

Precision LCR Meter

LCR-7300/7200/7100/7020/7002

USER MANUAL

VERSION: 1.00



ISO-9001 CERTIFIED MANUFACTURER

GW INSTEK

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Good Will Instrument Co., Ltd.

No. 7-1, Jhongsing Rd., Tucheng Dist., New Taipei City 236, Taiwan.

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S SAFETY INSTRUCTIONS

**Warning****Dangerous**

When you notice any of the unusual conditions listed below, immediately terminate operation and disconnect the power cable.

Please contact the GWINSTEK service center representative for repair of the instrument. If you continue to operate without repairing the instrument, there is a potential fire or shock hazard for operators. The instrument is operating abnormally if:

- The instrument emits abnormal noise, smell, smoke, or a spark-like light during the operation.
 - The instrument generates high temperature or electrical shock during operation.
 - The power cable, plug, or receptacle on the instrument is damaged.
 - Foreign substances or liquid has fallen into the instrument.
-

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument.

Failure to comply with these precautions or with specific WARNINGS elsewhere in this manual may impair the protection provided by the equipment. In addition, it violates safety standards of design, manufacture, and intended use of the instrument.

Disclaimer	GWINSTEK assumes no liability for the customer's failure to comply with these requirements.
Ground The Instrument	To avoid electric shock hazards, the instrument chassis and cabinet must be connected to a safety earth ground by the supplied power cable with earth blade.
DO NOT Operate in An Explosive Atmosphere	Do not operate the instrument in the presence of inflammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.
Keep Away from Live Circuits	Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable is removed. To avoid injuries, always disconnect the power and discharge the circuits before touching them.
DO NOT Service or Adjust Alone	Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
DO NOT Substitute Parts or Modify Instrument	Because of the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to a GWINSTEK authorized service center for service and repair to ensure that safety features are maintained.

UNPACKING AND PREPARATION

This chapter describes how to set up and start LCR-7000 Series Precision LCR Meter.

- Incoming Inspection
- Environmental Requirements
- Cleaning
- How to Remove the Handle

Incoming Inspection

After you receive the instrument, perform the following checks during unpacking according to the following procedure:



WARNING

If the external face of the instrument (such as the cover, front/rear panel, LCD screen, power switch, and port connectors) appears to have been damaged during transport, do not turn on the power switch. Otherwise, you may get an electrical shock.

Make sure that the packing box or shock-absorbing material used to package the instrument has not been damaged.

Refer to the <Packing List> in the packing box, check that all packaged items supplied with the meter have been provided as per the specified options.

Note	If an abnormality is detected, contact the company, and transport the meter to your nearest GWINSTEK Instruments sales or service office. Save the packing box, shock-absorbing material, and packaged items as you received them in case you need to mail the instrument to an authorized GWINSTEK distributor or service center.
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Environmental Requirements

Set up the LCR-7000 Series where the following environmental requirements are satisfied.

Operating Environment

Ensure that the operating environment meets the following requirements:

Temperature:	0 °C to 40 °C
Temperature range at calibration:	23 °C $\pm$ 5 °C (< 1 °C deviation from the temperature when performing calibration)
Humidity:	< 70 % at wet bulb temperature $\leq$ 40 °C (non-condensation)
Altitude:	(0 to 2000) m

Cleaning

To prevent electrical shock, disconnect the LCR-7000 Series power cable from the receptacle before cleaning. Use a dry cloth or a cloth slightly dipped in water to clean the casing. Do not attempt to clean the LCR-7000 Series internally.



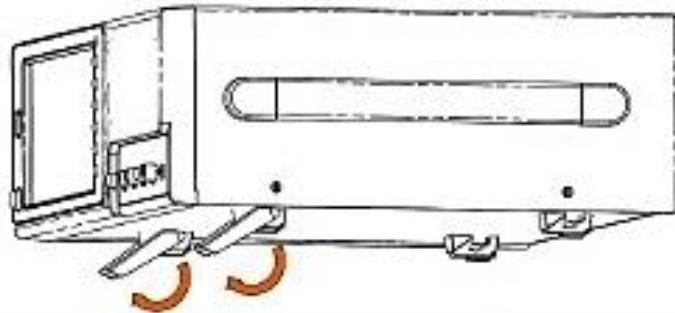
WARNING

Do Not Use Organic Solvents (such as alcohol or gasoline) to clean the Instrument.

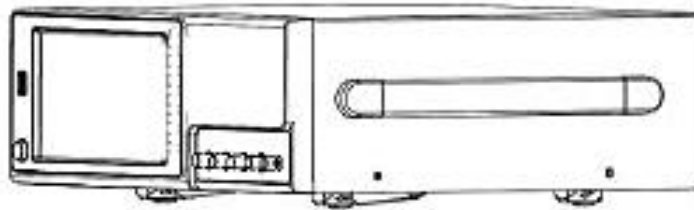
How to Remove the Handle

A handle kit is attached to the LCR-7000 Series. See how to remove the handle from the figures below.

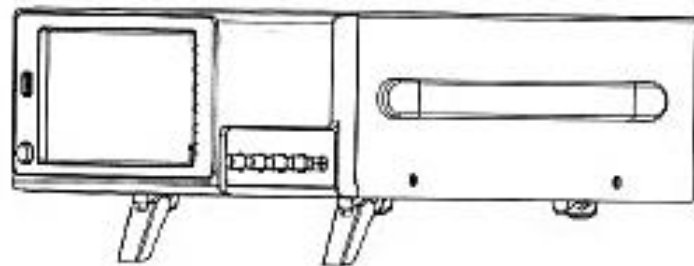
Lifting the instrument, starting from the front stand.



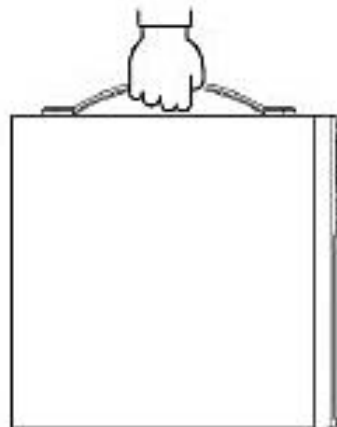
Horizontal position



Tilt stand position



Carry position



O**verview**

This chapter contains general information about LCR-7000 Series.

The information is organized as follows.

- Introduction
 - Main Specifications
 - Feature overview
-

Introduction

Thank you for purchasing an LCR-7000 Series LCR meter.

The GW INSTEK LCR-7000 Series is a general-purpose LCR meter for incoming inspection of components, quality control, and laboratory use.

The LCR-7000 Series is used for evaluating LCR components, materials, and semiconductor devices over a wide range of frequencies (10 Hz to 300 kHz) and test signal levels (10.00 mV to 2.00 V & 100.0 μ A to 20.00 mA).

With its built-in comparator, the LCR-7000 Series can output comparison/decision results for sorting components into a maximum of ten bins. Furthermore, by using the handler interface, the LCR-7000 Series can be easily combined with a component handler, and a system controller to fully automate component testing, sorting, and quality-control data processing.

The list measure function permits entry of up to 10 frequencies or test signal levels points to be automatically measured.

The SWEEP function performs parameter measurements across a frequency range and displays the results as a curve, enabling a quick assessment of frequency response characteristics.

Main Specifications and Features

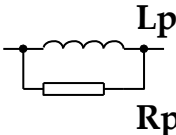
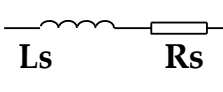
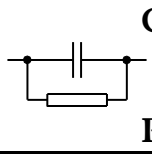
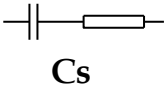
Test Function

Cs-Rs, Cs-D, Cp-Rp, Cp-D, Lp-Rp, Lp-Q, Ls-Rs, Ls-Q, Rs-Q, Rp-Q, R-X, DCR, Z- θ_r , Z- θ_d , Z-D, Z-Q

Equivalent Circuit

Serial and Parallel

Equivalent Circuit

Circuit		Dissipation Factor	Conversion
L		$D = 2\pi FL_p / R_p$ $= 1 / Q$	$L_s = L_p / (1 + D^2)$; $R_s = R_p D^2 / (1 + D^2)$
		$D = R_s / (2\pi FL_s) = 1 / Q$	$L_p = (1 + D^2)L_s$; $R_p = (1 + D^2)R_s / D^2$
C		$D = 1 / (2\pi FC_p R_p) = 1 / Q$	$C_s = (1 + D^2)C_p$; $R_s = R_p D^2 / (1 + D^2)$
		$D = 2\pi FC_s R_s = 1 / Q$	$C_p = C_s / (1 + D^2)$; $R_p = R_s (1 + D^2) / D^2$

$$Q = X_s / R_s, D = R_s / X_s, X_s = 1 / (2\pi FC_s) = 2\pi FL_s$$

Ranging

Auto, Hold and Nominal range. Total 9 Ranges.

About Nominal ranges: The LCR-7000 Series will automatically select the best range according to the nominal value.

