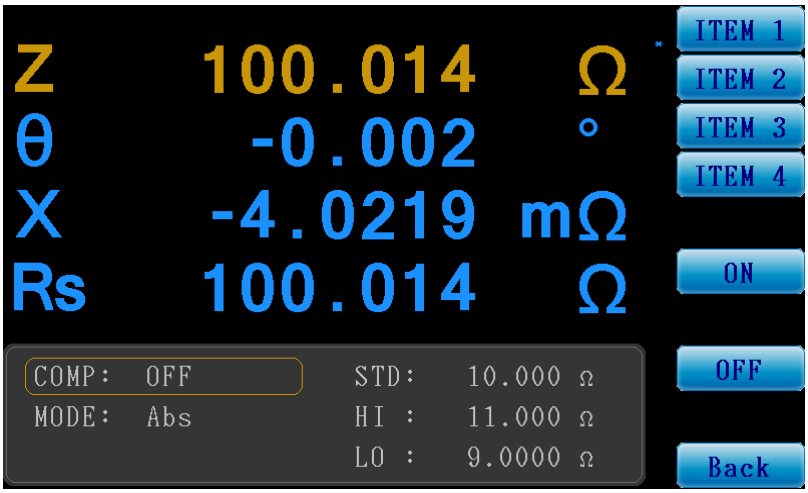


Figure 3-3-3-1 Compare function setting screen

- **Compare condition setting:**
  COMP: Set whether to turn the compare function ON/OFF.
  MODE: Sets the compare mode.
  Abs: Its upper and lower limits are determined by the value entered in the HI/LO fields.
  ΔAbs: Its upper limit is STD+HI; lower limit is STD+LO.
  Δ%: Its upper limit is STD + (STD x HI%); lower limit is STD + (STD x LO%).
  STD: Sets the standard value.
  HI: Sets the upper limit.
  LO: Sets the lower limit.

- **Function Menu:**
  ITEM 1: Select to edit measurement item 1.
  ITEM 2: Select to edit measurement item 2.
  ITEM 3: Select to edit measurement item 3.
  ITEM 4: Select to edit measurement item 4.
  Back: Return to the measurement screen.

The figure below is the screen when the compare function is enabled; the bars under the various sets of measured values will change according to the values.

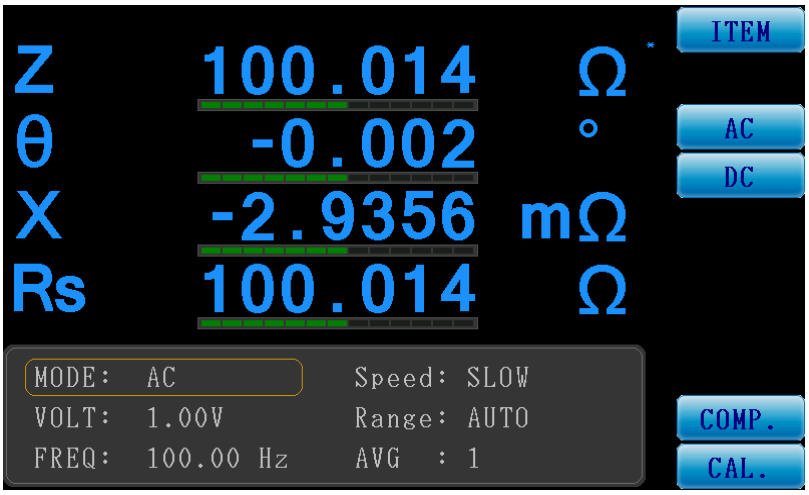


Figure 3-3-3-2 **compare function is enabled screen**

The representation for the bar graph of the compare function is as follows:



LO: When the measured value is lower than the lower limit, the bar will be displayed in red, and fall within the “LO” range.
PASS: When the measured value is within the upper and lower limits, the bar will be displayed in green, and fall within the “PASS” range.
HI: When the measured value is lower than the lower limit, the bar will be displayed in red, and fall within the “HI” range.

3.3.4 CAL. (Calibration Function)

- The calibration function provides OPEN/SHORT calibration.

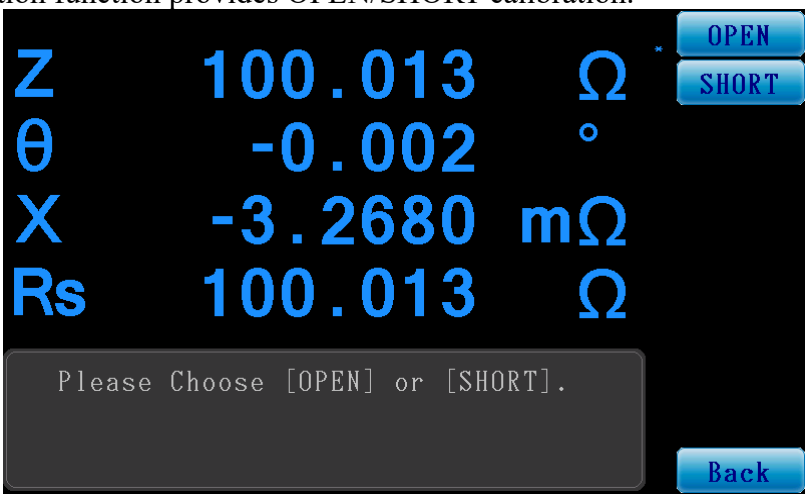


Figure 3-3-4-1 Meter Mode cal. function screen

- **OPEN:** Enters the open circuit calibration menu.
  DC: Starts direct current open circuit calibration.
  Spot: Starts the open circuit calibration for the current "alternating current" setting configuration.
  All Freq: Starts open circuit calibration for all frequencies.

- **SHORT:** Enters the short circuit calibration menu.
  DC: Starts direct current short circuit calibration.
  Spot: Starts the short circuit calibration for the current "alternating current" setting configuration.
  All Freq: Starts short circuit calibration for all frequencies.

※ **It is recommended to perform OPEN/SHORT calibration once before performing measurement for the first time or after changing the measurement fixture/cramp.**

3. 4 Transformer Setting Menu

Press the **Menu** control key, the screen will display the Main Menu; then press **Trans** to enter the transformer setting menu. This is where the various transformer test items can be edited.

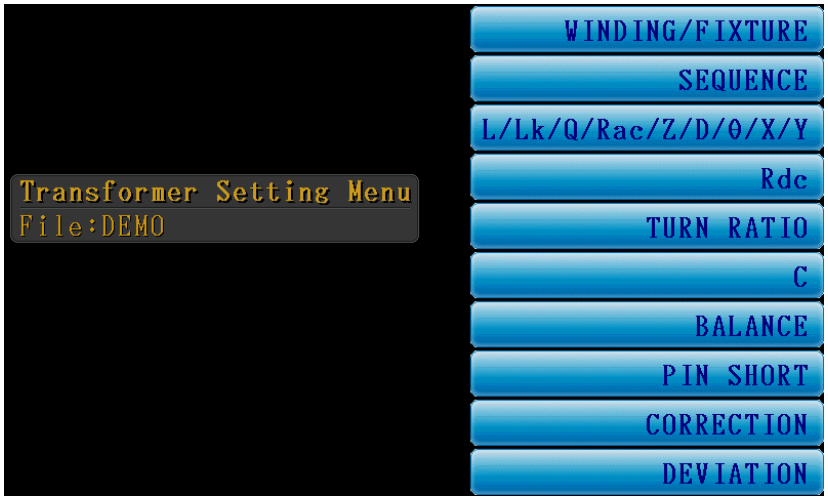


Figure 3-4-1 Transformer Setting Menu screen

3.4.1 WINDING/FIXTURE Setting

WINDING/FIXTURE: Transformer winding setting/Transformer and fixture pin allocation.

- Transformer pin allocation (Allocate Pin to Fixture) setting description:

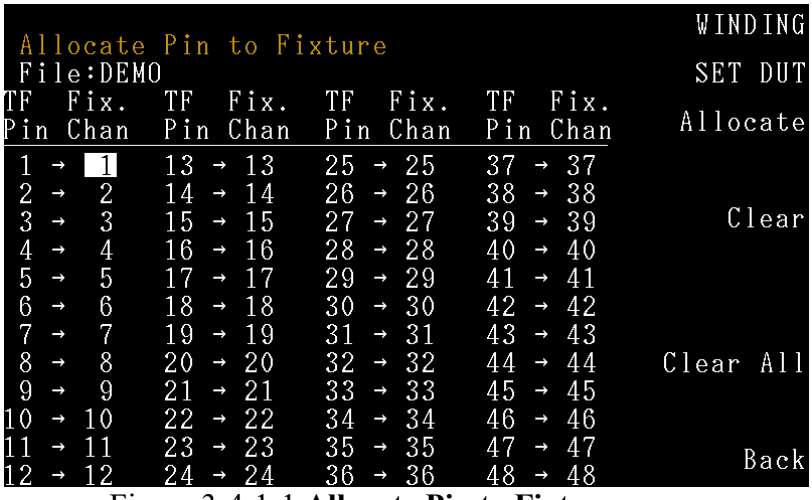
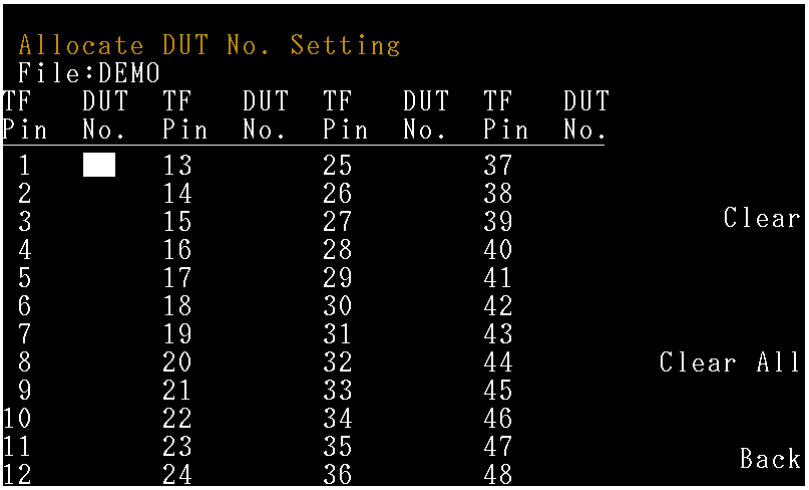


Figure 3-4-1-1 **Allocate Pin to Fixture** screen

1. **TF Pin:** Transformer pin, no need for setting and maximum pin 20.
2. **Fixture Channel:** Configures the position where each transformer pin is inserted on the fixture terminal; set using the number keys.
3. **DUT No.**：Multi DUT can be set by 1~12 with number keys. When the test DUT more than one

then you can use different number to distinguish the DUT.



4. **Allocate:** Automatic transformer pin allocation; after entering the two parameters below and pressing the ENTER key**,** the corresponding pins of the transformer and fixture will be set automatically.
   Transformer total pins: Enter the total number of PINs of the transformer.
   Fixture start channel: Enter the position where PIN1 of the transformer will be inserted on the fixture.
5. **WINDING:** Enters the transformer winding setting screen.
6. **Clear:** Clears a single setting.
7. **Clear All:** Clears all settings previously made for the corresponding transformer pins to the fixture.
8. **Back:** Exits and returns to the function setting menu.

- **Transformer Winding Setting Description:**

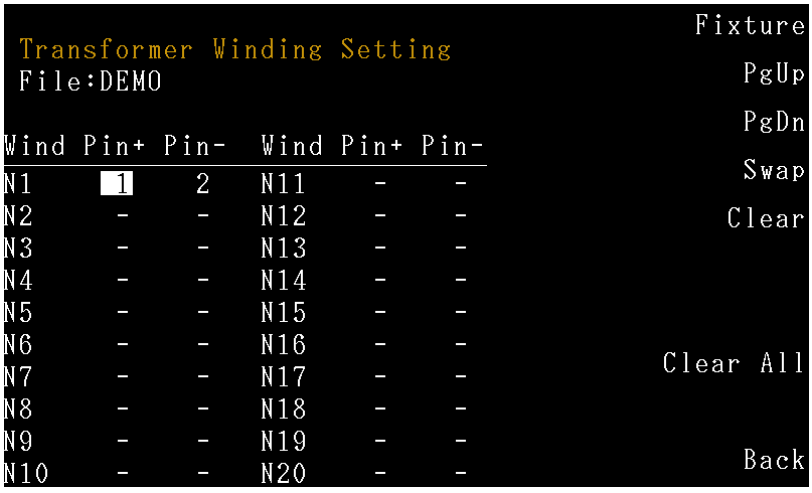


Figure 3-4-1-2 **Transformer Winding Setting** screen

1. **Wind** Transformer coil winding name (N1~N20); does not need to be set.
   Pin+: Sets the positive pin of the transformer winding.
   Pin-: Sets the negative pin of the transformer winding.
   Swap: Swaps the Pin+ and Pin- pins.
2. **Clear:** Clears a single setting.
3. **Clear All:** Clears all settings previously made for the corresponding transformer pins to the fixture.
4. **Back:** Exits and returns to the function setting menu.

3.4.2 Test Sequence Setting

Test Sequence Setting: Sets the test order of each item / whether to test each item.

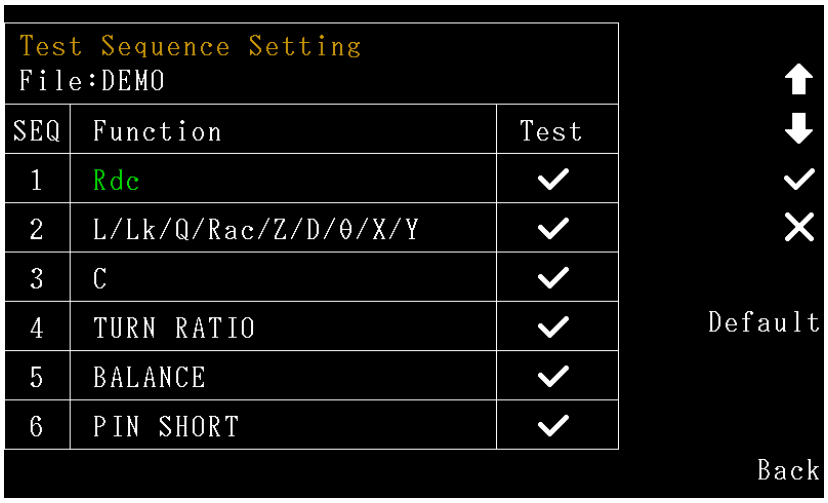


Figure 3-4-2-1 **Allocate Pin to Fixture** screen

Test Sequence Setting：

1. : Changes test order, it moves the currently selected test item up/down by one slot.
2. : Sets whether to enable/disable test for the currently selected test item.
3. **Default:** Restore default values.
4. **Back:** Exits and returns to the function setting menu.

3.4.3 L/Lk/Q/Rac/Z/D/θ/X/Y Setting

L/Lk/Q/Rac/Z/D/θ/X/Y Setting: Ls (serial inductance), Lp (parallel inductance), Lk (leaking inductance), Q (quality factor), Rs (serial resistance), Rp (parallel resistance), Z (impedance), D (dissipation factor), θ (phase angle), X (reactance), Y (admittance) test item settings; the screen is as shown below.

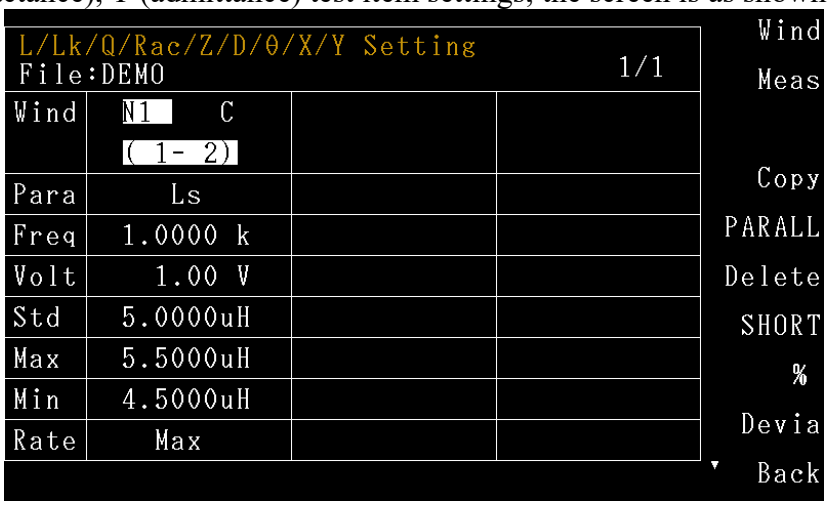


Figure 3-4-3-1

L/Lk/Q/Rac/Z/D/*θ*/X/Y setting description:

1. **Wind:** Transformer coil winding setting field; select the Wind function key to the right to enter settings.

   Right function keys descriptions:

   - **Wind:** Press this function key to select previously edited coil winding.
   - **Meas:** Measurement key; fixtures can be used to measure the value of the DUT for this item, and you can choose whether to carry over this measured value to be used as the standard value for this test item. (Put the DUT in place before measuring.)
   - **Copy:** Copy this set of test item to the next set.
   - **PARALL:** Sets the parallel pins of the transformer; press the PARALL key to enter the setting screen.
   - **Delete:** Deletes this set of test item.
   - **SHORT:** Sets the short-circuit pins of the transformer; press the SHORT key to enter the setting screen.
   - **%**: Sets the upper and lower limit values using percentage (%); its value is calculated using the standard value.
   - **Devia:** Compensation function; fixtures can be used to measure the value of the DUT for this item, the system will calculate the deviation between this measured value and the standard value of this item automatically. When the use of this compensation value is confirmed, this error value will be compensated automatically during testing. (Put the DUT in place before measuring.)
   - **Back:** Exits this function screen.

2. **Para:** Test item field; test items displayed by the function keys to the right of the screen can be selected, as shown in the figure below:

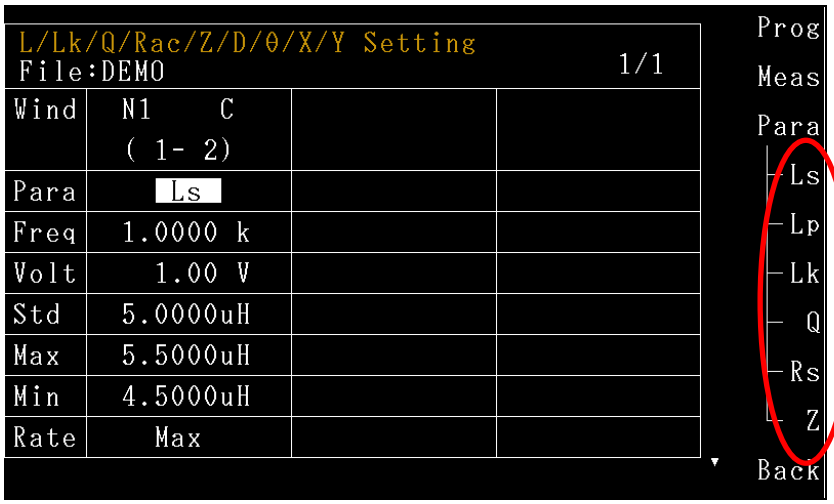
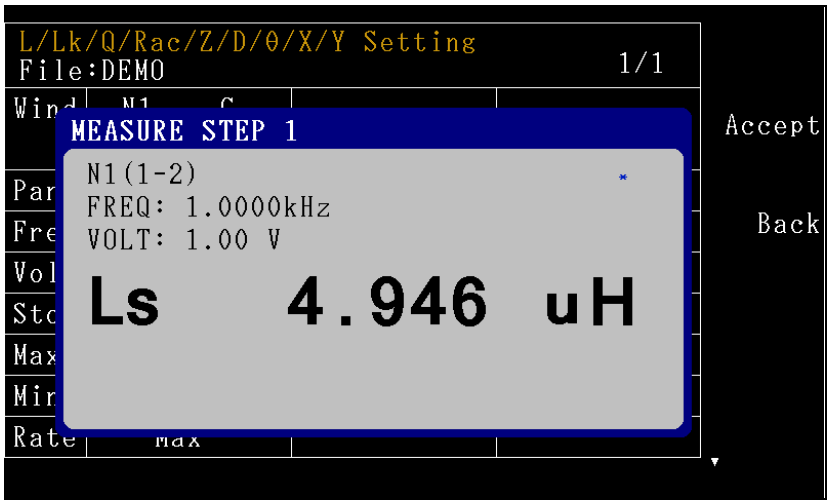


Figure 3-4-3-2

The software key (Para) to the right of the screen can be used to switch between test items, which include the Ls, Lp, Lk, Q, Rs, Z, D, θ, Rp, X and Y test parameters.

3. **Freq:** Sets the test frequency field.
4. **Volt:** Sets the test voltage field.
5. **Std:** Sets the standard value; the following three input methods can be used:
   - Enter the value using the number keys directly.
   - Press the **Meas** function key to the right to acquire the measurement value to use as the standard value directly, as shown in the figure below:



Meas function software key description:

- **Accept:** Confirm the use of this measured value as the standard value and return to the edit screen.
- **Back:** Do not use the current measured value and return to the edit screen.

- First enter the standard value in the standard value field, then press the Devia function key to the right to use compensation to automatically compensate the measured value to the standard value entered. After confirming, the system will automatically record this compensation value entry and automatically add the compensation value when testing this item. The screen is as shown below:

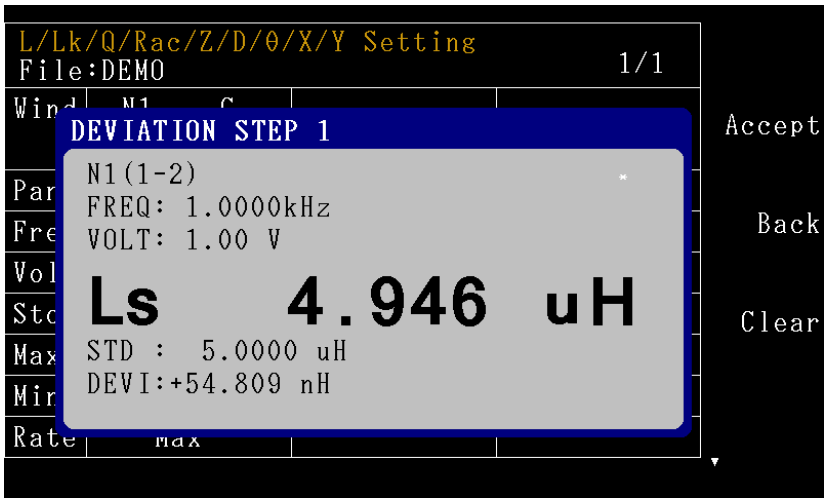


Figure 3-4-3-4

Devia function description:

- **Ls:** Test parameter and measured value display field; this value is the actual measured value.
- **STD:** Standard value display field; this is the standard value set for this test item.
- **DEVI:** Deviation value display field; it is the difference between the standard value (STD) set and the current measured value. If the use is confirmed, this value will be saved as the compensation value.
- **Accept:** Confirm the use of the compensation value and return to the edit screen.
- **Back:** Do not use the compensation value and return to the edit screen.
- **Clear:** Clear the saved compensation value and return to the edit screen.

※Please perform fixture calibration reset before using methods b and c.

6. **Max, Min:** Sets the upper and lower limit field; the value can be entered directly or use the % key to perform settings. In the Limit Setting window, enter the percentage values for the upper and lower limit respectively; after pressing the Enter key, the system will automatically carry of the value to the Max and Min fields. The screen is as shown below:

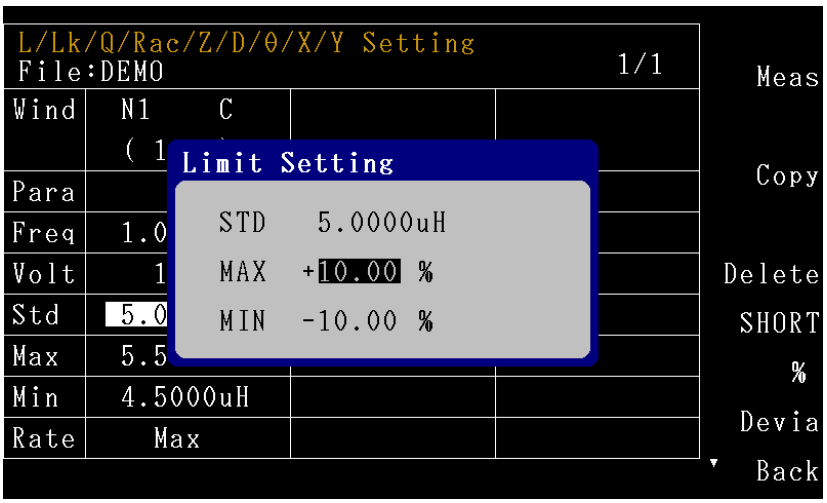


Figure 3-4-3-5

7. **Rate:** Measurement speed setting field; four measurement speeds are available for selection: MAX/FAST/MED/SLOW.

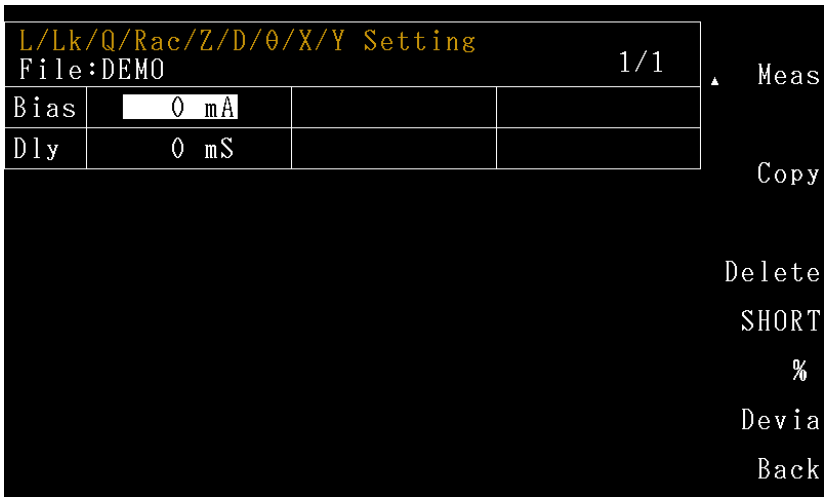


Figure 3-4-3-6

8. **Bias:** DC Bias Current function; the setting range is between 0~100mA. This function must be used with fixtures equipped with the DC Bias Current function (optional purchase).

9. **Dly:** Delay time setting field; the setting range is between 0~9999mS.

3.4.4 Rdc Setting

Rdc Test Setting: Direct current resistance test item setting; the screen is as follows.



Figure 3-4-4-1

Rdc setting description：

1. **Wind:** Transformer coil winding setting field; select the Wind function key to the right to enter settings.
   Right function keys descriptions:
   - **Wind:** Press this function key to select previously edited coil winding.
   - **Meas:** Measurement key; fixtures can be used to measure the value of the DUT for this item, and you can choose whether to carry over this measured value to be used as the standard value for this test item. (Put the DUT in place before measuring.)
   - **Copy:** Copy this set of test item to the next set.
   - **PARALL:** Sets the parallel pins of the transformer; press the PARALL key to enter the setting screen.
   - **Delete:** Deletes this set of test item.
   - **SHORT:** Sets the short-circuit pins of the transformer; press the SHORT key to enter the setting screen.
   - **%**: Sets the upper and lower limit values using percentage (%); its value is calculated using the standard value.
   - **Devia:** Compensation function; fixtures can be used to measure the value of the DUT for this item, the system will calculate the deviation between this measured value and the standard value of this item automatically. When the use of this compensation value is confirmed, this error value will be compensated automatically during testing. (Put the DUT in place before measuring.)
   - **Back:** Exits this function screen.

2. **Std:** Sets the standard value; the following three input methods can be used:
   a. Enter the value using the number keys directly.
   b. Press the Meas function key to the right to acquire the measurement value to use as the standard value directly, as shown in the figure below:

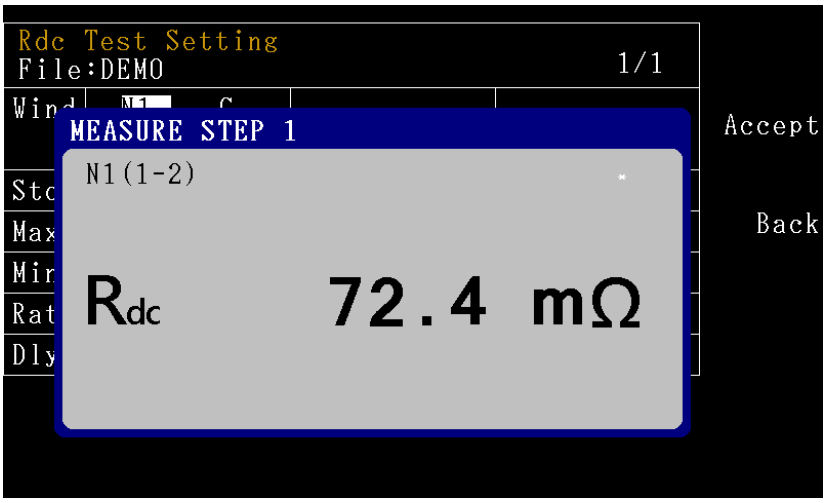


Figure 3-4-4-2

Meas function software key description:
- **Accept:** Confirm the use of this measured value as the standard value and return to the edit screen.
- **Back:** Do not use the current measured value and return to the edit screen.

c. First enter the standard value in the standard value field, then press the Devia function key to the right to use compensation to automatically compensate the measured value to the standard value entered. After confirming, the system will automatically record this compensation value entry and automatically add the compensation value when testing this item. The screen is as shown below:

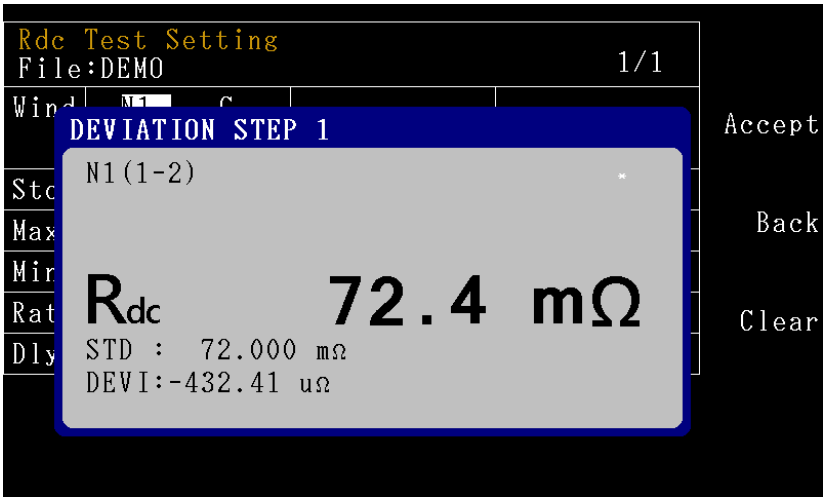


Figure 3-4-4-3

Devia function description:

- **Rdc:** Test parameter and measured value display field; this value is the actual measured value.
- **STD:** Standard value display field; this is the standard value set for this test item.
- **DEVI:** Deviation value display field; it is the difference between the standard value (STD) set and the current measured value. If the use is confirmed, this value will be saved as the compensation value.
- **Accept:** Confirm the use of the compensation value and return to the edit screen.
- **Back:** Do not use the compensation value and return to the edit screen.
- **Clear:** Clear the saved compensation value and return to the edit screen.

※Please perform fixture calibration reset before using methods b and c.

3. **Max, Min:** Sets the upper and lower limit field; the value can be entered directly or use the % key to perform settings. In the Limit Setting window, enter the percentage values for the upper and lower limit respectively; after pressing the Enter key, the system will automatically carry of the value to the Max and Min fields. The screen is as shown below:

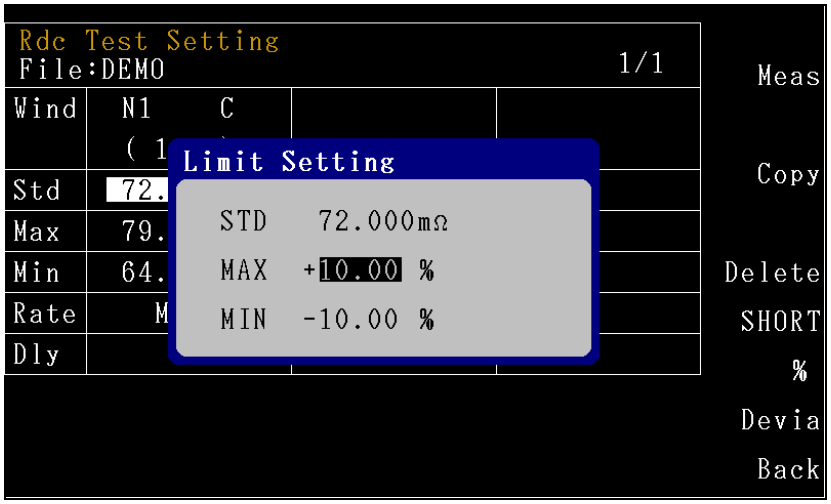


Figure 3-4-4-4

4. **Rate:** Measurement speed setting field; four measurement speeds are available for selection: MAX/FAST/MED/SLOW.

5. **Dly:** Delay time setting field; the setting range is between 0~9999mS.

3.4.5 Turn Ratio Test Setting

Turn Ratio Test Setting：

※ It is strongly recommended that when editing this step, place windings with more coils at the initial end and the windings with fewer coils at the secondary end in order to prevent forced amplification of the signal and generating a voltage that is too high, exceeding the measurement range acceptable to the instrument.

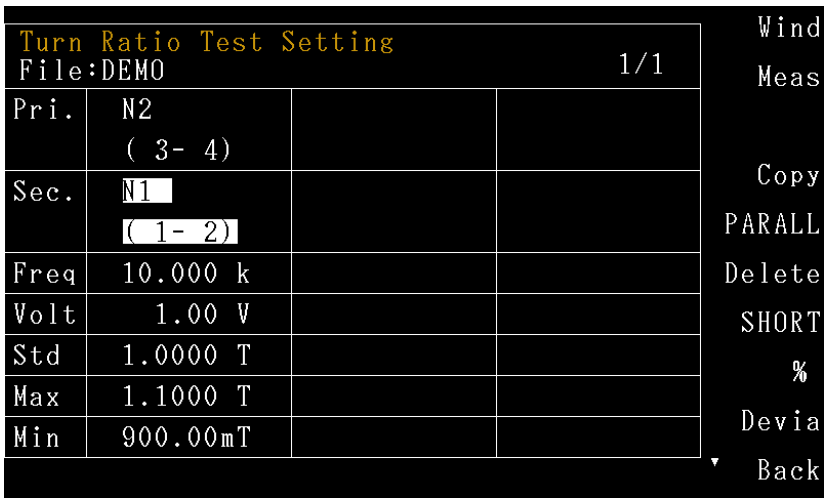


Figure 3-4-5-1

Turn ratio setting description:

1. **Pri., Sec.:** Primary winding and secondary winding setting fields of the transformer cable; select the Wind function key to the right to enter settings.
   Right function keys descriptions:
   - **Wind:** Press this function key to select previously edited coil winding.
   - **Meas:** Measurement key; fixtures can be used to measure the value of the DUT for this item, and you can choose whether to carry over this measured value to be used as the standard value for this test item. (Put the DUT in place before measuring.)
   - **Copy:** Copy this set of test item to the next set.
   - **PARALL:** Sets the parallel pins of the transformer; press the PARALL key to enter the setting screen.
   - **Delete:** Deletes this set of test item.
   - **SHORT:** Sets the short-circuit pins of the transformer; press the SHORT key to enter the setting screen.
   - **%**: Sets the upper and lower limit values using percentage (%); its value is calculated using the standard value.
   - **Devia:** Compensation function; fixtures can be used to measure the value of the DUT for this item, the system will calculate the deviation between this measured value and the standard value of this item automatically. When the use of this compensation value is confirmed, this error value will be compensated automatically during testing. (Put the DUT in place before measuring.)
   - **Back:** Exits this function screen.

2. **Std:** Sets the standard value; the following three input methods can be used:
   a. Enter the value using the number keys directly.
   b. Press the Meas function key to the right to acquire the measurement value to use as the standard value directly, as shown in the figure below:

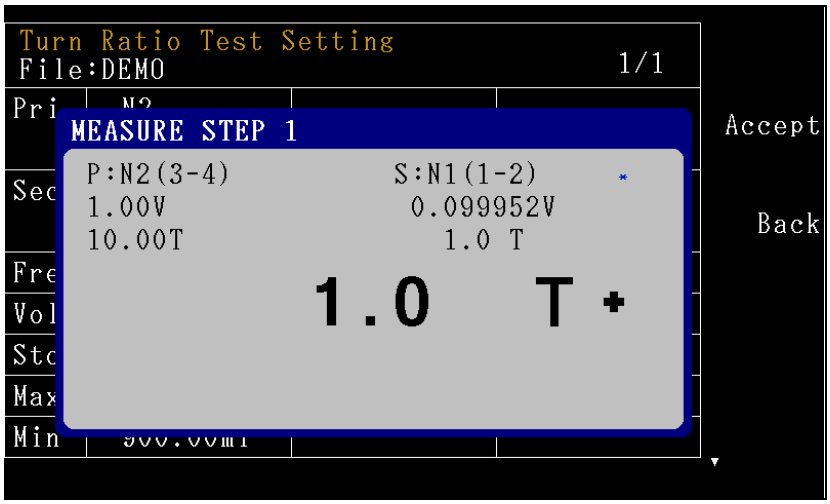


Figure 3-4-5-2

Meas function software key description:

- **Accept:** Confirm the use of this measured value as the standard value and return to the edit screen.
- **Back:** Do not use the current measured value and return to the edit screen.
  (The "+" sign displayed to the right of the measured value is the polarity; the polarity might be "+" or "-" according to different test conditions.)

c. First enter the standard value in the standard value field, then press the Devia function key to the right to use compensation to automatically compensate the measured value to the standard value entered. After confirming, the system will automatically record this compensation value entry and automatically add the compensation value when testing this item. The screen is as shown below:

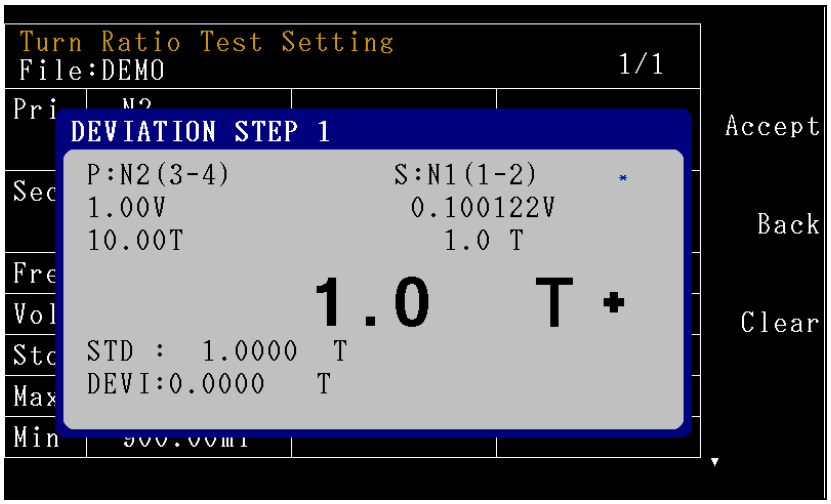


Figure 3-4-5-3

Devia function description:

- **Rdc:** Test parameter and measured value display field; this value is the actual measured value.
- **STD:** Standard value display field; this is the standard value set for this test item.
- **DEVI:** Deviation value display field; it is the difference between the standard value (STD) set and the current measured value. If the use is confirmed, this value will be saved as the compensation value.
- **Accept:** Confirm the use of the compensation value and return to the edit screen.
- **Back:** Do not use the compensation value and return to the edit screen.
- **Clear:** Clear the saved compensation value and return to the edit screen.

(The "+" sign displayed to the right of the measured value is the polarity; the polarity might be "+" or "-" according to different test conditions.)

3. **Max, Min:** Sets the upper and lower limit field; the value can be entered directly or use the % key to perform settings. In the Limit Setting window, enter the percentage values for the upper and lower limit respectively; after pressing the Enter key, the system will automatically carry of the value to the Max and Min fields. The screen is as shown below:

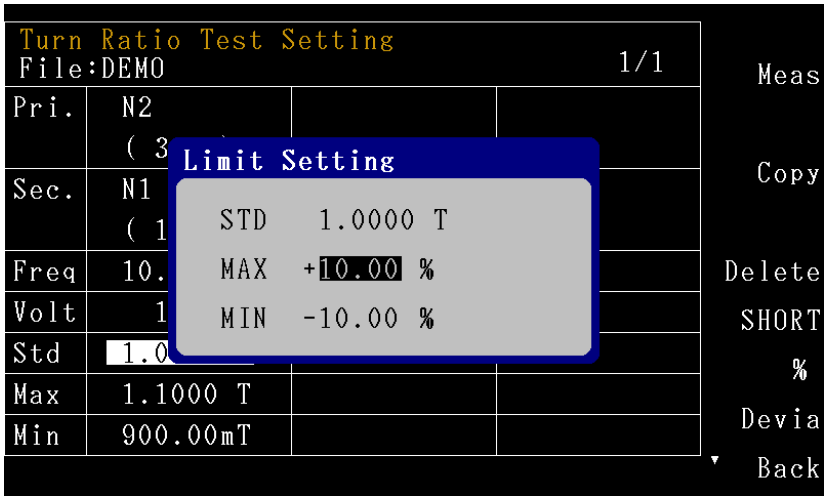


Figure 3-4-5-4

4. **Mode:** Measurement mode setting field; two measurement modes Turn and Volt are available for selection.
   - **Turn:** The test value is displayed using the number of turns.
   - **Volt:** The test value is displayed using voltage value.
5. **PriT:** Number of preliminary winding turns setting field.
6. **Pol:** Polarity setting field; “+”, “-” or “OFF” are available for selection.
7. **Rate:** Measurement speed setting field; four measurement speeds are available for selection: MAX/FAST/MED/SLOW.
8. **Dly:** Delay time setting field; the setting range is between 0~9999mS.

3.4.6 Capacitance Testing Setting

Capacitance Test Setting screen as below:

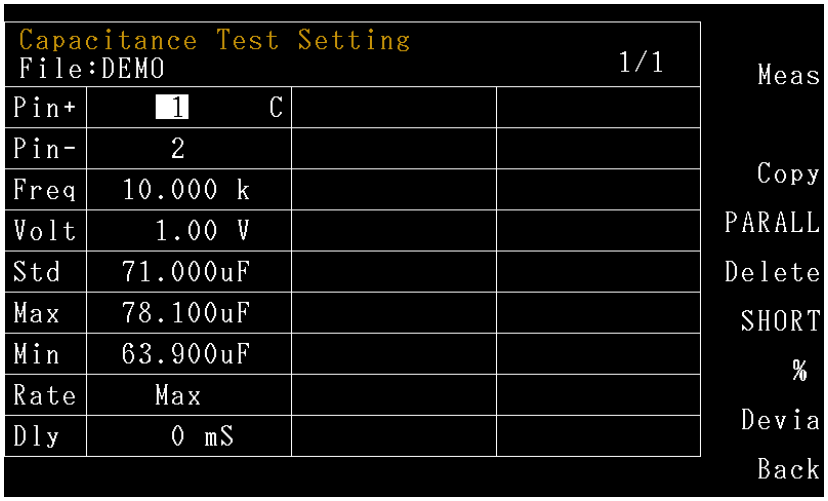


Figure 3-4-6-1

Capacitance test setting description:

1. **Pin+, Pin-:** Sets the pin of the transformer to measure the capacitance value.
   Right function keys descriptions:
   - **Meas:** Measurement key; fixtures can be used to measure the value of the DUT for this item, and you can choose whether to carry over this measured value to be used as the standard value for this test item. (Put the DUT in place before measuring.)
   - **Copy:** Copy this set of test item to the next set.
   - **PARALL:** Sets the parallel pins of the transformer; press the PARALL key to enter the setting screen.
   - **Delete:** Deletes this set of test item.
   - **SHORT:** Sets the short-circuit pins of the transformer; press the SHORT key to enter the setting screen.
   - **%**: Sets the upper and lower limit values using percentage (%); its value is calculated using the standard value.
   - **Devia:** Compensation function; fixtures can be used to measure the value of the DUT for this item, the system will calculate the deviation between this measured value and the standard value of this item automatically. When the use of this compensation value is confirmed, this error value will be compensated automatically during testing. (Put the DUT in place before measuring.)
   - **Back:** Exits this function screen.