Measurement Speed

Fast: 40 readings per second; 25 ms per reading^{*1}

Medium: 10 readings per second; 100 ms per reading^{*1}

Slow: 3 readings per second; 333 ms per reading^{*1}

You can also specify the averaging factor within the range of 1 to 256 in steps of 1 to improve performance.

NOTE

^{*1}1. Measurement speed in 300 kHz, typical.

Trigger Mode

Includes Internal, Manual, External and Bus Trigger.

Basic Accuracy

0.05 % @ SLOW/MED

0.1 % @ FAST

Display Range

Display Range

Parameter	Display Range
L	0.00001 μ H to 9999.99 H
C	0.00001 pF to 999.999 mF
R, X, Z	0.00001 Ω to 99.9999 M Ω
G, B, Y	0.01 nS to 999.999 S
D	0.00001 to 9.99999
Q	0.00001 to 99999.9
θ_d	-179.999° to 179.999°
θ_r	(-3.14159 to 3.14159) rad
DCR	0.00001 Ω to 99.9999 M Ω
$\Delta\%$	-999.999 % to 999.999 %

Test Signal

Test Signal Frequency

LCR-7300: 10 Hz to 300 kHz

LCR-7200: 10 Hz to 200 kHz

LCR-7100: 10 Hz to 100 kHz

LCR-7020: 10 Hz to 20 kHz

LCR-7002: 10 Hz to 2 kHz

Frequency Accuracy: $\pm 0.01\%$

Test Signal Level

AC: 10.00 mV to 2.00 V ($\pm 10\%$)

CV mode: 10.00 mV to 2.00 V ($\pm 6\%$)

100.0 μ A to 20.00 mA ($\pm 10\%$)

CC mode: 100.0 μ A to 20.00 mA ($\pm 6\%$) @2 V Max

DCR: DC voltage: +2 V $\pm (0.5\% + 0.05\text{ V})$, Output impedance fixed 30 Ω

Output impedance

30 Ω , 50 Ω and 100 Ω

Monitoring Test Signal Level

Vac: 10 mV to 2.00 V ($\pm 3\% + 0.5\text{ mV}$)

0.01 mV to 10 mV ($\pm 12\% + 0.1\text{ mV}$)

Iac: 100 μ A to 66 mA ($\pm 3\% + 5\text{ }\mu\text{A}$)

0.001 μ A to 100 μ A ($\pm 12\% + 1\text{ }\mu\text{A}$)

DC BIAS Voltage

-5.0 V to +5.0 V ($\pm 3\%$)

Main Functions

Correction Function

OPEN/SHORT/SPOT correction:

Eliminates measurement errors due to stray parasitic impedance in the test fixtures.

Comparator Function (BIN Sorting)

Bin sort:

The primary parameter can be sorted into BIN1-BIN9, AUX, OUT for each of the primary measurement parameters.

The sequential mode or tolerance mode can be selected as the sorting mode.

Limit Setup:

Absolute value, deviation value, and % deviation value can be used for setup.

BIN count:

Countable from 0 to 999999

List Measure

Points

There is a maximum of 10 points.

Sweep parameters

Test frequency, test voltage, test current.

Comparator function of list sweep

The comparator function enables you to set one pair of lower and upper limits for each measurement point.

You can select from:

Judge with the first sweep parameter/Judge with the second parameter/Not used for each pair of limits.

Go / NoGo

Quickly set the upper and lower limits and determine whether the measurement result passes or fails.

Sweep

Set a frequency range, measure the main and secondary parameters at 250 frequency points within that range, and represent the values as graphical curves.

Quickly understand the frequency response characteristics of the component.

Measurement Assistance Functions

Files

Up to 10 setup conditions can be written to/read from the built-in non-volatile memory.

Key Lock

The front panel keys can be locked.

RS-232/USB/LAN

Complies with SCPI.

Options

USB host port

Universal serial bus jack, type-A (4 contact positions, contact is on your left); female; for connection to USB memory devices only.

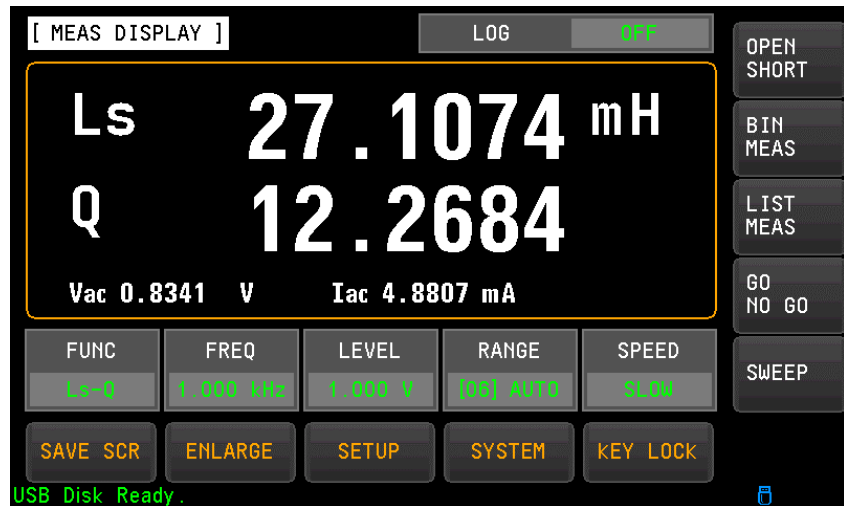
USB disk type: Flash disk only.

Format: FAT / FAT32 / exFAT.

Max memory size: 128 GB.

Save Screen

After a USB disk has been inserted into the USB host port of the LCR meter and if the meter detects that the USB disk is usable, the meter will show "USB Disk Ready". Touch the [SAVE SCR] key to save screen on the lower part of the LCD screen.



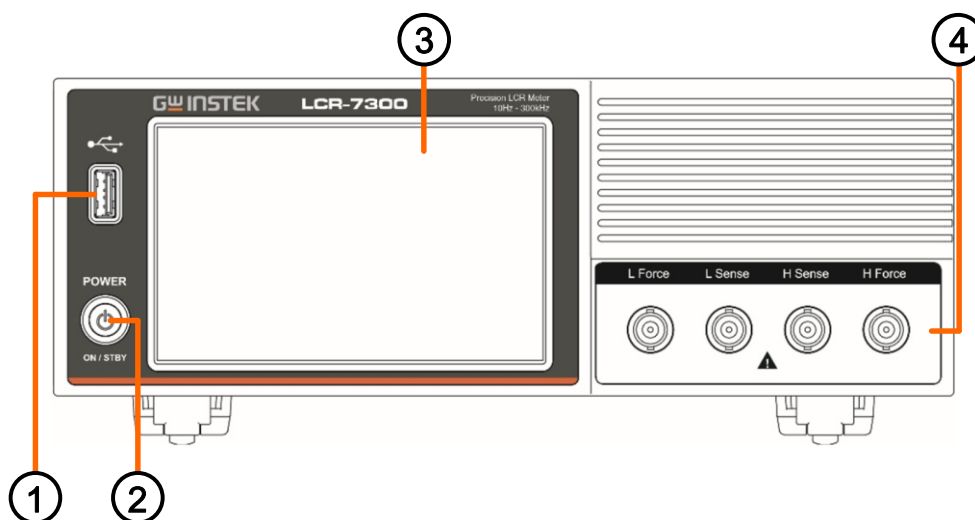
If the screenshot is saved successfully, the message area at the bottom of the screen will display "Screenshot saved". The screenshot location (F:\LCR-7300\Screen) and name use a sequential number (ScreenShot001.bmp).

Startup

This chapter describes names and functions of the front panel, rear panel, and screen display and provides the basic procedures for operating the LCR-7000 Series.

- Front panel summary
- Rear panel summary
- Power On/Off
- Connect to Device under test

Front panel



1 USB Disk Port (USB-Host)

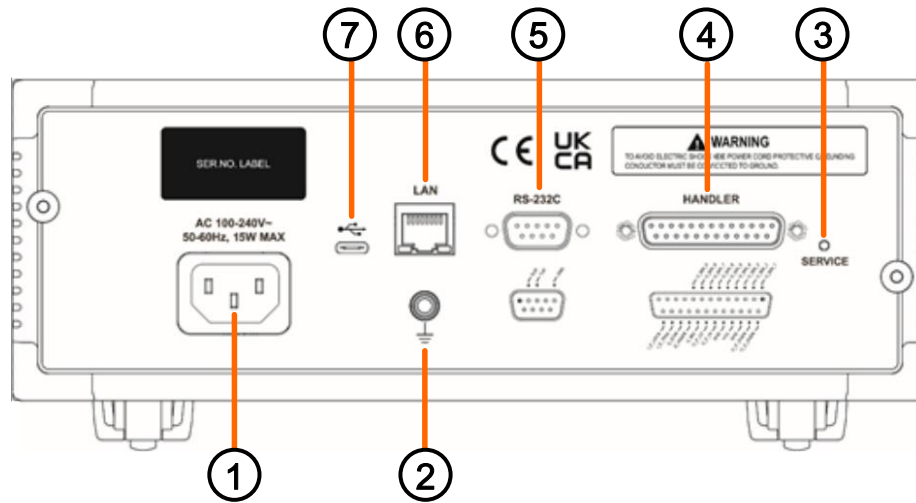
2 Power Switch

Warning: To ensure the safety of the internal power supply, the instrument should be turned off and allowed to be restarted after 2 seconds.