2. **Std:** Sets the standard value; the following three input methods can be used:
   a. Enter the value using the number keys directly.
   b. Press the Meas function key to the right to acquire the measurement value to use as the standard value directly, as shown in the figure below:

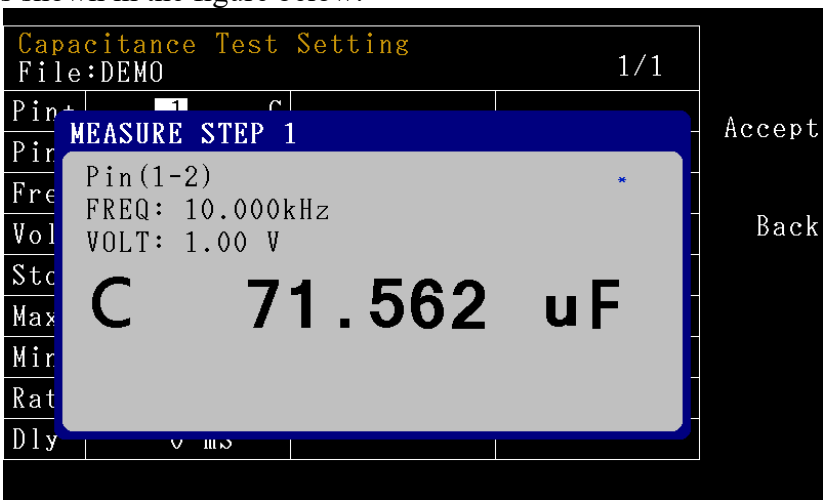


Figure 3-4-6-2

Meas function software key description:

- **Accept:** Confirm the use of this measured value as the standard value and return to the edit screen.
- **Back:** Do not use the current measured value and return to the edit screen.

   c. First enter the standard value in the standard value field, then press the Devia function key to the right to use compensation to automatically compensate the measured value to the standard value entered. After confirming, the system will automatically record this compensation value entry and automatically add the compensation value when testing this item. The screen is as shown below:

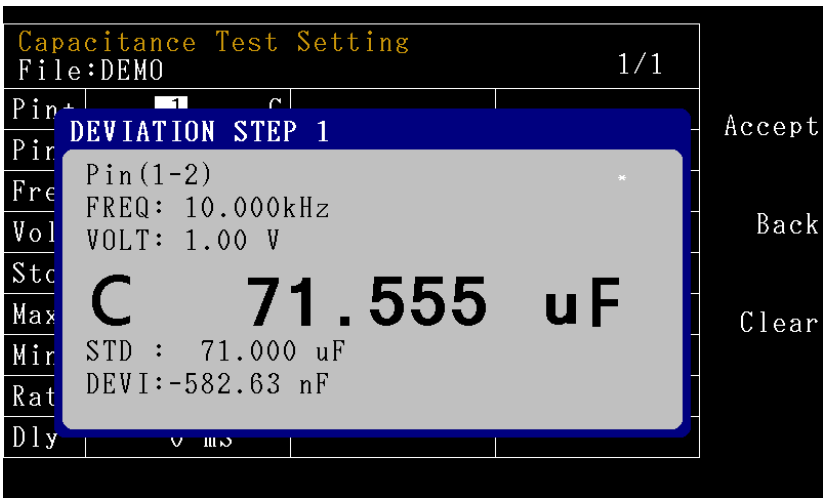


Figure 3-4-6-3

Devia function description:

- **C:** Test parameter and measured value display field; this value is the actual measured value.
- **STD:** Standard value display field; this is the standard value set for this test item.

- **DEVI:** Deviation value display field; it is the difference between the standard value (STD) set and the current measured value. If the use is confirmed, this value will be saved as the compensation value.
- **Accept:** Confirm the use of the compensation value and return to the edit screen.
- **Back:** Do not use the compensation value and return to the edit screen.
- **Clear:** Clear the saved compensation value and return to the edit screen.

3. **Max, Min:** Sets the upper and lower limit field; the value can be entered directly or use the % key to perform settings. In the Limit Setting window, enter the percentage values for the upper and lower limit respectively; after pressing the Enter key, the system will automatically carry of the value to the Max and Min fields. The screen is as shown below:

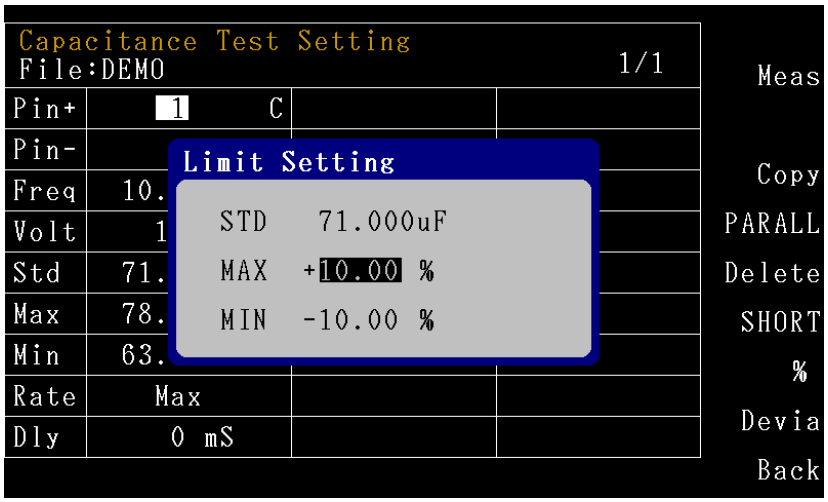


Figure 3-4-6-4

4. **Rate:** Measurement speed setting field; four measurement speeds are available for selection: MAX/FAST/MED/SLOW.

5. **Dly:** Delay time setting field; the setting range is between 0~9999mS.

3.4.7 Balance Test Setting

Balance Test Setting: Coil balance test item settings; it can compare the measured values of two sets of windings under the same conditions (test item/test frequency/test voltage). Please note that the winding that you are editing the coil balance for must be a coil winding with actual test items that have been created; otherwise, the correct results cannot be calculated.

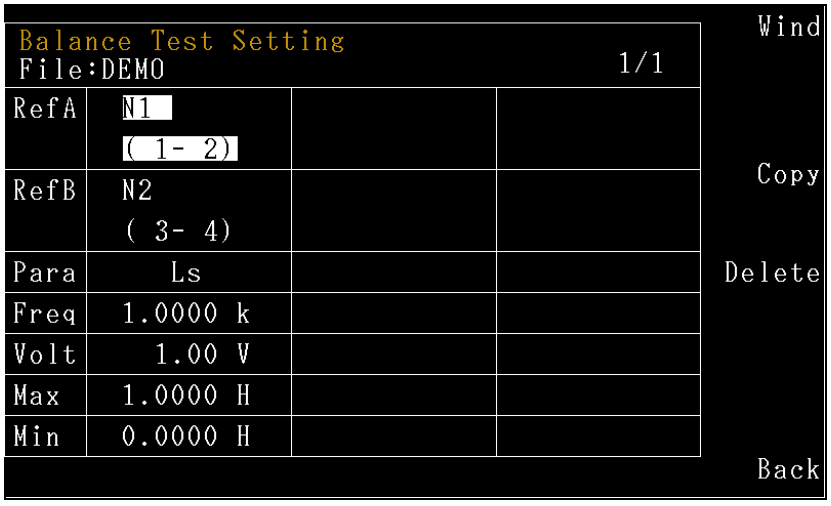


Figure 3-4-7-1

Coil balance test setting description:

1. **RefA, RefB:** Sets the windings for coil balance to compare.
   Right function keys descriptions:
   - **Wind:** Press this function key to select previously edited coil winding.
   - **Copy:** Copy this set of test item to the next set.
   - **Delete:** Deletes this set of test item.
   - **Back:** Exits this function screen.
2. **Para:** Test item field; the software key (Para) to the right of the screen can be used to switch between test items, which include the Ls, Lp, Lk, Rs, Z, and DCR etc. test parameters.
3. **Freq:** Sets the test frequency field.
4. **Volt:** Sets the test voltage field.
5. **Max, Min:** Sets the upper and lower limit fields.

3.4.8 Pin Short Test Setting

Pin Short Test Setting: Transformer short-circuit test item.

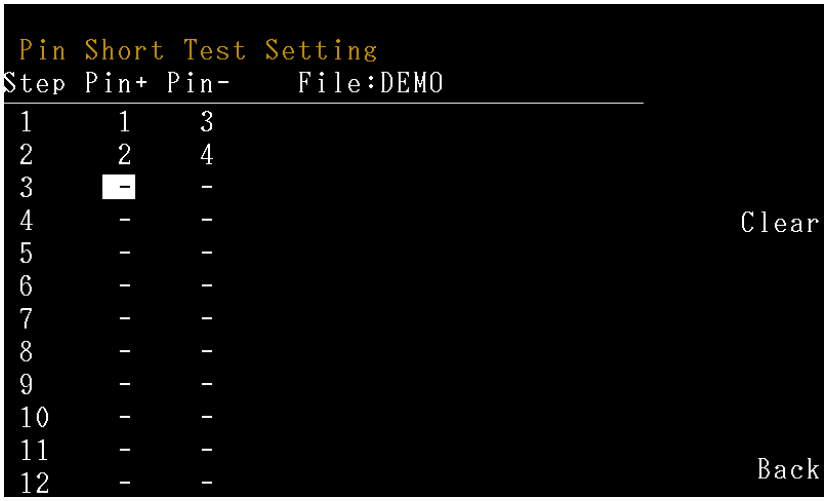


Figure 3-4-8-1

Pin short test setting description:

1. **Step:** Test step; a maximum of 12 short-circuit test items can be edited.
2. **Pin+, Pin-:** Sets the transformer pin combinations for the short-circuit test.
   Right function keys descriptions:
   - **Clear:** Clear key.
   - **Back:** Exits this function screen.

3.4.9 Correction Setting

Correction: Fixture error correction test; the goal for the correction is to eliminate the errors caused by parasitic capacitance or serial impedance of the fixture or test cable.
The corrected and reset data will be saved in the flash memory inside the instrument; the data will not disappear even if powered off. However, frequent correction and reset is necessary because only by doing so can the most accurate measured value be acquired. Corrections usually must be performed when the test frequency or drive voltage changes.
(Before preparing for correction, please first remove the transformer on the fixture from the fixture)



Figure 3-4-9-1

Correction setting description:

1. **OPEN:** Only correct the error value of the fixture for open circuits.
2. **SHORT:** Only correct the error value of the fixture for short circuits.
3. **Both:** First correct the error value of the fixture for open circuits then correct the error value for short circuits.
4. **Ext S/C**：Perform external short correction。User should short the pins which you need to test before perform, to actually zeroing to the end of the test object.
5. **Back:** Exits this function screen.

3.4.10 Complete Deviation Setting

Complete Deviation: Uses GOLDEN SAMPLE as the standard to perform error compensation setting; it compensates the measured value to the value acknowledged by you.

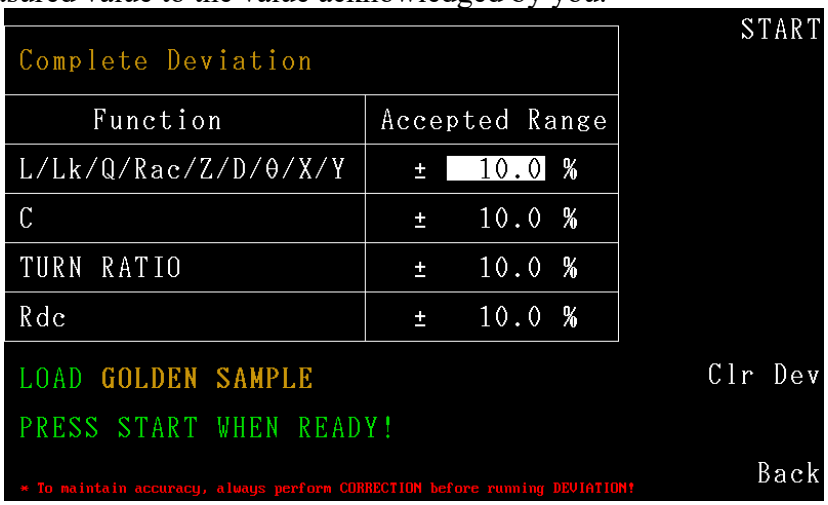


Figure 3-4-10-1

Complete deviation setting description:

※This compensation setting requires placing the GOLDEN SAMPLE in the F5648 test fixture.

1. **Function:** Displays test items that you can perform compensation for.
2. **Accepted Range:** Upper and lower limit for compensation; use this to set the maximum range for compensation.
3. **Clr Dev:** Clear all compensation value.
4. **Back:** Exits this function screen.
5. **START:** Enters the compensation value test screen.
   - **Compensation value test description:**

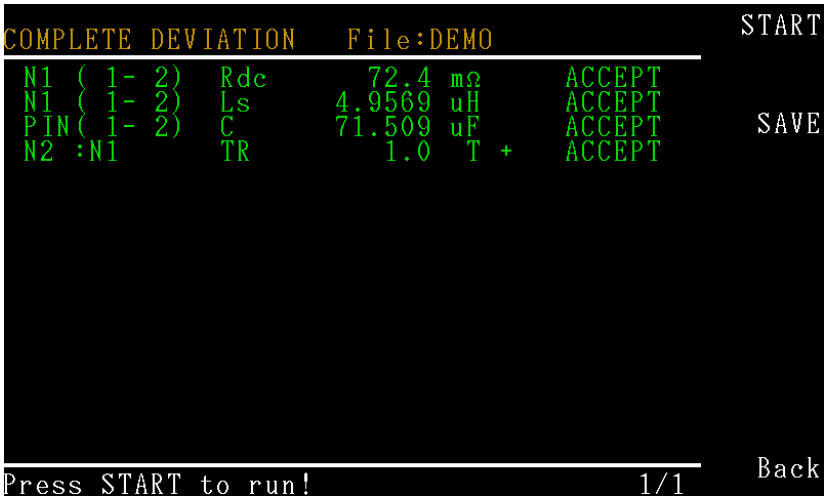


Figure 3-4-10-2

START: Starts performing test and calculate the compensation value; tests will be performed individually based on the test items you created. This test value will use standard value of the test item you created as the basis to perform compensation to the standard value. If the text REJECT appeared for the compensation value, it means that it exceeded the upper and lower limit for compensation and cannot be used. ACCEPT means that it is within range and is an acceptable compensation value.
SAVE: Saves the compensation value for this test.
Back: Exists this function screen.

3.5 Test Mode

When you have finished editing the step, the **Test** key on the front panel can be pressed to enter test mode, and use the **Trigger** key to perform transformer test; its test screen functions and definitions are as shown in the figure below:

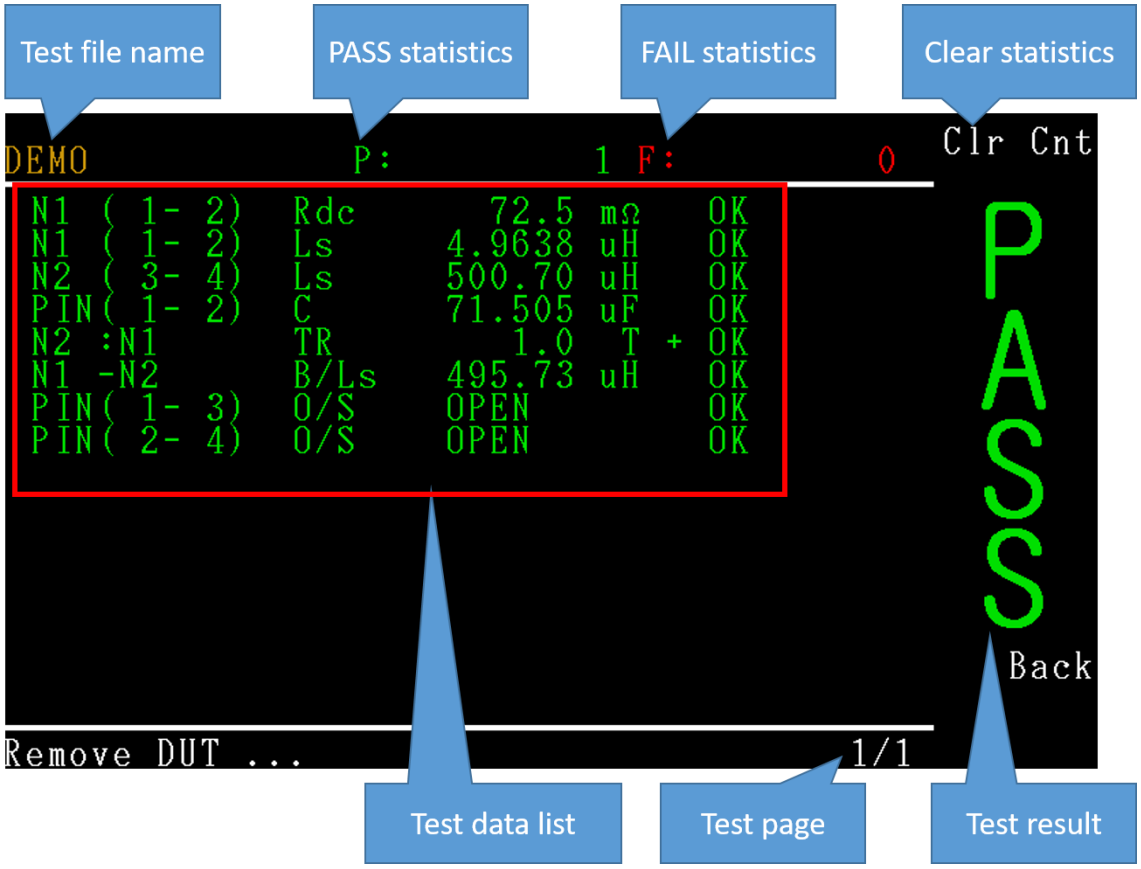


Figure 3-5-1 Multi Step Mode screen

※The maximum value of the PASS/FAIL statistics is 999,999,999 each. If this value is exceeded, it will be reset to 1 and continue to accumulate.

3.6 File Management

Under the Main Menu screen, press the **FILE** function key to enter the file management main menu.



Figure 3-6-1 FILE MANAGEMENT screen

3.6.1 Loading File

The figure below is the RAM FILE (internal file list) screen; the directional keys can be used to select the file to load. For example file {001} is displayed in green, this means that it is the currently selected file. The function key {LOAD} to the right can be pressed to load the file. The file with an {@} symbol in front of the file name means it is the file that is currently being used.



Figure 3-6-1-1 RAM FILE screen

- **LOAD:** Loads the currently selected file.
- **USB File:** Switches to the USB flash drive file list screen; the screen is as shown below.



Figure 3-6-1-2 USB FILE screen

RAM File: Returns to the internal file list screen.
Copy to RAM: Copies the currently selected file from the USB flash drive to the internal storage of the machine.

All to RAM：Copy all the file to the internal storage of the machine.

Note：If there have the same file name between USB and internal storage of the machine the file will be covered by the file in the USB.

PgDn: Jump to next page.

PgUp: Jump to the previous page.

QUIT: Returns to the file management page.

- **Copy to USB:** Copies the currently selected file to the USB flash drive. Its saving path is (USB:\TF_5465\SetFile).
- **All to USB**：Copy all the file to the USB.
- **PgDn:** Jump to next page.
- **PgUp:** Jump to the previous page.
- **QUIT:** Returns to the file management page.

3.6.2 Saving As

The figure below is the SAVE AS (save as new file) operation interface. The directional keys can be used to select the English letters and numbers on the screen to form the file name. For example {A} is displayed in green, which means it is the currently selected letter. The function key {Select} to the right can be pressed to enter the character {A}. Once input is completed, select {OK} to complete the SAVE AS function.

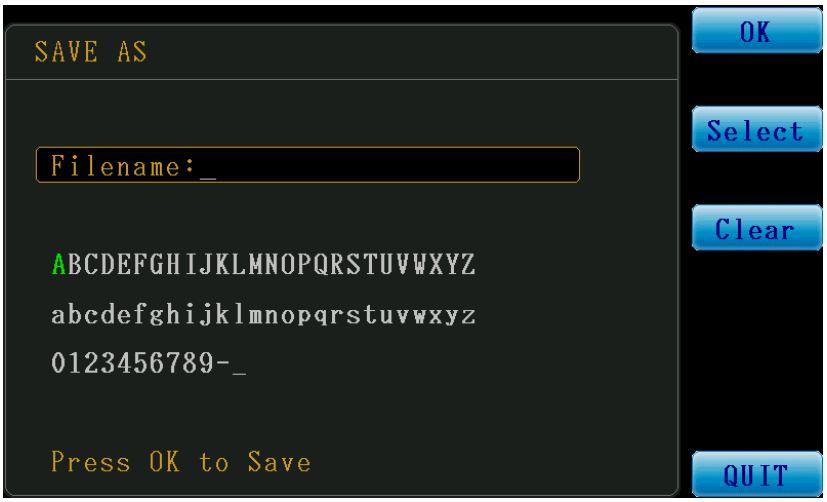


Figure 3-6-2-1 SAVE AS screen

- **Filename:** File name input area.
- **OK:** Save file confirm key.
- **Select:** File name text selection confirm key.
- **Clear:** File name deletion key; the letter at the end will be cleared each time it is pressed.
- **QUIT:** Returns to the file management page.

3.6.3 Creating New File

The figure below is the NEW FILE (create new file) operation interface. The directional keys can be used to select English letters and numbers on the screen to form the file name. For example {A} is displayed in green, which means it is the currently selected letter. The function key {Select} to the right can be pressed to enter the character {A}. Once input is completed, select {OK} to complete the NEW FILE function.

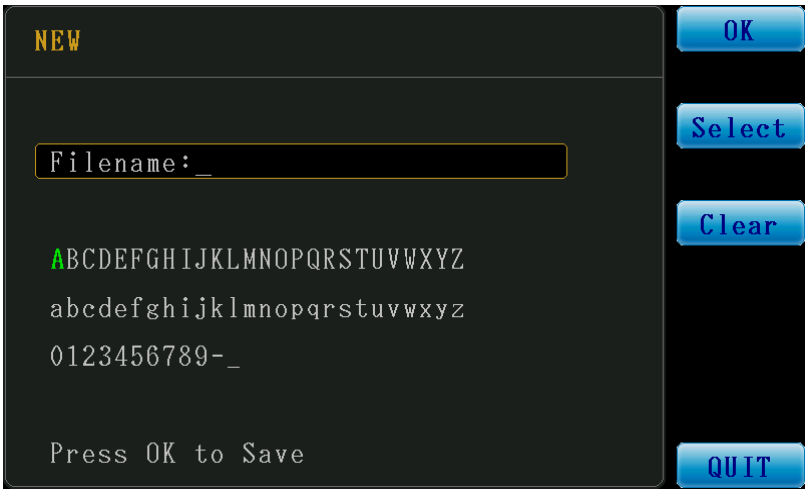


Figure 3-6-3-1 NEW FILE screen

- **Filename:** File name input area.
- **OK:** Save file confirm key.
- **Select:** File name text selection confirm key.
- **Clear:** File name deletion key; the letter at the end will be cleared each time it is pressed.
- **QUIT:** Returns to the file management page.

3.6.4 Deleting File

The figure below is the DELETE FILE (delete file) operation interface. The directional keys can be used to select the file to delete. For example {011} is displayed in green, which means it is the currently selected file. The function key {DELETE} to the right can be pressed to delete this file. The file name with the {@} symbol in front means it is the file currently being used and cannot be deleted. Another file must be loaded first in order to delete this file.

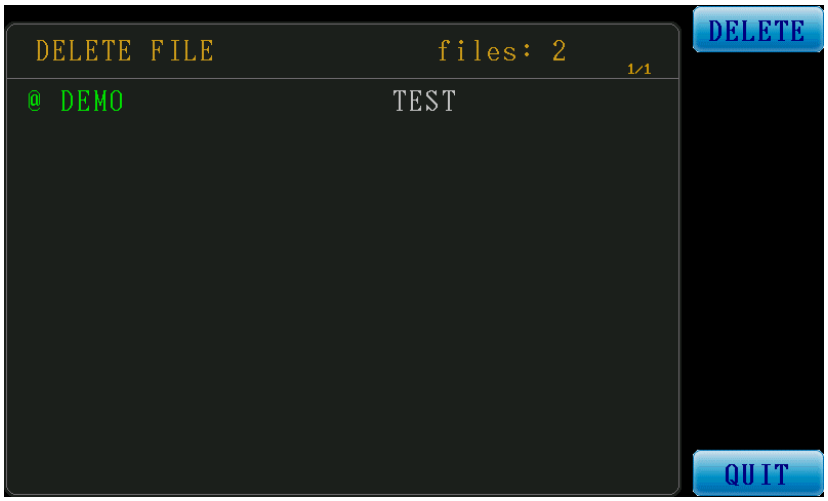
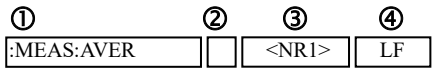


Figure 3-6-4-1 DELETE FILE Screen

- **DELETE:** Deletes the currently selected file.
- **PgDn:** Jump to next page.
- **PgUp:** Jump to the previous page.
- **QUIT:** Returns to the file management page.

3.7 Instruction Set

Instruction Structure



1. Instruction
2. Space
3. Parameter
4. End character

Parameter Types

<NR1>	Integers	Such as: 0, 1, 2, 3
<NR2>	Decimal number	Such as 0.1, 1.23, 2.0
<NR3>	Float	Such as: 2.5E-1, 6.25E+1
<disc>	Discrete data	Such as ON, OFF, MAX

End character

\n (0xa) Line feed code.(LF)

Syntax

The part titled "Syntax" describes the syntax of sending commands, which consists of commands and parameters. Spaces are used to separate the command and parameter parts.
If there are more than one parameters, use commas between the parameters. The period (...) between the commas means that the parameters in this part are omitted.
For example, <numeric 1>,...,<numeric 4> means four parameters, which means that <numeric 1>,<numeric 2>,<numeric 3>,<numeric 4> are required.
For string-type parameters, such as <"string">, <"string 1">, etc., double quotes (") must be used before and after the parameters.

Grammar uses symbol definition

< >	This symbol should include required parameter.
[ ]	In this symbol can be omitted.
{ }	You must select an item in brackets, and individual items are separated by vertical bars (|).

Remarks

Instructions are not case sensitive.

This machine accepts The International System of Units (SI) Instructions are as follows:

"G" (Giga) (10^9)
"MA" (Mega) (10^6)
"K" (Kilo) (10^3)
"m" (Milli) (10^{-3})
"u" (Micro) (10^{-6})
"n" (Nano) (10^{-9})
"p" (Pico) (10^{-12})
"f" (Femto) (10^{-15})

※ For any of the following instruction sets that involve frequency related settings, the frequency range is as follows:

5465 (10Hz~200kHz)
5466 (10Hz~500kHz)
5467 (10Hz~1MHz)

---

*IDN?

(Identification query) Identification query.
Responses: Manufacturer, machine model, serial number, information on the firmware version.

Syntax：

*IDN?

Example:

***IDN?**

Returns

MICROTEST,5465,S00001,V1.803300

---

*TRG

(Triggers a direct measurement) Triggers measurement once but does not return results.

※ Can be used for Meter Mode and Test Mode.

Syntax：

*TRG

Example:

***TRG**

:CAL:OPEN:ALL?

Executes open circuit correction for all frequencies, and reads the execution results.

Syntax：

:CAL:OPEN:ALL?

Responses:

OK (Calibration ok)
NG (Calibration failure)

Example:

:CAL:OPEN:ALL? Returns **OK**

:CAL:OPEN:DC?

Executes open circuit correction for direct current (DC), and reads the execution results.

Syntax：

:CAL:OPEN:DC?

Responses:

OK (Calibration ok)
NG (Calibration failure)

Example:

:CAL:OPEN:DC? Returns **OK**

:CAL:OPEN:SPOT?

Executes open circuit correction for the alternating current (AC) of the current frequency, and reads the execution results.

Syntax：

:CAL:OPEN:SPOT?

Responses:

OK (Calibration ok)
NG (Calibration failure)

Example:

:CAL:OPEN:SPOT? Returns **OK**

:CAL:SHORT:ALL?

Executes short circuit correction for all frequencies, and reads the execution results.

Syntax：

:CAL:SHORT:ALL?

Responses:

OK (Calibration ok)
NG (Calibration failure)

Example:

:CAL:SHORT:ALL? Returns **OK**

:CAL:SHORT:DC?

Executes short circuit correction for direct current (DC), and reads the execution results.

Syntax：

:CAL:SHORT:DC?

Responses:

OK (Calibration ok)
NG (Calibration failure)

Example:

:CAL:SHORT:DC? Returns **OK**

:CAL:SHORT:SPOT?

Executes short circuit correction for the alternating current (AC) of the current frequency, and reads the execution results.

Syntax：

:CAL:SHORT:SPOT?

Responses:

OK (Calibration ok)
NG (Calibration failure)

Example:

:CAL:SHORT:SPOT? Returns **OK**

:DISP:PAGE

Select the page to display.

Syntax：

:DISP:PAGE {MEAS|TEST|DEVTEST|CORR}

Parameters:

MEAS	Set the display page as Meter Mode
TEST	Set the display page as Test Mode

Example:

:DISP:PAGE MEAS

:DISP:PAGE?

Query currently displayed page.

Syntax：

:DISP:PAGE?

Responses:

MEAS	The current displayed page is Meter Mode
TEST	The current displayed page is Test Mode
OTHER	The current page is not in the pages described above.

Example:

:DISP:PAGE? Returns **MEAS**

:FETCH?　　(for Meter Mode)

Under Meter Mode, the measured data and comparison results can be returned according to the display order of the current measurement items.

※ Can be used for Meter Mode and Test Mode; here is the explanation when used in Meter Mode.

Syntax：

:FETCH?

Responses：

<Data 1>,<Data 2>,<Data 3>,<Data 4>,<Comp 1>,<Comp 2>,
<Comp 3>,<Comp 4>

Return parameter description:

<Data>

Measurement data; <NR3> scientific notation format is used for the return format.

Data 1~4 represents the measurement data of four test items. There are only values for items with display enabled. For example, if only two test items were enabled, two data entries will be returned; or when under DC mode, only the Rdc item can be measured, so only one set of data will be returned.

<Comp>

Measurement data compare results; <NR1> is used for the return format. Its definitions are as follows:

0 Compare function disabled
1 Comparison result is OK
2 Comparison result is NG

Comp 1~4 represents the individual test data comparison results of the four test items. Once the compare function is enabled for any one of the test items, the comparison results will be returned; its order is consistent with <Data>.

EX1:

4 test items with all compare function disabled, then the retuned result is
<Data 1>,<Data 2>,<Data 3>,<Data 4>

EX2:

4 test items, in which the compare function is enabled for one or all items, then the returned result is
<Data 1>,<Data 2>,<Data 3>,<Data 4>,<Comp 1>,<Comp 2>,
<Comp 3>,<Comp 4>

EX3:

2 test items with all compare function disabled, then the retuned result is
<Data 1>,<Data 2>

EX4:

4 test items, in which the compare function is enabled for one or all items, then the returned result is

<Data 1>,<Data 2>,<Comp 1>,<Comp 2>,

Example:

:FETCH?

Returns

1.000060E+02,3.791240E-04,1.000060E+02,9.999395E-03,1,1,1,1

:FETCH? (for Test Mode)

Under Test Mode, the measured data and results can be returned according to the order of the test items.

※ Can be used for Meter Mode and Test Mode; here is the explanation when used in Test Mode.

Syntax：

:FETCH?

Responses:

<File Name>,<Result>,<OK Count>,<NG Count>;
<Step 1 Data>;<Step 2 Data>;…<Step n Data>

Return parameter description:

<File Name>

<Result>

Results of this test; <NR1> is used for the return format. Its definitions are as follows:

0 Test interrupted and not completed
1 Test steps were all OK
2 There was NG during test steps

<OK Count>

Return total number of PASS.

<NG Count>

Return total number of FAIL.

<Step [n] Data>

Represents the returned test data of each test item; its detailed formats are as described below:
<Wind>,<Item Name>,<Data>,<Unit>,<Pol>,<Step Result>

- **<Wind>**

  The winding name for this test step.

- **<Item Name>**

  The item name return field for this test step; its corresponding test item names are as shown in the table below:

Test item name	Return name	Balance item name	Return name
Serial inductance	Ls	Ls	B/Ls
Parallel inductance	Lp	Lp	B/Lp
Lk	Lk	-	-
Quality factor	Q	-	-
Serial resistance	Rs	Rs	B/Rs
Parallel resistance	Rp	Rp	B/Rp
Impedance	Z	Z	B/Z
Dissipation factor	D	------	------
Phase angle	DEG	------	------
Reactance	X	------	------
Admittance	Y	------	------
Capacitance	C	------	------
DCR	Rdc	DCR	B/Rdc
TURN RATIO	TR	------	------
PIN SHORT	O/S	------	------

- **<Data>**

  Returned test value for this test step.

- **<Unit>**

  Test data unit for this test step, such as mohm, ohm, kohm, mH, H, uF and F etc.

Test item name	Return unit
Ls、Lp、Lk	H
Quality factor	Q
Rs、Rp、Z、X、DCR	ohm
Dissipation factor	D
Phase angle	deg
Admittance	S
Capacitance	F
TURN RATIO	T
PIN SHORT	------

- **<Pol>**

  Polarity test result of this test step: only exists for the TURN RATIO item; an empty space will be returned for other items.
  + test result is positive polarity
  - test result is negative polarity

  This field will be represented with an empty space when polarity test is disabled (OFF) for TURN RATIO or for non-Turn Ratio items.

- **<Step Result>**

  Test results for this step; its definitions are as follows:
  OK Test result is OK
  NG Test result is NG

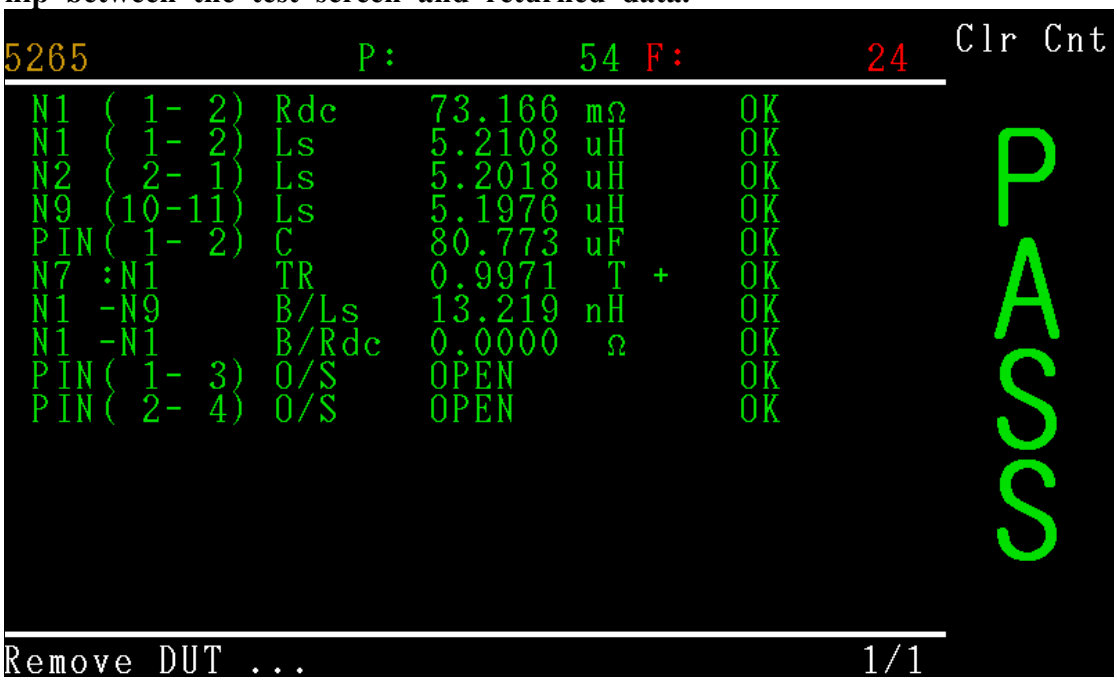
Example：

:FETCH?

Returns

5465,1,54,24;N1 (1- 2),Rdc,73.166,mohm, ,OK;N1 (1- 2),Ls,5.2108,uH, ,OK;N2 (2- 1),Ls,5.2018,uH, ,OK;N9 (10-11),Ls,5.1976,uH, ,OK;PIN(1- 2),C,80.773,uF, ,OK;N7 :N1 ,TR,0.9971, T,+,OK;N1 -N9 ,B/Ls,13.219,nH, ,OK;N1 -N1 ,B/Rdc,0.0000, ohm, ,OK;PIN(1- 3),O/S,OPEN,, ,OK;PIN(2- 4),O/S,OPEN,, ,OK

The figure below is the test screen for the example above; the returned data below was arranged using semicolon (;) for line break to make it easier to see the corresponding relationship between the test screen and returned data.



Returned data for the test:
5465,1,54,24;
N1 (1- 2),Rdc,73.166,mohm, ,OK;
N1 (1- 2),Ls,5.2108,uH, ,OK;
N2 (2- 1),Ls,5.2018,uH, ,OK;
N9 (10-11),Ls,5.1976,uH, ,OK;
PIN(1- 2),C,80.773,uF, ,OK;
N7 :N1 ,TR,0.9971, T,+,OK;
N1 -N9 ,B/Ls,13.219,nH, ,OK;
N1 -N1 ,B/Rdc,0.0000, ohm, ,OK;
PIN(1- 3),O/S,OPEN,, ,OK;
PIN(2- 4),O/S,OPEN,, ,OK

:FETCH?　　(for Deviation Mode)

Under Deviation Mode, the measured data and results can be returned according to the order of the test items.

※ Here is the explanation when used in Deviation Mode.

Syntax：

:FETCH?

Responses：

<File Name>,<Result>;
<Step 1 Data>;<Step 2 Data>;…<Step n Data>

Return parameter description:

<File Name>

Test file name.

<Result>

Results of this test; <NR1> is used for the return format. Its definitions are as follows:

0　Test interrupted and not completed
1　Test steps were all OK
2　There was NG during test steps

<Step [n] Data>

Represents the returned test data of each test item; its detailed formats are as described below:
<Wind>,<Item Name>,<Data>,<Unit>,<Pol>,<Step Result>

- **<Wind>**

  The winding name for this test step.

- **<Item Name>**

  The item name return field for this test step; its corresponding test item names are as shown in the table below:

Test item name	Return name
Ls (Serial inductance)	Ls
Lp (Parallel inductance)	Lp
Lk (Leakage inductance)	Lk
Q (Quality factor)	Q
Rs (Serial resistance)	Rs
Rp (Parallel resistance)	Rp
Z (Impedance)	Z
D (Dissipation factor)	D
θ(Phase angle)	DEG
X (Reactance)	X
Y (Admittance)	Y
C (Capacitance)	C
DCR	Rdc
TURN RATIO	TR

- **<Data>**

  Returned test value for this test step.

- **<Unit>**

  Test data unit for this test step, such as mohm, ohm, kohm, mH, H, uF and F etc.

Test item name	Return unit
Ls、Lp、Lk	H
Q(Quality factor)	Q
Rs、Rp、Z、X、DCR	ohm
D(Dissipation factor)	D
θ(Phase angle)	deg
Y(Admittance)	S
C(Capacitance)	F
TURN RATIO	T

- **<Pol>**

  Polarity test result of this test step: only exists for the TURN RATIO item; an empty space will be returned for other items.

  "+" test result is positive polarity

  "-" test result is negative polarity

  This field will be represented with an empty space when polarity test is disabled (OFF) for TURN RATIO or for non-Turn Ratio items.

- **<Step Result>**
  Test results for this step; its definitions are as follows:
  OK Test result is OK
  NG Test result is NG

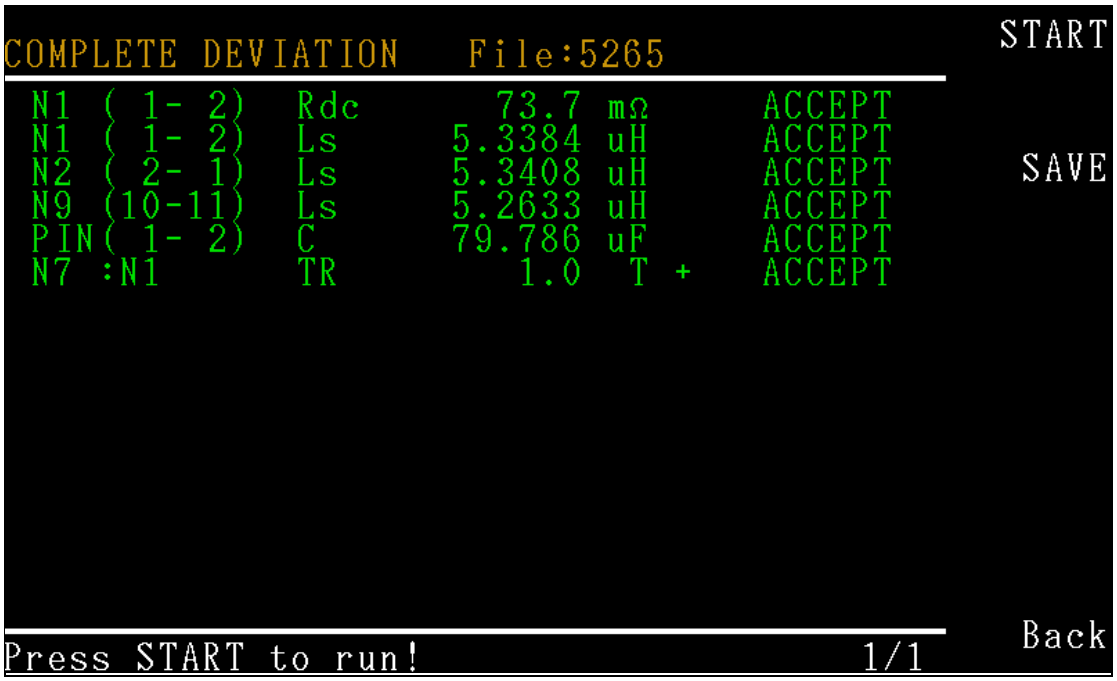
Example：

:FETCH?

Returns

5465,1;N1 (1- 2),Rdc, 73.8,mohm, ,ACCEPT;N1 (1- 2),Ls,5.3425,uH, ,ACCEPT;N2 (2- 1),Ls,5.3399,uH, ,ACCEPT;N9 (10-11),Ls,5.2550,uH, ,ACCEPT;PIN(1- 2),C,80.288,uF, ,ACCEPT;N7 :N1 ,TR, 1.0, T,+,ACCEPT

The figure below is the test screen for the example above; the returned data below was arranged using semicolon (;) for line break to make it easier to see the corresponding relationship between the test screen and returned data.



Returned data for the test:

5465,1;
N1 (1- 2),Rdc, 73.8,mohm, ,ACCEPT;
N1 (1- 2),Ls,5.3425,uH, ,ACCEPT;
N2 (2- 1),Ls,5.3399,uH, ,ACCEPT;
N9 (10-11),Ls,5.2550,uH, ,ACCEPT;
PIN(1- 2),C,80.288,uF, ,ACCEPT;
N7 :N1 ,TR, 1.0, T,+,ACCEPT

:FILE:DEL

Delete internal files。

Syntax：

:FILE:DEL <“file”>

Parameters：

<“file”> String, the name of the file to be deleted.

Example：

:FILE:DEL “DEMO”

※After using this instruction, please delay at least 100mS before executing the next instruction.
※Cannot delete the files which is using.

:FILE:DIR?

Search all the files in machine.

Syntax：

:FILE:DIR?

Responses：

<TOTAL>;<File Name 1>,<File Name 2>,…,<File Name n>

Return parameter description:

- **<TOTAL>**
  The total files number in the machine, the maximum is 128.

- **<File Name>**
  The file name.

Example：

:FILE:DIR? Returns **3;DEMO,FILE_1,FILE_2**

:FILE:LOAD

Load the file which is in the machine.

Syntax：

:FILE:DIR <“file”>

Parameters：

<“file”> string, the file name is going to load.

Example：

:FILE:LOAD “DEMO”

※After using this instruction, please delay at least 100mS before executing the next instruction.

:FILE:LOAD?

Search the file name which is using.

Syntax：

:FILE:LOAD?

Responses：

<file> string, the file name being used.

Example：

:FILE:LOAD? Returns **DEMO**

:FILE:NEW

Create a new file.

Syntax：

:FILE:NEW <“file”>

Parameters：

<“file”> string, the name of the file to be created.

Example：

:FILE:NEW “DEMO”

※After using this instruction, please delay at least 100mS before executing the next instruction.
※Duplicate file name cannot be created, the number of characters 1~15.
※The file name can use the characters as follows,

‘A~Z’ / ‘0~9’ / ‘-’ / ‘_’

:MEAS:AVER

Set the average number of measurements.

Syntax：

:MEAS:AVER <NR1>

<NR1>: Setting range between 1~64

Example:

:MEAS:AVER 4

:MEAS:AVER?

Query the average number of measurements.

Syntax：

:MEAS:AVER?

Responses: Returns the setting value (1~64) of the current average number of times.

Example:

:MEAS:AVER? Returns **4**

:MEAS:COMP:LOW

Sets the lower limit of the compare function

Syntax：

:MEAS:COMP:LOW {<NR3>|MAX|MIN}

Parameters:

<NR3>	(Setting range -999G ~ +999G)
MAX	Set as maximum value (+999G)
MIN	Set as minimum value (-999G)

Example:

:MEAS:COMP:LOW 1000
:MEAS:COMP:LOW 1k
:MEAS:COMP:LOW MAX

:MEAS:COMP:LOW?

Query lower limit of compare function.

Syntax：

:MEAS:COMP:LOW?

Responses:

<NR3> scientific notation format is used for the return format.

Example:

:MEAS:COMP:LOW?

Returns

1.000000E+03

:MEAS:COMP:MODE

Sets the comparison mode of the compare function.

Syntax：

:MEAS:COMP:MODE {ABS|DEV|PERC}

Parameters:

ABS	Measured value
DEV	Deviation value
PERC	Deviation percentage

Example:

:MEAS:COMP:MODE ABS

:MEAS:COMP:MODE?

Query the comparison mode of the compare function.

Syntax：

:MEAS:COMP:MODE?

Responses:

Return one of the following modes

ABS	Measured value
DEV	Deviation value
PERC	Deviation percentage

Example:

:MEAS:COMP:MODE? Returns **ABS**

:MEAS:COMP:NOM

Sets the standard value of the compare function.

Syntax：

:MEAS:COMP:NOM {<NR3>|MAX|MIN}

Parameters:

<NR3>	(Setting range -999G ~ +999G)
MAX	Set as maximum value (+999G)
MIN	Set as minimum value (-999G)

Example:

: MEAS:COMP:NOM 1000
: MEAS:COMP:NOM 1k
: MEAS:COMP:NOM MAX

:MEAS:COMP:NOM?

Query the standard value of the compare function.

Syntax：

:MEAS:COMP:NOM?

Responses:

<NR3> scientific notation format is used for the return format.

Example:

:MEAS:COMP:NOM? Returns **1.000000E+03**

:MEAS:COMP:PARA

Sets the parameter items to be set with the compare function.