3 LCD Display and Touch Screen

4 BNC Terminal

Rear Panel



-
- | | |
|---|---------------------------------|
| 1 | Power Cable Receptacle (Outlet) |
| 2 | Frame Terminal |
| 3 | Update firmware switch |
| 4 | Handler Interface |
| 5 | RS-232 Interface |
| 6 | LAN Interface |
| 7 | USB Interface (Type C) |
-

Power On/Off

Power On

Press the power key for at least 1 second. Release power key when the POWER LED turns green.



WARNING

To ensure the safety of the internal power supply, the instrument should be turned off and allowed to be restarted after 2 seconds.

Power Off

Press the power key at least 1 second. LCR-7000 Series will shut down when you release the power key after the POWERLED turns red.

If the AUTOSAVE option of the File Operation menu is set to ON (see page 105), the POWER LED will flash twice and the AUTOSAVE function will be executed during the power-off sequence.

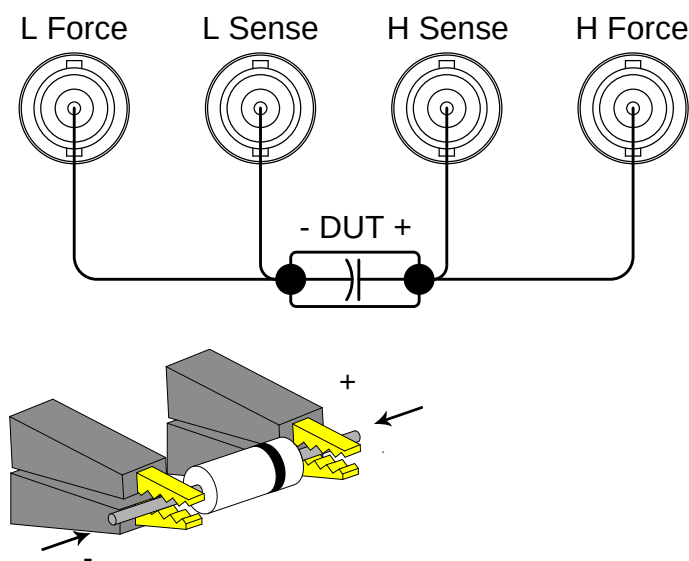
Warm-up Time

LCR-7000 Series is ready to be used as soon as the power-up sequence has completed. However, to achieve the specification accuracy, first warm up the instrument for 30 minutes.

Connect to the Device Under Test (DUT)

The LCR-7000 Series uses a four terminal measurement configuration that provides easy, accurate, and stable measurements and avoids mutual inductance, interference from measurement signals, noise, and other factors inherent with other types of connections.

Connect to DUT



Do not apply DC voltage or current to the UNKNOWN terminals. Applying a DC voltage or current may lead to device failure. Connect the measurement sample (DUT) to the test port (or the test fixture, cables, etc. after the DUT has been completely discharged.

M

Measure

This section includes the following information:

- MEAS DISPLAY page
 - ENLARGE page
 - OPEN/SHORT page
 - BIN MEAS page
 - BIN COUNT page
 - LIST MEAS page
 - GO NoGO page
 - SWEEP page
-

[MEAS DISPLAY] Page

Touch the [MEAS] key, the [MEAS DISPLAY] page appears. The following measurement controls can be set.

- FUNC – Measurement Function
- FREQ – Test Frequency
- LEVEL – Test Signal Level
- RANGE – Impedance range
- SPEED – Measure Speed

To activate the [MEAS DISPLAY] root directory mode, touch the [MEAS DISPLAY] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

[MEAS DISPLAY] Page



Measurement Function [FUNC]

The LCR-7000 Series simultaneously measures four components of complex impedance (parameters) in a measurement cycle. These include a primary parameter, a secondary parameter and two monitor parameters.

NOTE

The monitor parameters can be set in the [SETUP] page. The monitor parameters are initially set to OFF.

Types of measurement parameters

Measurement parameter combinations

Cs-Rs	Cs-D	Cp-Rp	Cp-D
Lp-Rp	Lp-Q	Ls-Rs	Ls-Q
Rs-Q	Rp-Q	R-X	DCR
Z- θ_r	Z- θ_d	Z-D	Z-Q

Monitor parameters

Monitor parameters

Z	D	Q	
Vac	Iac	Δ	$\Delta\%$
θ_r	θ_d	R	X
G	B	Y	

Parameter	Description
Cs	Capacitance value measured using the series equivalent circuit model
Cp	Capacitance value measured using the parallel equivalent circuit model
Ls	Inductance value measured using the series equivalent circuit model
Lp	Inductance value measured using the parallel equivalent circuit model
Rs	Equivalent series resistance measured using the series equivalent circuit model (ESR)
Rp	Equivalent parallel resistance measured using the parallel equivalent circuit model
Z	Absolute value of impedance
Y	Absolute value of admittance
G	Conductance
B	Susceptance
R	Resistance ($= R_s$)
X	Reactance
D	Dissipation factor
Q	Quality factor ($= 1 / D$)
θ_r	Phase radian
θ_d	Phase angle
Vac	Test signal Voltage
Iac	Test signal Current
Δ	Absolute deviation value
$\Delta\%$	Relative deviation value
DCR	Direct Current Resistance

Procedure for setting measurement function [FUNC]

- Step 1. Touch the [MEAS] key.
- Step 2. Touch the [FUNC] field.
- Step 3. Touch the measurement function on the right side of the screen or switch to other functions.

Test Frequency [FREQ]

LCR-7300: 10 Hz to 300 kHz

LCR-7200: 10 Hz to 200 kHz

LCR-7100: 10 Hz to 100 kHz

LCR-7020: 10 Hz to 20 kHz

LCR-7002: 10 Hz to 2 kHz

Frequency range and resolution

Frequency range(<i>F</i>)	Resolution
$10.00 \text{ Hz} \leq F \leq 99.99 \text{ Hz}$	0.01 Hz
$100.0 \text{ Hz} \leq F \leq 999.9 \text{ Hz}$	0.1 Hz
$1.000 \text{ kHz} \leq F \leq 9.999 \text{ kHz}$	1 Hz
$10.00 \text{ kHz} \leq F \leq 99.99 \text{ kHz}$	10 Hz
$100.0 \text{ kHz} \leq F \leq 300.0 \text{ kHz}$	100 Hz

Frequency Accuracy: $\pm 0.01 \%$

Procedure for setting test frequency [FREQ]

- Step 1. Touch the [MEAS] key.
- Step 2. Touch the [FREQ] field.
- Step 3. Touch the [INPUT FREQ] key to enter the test frequency.

When data is entered with the numeric keys, the select-keys change to unit labels (Hz, kHz).

select-key	Function
INPUT FREQ	Turn on the numeric keypad and set any value.
INCR + DECR -	Be used to select between predefined measuring frequencies. Refer to data from the following 5 tables for more details.

LCR-7300's predefined test frequencies that can be selected by using INCR+/DECR-

INCR + / DECR -				
10 Hz	50 Hz	60 Hz	100 Hz	120 Hz
1 kHz	2 kHz	10 kHz	20 kHz	40 kHz
50 kHz	100 kHz	200 kHz	250 kHz	300 kHz

LCR-7200's predefined test frequencies that can be selected by using INCR+/DECR-

INCR+/DECR-				
10 Hz	50 Hz	60 Hz	100 Hz	120 Hz
1 kHz	2 kHz	10 kHz	20 kHz	40 kHz
50 kHz	100 kHz	200 kHz		

LCR-7100's predefined test frequencies that can be selected by using INCR+/DECR-

INCR+/DECR-				
10 Hz	50 Hz	60 Hz	100 Hz	120 Hz
1 kHz	2 kHz	10 kHz	20 kHz	40 kHz
50 kHz	100 kHz			

LCR-7020's predefined test frequencies that can be selected by using INCR+/DECR-

INCR+/DECR-				
10 Hz	50 Hz	60 Hz	100 Hz	120 Hz
1 kHz	2 kHz	10 kHz	20 kHz	

LCR-7002's predefined test frequencies that can be selected by using INCR+/DECR-

INCR+/DECR-				
10 Hz	50 Hz	60 Hz	100 Hz	120 Hz
1 kHz	2 kHz			

Test Signal Voltage/Current Level [LEVEL]

The LCR-7000 Series' test signal voltage/current level can be set as the effective value (RMS value) of a sine wave of the test frequency from the unit's internal oscillator.