Syntax：

:MEAS:COMP:PARA <NR1>

Parameters:

The <NR1> format is used for parameter settings; its definitions are as follows:

1	Sets the first set of measurement parameter under AC mode
2	Sets the second set of measurement parameter under AC mode
3	Sets the third set of measurement parameter under AC mode
4	Sets the fourth set of measurement parameter under AC mode
5	Sets the measurement parameter under DC mode (RDC)

Example:

: MEAS:COMP:PARA 1

: MEAS:COMP:PARA 5

:MEAS:COMP:PARA?

Query which parameter item is currently being set by the compare function.

Syntax：

:MEAS:COMP:PARA?

Responses:

The <NR1> format is used for return format; its definitions are as follows:

1	Currently the compare function sets the first set of measurement parameters under AC mode
2	Currently the compare function sets the second set of measurement parameters under AC mode
3	Currently the compare function sets the third set of measurement parameters under AC mode
4	Currently the compare function sets the fourth set of measurement parameters under AC mode
5	Currently the compare function sets the measurement parameters under DC mode (RDC)

Example:

:MEAS:COMP:PARA? Returns **1**

:MEAS:COMP:STAT

Sets whether to enable or disable the compare function.

Parameters:

OFF or 0	Sets the compare function for this set as disabled
ON or 1	Sets the compare function for this set as enabled

Example:

: MEAS:COMP:STAT 1

:MEAS:COMP:STAT?

Query whether the compare function is enabled or disabled.

Syntax：

:MEAS:COMP:STAT {OFF|ON|0|1}

Responses:

Return the following parameters

OFF	The compare function for this set is disabled
ON	The compare function for this set is enabled

Example:

:MEAS:COMP:STAT? Returns **ON**

:MEAS:COMP:UPP

Sets the upper limit of the compare function.

Syntax：

:MEAS:COMP:UPP {<NR3>|MAX|MIN}

Parameters:

<NR3>	(Setting range -999G ~ +999G)
MAX	Set as maximum value (+999G)
MIN	Set as minimum value (-999G)

Example:

:MEAS:COMP:UPP 1000
:MEAS:COMP:UPP 1k
:MEAS:COMP:UPP MAX

:MEAS:COMP:UPP?

Query the upper limit of the compare function.

Syntax：

:MEAS:COMP:UPP?

Responses:

<NR3> scientific notation format is used for the return format.

Example:

:MEAS:COMP:UPP? Returns **1.000000E+03**

:MEAS:FREQ

Sets measurement frequency.

Syntax：

:MEAS:FREQ {<NR3>|MAX|MIN}

Parameters:

10~200000	(Frequency setting range 10Hz~200kHz)
MAX	Set frequency as 200kHz
MIN	Set frequency as 10Hz

Example:

:MEAS:FREQ 1000
:MEAS:FREQ 1k
:MEAS:FREQ 1kHz
:MEAS:FREQ 1E3
:MEAS:FREQ MAX
:MEAS:FREQ MIN

:MEAS:FREQ?

Query current measurement frequency.

Syntax：

:MEAS:FREQ?

Responses:

<NR3> scientific notation format is used for the return format.

Example:

:MEAS:FREQ? Returns **1.000000E+03**

:MEAS:MODE

Sets measurement mode.

Syntax：

:MEAS:MODE {AC|DC}

Parameters:

AC	Sets the measurement mode as AC
DC	Sets the measurement mode as DC

Example:

:MEAS:MODE AC

:MEAS:MODE?

Query current measurement mode.

Syntax：

:MEAS:MODE?

Responses:

AC	Measurement mode is AC
DC	Measurement mode is DC

Example:

:MEAS:MODE? Returns **AC**

:MEAS:PARA

Sets the measurement parameter: at least one of the four sets of AC measurement parameters that corresponds to Meter Mode must be set, not they cannot all be set as OFF. A maximum of four sets of measurement parameters can be set.

Syntax：

:MEAS:PARA <Para-1>[,<Para-2>][,<Para-3>][,<Para-4>]

Parameters:

Its <disc> parameter definitions are as follows

OFF	Disables this measurement
LS	Serial inductance (Ls)
LP	Parallel inductance (Lp)
CS	Serial capacitance (Cs)
CP	Parallel capacitance (Cp)
RS	Serial resistance (Rs)
RP	Parallel resistance (Rp)
X	Reactance (X)
B	Susceptance (B)
Z	Impedance (Z)
Y	Admittance (Y)
D	Dissipation factor (D)
Q	Quality factor (Q)
DEG	Phase angle (θ)
G	Conductance (G)

Example:

:MEAS:PARA Z,DEG,X,RS

Set the first item as Z, second item as DEG (θ), third item as X and fourth item as RS.

:MEAS:PARA Z,DEG,OFF,RS

Set the first item as Z, second item as DEG (θ), third item as OFF and fourth item as RS.

:MEAS:PARA Z,DEG

Set the first item as Z, second item as DEG (θ); not setting items three and four is the same as OFF.

:MEAS:PARA?

Query current measurement parameter.

Syntax：

:MEAS:PARA?

Responses:

<Para 1>,<Para 2>,<Para 3>,<Para 4>

Return parameter <Para> definitions are as follows:

OFF	Disables this measurement
LS	Serial inductance (Ls)
LP	Parallel inductance (Lp)
CS	Serial capacitance (Cs)
CP	Parallel capacitance (Cp)
RS	Serial resistance (Rs)
RP	Parallel resistance (Rp)
X	Reactance (X)
B	Susceptance (B)
Z	Impedance (Z)
Y	Admittance (Y)
D	Dissipation factor (D)
Q	Quality factor (Q)
DEG	Phase angle (θ)
G	Conductance (G)

Example:

:MEAS:PARA? returns Z,DEG,X,RS

The first item is Z, second item is DEG (θ), third item is X and fourth item is RS

:MEAS:PARA? returns Z,DEG,OFF,OFF

The first item is Z, second item is DEG (θ), the third and fourth item is OFF.

:MEAS:RANG

Sets measurement gear.

Syntax：

:MEAS:RANG <NR1>

Parameters:

Setting range is from 1~3.

Example:

:MEAS:RANG 1

:MEAS:RANG?

Query current measurement gear.

Syntax：

:MEAS:RANG?

Responses:

Return gear 1~3.

Example:

:MEAS:RANG? Returns **1**

:MEAS:RANG:AUTO

Sets measurement gear as automatic gear change.

Syntax：

:MEAS:RANG:AUTO

Example:

:MEAS:RANG:AUTO

:MEAS:RANG:HOLD

Sets measurement gear as remain fixed with current gear.

Syntax：

:MEAS:RANG:HOLD

Example:

:MEAS:RANG:HOLD

:MEAS:TIME

Sets measurement speed.

Syntax：

:MEAS:TIME {MAX|FAST|MED|SLOW}

Parameters:

One of the following speeds can be set
MAX
FAST
MEDI
SLOW

Example:

:MEAS:TIME SLOW

:MEAS:TIME?

Query current measurement speed.

Syntax：

:MEAS:TIME?

Responses:

Return one of the following speeds
MAX
FAST
MEDI
SLOW

Example:

:MEAS:TIME? Returns **SLOW**

:MEAS:TRIG:MODE

Sets trigger mode.

Syntax：

:MEAS:TRIG:MODE {REP|SING}

Parameters:

REP	Repeat trigger mode
SING	Single trigger mode

Example:

:MEAS:TRIG:MODE REP

:MEAS:TRIG:MODE?

Query current trigger mode.

Syntax：

:MEAS:TRIG:MODE?

Responses:

REPEAT	Repeat trigger mode
SINGLE	Single trigger mode

Example:

:MEAS:TRIG:MODE? Returns **REPEAT**

:MEAS:VOLT

Sets measurement voltage.

Syntax：

:MEAS:VOLT {NR3|MAX|MIN}

Parameters:

0.01~2.0	(Voltage setting range 10mV~2.0V)
MAX	Sets voltage as 2.0V
MIN	Sets voltage as 10mV

Example:

:MEAS:VOLT 1
:MEAS:VOLT 1V
:MEAS:VOLT 100mV
:MEAS:VOLT 1E-1
:MEAS:VOLT MAX
:MEAS:VOLT MIN

:MEAS:VOLT?

Query current measurement voltage.

Syntax：

:MEAS:VOLT?

Responses:

<NR3> scientific notation format is used for the return format.

Example:

:MEAS:VOLT? Returns **1.000000E+00**

:SYST:BEEP:COMP

Buzzer prompt timing when setting compare mode.

Syntax：

: SYST:BEEP:COMP {OFF|NG|OK}

Parameters:

OFF	Disables the buzzer prompt function
NG	Enables the buzzer prompt function and will prompt when failed
OK	Enables the buzzer prompt function and will prompt when passed

Example:

:SYST:BEEP:COMP OFF

:SYST:BEEP:COMP?

Buzzer prompt timing when querying compare mode.

Syntax：

: SYST:BEEP:COMP?

Responses:

OFF	Disables the buzzer prompt function
NG	Enables the buzzer prompt function and will prompt when failed
OK	Enables the buzzer prompt function and will prompt when passed

Example:

:SYST:BEEP:COMP? Returns **OFF**

:SYST:BEEP:TRAN

Sets transformer test mode buzzer prompt.

Syntax：

: SYST:BEEP:TRAN {ALL|NG|OK|OFF}

Parameters:

ALL	Enables the buzzer prompt function and will prompt both when passed and failed
NG	Enables the buzzer prompt function and will prompt when failed
OK	Enables the buzzer prompt function and will prompt when passed
OFF	Disables the buzzer prompt function

Example:

:SYST:BEEP:TRAN ALL

:SYST:BEEP:TRAN?

Query transformer test mode buzzer prompt setting value.

Syntax：

:SYST:BEEP:TRAN?

Responses:

ALL	Enables the buzzer prompt function and will prompt both when passed and failed
NG	Enables the buzzer prompt function and will prompt when failed
OK	Enables the buzzer prompt function and will prompt when passed
OFF	Disables the buzzer prompt function

Example:

:SYST:BEEP:TRAN? Returns **ALL**

:SYST:TEST:DATA:UPLO

Sets the data upload function, under transformer test mode.

Syntax：

:SYST:TEST:DATA:UPLO {OFF|ON}

Parameters：

OFF	Disables data upload function.
ON	Enables data upload function.

Example：

:SYST:TEST:DATA:UPLO ON

:SYST:TEST:DATA:UPLO?

Query data upload function, under transformer test mode setting value.

Syntax：

:SYST:TEST:DATA:UPLO?

Responses：

OFF	Disables data upload function.
ON	Enables data upload function.

Example：

:SYST:TEST:DATA:UPLO? Returns **ON**

:SYST:TEST:DATA:USB

Sets the save data to USB function, under transformer test mode.

Syntax：

:SYST:TEST:DATA:USB {OFF|ON}

Parameters：

OFF	Disables save data to USB function.
ON	Enables save data to USB function.

Example：

:SYST:TEST:DATA:USB OFF

:SYST:TEST:DATA:USB?

Query the save data to USB function, under transformer test mode setting value..

Syntax：

:SYST:TEST:DATA:USB?

Responses：

OFF	Disables save data to USB function.
ON	Enables save data to USB function.

Example：

:SYST:TEST:DATA:USB? Returns **OFF**

:SYST:TEST:DISP

Sets the display test data function, under the transformer test mode.

Syntax：

:SYST:TEST:DISP {ALL|NG}

Parameters：

ALL	All the test results are displayed..
NG	Only the fail results are displayed..

Example：

:SYST:TEST:DISP ALL

:SYST:TEST:DISP?

Query the display test data function, under transformer test mode setting value.

Syntax：

:SYST:TEST:DISP?

Responses：

ALL	All the test results are displayed..
NG	Only the fail results are displayed..

Example：

:SYST:TEST:DISP? Returns **ALL**

:SYST:TEST:FAIL:STOP

Sets the test fail stop function, under transformer test mode.

Syntax：

:SYST:TEST:FAIL:STOP {OFF|ON}

Parameters：

OFF	Disables test fail stop function.
ON	Enables test fail stop function.

Example：

:SYST:TEST:FAIL:STOP OFF

:SYST:TEST:FAIL:STOP?

Query the test fail stop function, under transformer test mode setting value.

Syntax：

:SYST:TEST:FAIL:STOP?

Responses：

OFF	Disables test fail stop function.
ON	Enables test fail stop function.

Example：

:SYST:TEST:FAIL:STOP? Returns **ON**

:SYST:TEST:FONT:SIZE

Sets the test mode font size function, under transformer test mode.

Syntax：

:SYST:TEST:FONT:SIZE {LARGE|SMALL}

Parameters：

LARGE	Set the test mode font size to large.
SMALL	Set the test mode font size to small..

Example：

:SYST:TEST:FONT:SIZE LARGE

:SYST:TEST:FONT:SIZE?

Query the test mode font size function, under transformer test mode setting value.

Syntax：

:SYST:TEST:FONT:SIZE?

Responses：

LARGE Set the test mode font size to large.
SMALL Set the test mode font size to small..

Example：

:SYST:TEST:FONT:SIZE? Returns **LARGE**

:SYST:TEST:RESC

Sets the repeat test and repeat test time interval for transformer test mode.

- When the value is set as 0, the continual test function is disabled.
- When the value is set between 1~100, the continual test function is enabled and the time for continual test intervals is the value set x100mS.

Syntax：

:SYST:TEST:RESC <NR1>

Parameters: Setting range between 0~100

Example:

:SYST:TEST:RESC 0

:SYST:TEST:RESC?

Query the repeat test and repeat test time interval for transformer test mode.

- When the value is set as 0, the continual test function is disabled.
- When the value is set between 1~100, the continual test function is enabled and the time for continual test intervals is the value set x100mS.
- **Syntax**：
- :SYST:TEST:RESC?

Responses: Return current setting value (0~100).

Example:

:SYST:TEST:RESC? Returns **0**

:SYST:TRIG:DEL

Set trigger delay time.

Syntax：

:SYST:TRIG:DEL <NR1>

Parameters:

Setting range is from 0~5000; its unit is mS.

Example:

:SYST:TRIG:DEL 100

:SYST:TRIG:DEL?

Query current trigger delay time.

Syntax：

:SYST:TRIG:DEL?

Responses:

Return 0~5000; its unit is mS.

Example:

:SYST:TRIG:DEL? Returns **100**

:SYST:VER?

Query the version information of machine, firmware version, measurement version, special version number, and command version.

Syntax：

:SYST:VER?

Responses：

<Ver 1>,<Ver 2>,<Ver 3>,<Ver 4>

<Ver 1> Firmware version
<Ver 2> Measurement version
<Ver 3> Special version number
<Ver 4> Command version

Example：

:SYST:VER? Returns **V1.901080,20180921,S-0000,1.100000**

:TEST:COUN:CLE

Set the statistics of the transformer test mode to zero.

Syntax：

:TEST:COUN:CLE

Example：

:TEST:COUN:CLE

:TRAN:FIX:CLE:ALL

Clear the setting value on the Allocate Pin to Fixture page.

Syntax：

:TRAN:FIX:CLE:ALL

Example：

:TRAN:FIX:CLE:ALL

:TRAN:FIX:PIN[1-20]:CHAN

Set the fixture channel on the Allocate Pin to Fixture page.

Syntax：

:TRAN:FIX:PIN[1-20]:CHAN <NR1>

Parameters：

<NR1> Fixture channels, the setting range is 0~20 and 0 means clear

Example：

:TRAN:FIX:PIN1:CHAN 1

:TRAN:FIX:PIN[1-20]:CHAN?

Query the fixture channel setting value on the Allocate Pin to Fixture page.

Syntax：

:TRAN:FIX:PIN[1-20]:CHAN?

Responses： Return the current setting value (0~20), 0 means not set.

Example：

:TRAN:FIX:PIN1:CHAN? Returns **1**

:TRAN:FIX:PIN[1-20]:DUT

Sets the DUT number on the Allocate Pin to Fixture page.

Syntax：

:TRAN:FIX:PIN[1-20]:DUT <NR1>

Parameters：

<NR1> stands for DUT Number, the setting range is 0~12, 0 means clear

Example：

:TRAN:FIX:PIN1:DUT 1

:TRAN:FIX:PIN[1-20]:DUT?

Query the DUT number setting value on the Allocate Pin to Fixture page .

Syntax：

:TRAN:FIX:PIN[1-20]:DUT?

Responses： Return the current setting value (0~20), 0 means not set.

Example：

:TRAN:FIX:PIN1:DUT? Returns **1**

:TRAN:WIND:CLE:ALL

Clear all the setting value on transformer winding setting page

Syntax：

:TRAN:WIND:CLE:ALL

Example：

:TRAN:WIND:CLE:ALL

:TRAN:WIND:N[1-20]

Sets the Pin+ and Pin- on the Transformer Winding Setting page.

※The setting on the Allocate Pin to Fixture page should be complete before setting the winding.

Syntax：

:TRAN:WIND:N[1-20] <PIN+>,<PIN->

Parameters：

<PIN+> Positive pin of transformer winding, the setting range is 1~20.
<PIN-> Negative pin of transformer winding, the setting range is 1~20.

Example：

:TRAN:WIND:N1 1,2

:TRAN:WIND:N[n]?

Query the Pin+ and Pin- setting value on the Transformer Winding Setting page.

Syntax：

:TRAN:WIND:N[1-20]?

Responses：

Return the current setting value of winding <PIN+>,<PIN->

<PIN+> Positive pin of transformer winding, the range is 1~20 means not set.

<PIN-> Negative pin of transformer winding, the range is 1~20, 0 means not set.

Example：

:TRAN:WIND:N1? Returns **1,2**

:TRAN:WIND:N2? Returns **0,0**

:TRAN:SEQ:DEF

Sets the Test Sequence Setting to Default.

Syntax：

:TRAN:SEQ:DEF

Example：

:TRAN:SEQ:DEF

:TRAN:SEQ:FUNC

Sets the Test Sequence Setting.

Syntax：

:TRAN:SEQ:FUNC <FUNC1>,<FUNC2>,<FUNC3>,<FUNC4>,<FUNC5>,<FUNC6>

Parameters：

According to the parameters of <FUNC1>~<FUNC6> to setting the test sequence, the setting cannot be repeat.

<FUNC> means test item，the setting can be RDC、ACX、CAP、TURN、BAL、SHOR。

RDC：DC Resistance

ACX：AC test items (L/Lk/Q/Rac/Z/D/θ/X/Y)

CAP：Capacitance

TURN：Turn Ratio

BAL：Balance

SHOR：Pin Short

Example：

:TRAN:SEQ:FUNC RDC,ACX,CAP,TURN,BAL,SHOR

:TRAN:SEQ:FUNC?

Query the Test Sequence Setting.

Syntax：

:TRAN:SEQ:FUNC?

Responses：

Return the parameter<FUNC1>, <FUNC2>, <FUNC3>, <FUNC4>, <FUNC5>, <FUNC6>, Which return is the test sequence setting.

<FUNC> means test item，the setting can be RDC、ACX、CAP、TURN、BAL、SHOR。

RDC：DC Resistance

ACX：AC test items (L/Lk/Q/Rac/Z/D/θ/X/Y)

CAP：Capacitance

TURN：Turn Ratio

BAL：Balance

SHOR：Pin Short

Example：

:TRAN:SEQ:FUNC? Returns **RDC,ACX,CAP,TURN,BAL,SHOR**

:TRAN:SEQ:STAT

Sets the ON/OFF on the Test Sequence Setting page, this setting is for whether to open to test.

Syntax：

:TRAN:SEQ:FUNC <SW 1>,<SW 2>,<SW 3>,<SW 4>,<SW 5>,<SW 6>

Parameters：

According to the test sequence of test items <SW 1>~<SW 6> whether to open to test.

<SW> ON：Enable to test.

OFF：Disable to test.

Example：

:TRAN:SEQ:STAT ON,ON,ON,ON,ON,OFF

:TRAN:SEQ:STAT?

Query the ON/OFF on the Test Sequence Setting page, this setting is for whether to open to test.

Responses：

Return the parameter of <SW 1>, < SW 2>, < SW 3>, < SW 4>, < SW 5>, < SW 6>.
The return parameter is means whether to open the test.

<SW> ON：Enable to test.

OFF：Disable to test.

Example：

:TRAN:SEQ:STAT? Returns **ON,ON,ON,ON,ON,OFF**

:TRAN:STEP:TOTAL?

Query the total number of test item which has been create.

Syntax：

:TRAN:STEP:TOTAL? {RDC|ACX|CAP|TURN|BAL|SHOR}

Parameters as follows：

RDC：DC Resistance

ACX：AC test items (L/Lk/Q/Rac/Z/D/θ/X/Y)

CAP：Capacitance

TURN：Turn Ratio

BAL：Balance

SHOR：Pin Short

Responses：

<NR1> **t**he total number of test item which has been create.

Example：

:TRAN:STEP:TOTAL? ACX Returns **10**

:TRAN:ACX:CLE:ALL

Clear all the setting in the AC test item (L/Lk/Q/Rac/Z/D/θ/X/Y Test Setting) which has been create.

Syntax：

:TRAN:ACX:CLE:ALL

Example：

:TRAN:ACX:CLE:ALL

:TRAN:ACX[1-30]:SET

Create/ Delete AC test items.

※Note(Before create the test item): Before create the second test item, the first one test item should be created, or the setting will be fail.

※Note(Before delete the test item): If there are still test item after deleted test item, it will be filled forward.

For example：

The total test items have 4, if the 2nd item are deleted, the 3rd and 4th test item will be filled forward to 2nd and 3rd, so the total test item become 3.

Syntax：

:TRAN:ACX[1-30]:SET
{OFF|<WIND>,<PARA>,<FREQ>,<VOLT>,<STD>,<HI>,<LO>,<RATE>,<BIAS>,<DELAY>}

Parameters：

OFF Disable the test item.
When the setting is not OFF, means open the test item, the parameter as follows,

<WIND>
Setting winding, the range is N1~N20.
※The defined settings must be made.

<PARA>

<PARA>	Test item name
LS	Ls(Series inductance)
LP	Lp(Parallel inductance)
LK	Lk(Leakage inductance)
Q	Q(Quality factor)
RS	Rs(Series resistance)
RP	Rp(Parallel resistance)
Z	Z(Impedance)
D	D(Dissipation factor)
DEG	Θ(Phase angle)
X	X(reactance)
Y	Y(Admittance)

<FREQ>
Sets the test frequency.

<NR3>	(The frequency setting range depends on the model)
MAX	The set frequency is the highest frequency of the model
MIN	The set frequency is the lowest frequency of the model

Example：

1000.0
1k
1kHz
1E3
MAX
MIN

<VOLT>
Sets the test voltage

<NR3>	0.01~2.0
MAX	Set the voltage 2.0V
MIN	Set the voltage 10mV

Example：

1.0
1V
100mV
1E-1
MAX
MIN

<STD> <HI> <LO>
Sets the test item standard value, high limit, low limit,

<NR3>	Setting range -999.99G~+999.99G
MAX	Set the value +999.99G
MIN	Set the value -999.99G

Example：

1000.0
1k
1E3
MAX
MIN

<RATE>
Sets the test speed,

MAX
FAST
MEDI
SLOW

<BIAS>
Sets the Bias current (mA).
<NR1> Setting range 0~100.

<DELAY>
Sets the test delay time (mS),
<NR1> Setting range 0~9999,

Example：
:TRAN:ACX1:SET OFF
:TRAN:ACX1:SET N1,LS,1000,1.0,10u,11u,9u,MAX,0,0

:TRAN:ACX[1-30]:SET?