When a constant voltage or current level measurement is performed, an asterisk mark (*) appears at the end of the LEVEL display.

Test signal level setting procedure

- Step 1. Touch the [MEAS] key
- Step 2. Touch the [LEVEL] field
- Step 3. Touch the [INPUT LEVEL] key to enter the test signal voltage/current level.

When data is entered with the numeric keys, the select-keys change to unit labels (mV, V, μ A, mA).

select-key	Function
INPUT LEVEL	Turn on the numeric keypad and set any value.
INCR +	Refer to table below
DECR -	
ALC ON	Auto Level Control ON
ALC OFF	Auto Level Control OFF

Test voltage/current level that can be selected with INCR+/DECR-

INCR+/DECR-			
10.00 mV	100.0 mV	300.0 mV	500.0 mV
1.000 V	1.500 V	2.000 V	
INCR+/DECR-			
100.0 μ A	500.0 μ A	1.000 mA	
5.000 mA	10.000 mA	20.00 mA	

Voltage range	Resolution
$10.00 \text{ mV} \leq \text{LEVEL} \leq 99.99 \text{ mV}$	0.01 mV
$100.0 \text{ mV} \leq \text{LEVEL} \leq 999.9 \text{ mV}$	0.1 mV
$1.000 \text{ V} \leq \text{LEVEL} \leq 2.000 \text{ V}$	0.001 V

Current range	Resolution
$100.0\ \mu\text{A} \leq \text{LEVEL} \leq 999.9\ \mu\text{A}$	$0.1\ \mu\text{A}$
$1.000\ \text{mA} \leq \text{LEVEL} \leq 9.999\ \text{mA}$	$0.001\ \text{mA}$
$10.00\ \text{mA} \leq \text{LEVEL} \leq 20.00\ \text{mA}$	$0.01\ \text{mA}$

Impedance Range [RANGE]

Impedance range mode

To achieve the best measurement result, it is recommended to set the impedance range mode to "Auto range". When using "Hold range", errors in measurement results may occur if the measured value exceeds the full scale of the selected range.

Impedance range mode

Mode	Function overview	Advantage	Disadvantage
Auto Range	Sets the optimum impedance range for the impedance of the DUT	You don't need to select range	The measurement time is longer due to the ranging time
Hold Range	Measurement is performed with a fixed impedance range	No ranging time is required	You need to select a proper range depending on the value of the DUT.
Nominal Range	Sets the optimum range depending on the nominal value	You don't need to select range. No ranging time is required	Valid only in the sorting mode

Available impedance range

The hold range has nine impedance ranges: 10 Ω , 30 Ω , 100 Ω , 300 Ω , 1 k Ω , 3 k Ω , 10 k Ω , 30 k Ω and 100 k Ω . The impedance range is selected according to the DUT's impedance even if the measurement parameter is capacitance or inductance.

Effective measurement range for the impedance range when in HOLD state.

Range No.	Impedance range	Effective measurement range
8	10 Ω	(0 to 10) Ω
7	30 Ω	10 Ω to 100 Ω
6	100 Ω	100 Ω to 316 Ω
5	300 Ω	316 Ω to 1 k Ω
4	1 k Ω	1 k Ω to 3.16 k Ω
3	3 k Ω	3.16 k Ω to 10 k Ω
2	10 k Ω	10 k Ω to 31.6 k Ω
1	30 k Ω	31.6 k Ω to 100 k Ω (∞)
0	100 k Ω	100 k Ω to ∞ (This range is available only when the test frequency $\leq$ 20 kHz.)

DCR FUNC best measurement range for the impedance range when in HOLD state.

When the measured value exceeds 150 % of the full scale for the selected range, "OVERLOAD" will be displayed.

Range No.	Impedance range	Best measurement range	Overload
7	100 m Ω	0 Ω to 0.33 Ω	0.495 Ω
6	1 Ω	0.32 Ω to 3.3 Ω	4.95 Ω
5	10 Ω	3.2 Ω to 99 Ω	148.5 Ω
4	100 Ω	90 Ω to 990 Ω	1.485 k Ω
3	1 k Ω	900 Ω to 9.9 k Ω	14.85 k Ω
2	10 k Ω	9 k Ω to 33 k Ω	49.5 k Ω
1	100 k Ω	32 k Ω to 990 k Ω	1.485 M Ω
0	1 M Ω	900 k Ω to 10 M Ω	100 M Ω

DCR accuracy: ± 0.1 % with 15.0001 Ω to 312 k Ω , ± 0.25 % with 0.1 Ω to 15 Ω measurement range.

Procedure for setting the impedance range [RANGE]

- Step 1. Touch the [MEAS] key.
- Step 2. Touch the [RANGE] field.
- Step 3. Touch the select-keys to select the impedance range mode or impedance range.

Select-key	Function
AUTO RANGE	Sets to AUTO range
HOLD RANGE	Sets to HOLD range
NOMINAL RANGE	Sets to NOMINAL range
INCR +	Increments the impedance range in the HOLD mode
DECR -	Decrements the impedance range in the HOLD mode

Measurement Speed [SPEED]

SLOW, MED and FAST can be selected.

SLOW mode will result in more stable and accurate measurement results.

Procedure for setting measurement speed mode

- Step 1. Touch the [MEAS] key.
- Step 2. Touch the [SPEED] field.
- Step 3. Touch the select-keys to set measurement speed.

Select-key	Function
FAST	40 times/sec ^{*1}
MED	10 times/sec ^{*1}
SLOW	3 times/sec ^{*1}

NOTE

*1. Measurement speed in 300 kHz, typical.
The Measurement Speed time is the trigger to the end of measurement (EOM) output on the Handler.

Display: [BIN MEAS] Page

[RANGE]: HOLD RANGE

[AVG]: 1

[BIAS]: OFF

[AUTO LCZ]: OFF

[MON 1] [MON 2]: OFF

[DELAY]: 0 ms

[ALC]: OFF

Measurement speed [ms]

	Speed		
Test Frequency (Hz)	SLOW	MED	FAST
10	1600	1600	1600
20	800	800	800
100	483	160	160
1000	342	94	30
2000	336	91	26.5
10000	332	88.5	20.5
100000	332	88.5	20.5
300000	332	88.5	20.5
DCR	260	135	35

Measurement log [LOG]

The LCR-7000 has an internal data buffer that record up to 10000 measurement readings. These readings can be saved to an external USB drive in a .csv file format. These readings can then be opened on a PC using software such as Windows Excel. When the LOG function is active, the display is fixed to the [MEAS DISPLAY] screen. The [FUNC], [FREQ] and [LEVEL] settings are also fixed and cannot be changed.

Procedure for setting Log

- Step 1. Touch the [MEAS] key.
- Step 2. Touch the [LOG] field.
- Step 3. Touch the [START LOG] select-key to start a new log.

Select-key	Function
START LOG	To start a new measurement log.

- Step 4. After a new log has started, the measurement readings will be recorded into the meter's internal buffer. The options in the following table are available during this recording process:

Select-key	Function
STOP	Stops the recording and temporarily saves the logs into the buffer. An exclamation mark will be added after the record counts (in the [LOG] status field) to remind you that there are recorded readings in the buffer that have not yet been processed.
SAVE TO USB	Saves the recorded readings in the buffer to an external USB flash drive. The internal buffer is cleared after this operation.

CLEAR BUFFER	Clears the internal buffer.
SAVE & STOP	Stops the recording and saves the recorded readings in the internal buffer to an external USB flash drive. The internal buffer will be cleared after the save operation. If an external USB flash drive is not plugged in, the meter will not stop the ongoing recording.
CLEAR & STOP	Stop recording and clears the internal buffer.

Step 5. When the internal buffer is full, “!FULL” will be added after the number of recorded counts(in the [LOG] status field). The following two operations are available in this situation:

Select-key	Function
SAVE TO USB	Saves the recorded readings in the buffer to an external USB flash drive. The internal buffer is cleared after this operation.
CLEAR BUFFER	Clears the internal buffer.

Before saving the recorded readings in the internal buffer to the external USB flash drive, remember to plug the external USB drive into the USB port on the front panel.

The recorded readings will be saved in a subdirectory named MEAS DATA, whose parent directory will have the same name as the LCR-7000 model being used. See the example in below:

Example: F:\LCR-7300\MEAS
DATA\MEAS0000.CSV

Up to 9999 recording files can be saved, with their file names from 0001.csv~9999.csv.

The size of the internal buffer can be adjusted in SYSTEM→SYSTEM CONFIG→DATA BUFFER setting field. The maximum data buffer size is 10000.