Query the setting value of AC test item.

Syntax：
:TRAN:ACX[1-30]:SET?

Responses：
{OFF|<WIND>,<PARA>,<FREQ>,<VOLT>,<STD>,<HI>,<LO>,<RATE>,<BIAS>,<DELAY>}

Return parameter:
OFF means not created

If return parameter is not OFF, means the test item has been created,

<WIND>
Winding (N1~N20).

<PARA>
Test parameter

<PARA>	Test item name
LS	Ls(Series inductance)
LP	Lp(Parallel inductance)
LK	Lk(Leakage inductance)
Q	Q(Quality factor)
RS	Rs(Series resistance)
RP	Rp(Parallel resistance)
Z	Z(Impedance)
D	D(Dissipation factor)
DEG	Θ(Phase angle)
X	X(reactance)
Y	Y(Admittance)

<FREQ>
The measurement frequency of the test item, the return format uses the <NR3> scientific notation format.

Example：
1.000000E+03
<VOLT>
The measurement voltage of the test item, the return format uses the <NR3> scientific notation format.
Example：
1.000000E+00

<STD> <HI> <LO>
The Standard<STD>, high limit<HI>, low limit<LO> of the test item, the return format uses the <NR3> scientific notation format.
Example：
1.000000E+03

<RATE>
Test speed,
MAX
FAST
MEDI
SLOW

<BIAS>
DC bias (mA), the return format uses the <NR1>format.

Example：
100

<DELAY>
Test delay time (mS), the return format uses the <NR1>format.

Example：
10

Example：
:TRAN:ACX1:SET? Returns **OFF**

:TRAN:ACX1:SET? Returns **N1,LS,1.000000E+03,1.000000E+00,1.000000E-03,1.100000E-05,9.000000E-06,MAX,0,0**

:TRAN:ACX[1-30]:PARAL:CLE:ALL

Clear the parallel pin setting of the AC test item.

Syntax：
:TRAN:ACX[1-30]:PARAL:CLE:ALL

Example：
:TRAN:ACX1:PARAL:CLE:ALL

:TRAN:ACX[1-30]:PARAL:POS

Set the parallel positive pin setting of the AC test item.

Syntax：
:TRAN:ACX[1-30]:PARAL:POS <PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]

Parameters：
<PIN> Set the parallel pin, the format would be <NR1>, the setting range is 1~20.

Example：
:TRAN:ACX1:PARAL:POS 2,3

:TRAN:ACX[1-30]:PARAL:POS?

Query the parallel positive pin setting of the AC test item.

Syntax：
:TRAN:ACX[1-30]:PARAL:POS?

Responses：

{0|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

0 If the return value is 0, means this parallel pin setting not set.

<PIN> Return the parallel pin and the format would be <NR1>, the range is 1~20.

Example：

:TRAN:ACX1:PARAL:POS Returns **0**

:TRAN:ACX1:PARAL:POS Returns **2,3**

:TRAN:ACX[1-30]:PARAL:NEG

Set the parallel negative pin setting of the AC test item.

Syntax：

:TRAN:ACX[1-30]:PARAL:NEG <PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]

Parameters：

<PIN> Set the parallel pin, the format would be <NR1>, the setting range is 1~20.

Example：

:TRAN:ACX1:PARAL:NEG 2,3

:TRAN:ACX[1-30]:PARAL:NEG?

Query the parallel negative pin setting of the AC test item.

Syntax：

:TRAN:ACX[1-30]:PARAL:NEG?

Responses：

{0|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

0 If the return value is 0, means this parallel pin setting not set.

<PIN> Return the parallel pin and the format would be <NR1>, the range is 1~20.

Example：

:TRAN:ACX1:PARAL:NEG Returns **0**

:TRAN:ACX1:PARAL:NEG Returns **2,3**

:TRAN:ACX[1-30]:SHOR:CLE:ALL

Clear the short pin setting of the AC test item.

Syntax：

:TRAN:ACX[1-30]:SHOR:CLE:ALL

Example：

:TRAN:ACX1:SHOR:CLE:ALL

:TRAN:ACX[1-30]:SHOR:PIN

Set the short pin setting of the AC test item.

Syntax：

:TRAN:ACX[1-30]:SHOR:PIN {ALL|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

Parameters：

ALL	Set all the pins short.
<PIN>	Set the short pin, the setting format would be <NR1>, the setting range is 1~20.

Example：

:TRAN:ACX1:SHOR:PIN 2,3

:TRAN:ACX[1-30]:SHOR:PIN?

Query the short pin setting of the AC test item.

Syntax：

:TRAN:ACX[1-30]:SHOR:PIN?

Responses：

{0|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

0	If the return value is 0, means this short pin setting not set.
<PIN>	Return the short pin and the format would be <NR1>, the range is 1~20.

Example：

:TRAN:ACX1:SHOR:PIN	Returns	**0**
:TRAN:ACX1:SHOR:PIN	Returns	**2,3**

:TRAN:ACX[1-30]:DEV

Sets the deviation value of the AC test items.

Syntax：
:TRAN:ACX[1-30]:DEV <NR3>

Parameters：
<NR3> Sets the deviation value, the setting range is -999.99G~ +999.99G, set 0 means clear.

Example：
:TRAN:ACX1:DEV 0
:TRAN:ACX1:DEV 0.0012

:TRAN:ACX[1-30]:DEV?

Query the deviation value of the AC test items.

Syntax：
:TRAN:ACX[1-30]:DEV?

Responses：
The return format is <NR3>.

Example：
:TRAN:ACX1:DEV 0.000000E+00
:TRAN:ACX1:DEV 1.200000E-03

:TRAN:RDC:CLE:ALL

Clear all the setting in the Rdc Test Setting which has been create.

Syntax：
:TRAN:RDC:CLE:ALL

Example：
:TRAN:RDC:CLE:ALL

:TRAN:RDC[1-15]:SET

Create/ Delete Rdc test items.

※Note(Before create the test item): Before create the second test item, the first one test item should be created, or the setting will be fail.

※Note(Before delete the test item): If there are still test item after deleted test item, it will be filled forward.

For example：

The total test items have 4, if the 2nd item are deleted, the 3rd and 4th test item will be filled forward to 2nd and 3rd, so the total test item become 3.

Syntax：

:TRAN:RDC[1-15]:SET {OFF|<WIND>,<STD>,<HI>,<LO>,<RATE>,<DELAY>}

Parameters：

OFF Disable the test item.

When the setting is not OFF, means open the test item, the parameter as follows,

<WIND>

Setting winding, the range is N1~N20.

※The defined settings must be made.

<STD> <HI> <LO>

The Standard<STD>, high limit<HI>, low limit<LO> of the test item, used the format as follows,

<NR3>	Setting range -999.99G~+999.99G
MAX	Set +999.99G
MIN	Set -999.99G

Example：

1000.0
1k
1E3
MAX
MIN

<RATE>
Sets the test speed,

MAX
FAST
MEDI
SLOW

<DELAY>
Sets the test delay time(mS).

<NR1> The setting range 0~9999.

Example：

:TRAN:RDC1:SET OFF
:TRAN:RDC1:SET N1 ,10,11,9,MAX,0,0

:TRAN:RDC[1-15]:SET?

Query the Rdc test setting value.

Syntax：
:TRAN:RDC[1-15]:SET?

Responses：
{OFF|<WIND>,<STD>,<HI>,<LO>,<RATE>,<DELAY>}

Return parameter:
OFF means not created

If return parameter is not OFF, means the test item has been created,

<WIND>
Winding (N1~N20).

<STD> <HI> <LO>
The Standard<STD>, high limit<HI>, low limit<LO> of the test item, the return format uses the <NR3> scientific notation format.

Example：
1.000000E+03
<RATE>
Sets the test speed,

MAX
FAST
MEDI
SLOW

<DELAY>
Test delay time (mS), the return format uses the <NR1>format.

Example：
10

Example：
:TRAN:RDC1:SET? Returns **OFF**

:TRAN:RDC1:SET? Returns **N1,1.000000E-03,1.100000E-05,9.000000E-06,MAX,0**

:TRAN:RDC[1-15]:PARAL:CLE:ALL

Clear the parallel pin setting of the Rdc test item.

Syntax：
:TRAN:RDC[1-15]:PARAL:CLE:ALL

Example：
:TRAN:RDC1:PARAL:CLE:ALL

:TRAN:RDC[1-15]:PARAL:POS

Set the parallel positive pin setting of the Rdc test item.

Syntax：
:TRAN:RDC[1-30]:PARAL:POS <PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]

Parameters：
<PIN> Set the parallel pin, the format would be <NR1>, the setting range is 1~20.

Example：
:TRAN:RDC1:PARAL:POS 2,3

:TRAN:RDC[1-15]:PARAL:POS?

Query the parallel positive pin setting of the Rdc test item.

Syntax：

:TRAN:RDC[1-15]:PARAL:POS?

Responses：

{0|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

0 If the return value is 0, means this parallel pin setting not set.

<PIN> Return the parallel pin and the format would be <NR1>, the range is 1~20.

Example：

:TRAN:RDC1:PARAL:POS Returns **0**

:TRAN:RDC1:PARAL:POS Returns **2,3**

:TRAN:RDC[1-15]:PARAL:NEG

Set the parallel negative pin setting of the Rdc test item.

Syntax：

:TRAN:RDC[1-15]:PARAL:NEG <PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]

Parameters：

<PIN> Set the parallel pin, the format would be <NR1>, the setting range is 1~20.

Example：

:TRAN:RDC1:PARAL:NEG 2,3

:TRAN:RDC[1-15]:PARAL:NEG?

Query the parallel negative pin setting of the Rdc test item.

Syntax：

:TRAN:RDC[1-15]:PARAL:NEG?

Responses：

{0|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

0 If the return value is 0, means this parallel pin setting not set.

<PIN> Return the parallel pin and the format would be <NR1>, the range is 1~20.

Example：

:TRAN:RDC1:PARAL:NEG Returns **0**

:TRAN:RDC1:PARAL:NEG Returns **2,3**

:TRAN:RDC[1-15]:SHOR:CLE:ALL

Clear the short pin setting of the Rdc test item.

Syntax：

:TRAN:RDC[1-15]:SHOR:CLE:ALL

Example：

:TRAN:RDC1:SHOR:CLE:ALL

:TRAN:RDC[1-15]:SHOR:PIN

Set the short pin setting of the Rdc test item.

Syntax：

:TRAN:RDC[1-30]:SHOR:PIN {ALL|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

Parameters：

ALL Set all the pins short.

<PIN> Set the short pin, the setting format would be <NR1>, the setting range is 1~20.

Example：

:TRAN:RDC1:SHOR:PIN 2,3

:TRAN:RDC[1-15]:SHOR:PIN?

Query the short pin setting of the Rdc test item.

Syntax：

:TRAN:RDC[1-15]:SHOR:PIN?

Responses：

{0|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

0 If the return value is 0, means this short pin setting not set.

<PIN> Return the short pin and the format would be <NR1>, the range is 1~20.

Example：

:TRAN:RDC1:SHOR:PIN Returns **0**

:TRAN:RDC1:SHOR:PIN Returns **2,3**

:TRAN:RDC[1-15]:DEV

Sets the deviation value of the Rdc test items.

Syntax：
:TRAN:RDC[1-15]:DEV <NR3>

Parameters：
<NR3> Sets the deviation value, the setting range is -999.99G~ +999.99G, set 0 means clear.

Example：
:TRAN:RDC1:DEV 0
:TRAN:RDC1:DEV 0.0012

:TRAN:RDC[1-15]:DEV?

Query the deviation value of the Rdc test items.

Syntax：
:TRAN:RDC[1-15]:DEV?

Responses：
The return format is <NR3>.

Example：
:TRAN:RDC1:DEV 0.000000E+00
:TRAN:RDC1:DEV 1.200000E-03

:TRAN:TURN:CLE:ALL

Clear all the setting in the Turn Ratio Test Setting which has been create.

Syntax：
:TRAN:TURN:CLE:ALL

Example：
:TRAN:TURN:CLE:ALL

:TRAN:TUEN[1-12]:SET

Create/ Delete Turn Ratio test items.

※Note(Before create the test item): Before create the second test item, the first one test item should be created, or the setting will be fail.

※Note(Before delete the test item): If there are still test item after deleted test item, it will be filled forward.

For example：

The total test items have 4, if the 2nd item are deleted, the 3rd and 4th test item will be filled forward to 2nd and 3rd, so the total test item become 3.

Syntax：

:TRAN:TURN[1-12]:SET
{OFF|< PRI.>,< SEC.>,<FREQ>,<VOLT>,<STD>,<HI>,<LO>,<MODE>,<PRI_T>,<POL>,
<RATE>,<DELAY>}

Parameters：

OFF Disable the test item.

When the setting is not OFF, means open the test item, the parameter as follows,

<PRI.>

Sets primary winding, the setting parameter would be N1~N20.

※Need to set the winding which has been create.

<SEC.>

Sets secondary winding, the setting parameter would be N1~N20.

※Need to set the winding which has been create.

<FREQ>

Sets the test frequency.

<NR3>	50~200K(Hz)
MAX	The set frequency is 200KHz.
MIN	The set frequency is 50Hz.

Example：

1000.0
1k
1kHz
1E3
MAX
MIN

<VOLT>

Sets the test voltage

<NR3>	0.01~10.0(V)
MAX	Set the voltage 10.0V
MIN	Set the voltage 10mV

Example：

1.0
1V
100mV
1E-1
MAX
MIN

<STD> <HI> <LO>

Sets the test item standard value, high limit, low limit,

<NR3>	Setting range -999.99G~+999.99G
MAX	Set the value +999.99G
MIN	Set the value -999.99G

Example：

1000.0
1k
1E3
MAX
MIN

<MODE>

Sets the test mode of turn ratio

TURN	Turn ratio mode
VOLT	Voltage compare mode

<PRI_T>

Sets the number of primary winding turns, the format is <NR2>, the setting range is 1.0~99999.0

※Although this is invalid when <MODE> is set to "VOLT" mode, it still needs to setting a value.

Example：

100.0

<POL>
Sets the polarity judgment function.

OFF	Set the polarity judgment function to off
POS	Set the polarity judgment function to “+”
NEG	Set the polarity judgment function to “-”

<RATE>
Sets the test speed,

MAX
FAST
MEDI
SLOW

<DELAY>
Sets the test delay time (mS),

<NR1>	Setting range 0~9999,

Example：

:TRAN:TURN:SET OFF
:TRAN:TURN:SET N1,N2,1000,1.0,100,101,99,TURN,100.0,POS,MAX,0
:TRAN:TURN:SET N1,N2,1000,1.0,1.0,1.1,0.9,VOLT,1.0,OFF,MAX,0

:TRAN:TURN[1-12]:SET?

Query the setting value of Turn Ratio test.

Syntax：
:TRAN:TURN[1-12]:SET?

Responses：
{OFF|<PRI.>,< SEC.>,<FREQ>,<VOLT>,<STD>,<HI>,<LO>,<MODE>,<PRI_T>,<POL>,
<RATE>,<DELAY>}

Return parameter:
OFF means not created

When the setting is not OFF, means open the test item, the parameter as follows,

<PRI.>
Primary winding (N1~N20)。

<SEC.>
Secondary winding (N1~N20)。

<FREQ>
The measurement frequency of the test item, the return format uses the <NR3> scientific notation format.

Example：
1.000000E+03

<VOLT>
The measurement voltage of the test item, the return format uses the <NR3> scientific notation format.

Example：
1.000000E+00

<STD> <HI> <LO>
The Standard<STD>, high limit<HI>, low limit<LO> of the test item, the return format uses the <NR3> scientific notation format.

Example：
1.000000E+03

<MODE>
Sets the test mode of turn ratio

TURN	Turn ratio mode
VOLT	Voltage compare mode

<PRI_T>
Sets the number of primary winding turns, the format is <NR2>, the setting range is 1.0~99999.0

※Although this is invalid when <MODE> is set to "VOLT" mode, it still needs to setting a value.

Example：
100.0

<POL>
Sets the polarity judgment function.

OFF	Set the polarity judgment function to off
POS	Set the polarity judgment function to “+”
NEG	Set the polarity judgment function to “-”

<RATE>
Sets the test speed,

MAX
FAST
MEDI
SLOW

<DELAY>
Sets the test delay time (mS), the return format is <NR1>.
<NR1> Setting range 0~9999,
Example：
10

Example：
:TRAN:TURN1:SET? Returns **OFF**

:TRAN:TURN1:SET? Returns **N1,N2,1.000000E+03,1.000000E+00,1.000000E-03,1.100000E-05,9.000000E-06,TURN,100.0,POL,MAX,0**

:TRAN:TURN[1-12]:PARAL:CLE:ALL

Clear the parallel pin setting of the Turn Ratio test item.

Syntax：
:TRAN:TURN[1-12]:PARAL:CLE:ALL

Example：
:TRAN:TURN1:PARAL:CLE:ALL

:TRAN:TURN[1-12]:PARAL:POS

Set the parallel positive pin setting of the Turn Ration test item.

Syntax：
:TRAN:TURN[1-12]:PARAL:POS <PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]

Parameters：
<PIN> Set the parallel pin, the format would be <NR1>, the setting range is 1~20.

Example：
:TRAN:TURN1:PARAL:POS 2,3

:TRAN:TURN[1-12]:PARAL:POS?

Query the parallel positive pin setting of the Turn Ratio test item.

Syntax：
:TRAN:TURN[1-12]:PARAL:POS?

Responses：

{0|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

0 If the return value is 0, means this parallel pin setting not set.

<PIN> Return the parallel pin and the format would be <NR1>, the range is 1~20.

Example：

:TRAN:TURN1:PARAL:POS Returns **0**

:TRAN:TURN1:PARAL:POS Returns **2,3**

:TRAN:TURN[1-12]:PARAL:NEG

Set the parallel negative pin setting of the Turn Ratio test item.

Syntax：

:TRAN:TURN[1-30]:PARAL:NEG <PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]

Parameters：

<PIN> Set the parallel pin, the format would be <NR1>, the setting range is 1~20.

Example：

:TRAN:TURN1:PARAL:NEG 2,3

:TRAN:TURN[1-12]:PARAL:NEG?

Query the parallel negative pin setting of the Turn Ratio test item.

Syntax：

:TRAN:TURN[1-12]:PARAL:NEG?

Responses：

{0|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

0 If the return value is 0, means this parallel pin setting not set.

<PIN> Return the parallel pin and the format would be <NR1>, the range is 1~20.

Example：

:TRAN:TURN1:PARAL:NEG Returns **0**

:TRAN:TURN1:PARAL:NEG Returns **2,3**

:TRAN:TURN[1-12]:SHOR:CLE:ALL

Clear the short pin setting of the Turn Ratio test item.

Syntax：

:TRAN:TURN[1-12]:SHOR:CLE:ALL

Example：

:TRAN:TURN1:SHOR:CLE:ALL

:TRAN:TURN[1-12]:SHOR:PIN

Set the short pin setting of the Turn Ratio test item.

Syntax：

:TRAN:TURN[1-12]:SHOR:PIN {ALL|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

Parameters：

ALL	Set all the pins short.
<PIN>	Set the short pin, the setting format would be <NR1>, the setting range is 1~20.

Example：

:TRAN:TURN1:SHOR:PIN 2,3

:TRAN:TURN[1-12]:SHOR:PIN?

Query the short pin setting of the Turn Ratio test item.

Syntax：

:TRAN:TURN[1-12]:SHOR:PIN?

Responses：

{0|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

0	If the return value is 0, means this short pin setting not set.
<PIN>	Return the short pin and the format would be <NR1>, the range is 1~20.

Example：

:TRAN:TURN1:SHOR:PIN	Returns	**0**
:TRAN:TURN1:SHOR:PIN	Returns	**2,3**

:TRAN:TURN[1-12]:DEV

Sets the deviation value of the Turn Ratio test items.

Syntax：
:TRAN:TURN[1-12]:DEV <NR3>

Parameters：
<NR3> Sets the deviation value, the setting range is -999.99G~ +999.99G, set 0 means clear.

Example：
:TRAN:TURN1:DEV 0
:TRAN:TURN1:DEV 0.0012

:TRAN:TURN[1-12]:DEV?

Query the deviation value of the Turn Ratio test items.

Syntax：
:TRAN:TURN[1-12]:DEV?

Responses：
The return format is <NR3>.

Example：
:TRAN:TURN1:DEV 0.000000E+00
:TRAN:TURN1:DEV 1.200000E-03

:TRAN:CAP:CLE:ALL

Clear all the Capacitance Test Setting which has been create.

Syntax：
:TRAN:CAP:CLE:ALL

Example：
:TRAN:CAP:CLE:ALL

:TRAN:CAP[1-12]:SET

Create/ Delete Capacitance test items.

※Note(Before create the test item): Before create the second test item, the first one test item should be created, or the setting will be fail.

※Note(Before delete the test item): If there are still test item after deleted test item, it will be filled forward.

For example：

The total test items have 4, if the 2nd item are deleted, the 3rd and 4th test item will be filled forward to 2nd and 3rd, so the total test item become 3.

Syntax：

:TRAN:CAP[1-12]:SET {OFF|<PIN+>,<PIN->,<FREQ>,<VOLT>,<STD>,<HI>,<LO>,<RATE>,<DELAY>}

Parameters：

OFF Disable the test item.

When the setting is not OFF, means open the test item, the parameter as follows,

<PIN+>

Sets the test pin(Positive), the setting parameter can be 1~20.

※Must be set to the defined transformer pin

<PIN->

Sets the test pin(Negative), the setting parameter can be 1~20.

※Must be set to the defined transformer pin

<FREQ>

Sets the test frequency.

<NR3>	(The frequency setting range depends on the model)
MAX	The set frequency is the highest frequency of the model
MIN	The set frequency is the lowest frequency of the model

Example：

1000.0
1k
1kHz
1E3
MAX
MIN

<VOLT>
Sets the test voltage

<NR3>	0.01~2.0
MAX	Set the voltage 2.0V
MIN	Set the voltage 10mV

Example：

1.0
1V
100mV
1E-1
MAX
MIN

<STD> <HI> <LO>
Sets the test item standard value, high limit, low limit,

<NR3>	Setting range -999.99G~+999.99G
MAX	Set the value +999.99G
MIN	Set the value -999.99G

Example：

1000.0
1k
1E3
MAX
MIN

<RATE>
Sets the test speed,

MAX
FAST
MEDI
SLOW

<DELAY>
Sets the test delay time (mS),

<NR1>	Setting range 0~9999,

Example：

:TRAN:CAP1:SET OFF
:TRAN:CAP1:SET 1,2,1000,1.0,10u,11u,9u,MAX,0

:TRAN:CAP[1-12]:SET?

Query the setting value of Capacitance test item.

Syntax：
:TRAN:CAP[1-12]:SET?

Responses：
{OFF|<PIN+>,<PIN->,<FREQ>,<VOLT>,<STD>,<HI>,<LO>,<RATE>,<DELAY>}

Return parameter:
OFF means not created

If return parameter is not OFF, means the test item has been created,

<PIN+>
Sets the test pin(Positive), the setting parameter can be 1~20.