[ENLARGE DISPLAY] Page

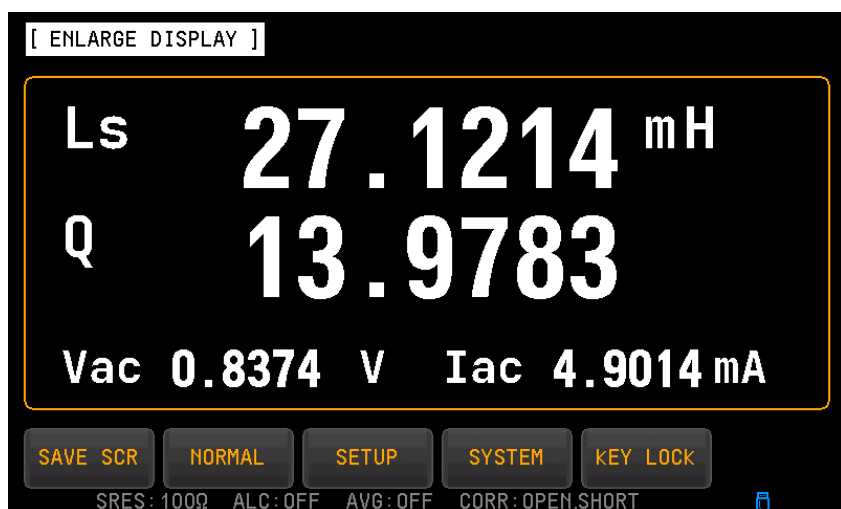
Only four measurement values will be shown in this simplified display mode: The primary measurement parameters, the secondary measurement parameters and two monitored parameters such as Δ , $\Delta\%$, Iac or Vac, etc.

Enlarge Display

Touch the [ENLARGE] key in the [MEAS DISPLAY] to enter the [ENLARGE DISPLAY] mode (simplified display mode); on the contrary, touch the [NORMAL] key in the [ENLARGE DISPLAY] mode to quit the [ENLARGE DISPLAY] mode and return to the regular [MEAS DISPLAY] mode.

The parameter setting fields and function selection keys are not displayed; only the measurement values are shown, making it easier for users to read the measurement values.

[ENLARGE DISPLAY] Page



[OPEN/SHORT] Page

When you touch the [MEAS] key then the [OPEN SHORT] select-key, the [OPEN SHORT] page appears.

In this page, the OPEN/SHORT/SPOT correction for correcting the stray admittance and residual impedances can be performed.

The OPEN and SHORT function performs open or short correction over a range of fixed trimming points. The correction for all other frequencies is interpolated from those fixed trimming points. Please refer to the Specification page to see what the trimming frequency points are for each LCR-7000 model.

The SPOT function will perform open, or short correction at a user-defined “spot” frequency.

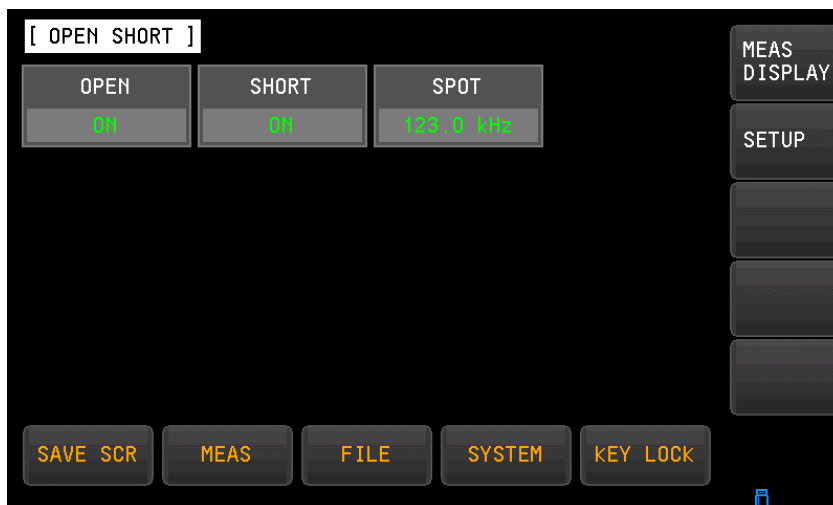
Before executing the OPEN/SHORT/SPOT procedure, please warm up the instrument for 30 minutes to ensure optimal accuracy after correction.

In the [OPEN SHORT] page, you can configure each of the following controls with touch in the corresponding field:

- Open correction [OPEN]
- Short correction [SHORT]
- SPOT correction [SPOT]

To activate the [OPEN SHORT] root directory mode, touch the [OPEN SHORT] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

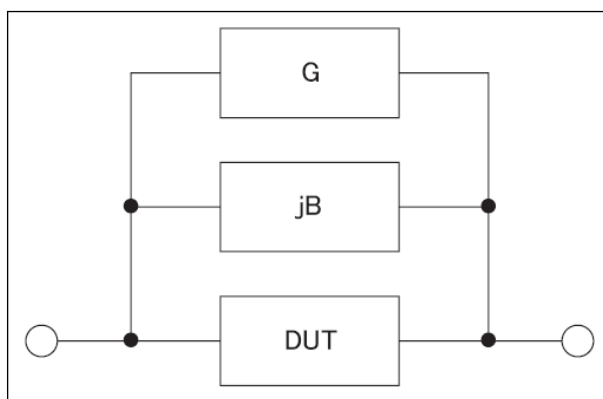
[OPEN SHORT] Page



Open Correction [OPEN]

The LCR-7000 Series' OPEN correction capability cancels errors due to the stray admittance (G , B) in parallel with the device under test. Refer to the figure below.

Stray Admittance



The OPEN correction data is taken at all preset frequency points, independent of the test frequency you set. Refer to the tables on page 175 for the trimming frequency point lists for each model.

To perform open correction

- Step 1. Touch the [Measure] key.
- Step 2. Touch the [OPEN SHORT] select-key.
- Step 3. Touch the [OPEN] field.

Select-key	Function
ON/OFF	Enables/Disables open correction.
MEAS OPEN	Starts open correction (AC).
DCR OPEN	Starts open correction (DC).

- Step 4. Touch the [MEAS OPEN] or [DCR OPEN] select-key. A dialog message, "Open-circuit the test terminals" will appear.
- Step 5. Connect the test fixture to the BNC terminals. Do not connect the DUT to the fixture.
- Step 6. Touch the [OK] select-key. The LCR-7000 will then measure the open admittances (capacitance and conductance) at the all-test frequency points.

During the measurement, an "LCR OPEN measurement in progress" dialog message is shown on the display.

When the measurement has finished, "Correction finished" is displayed.

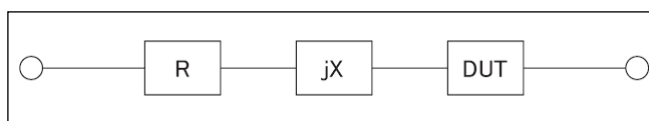
During the measurement, you can press the [CANCEL] select-key to abort the OPEN correction.

- Step 7. After the OPEN measurement has finished, the meter will enable OPEN correction automatically. You can, however, still choose to manually choose to enable or disable OPEN correction by depressing the [ON] or [OFF] select-keys.

Short Correction [SHORT]

The short correction feature of the LCR-7000 Series compensates for any residual impedances (R,X) that may exist outside of calibration, such as the impedance of the cables and the DUT connection points. See the figure below.

Residual Impedances



To perform short correction

- Step 1. Touch the [MEAS] key.
- Step 2. Touch the [OPEN SHORT] select-key.
- Step 3. Touch the [SHORT] field.

Select-key	Function
ON/OFF	Enables/Disables short correction.
MEAS SHORT	Starts short correction (AC).
DCR SHORT	Starts short correction (DC).

- Step 4. Touch the [MEAS SHORT] or [DCR SHORT] select-key, a dialog message, "Short-circuit the test terminals", will appear.
- Step 5. Connect the test fixture to the BNC terminals and short-circuit the test terminals.
- Step 6. Touch the [OK] select-key. The LCR-7000 measures the short impedances (inductances and resistance) at the all-test frequency points.
- During the measurement, an "LCR SHORT measurement in progress" dialog message is shown on the display. When the measurement has finished, "Correction finished" is displayed. During the measurement, you can press the [CANCEL] select-key to abort the SHORT correction.
- Step 7. After the SHORT measurement has finished, the meter will enable SHORT correction automatically. You can, however, still choose to manually choose to enable or disable SHORT correction by depressing the [ON] or [OFF] select-keys.

SPOT Correction

The spot correction function involves performing open/short correction at user-specified frequency points. You can specify 1 frequency point.

Specify frequency points and perform open correction

- Step 1. Touch the [MEAS] key.
- Step 3. Touch the [OPEN SHORT] select-key.
- Step 3. Touch the [SPOT] field.
- Step 4. Touch the [INPUT FREQ] select-key to enter the correction frequency or touch the [CURRENT FREQ] select-key to set the currently used frequency for measurement.

Select-key	Function
ON/OFF	Enable/Disables this point.
INPUT FREQ	Turn on the numeric keypad and set any value.
CURRENT FREQ	Use current frequency
MEAS OPEN	Starts open correction.
MEAS SHORT	Starts short correction

- Step 5. Touch the [MEAS OPEN] select-key. A dialog message, "Open-circuit the test terminals", will appear.
- Step 6. Connect the test fixture to the BNC terminals. Do not connect the DUT to the test fixture.
- Step 7. Touch the [OK] select-key. The LCR-7000 measures the open admittances (capacitance and conductance) at this frequency point.
- During the measurement, an "OPEN measurement in progress" dialog message will be shown on the display. When the measurement has finished, "Correction finished", will be displayed. During the measurement, you can press the [CANCEL] select-key to abort open correction.

Specify frequency points and perform short correction

- Step 1. Touch the [MEAS SHORT] select-key, a dialog message, "Short-circuit the test terminals", will be displayed.
- Step 2. Connect the test fixture to the BNC terminals and short-circuit the test terminals.
- Step 3. Touch the [OK] select-key. The LCR-7000 measures the short impedances (inductances and resistance) at this frequency point.

During the measurement, a "SHORT measurement in progress" dialog message will be shown on the display.

When the measurement has finished, "Correction finished" is displayed on the screen. During the measurement, you can press the [CANCEL] select-key to abort short correction.

[BIN MEAS] Page

Touch the [MEAS] key then the [BIN MEAS] select-key, the [BIN MEAS] page appears. The bin sorting results are displayed in larger colored characters while the measurement results are shown in normal characters.

To activate the [BIN MEAS] root directory mode, touch the [BIN MEAS] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

[BIN MEAS] Page



This page provides the following information:

- BIN: Sorting result for BIN (BIN1-9, OUT).
- AUX: Indicates that the limit has been exceeded.
- NG: Overall judgment result (OK, NG).
- Ls-Q: Primary/secondary parameter measurement values.
- NOMINAL: Nominal value.
- COMP MODE: Primary parameter comparator limit mode (ABS, PER, SEQ)
- FUNC, FREQ, LEVEL, RANGE, SPEED: These conditions can be set from [MEAS DISPLAY] page.
- [TRIG]: Measurement Start Source Selection.
- [COMP]: Comparator function ON/OFF.
- [AUX]: Auxiliary bin ON/OFF.

Comparator Function ON/OFF

LCR-7000 built-in comparator can sort DUTs into a maximum of 10 bins (BIN1 to BIN9 and OUT) using a maximum of nine pairs of primary parameter limits and one pair of secondary parameter limits.

A DUT which has the primary parameter within the limits, but secondary parameter is not, can be sorted into an auxiliary BIN (AUX).

See the figure Page Comparator Workflow on page 71 for the Comparator Workflow.

Procedure for setting comparator function [COMP]

- Step 1. Touch the [MEAS] key.
- Step 2. Touch the [BIN MEAS] select-key.
- Step 3. Touch the [COMP] field.
- Step 4. Touch the select-key to turn on/off the comparator.

Select-key	Function
OFF	Turns OFF the COMP function
ON	Turns ON the COMP function

Auxiliary Bin [AUX]

After AUX is turned on, DUTs that do not fall within the primary parameter limit values are sorted as OUT. In addition, DUTs that fall within the primary parameter limits but out of the secondary parameter limits are sorted into the auxiliary (AUX) bin.

Procedure for turning ON/OFF the auxiliary bin [AUX]

- Step 1. Touch the [MEAS] key.
- Step 2. Touch the [BIN MEAS] select-key.
- Step 3. Touch the [AUX] field.
- Step 4. Touch the select-key to turn on/off the auxiliary bin.

Select-key	Function
ON	Turns ON the auxiliary bin
OFF	Turns OFF the auxiliary bin

Measurement log [LOG]

The LCR-7000 has an internal data buffer that record up to 10000 measurement readings. These readings can be saved to an external USB drive in a .csv file format. These readings can then be opened on a PC using software such as Windows Excel.

When the LOG function is active, the display is fixed to the [BIN MEAS] screen. The [FUNC], [FREQ] and [LEVEL] settings are also fixed and cannot be changed.

For related operations, please refer to section 4.1.6 Measurement log [LOG].

The recorded readings will be saved in a subdirectory named MEAS DATA, whose parent directory will have the same name as the LCR-7000 model being used. See the example in below:

Example: F:\LCR-7300\MEAS
DATA\MEAS0000.CSV

[BIN COUNT] Page

Touch the [BIN COUNT] key, the [BIN COUNT] page appears. Counts the primary parameter measurement results by BIN1-9 classification, counts the secondary parameter AUX exceeding the standard, and displays the OUT total result.

To activate the [BIN COUNT] root directory mode, touch the [BIN COUNT] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

This page provides the following information:

- [COUNT]: Counter function.

[BIN COUNT] Page



Counter Function [COUNT]

The number of DUTs sorted into each bin is counted while the unit sorts the DUTs into the appropriate bins using the comparator function.

When the maximum count of 99999999 is reached, the counting operation stops and the overflow message

“-----” appears.

Set the Counter:

- Step 1. Touch the [MEAS] key.
- Step 2. Touch the [BIN MEAS] select-key.
- Step 3. Touch the [BIN COUNT] select-key.
- Step 4. Touch the [COUNT] field.
- Step 5. Touch the select-key to turn on/off the counter.

Select-key	Function
COUNT ON	Turns the counter function on
COUNT OFF	Turns the counter function off
RESET COUNT	The counter is reset when this key pressed.

[LIST MEAS] Page

The [LIST MEAS] page will appear when you touch the [MEAS] key and then the [LIST MEAS] select-key. Set 10 measurement conditions (frequency and level) for list measurement, and set the acceptable range of the primary /secondary parameters and judge the result (PASS/HIGH/LOW).

To activate the [LIST MEAS] root directory mode, touch the [LIST MEAS] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

[LIST MEAS] Page

[LIST MEAS]		LOG		OFF		LIST SETUP
TRIG	No	FREQ	Ls	Q	CMP	
MAN	1	60.00 Hz	24.1765 mH	3.58674	-	
	2	1.000 kHz	27.2612 mH	13.3866	P	
MODE	3	10.00 kHz	26.4086 mH	32.9192	P	
SEQ	4	20.00 kHz	25.7377 mH	39.8007	H	
	5	50.00 kHz	25.9194 mH	32.4356	-	
RANGE	6	100.0 kHz	28.8028 mH	15.1182	-	
[04] AUTO	7	150.0 kHz	35.0396 mH	6.67309	-	
	8	200.0 kHz	47.2417 mH	3.04439	H	
	9	250.0 kHz	59.0998 mH	0.93874	-	
	10	300.0 kHz	-39.6309 mH	0.54489	-	
SAVE SCR	MEAS	SETUP	SYSTEM	KEY LOCK	TRIGGER	
SRES: 100Ω ALC: OFF AVG: OFF CORR: OPEN SHORT SPOT						

On the [LIST MEAS] page, the list points are swept and the measurement results are compared to the limits. During a sweep, an asterisk mark (*) will appear on the left side of the list point currently being measured.

This page provides the following information:

- [TRIG]: Trigger mode.
- [MODE]: Test mode.
- [RANGE]: Range mode.
- [LOG]: Measurement recording.

These conditions can be set from [MEAS DISPLAY] page and [SETUP] page.

Trigger Mode [TRIG]

Select the trigger mode for LIST MEAS here; manual trigger is generally used for LIST MEAS.

When entering the LIST MEAS function, the default trigger mode is the manual trigger mode.

You can touch the [TRIG] field and select the other available trigger sources.

Trigger mode

When entering LIST MEAS for the first time, the system will set Trig Mode to MAN.

Trig Mode	Function
INT	Internal Trigger. All ten list points are swept continuous.
MAN	Manual Trigger. Each time the instrument is triggered by [TRIGGER] key, the list points are swept.
EXT	External Trigger. Each time the instrument is triggered by the handler trigger pin, the list points are swept.
BUS	BUS Trigger. Each time the instrument is triggered by SCPI command, the list points are swept.

Test Mode [MODE]

The [LIST MEAS] page will execute a list of up to 10 swept frequency or level tests.

When [MODE] is set to SEQ and [TRIG] is set to MAN, the [LIST MEAS] function will automatically execute each test step on the list in sequence until the last step is executed. The meter will then wait for the trigger button to be depressed before repeating the process.

When [MODE] is set to STEP and [TRIG] is set to MAN, the [LIST MEAS] function will automatically execute the first test step. The meter will then wait for the trigger button to be depressed before executing the next step. This process is repeated for each step on the list.

Test Mode

Select-key	Function
SEQ	Sequence measures all step by one trigger.
STEP	Measure one step by one trigger.

There are 4 available trigger modes in the [LIST MEAS] page.

Trigger Modes	Function
INT	Trigger by the meter's internal trigger source.
MAN	Trigger by pressing the trigger button.
EXT	Trigger by sending a signal to the trigger pin on the handler interface.
BUS	Trigger by the RS-232/USB/LAN port.

Range Mode [RANGE]

Displays the selected measurement range for each measurement step. If you need to change the measurement range, please refer to the [RANGE] option in the [MEAS DISPLAY] or [MEAS SETUP] functions for changes.