<PIN->
Sets the test pin(Negative), the setting parameter can be 1~20.

<FREQ>
The measurement frequency of the test item, the return format uses the <NR3> scientific notation format.

Example：
1.000000E+03
<VOLT>
The measurement voltage of the test item, the return format uses the <NR3> scientific notation format.

Example：
1.000000E+00

<STD> <HI> <LO>
The Standard<STD>, high limit<HI>, low limit<LO> of the test item, the return format uses the <NR3> scientific notation format.

Example：
1.000000E+03

<RATE>
Test speed,
MAX
FAST
MEDI
SLOW

<DELAY>
Test delay time (mS), the return format uses the <NR1>format.

Example：
10

Example：
:TRAN:CAP1:SET? Returns **OFF**

:TRAN:CAP1:SET? Returns **1,2,1.000000E+03,1.000000E+00,1.000000E-03,1.100000E-05,9.000000E-06,MAX,0**

:TRAN:CAP[1-12]:PARAL:CLE:ALL

Clear the parallel pin setting of the Capacitance test item.

Syntax：
:TRAN:CAP[1-12]:PARAL:CLE:ALL

Example：
:TRAN:CAP1:PARAL:CLE:ALL

:TRAN:CAP[1-12]:PARAL:POS

Set the parallel positive pin setting of the Capacitance test item.

Syntax：
:TRAN:CAP[1-12]:PARAL:POS <PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]

Parameters：
<PIN> Set the parallel pin, the format would be <NR1>, the setting range is 1~20.

Example：
:TRAN:CAP1:PARAL:POS 2,3

:TRAN:CAP[1-12]:PARAL:POS?

Query the parallel positive pin setting of the Capacitance test item.

Syntax：

:TRAN:CAP[1-12]:PARAL:POS?

Responses：

{0|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

0 If the return value is 0, means this parallel pin setting not set.

<PIN> Return the parallel pin and the format would be <NR1>, the range is 1~20.

Example：

:TRAN:CAP1:PARAL:POS Returns **0**

:TRAN:CAP1:PARAL:POS Returns **2,3**

:TRAN:CAP[1-12]:PARAL:NEG

Set the parallel negative pin setting of the Capacitance test item.

Syntax：

:TRAN:CAP[1-12]:PARAL:NEG <PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]

Parameters：

<PIN> Set the parallel pin, the format would be <NR1>, the setting range is 1~20.

Example：

:TRAN:CAP1:PARAL:NEG 2,3

:TRAN:CAP[1-12]:PARAL:NEG?

Query the parallel negative pin setting of the Capacitance test item.

Syntax：

:TRAN:CAP[1-12]:PARAL:NEG?

Responses：

{0|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

0 If the return value is 0, means this parallel pin setting not set.

<PIN> Return the parallel pin and the format would be <NR1>, the range is 1~20.

Example：

:TRAN:CAP1:PARAL:NEG Returns **0**

:TRAN:CAP1:PARAL:NEG Returns **2,3**

:TRAN:CAP[1-12]:SHOR:CLE:ALL

Clear the short pin setting of the Capacitance test item.

Syntax：

:TRAN:CAP[1-12]:SHOR:CLE:ALL

Example：

:TRAN:CAP1:SHOR:CLE:ALL

:TRAN:CAP[1-12]:SHOR:PIN

Set the short pin setting of the Capacitance test item.

Syntax：

:TRAN:CAP[1-12]:SHOR:PIN {ALL|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

Parameters：

ALL Set all the pins short.

<PIN> Set the short pin, the setting format would be <NR1>, the setting range is 1~20.

Example：

:TRAN:CAP1:SHOR:PIN 2,3

:TRAN:CAP[1-12]:SHOR:PIN?

Query the short pin setting of the Capacitance test item.

Syntax：

:TRAN:CAP[1-12]:SHOR:PIN?

Responses：

{0|<PIN 1>[,<PIN 2>][,<PIN 3>]….[,<PIN 20>]}

0 If the return value is 0, means this short pin setting not set.
<PIN> Return the short pin and the format would be <NR1>, the range is 1~20.

Example：

:TRAN:CAP1:SHOR:PIN Returns **0**
:TRAN:CAP1:SHOR:PIN Returns **2,3**

:TRAN:CAP[1-12]:DEV

Sets the deviation value of the Capacitance test items.

Syntax：

:TRAN:CAP[1-12]:DEV <NR3>

Parameters：

<NR3> Sets the deviation value, the setting range is -999.99G~ +999.99G, set 0 means clear.

Example：

:TRAN:CAP1:DEV 0
:TRAN:CAP1:DEV 0.0012

:TRAN:CAP[1-12]:DEV?

Query the deviation value of the Capacitance test items.

Syntax：

:TRAN:TURN[1-12]:DEV?

Responses：

The return format is <NR3>.

Example：

:TRAN:CAP1:DEV 0.000000E+00
:TRAN:CAP1:DEV 1.200000E-03

:TRAN:BAL:CLE:ALL

Clear all the Balance Test Setting which has been create.

Syntax：

:TRAN:BAL:CLE:ALL

Example：

:TRAN:BAL:CLE:ALL

:TRAN:BAL[1-9]:SET

Create/ Delete balance test items.

※Note(Before create the test item): Before create the second test item, the first one test item should be created, or the setting will be fail.

※Note(Before delete the test item): If there are still test item after deleted test item, it will be filled forward.

For example：

The total test items have 4, if the 2nd item are deleted, the 3rd and 4th test item will be filled forward to 2nd and 3rd, so the total test item become 3.

Syntax：

:TRAN:BAL[1-9]:SET {OFF|<REF A>,<REF B>,<PARA>,<FREQ>,<VOLT>,<HI>,<LO>}

Parameters：

OFF Disable the test item.

When the setting is not OFF, means open the test item, the parameter as follows,

<REF A>

Sets the balance winding comparison group A, the setting can be N1~N20.

※Must be set to the defined winding.

<REF B>

Sets the balance winding comparison group B, the setting can be N1~N20.

※Must be set to the defined winding.

<PARA>

<PARA>	Test parameter name
LS	Ls(Series inductance)
LP	Lp(Parallel inductance)
LK	Lk(Leakage inductance)
RS	Rs(Series resistance)
Z	Z(Impedance)
DCR	DCR

<FREQ>
Sets the test frequency.

<NR3>	(The frequency setting range depends on the model)
MAX	The set frequency is the highest frequency of the model
MIN	The set frequency is the lowest frequency of the model

※When the <PARA> setting is “DCR”, it’s still need to enter the value.

Example：

1000.0
1k
1kHz
1E3
MAX
MIN

<VOLT>
Sets the test voltage

<NR3>	0.01~2.0
MAX	Set the voltage 2.0V
MIN	Set the voltage 10mV

※When the <PARA> setting is “DCR”, it’s still need to enter the value.

Example：

1.0
1V
100mV
1E-1
MAX
MIN

<HI> <LO>
Sets the test item standard value, high limit, low limit,

<NR3>	Setting range -999.99G~+999.99G
MAX	Set the value +999.99G
MIN	Set the value -999.99G

Example：

1000.0
1k
1E3
MAX
MIN

Example：

:TRAN:BAL1:SET OFF
:TRAN:BAL1:SET N1,N2,LS,1000,1.0,10u,9u
:TRAN:BAL1:SET N1,N2,DCR,1000,1.0,10m,9m

:TRAN:BAL[1-9]:SET?

Query the setting value of Balance test item.

Syntax：
:TRAN:BAL[1-9]:SET?

Responses：
{OFF|<REF A>,<REF B>,<PARA>,<FREQ>,<VOLT>,<HI>,<LO>}

Return parameter:
OFF means not created

If return parameter is not OFF, means the test item has been created,
<REF A>
Balance comparison group A, (N1~N20)

<REF B>
Balance comparison group B, (N1~N20)

<PARA>

<PARA>	Test parameter name
LS	Ls(Series inductance)
LP	Lp(Parallel inductance)
LK	Lk(Leakage inductance)
RS	Rs(Series resistance)
Z	Z(Impedance)
DCR	DCR

<FREQ>
The frequency of the test item, the return format uses the <NR3> scientific notation format.

※When the <PARA> setting is “DCR”, it’s still need to enter the value.

Example：
1.000000E+03
<VOLT>
The voltage of the test item, the return format uses the <NR3> scientific notation format.

※When the <PARA> setting is “DCR”, it’s still need to enter the value.

Example：
1.000000E+00

<HI> <LO>
The high limit<HI>, low limit<LO> of the test item, the return format uses the <NR3> scientific notation format.

Example：
1.000000E+03

Example：
:TRAN:BAL1:SET? Returns **OFF**

:TRAN:BAL1:SET? Returns **N1,N2,LS,1.000000E+03,1.000000E+00,1.100000E-05,9.000000E-06**

:TRAN:SHOR:CLE:ALL

Clear all the Pin Short Test Setting which has been create.

Syntax：

:TRAN:SHOR:CLE:ALL

Example：

:TRAN:SHOR:CLE:ALL

:TRAN:SHOR[1-9]:SET

Sets the value of Pin short test item

Syntax：

:TRAN:SHOR[1-12]:SET {OFF|<PIN+>,<PIN->}

Parameters：

OFF Disable the test item.

When the setting is not OFF, means open the test item, the parameter as follows,

<PIN+>

Sets the test pin(Positive), the setting parameter range is 1~20.

※Must be set to the defined transformer pin

<PIN->

Sets the test pin(Negative), the setting parameter range is 1~20.

※Must be set to the defined transformer pin

Example：

:TRAN:SHOR1:SET OFF

:TRAN:SHOR1:SET 1,2

:TRAN:SHOR[1-9]:SET?

Query the setting value of Pin short test item..

Syntax：
:TRAN:SHOR[1-12]:SET?

Parameters：
{OFF|<PIN+>,<PIN->}

OFF means not created

If return parameter is not OFF, means the test item has been created,

<PIN+>
Sets the test pin(Positive), the setting parameter can be 1~20.

<PIN->
Sets the test pin(Negative), the setting parameter can be 1~20.

Example：
:TRAN:SHOR1:SET Returns OFF
:TRAN:SHOR1:SET Returns 1,2

:TRAN:CORR:OPEN?

Perform open-circuit correction of the transformer test item, and read back the result.

Syntax：
:TRAN:CORR:OPEN?

Responses：
OK (Correction complete)
NG (Correction fail)

Example：
:TRAN:CORR:OPEN? Returns **OK**

※When this command is executed, the system will automatically switch to the CORRECTION page.

:TRAN:CORR:SHOR?

Perform short-circuit correction of the transformer test item, and read back the result.

Syntax：

:TRAN:CORR:SHOR?

Responses：

OK (Correction complete)
NG (Correction fail)

Example：

:TRAN:CORR:SHOR? Returns **OK**

※When this command is executed, the system will automatically switch to the CORRECTION page.

:TRAN:CORR:SHOR:EXT?

Perform the external short-circuit correction of the transformer test item, and read back the result.

*** The user need to short the measurement pin before execution.**

Syntax：

:TRAN:CORR:SHOR?

Responses：

OK (Correction complete)
NG (Correction fail)

Example：

:TRAN:CORR:SHOR:EXT? Returns **OK**

※When this command is executed, the system will automatically switch to the CORRECTION page.

:TRAN:DEV:CLE

Clear all the deviation value.

Syntax：
:TRAN:DEV:CLE

Example：
:TRAN:DEV:CLE

:TRAN:DEV:RANG

Set the range of deviation value.

Syntax：
:TRAN:DEV:RANG <ACX%>,<CAP%>,<TURN%>,<RDC%>

Parameters：

<ACX%>	**Set the deviation range of AC test item(%).**
<CAP%>	**Set the deviation range of Capacitance(%).**
<TURN%>	**Set the deviation range of Turn Ratio(%).**
<RDC%>	**Set the deviation range of RDC(%).**

Above setting are used format <NR2>, the range is 0~9999.9.

Example：
:TRAN:DEV:RANG 100.0,100.0,100.0,100.0

:TRAN:DEV:RANG?

Query the range of deviation value.

Syntax：
:TRAN:DEV:RANG?

Responses：
<ACX%>,<CAP%>,<TURN%>,<RDC%>

<ACX%> **Set the deviation range of AC test item(%).**
<CAP%> **Set the deviation range of Capacitance(%).**
<TURN%> **Set the deviation range of Turn Ratio(%).**
<RDC%> **Set the deviation range of RDC(%).**

Above setting are used format <NR2>, the range is 0~9999.9.

Example：
:TRAN:DEV:RANG? Returns **100.0,100.0,100.0,100.0**

:TRAN:DEV:SAVE

Save the deviation value after learning.

Syntax：
:TRAN:DEV:SAVE

Example：
:TRAN:DEV:SAVE

:TRAN:DEV:SAVE?

Query whether can save the deviation value.

Syntax：
:TRAN:DEV:SAVE?

Responses：
0 There has no deviation value can be saved.
1 There has deviation value can be saved.

Example：
:TRAN:DEV:SAVE? Returns **1**

:TRIG?

Under Meter Mode, single measurement can be triggered and the measured data and comparison results for that test can be returned according to the display order of the current measurement items. (Return time varies according to the settings of the measurement speed and measurement frequency)

※ **Only applicable to Meter Mode.**

Responses:
<Data 1>,<Data 2>,<Data 3>,<Data 4>,<Comp 1>,<Comp 2>,
<Comp 3>,<Comp 4>

Return parameter description:
<Data>
Measurement data; <NR3> scientific notation format is used for the return format.

Data 1~4 represents the measurement data of four test items. There are only values for items with display enabled. For example, if only two test items were enabled, two data entries will be returned; or when under DC mode, only the Rdc item can be measured, so only one set of data will be returned.

<Comp>
Measurement data compare results; <NR1> is used for the return format. Its definitions are as follows:
0 Compare function disabled
1 Comparison result is OK
2 Comparison result is NG

Comp 1~4 represents the individual test data comparison results of the four test items. Once the compare function is enabled for any one of the test items, the comparison results will be returned; its order is consistent with <Data>.

EX1:
4 test items with all compare function disabled, then the retuned result is
<Data 1>,<Data 2>,<Data 3>,<Data 4>
EX2:
4 test items, in which the compare function is enabled for one or all items, then the returned result is
<Data 1>,<Data 2>,<Data 3>,<Data 4>,<Comp 1>,<Comp 2>,
<Comp 3>,<Comp 4>

EX3:
2 test items with all compare function disabled, then the retuned result is
<Data 1>,<Data 2>
EX4:
4 test items, in which the compare function is enabled for one or all items, then the returned result is
<Data 1>,<Data 2>,<Comp 1>,<Comp 2>,

Example:

:TRIG?

Returns

1.000060E+02,3.791240E-04,1.000060E+02,9.999395E-03,1,1,1,1

3.8 Establishing LAN Communication Interface (NI VISA)

Once you have completed the LAN related configurations for the instrument terminal, you can communicate with the instrument using a computer through the network. The following is the introduction to establishing communication with the instrument through NI VISA.

First start the NI Measurement & Automation Explorer program on the computer; the screen is as shown in the figure below. Press Network Devices under Devices and Interface to the left, and then select Add Network Device from the top-right of the screen to add the instrument. The screen is as shown in the figure below:

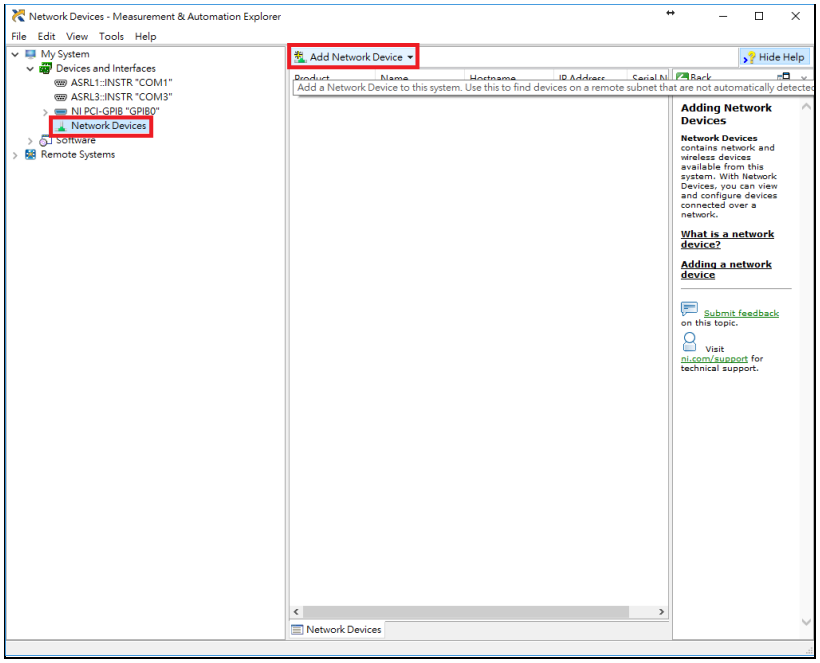


Figure 3-8-1 NI Measurement & Automation Explorer

After clicking Add Network Device, a pull-down window will appear; select the VISA TCP/IP Resource item. The screen is as shown in the figure below:

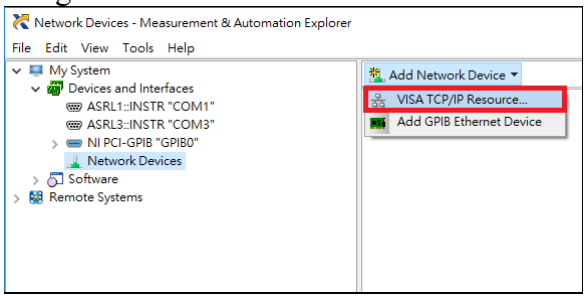


Figure 3-8-2 Add Network Device

After entering the Choose the type of LAN resource you want to add. window, select the Manual Entry of Raw Socket item and then click Next to enter the next step; the screen is as shown in the figure below:

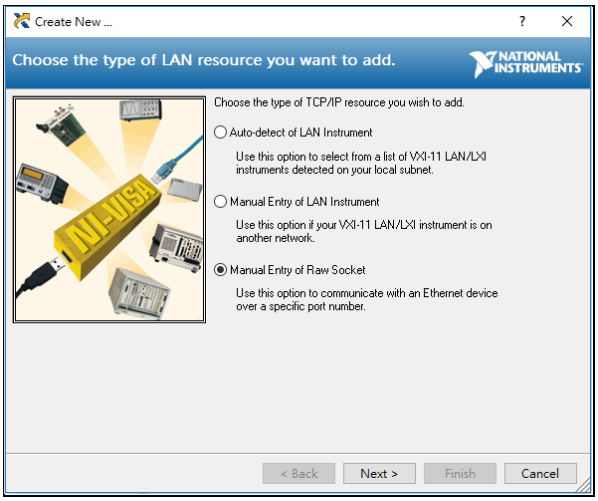


Figure 3-8-3 Choose the type of LAN resource

After entering the Enter the LAN resource details window, enter the IP address displayed on the instrument screen in the Hostname or IP address field, and enter the IP Port value in the Port Number field. The screen is as shown in the figure below:

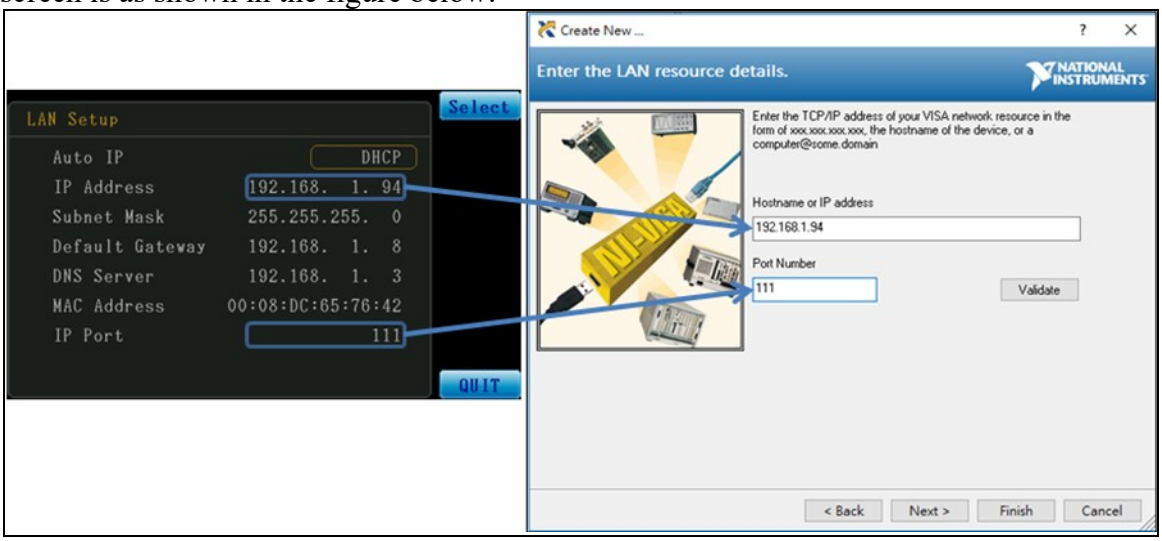


Figure 3-8-4 Enter the LAN resource detail

After filling the fields, click the Validate key to the right to check whether communication with the instrument was connected successfully. If the message displayed is Successfully opened a VISA session, it means that the instrument was connected successfully; its screen is as shown in the figure below:

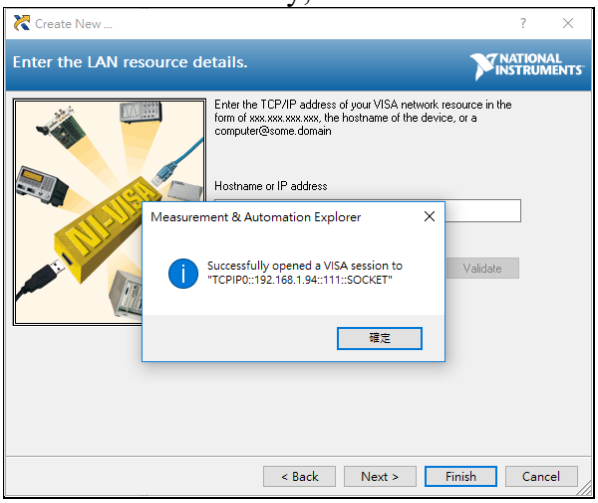


Figure 3-8-5 Validate

Once successfully connected, press Finish to return.
At this time, the device that was just added (TCPIP0::192.168.1.94::111::SOCKET) will be displayed under the Network Devices item; its screen is as shown in the figure below:

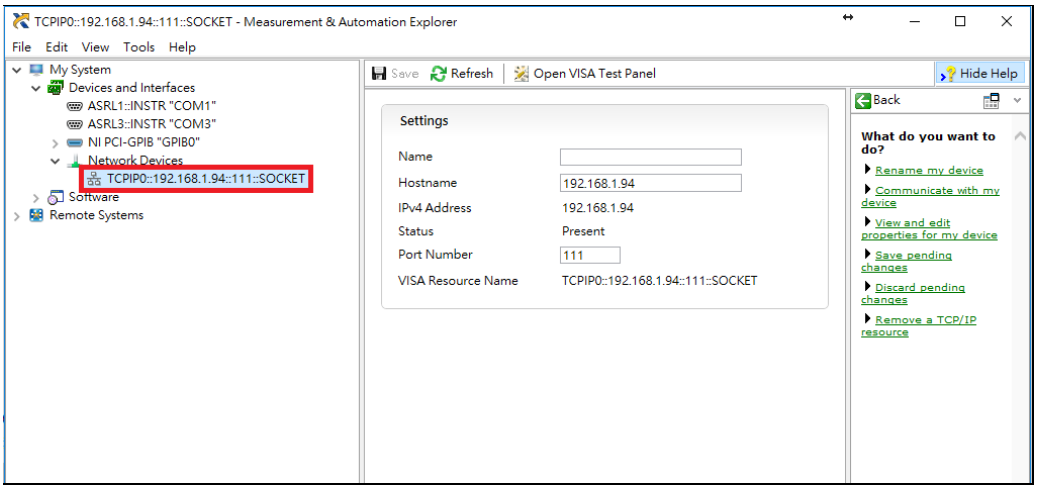


Figure 3-8-6 VISA TCP/IP Resource

Click the Open VISA Test Panel at the top-right of the window to open the communication interface; its screen is as shown in the figure below:

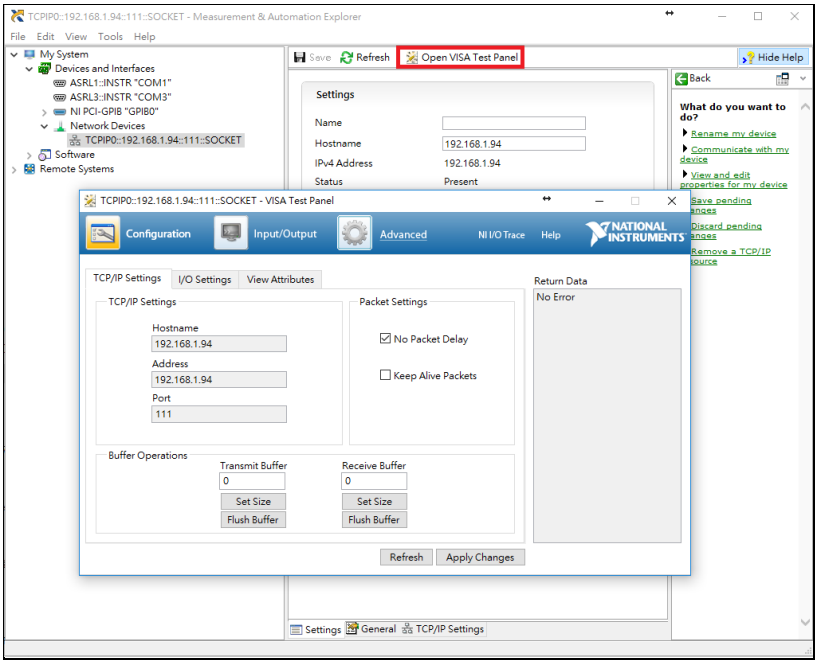


Figure 3-8-7 Open VISA Test Panel

In the VISA Test Panel window, select the I/O Settings tab and change the Termination Methods setting. Only check the Send End On Writes function and leave the remaining items unchecked. When completed, click Apply Changes to confirm the changes; its screen is as shown in the figure below:

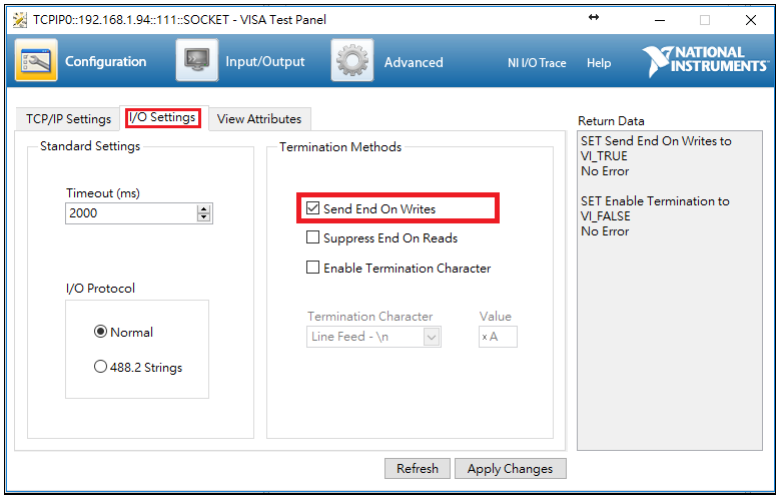


Figure 3-8-9 I/O Settings

After selecting the Input /Output function, press the Query key and the field below should display the message returned by the instrument (MICROTEST,5465,TD4-0514,V2.008190\n) at this time; its screen is as shown in the figure below:

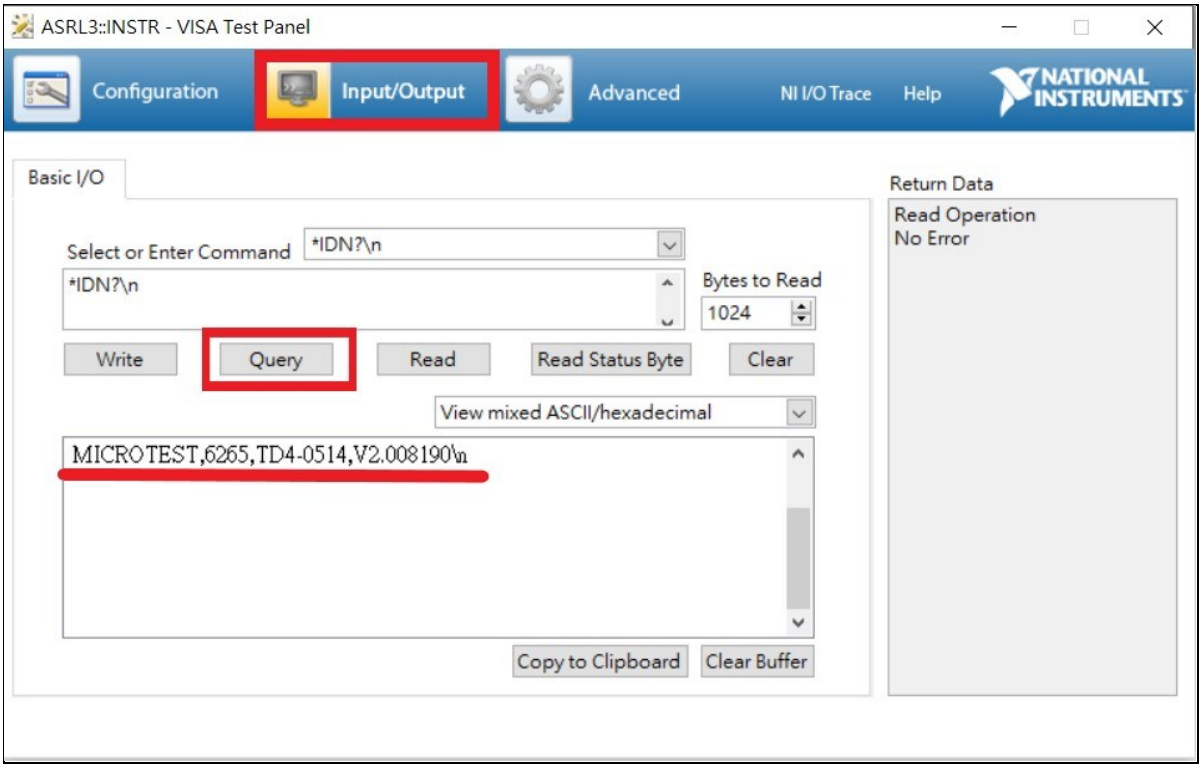


Figure 3-8-10 Input / Output

3.9 Handler Interface

Remote control interface (Handler Interface); use the Handler O/O communication port on the rear panel of the machine to use external signal to control the tests of this machine.

To use this function, please go to SYSTEM and set the Handler Interface to ON to enable the remote control function.

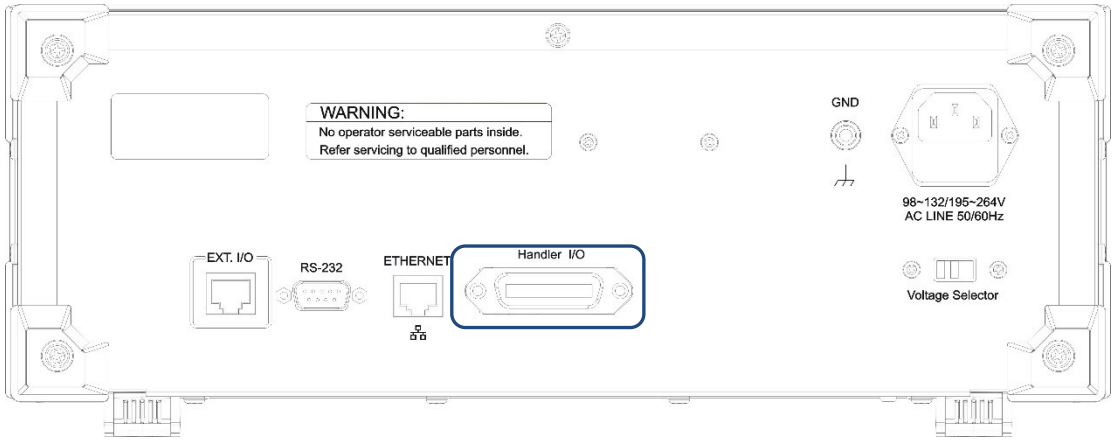


Figure 3-9-1 Rear of Handler I/O

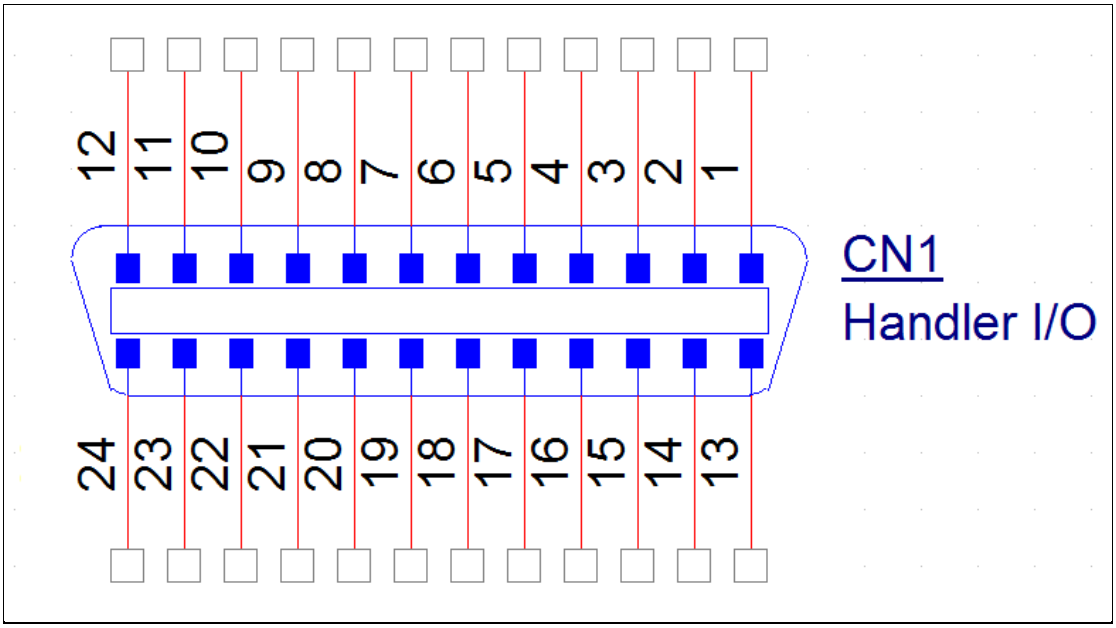


Figure 3-9-2 Handler I/O pin

- **Handler I/O pin description：**

Pin	Pin name	I/O	Function
1	/START	I	Test trigger
2	/ DAV	O	Test program ended
3	/PASS	O	Test result is PASS
4	/FAIL	O	Test result is FAIL
5	GND	-	Ground
6	GND	-	Ground
7	GND	-	Ground
8	NULL	-	Empty pin
9	NULL	-	Empty pin
10	+5V	-	DC +5V output
11	NULL	-	Empty pin
12	NULL	-	Empty pin
13	/READY	O	Test preparation ready, which means it can receive trigger status. (When the measuring program is executing or when in modes other than Meter Mode and Test Mode, this signal will not be ready)
14	/INDEX	O	Measuring program complete (Only measurement is complete; the entire test program has not yet completed)
15	/OK1	O	When the compare function is enabled in Meter Mode, the 1st item has passed.
16	/OK2	O	When the compare function is enabled in Meter Mode, the 2nd item has passed.
17	/OK3	O	When the compare function is enabled in Meter Mode, the 3rd item has passed.
18	/OK4	O	When the compare function is enabled in Meter Mode, the 4th item has passed.
19	/NG1	O	When the compare function is enabled in Meter Mode, the 1st item has failed.
20	/NG2	O	When the compare function is enabled in Meter Mode, the 2nd item has failed.
21	/NG3	O	When the compare function is enabled in Meter Mode, the 3rd item has failed.
22	/NG4	O	When the compare function is enabled in Meter Mode, the 4th item has failed.
23	undefined	O	Reserved
24	undefined	O	Reserved

- **Handler I/O timing diagram:**

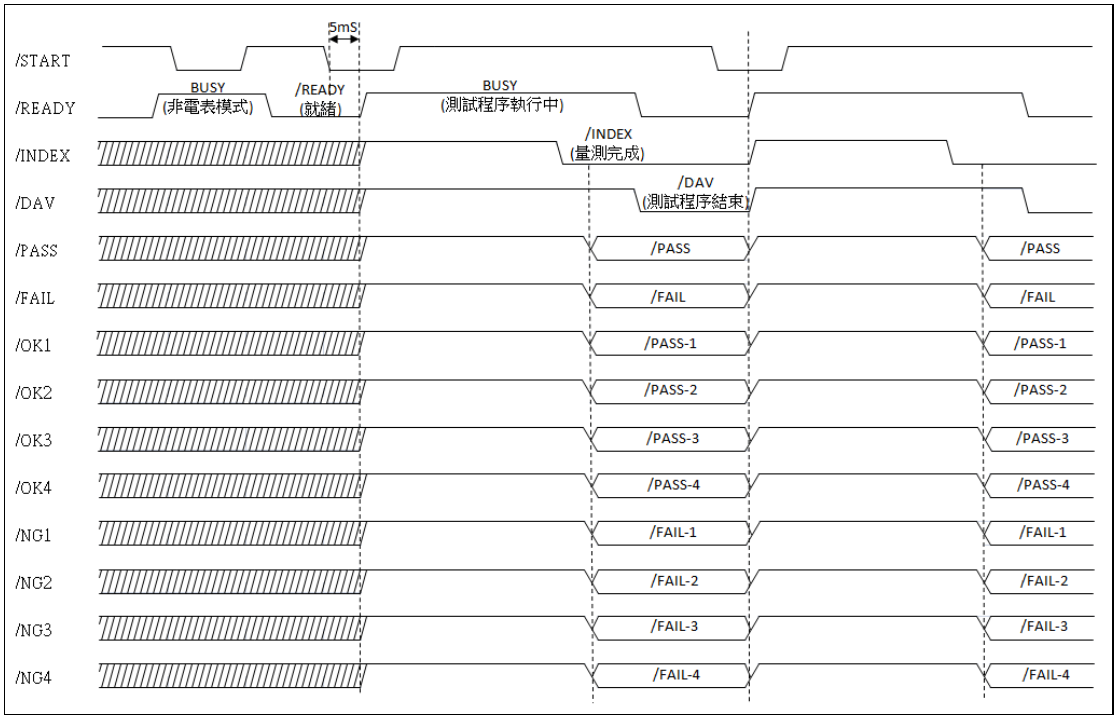


Figure 3-9-3 Handler I/O timing diagram

※Note: The Handler Interface is only applicable under Meter Mode and Test Mode. When test is triggered under Meter, the measurement mode will be automatically set as Single Mode (single trigger mode).

- **Handler I/O pin description (for Test Mode)：**

Pin	Pin name	I/O	Function
1	/START	I	Test trigger
2	/ DAV	O	Test program ended
3	/PASS	O	Test result is PASS
4	/FAIL	O	Test result is FAIL
5	GND	-	Ground
6	GND	-	Ground
7	GND	-	Ground
8	NULL	-	Empty pin
9	NULL	-	Empty pin
10	+5V	-	DC +5V output
11	NULL	-	Empty pin
12	NULL	-	Empty pin
13	/READY	O	Test preparation ready, which means it can receive trigger status. (When the measuring program is executing or when in modes other than Meter Mode and Test Mode, this signal will not be ready)
14	/INDEX	O	Measuring program complete (Only measurement is complete; the entire test program has not yet completed)
15	/OK1	O	In Test Mode, the 1st item has passed.
16	/OK2	O	In Test Mode, the 2nd item has passed.
17	/OK3	O	In Test Mode, the 3rd item has passed.
18	/OK4	O	In Test Mode, the 4th item has passed.
19	/OK5	O	In Test Mode, the 5th item has passed.
20	/OK6	O	In Test Mode, the 6th item has passed.
21	/OK7	O	In Test Mode, the 7th item has passed.
22	/OK8	O	In Test Mode, the 8th item has passed.
23	/OK9	O	In Test Mode, the 9th item has passed.
24	/OK10	O	In Test Mode, the 10th item has passed.

※Note: Output signal OK1 ~ OK10 must be valid when multi-DUT are defined. (Regarding Multi-DUT setting, please refer to 3.4.1 WINDING/FIXTURE setting instructions)

- **Handler I/O timing diagram (for Test Mode)：**

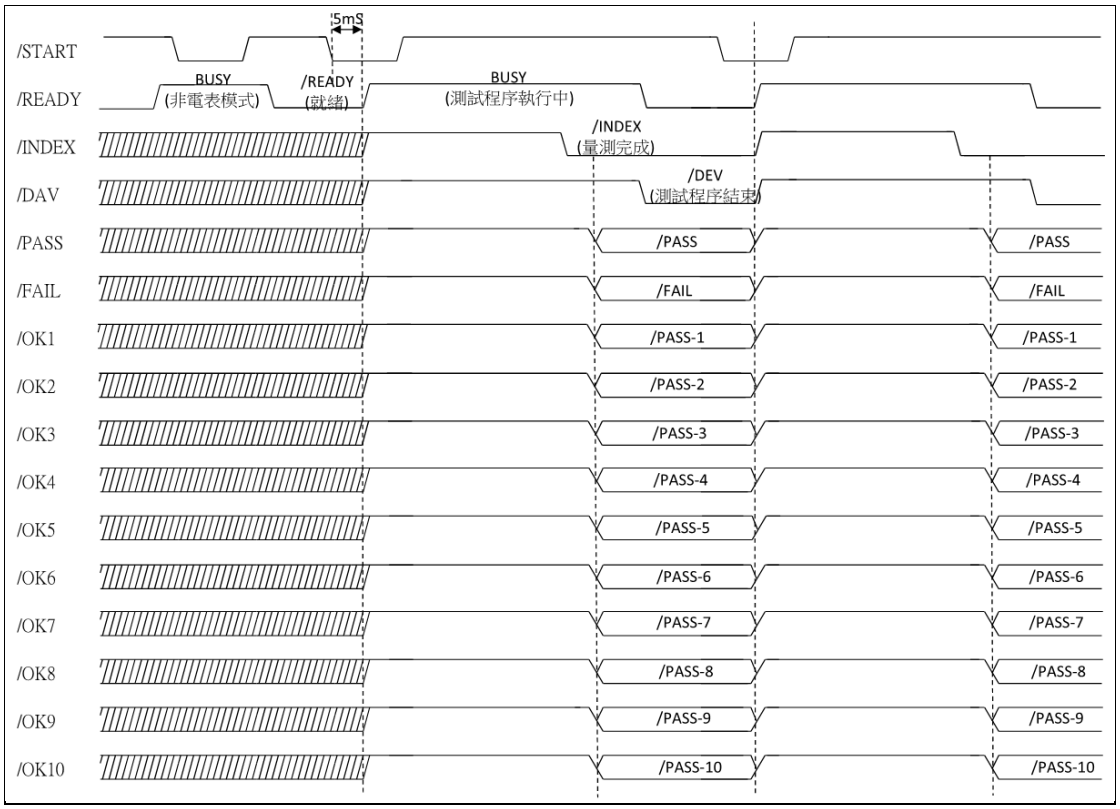


figure3-8-4 Handler I/O **timing diagram** (for Test Mode)

※Note: The Handler Interface is only applicable under Meter Mode and Test Mode.
When test is triggered under Meter, the measurement mode will be automatically set as Single Mode (single trigger mode).

- **Instructions:**

All output pin have open collector output and no voltages or signals are outputted. The **current that passes each contact must not exceed 30mA** and the **voltage must not exceed DC 24V.**

- **Common usage:**

1. **Trigger signal:** Uses the normal open switch of the relay to control the machine to perform tests. **(Note: The trigger signal must last over 5mS)**

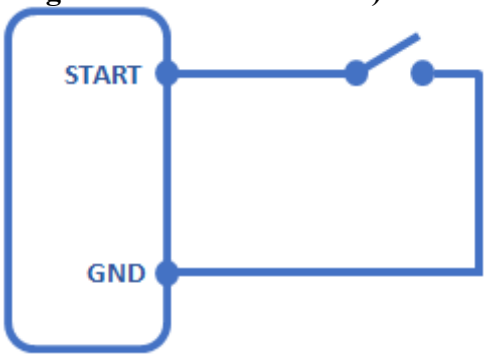


Figure 3-9-4 Illustration of recommended connection for the trigger signal

2. **Output signal:** Uses the output signal to control the relay. For safer usage, please connect a Zener diode to the relay coil. **(Voltage used must be less than DC 24V)**

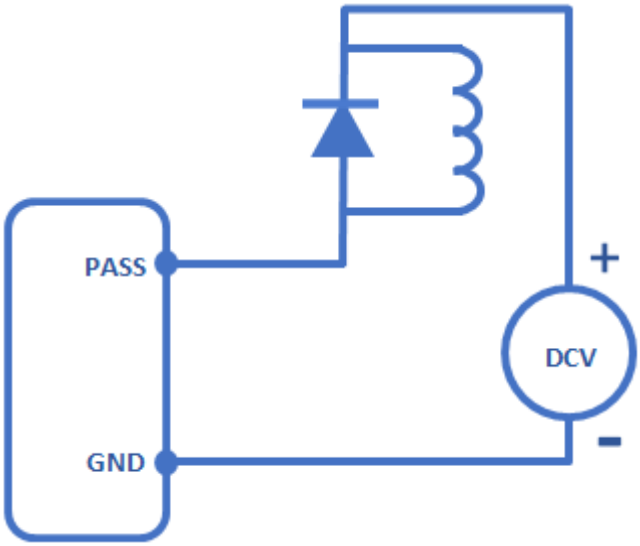


Figure 3-9-5 Illustration of recommended connection for the output signal