Measurement log [LOG]

The LCR-7000 has an internal data buffer that record up to 10000 measurement readings. These readings can be saved to an external USB drive in a .csv file format. These readings can then be opened on a PC using software such as Windows Excel.

Procedure for setting Log

- Step 1. Touch the [LIST MEAS] select-key.
- Step 2. Touch the [LOG] field.
- Step 3. Use the [START LOG] soft-keys to start a new log.

Select-key	Function
START LOG	To start a new measurement log.

Step 4. After a new log has started, the measurement readings will be recorded into the meter's internal buffer. The options in the following table are available during this recording process:

Select -key	Function
STOP	Stops the recording and temporarily saves the logs into the buffer. An exclamation mark will be added after the record counts (in the [LOG] status field) to remind you that there are recorded readings in the buffer that have not yet been processed.
CLEAR & STOP	Stop recording and clears the internal buffer.

Step 5. When the internal buffer is full, “!FULL” will be added after the number of recorded counts (in the [LOG] field). The following two operations are available in this situation:

Select -key	Function
SAVE TO USB	Saves the recorded readings in the buffer to an external USB flash drive. The internal buffer is cleared after this operation.
CLEAR BUFFER	Clears the internal buffer.

Before saving the recorded readings in the internal buffer to the external USB flash drive, remember to plug the external USB drive into the USB port on the front panel.

The recorded readings will be saved in a subdirectory named LIST DATA, whose parent directory will have the same name as the LCR-7000 model being used. See the example in below:

Example: F:\LCR-7300\LIST

DATA\LIST0000.CSV

Up to 9999 recording files can be saved, with their file names from 0001.csv~9999.csv.

The size of the internal buffer can be adjusted in SYSTEM→SYSTEM CONFIG→DATA BUFFER setting field. The maximum data buffer size is 10000.

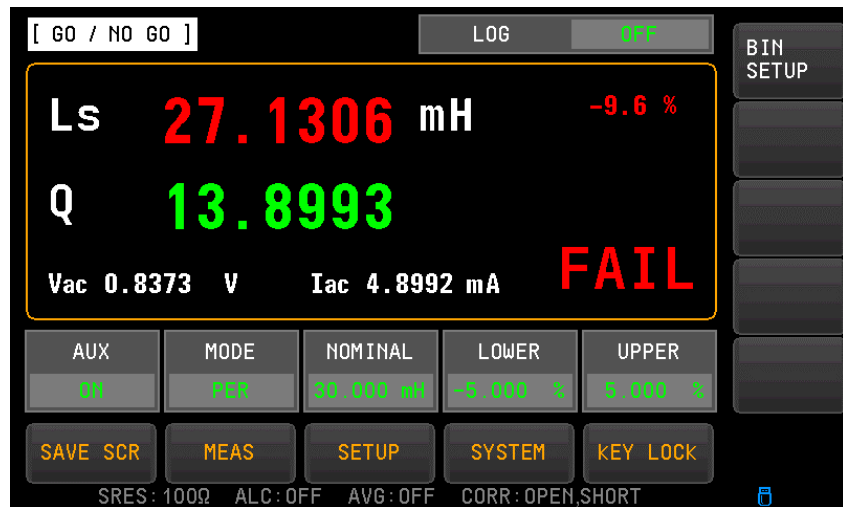
[GO NOGO] Page

Touch the [MEAS] key then the [GO NOGO] select-key, the [GO NOGO] page appears. The measurement results are displayed in colored font: green indicates compliance with specifications, and red indicates non-compliance with specifications. The overall result is displayed in the lower right corner as either green "PASS" or red "FAIL".

The [GO NOGO] page allows you to quickly set the acceptable range for primary parameter and perform DUT measurement judgment applications. Measurement parameters use the BIN settings; the AUX acceptable range is set on the [BIN SETUP] page.

To activate the [GO NOGO] root directory mode, touch the [GO NOGO] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

[GO NOGO] Page



This page provides the following information:

- [AUX]: Auxiliary bin ON/OFF.
- [MODE]: Primary parameter comparator limit mode.
- [NOM]: Nominal value.
- [LOWER]: Lower limit value.
- [UPPER]: Upper limit value.

Instructions for setting these conditions can be found on the [BIN SETUP] page.

Measurement log [LOG]

The LCR-7000 has an internal data buffer that record up to 10000 measurement readings. These readings can be saved to an external USB drive in a .csv file format. These readings can then be opened on a PC using software such as Windows Excel.

When the LOG function is active, the display is fixed to the [GO NOGO] screen. The all settings are also fixed and cannot be changed.

For related operations, please refer to section 4.1.6 Measurement log [LOG].

The recorded readings will be saved in a subdirectory named MEAS DATA, whose parent directory will have the same name as the LCR-7000 model being used. See the example in below:

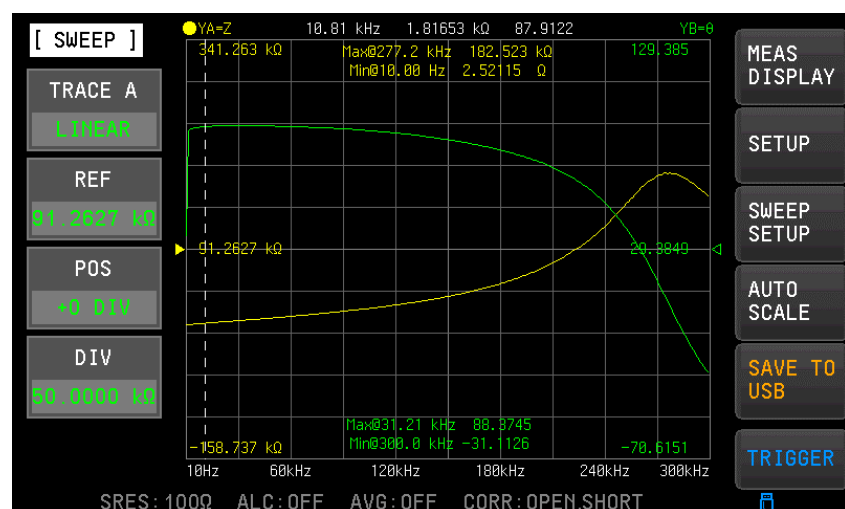
Example: F:\LCR-7300\GO NOGO
DATA\MEAS0000.CSV

[SWEEP] Page

Touch the [MEAS] key then the [SWEEP] select-key, the [SWEEP] page appears. Set a frequency range and perform frequency sweep measurements at more than 250 frequency points, displaying the value curves of the main/secondary parameters.

To activate the [SWEEP] root directory mode, touch the [SWEEP] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

[SWEEP] Page



This page provides the following information:

- [TRACE A/B]: Y-axis scale modes LINEAR and LOG of trace A or B.
- [REF]: Y-axis reference point of trace A or B.
- [POS]: Move the graphic position of trace A or B.
- [DIV]: Y-axis single division values of trace A or B.
- [SWEEP SETUP]: SWEEP Measurement Control Parameter Settings.
- [AUTO SCALE]: Automatically adjust the Y-axis scale and position of the sweep graph.
- [SAVE TO USB]: Store SWEEP measurement data and graphs to external USB disk.

Y-axis scale modes [TRACE A/B]

The Y-axis scale shows 2 modes LINEAR and LOG of trace A or trace B. Turn on the measurement cursor and move it to display the measurement values at each frequency point.

Step 1. Touch the [MEAS] key.

Step 2. Touch the [SWEEP] select-key.

Step 3. Touch the [TRACE A/B] field.

Select-key	Function
LINEAR	The Y-axis uses equal scales.
LOG	The Y-axis uses a logarithmic
CURSOR	Turn on the measurement
CURSOR←	Move the cursor to the left.
CURSOR→	Move the cursor to the right.

Reference point [REF]

Set the Y-axis reference point scale for trace A or B.

- Step 1. Touch the [MEAS] key.
- Step 2. Touch the [SWEEP] select-key.
- Step 3. Touch the [REF] field.
- Step 4. Touch the [INPUT REF] select-key to enter the Reference point values or touch the [AUTO SCALE] select-key Automatically adjust.

Graphic position [POS]

Move the graphic of trace A or trace B.

- Step 1. Touch the [MEAS] key.
- Step 2. Touch the [SWEEP] select-key.
- Step 3. Touch the [POS] field.
- Step 4. Touch the [INCR+] or [DECL-] select-key to Move the graphic up or down or touch the [AUTO SCALE] select-key Automatically adjust.

Division scale [DIV]

Set the Y-axis single-division scale value of trace A or trace B.

- Step 1. Touch the [MEAS] key.
- Step 2. Touch the [SWEEP] select-key.
- Step 3. Touch the [DIV] field.
- Step 4. Touch the [INCR+] or [DECL-] select-key increases or decreases the scale value or touch the [AUTO SCALE] select-key Automatically adjust.

Setup

This section includes the following information:

- MEAS SETUP page
- BIN SETUP page
- LIST SETUP page
- SWEEP SETUP page
- SAVE TO USB page

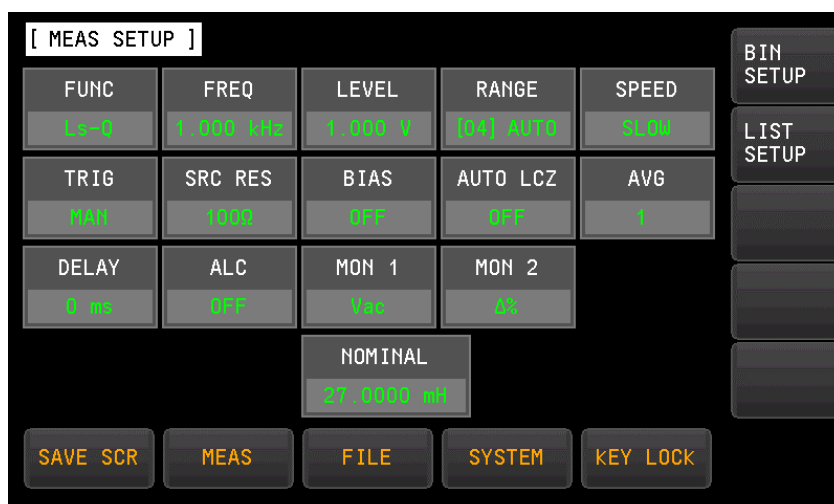
Every time or everywhere you can touch the [SETUP] key to open the [MEAS SETUP] page.

[MEAS SETUP] Page

NOTE

In [MEAS SETUP] page, the Instrument does not display test result and sorting result, but testing still in progress.

[MEAS SETUP] Page



To activate the [MEAS SETUP] root directory mode, touch the [MEAS SETUP] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

On the [MEAS SETUP] page, you can directly touch the field to configure each of the following measurement controls.

- Measurement Function [FUNC] *1
- Test Frequency [FREQ] *1
- Test Signal Voltage Level [LEVEL] *1
- Impedance range [RANGE] *1
- Measurement Speed [SPEED] *1
- Trigger Mode [TRIG]
- Source Output Impedance [SRC RES]
- DC Bias Voltage [BIAS]
- Auto LCZ Function [AUTO LCZ]
- Averaging Factor [AVG]
- Measurement Delay Time [DELAY]
- Auto Level Control [ALC]
- Monitor 1 and Monitor 2 Parameter Select [MON 1] [MON 2]
- Nominal value [NOMINAL]

NOTE

*1. These settings can be set in the [MEAS DISPLAY] page. Please refer to section [MEAS DISPLAY] Page on page 25 for details.

Trigger Mode [TRIG]

Four trigger modes: INT (internal), EXT (external), MAN (manual) and BUS (RS-232/USB/LAN).

Trigger	Description
INT	Continuously repeats the measurement cycle.
MAN	Performs one cycle of measurement each time you touch the [TRIGGER] key.
EXT	Performs one cycle of measurement each time a rising pulse is input to the handler external trigger input pin on the rear panel.
BUS	Performs one cycle of measurement each time it receives a trigger command sent via RS-232/USB/LAN.

Procedure for choosing trigger mode [TRIG]

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [TRIG] field.
- Step 3. Touch the select-keys to select desired trigger mode.

Select-key	Function
INT	Internal Trigger Mode
MAN	Manual Trigger Mode
EXT	External Trigger Mode
BUS	BUS Trigger Mode

Source Output Impedance [SRC RES]

The Source output impedance can be set to 30 Ω , 50 Ω or 100 Ω .

If you are test a smaller inductor, please use 30 Ω .

If you need to compare test results with Keysight E4980A, select 100 Ω .

Procedure for setting source output impedance

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [SRC RES] field.
- Step 3. Touch the select-keys to select source output impedance.

Select-key	Function
30 Ω	30 Ω
50 Ω	50 Ω
100 Ω	100 Ω

DC Bias Voltage [BIAS]

This function will apply a DC bias voltage onto the DUT while LCR meter is performing its AC measurement on the DUT. The settable DC bias voltage range is from -5.00 V to 5.00 V.

Procedure for setting DC bias voltage

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [BIAS] field.
- Step 3. Touch the select-keys to select DC bias voltage.

Select-key	Function
INPUT BIAS	Turn on the numeric keypad and set voltage value.
OFF	Turn off the DC bias voltage
5.00 V	5 V voltage is applied to the device

	under test.
-5.00 V	-5 V voltage is applied to the device under test.

Bias Voltage range	Resolution
$0.01\text{ V} \leq \text{DC BIAS} \leq 5.00\text{ V}$	0.01 V
$-5.00\text{ V} \leq \text{DC BIAS} \leq -0.01\text{ V}$	0.01 V

Auto LCZ Function [AUTO LCZ]

Auto LCZ Function can help you to select a proper measurement parameter.

NOTE

Auto LCZ Function cannot judge complex components, please do not rely entirely on this function to measure.

To set up the Auto LCZ Function

- Step 1. Touch the [SETUP] key
- Step 2. Touch the [AUTO LCZ] field
- Step 3. Touch the select-keys to turn on/off the Auto LCZ Function.

Select-key	Function
OFF	Turn off the Auto LCZ Function
ON	Turn on the Auto LCZ Function. When Auto LCZ Function is set to ON, "AUTO-LCZ" will display on [FUNC] field.

NOTE

The Auto LCZ Function will be turned off after you set the measurement function.

Averaging Factor [AVG]

The averaging feature allows you to obtain moving average values of successive measurement results.

You can specify the averaging factor from integer 1 to integer 256.

To set up the averaging factor

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [AVG] field.
- Step 3. Touch the select-keys or number keys to enter averaging factor.

Select-key	Function
INPUT AVG	Turn on the numeric keypad and set average value.
INCR +	Increments the averaging factor in steps of 1, 2, 4, 8, 16, 32, 64, 128 and 256.
DECR -	Decrements the averaging factor in steps of 1, 2, 4, 8, 16, 32, 64, 128 and 256.

Measurement Delay [DELAY]

This setting decides how long the meter will wait to commence a measurement after the trigger signal is received. Settable range: 0 ms to 60 s.

To set up the measurement delay

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [DELAY] field.
- Step 3. Touch the [INPUT] select-keys turn on number keys to enter delay time.

AUTO LEVEL CONTROL [ALC]

The automatic level control (ALC) feature adjusts the voltage across the DUT or the current through the DUT to match the voltage/current level setting. Using this feature, you can try to ensure a constant signal level (voltage or current) is applied to the DUT.

To set up the auto level control

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [ALC] field.
- Step 3. Touch the [ON] or [OFF] select-keys turn on/off function.

NOTE

In situations when the actual measuring Vac or Iac goes beyond the extent that the ALC can regulate, a warning message, "Failed! ALC can't regulate!", will be shown at the bottom of the screen to indicate to the operator that the ALC can no longer regulate Vac/Iac.

An asterisk will be shown beside the LEVEL V or A unit when the ALC is turned on.

Select-key	Function
OFF	Turn off the Auto Level Control Function
ON	Turn on the Auto Level Control Function

Monitor 1 and Monitor 2 [MON 1] [MON 2]

The LCR-7000 Series can monitor the other two parameters.

NOTE

Additional monitoring parameters **do not** increase the instrument measurement time. Monitor parameter display in [MEAS DISPLAY] page and [ENLARGE] page.

Procedure for setting monitor (1 and 2) parameters

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [MON 1] or [MON 2] field.
- Step 3. Touch the select-keys to select function.
Usually, Vac and Iac will be selected.

Select-key	Function
OFF	Turn off the monitor
Z	Absolute value of impedance
D	Dissipation factor
Q	Quality factor ($= 1 / D$)
Vac	Test signal Voltage
Iac	Test signal Current
Δ	Absolute deviation value
$\Delta\%$	Relative deviation value
θ_r	Phase radian
θ_d	Phase angle
R	Resistance ($= R_s$)
X	Reactance
G	Conductance
B	Sustenance
Y	Absolute value of admittance

Nominal Value [NOMINAL]

The Nominal Value parameter becomes displayed and settable only when MON1 and MON2 are set in either Δ or $\Delta\%$ modes. The Nominal Value and the measured main parameter will then be used to perform the Δ or $\Delta\%$ calculations.

To set up the nominal value

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [NOMINAL] field.
- Step 3. Touch the [INPUT] select-keys turn on number keys to enter nominal value.

[BIN SETUP] Page

Touch the [SETUP] key and touch the [BIN SETUP] select-key to open [BIN SETUP] page.

This page allows you to configure the LCR-7000 Series' built-in comparator. The built-in comparator can sort DUTs into a maximum of 10 levels (BIN1 through BIN9 and OUT) using up to nine sets of primary parameter limits along with one set of secondary parameter limits.

In addition, DUTs that fall within the primary parameter limits but are out of the secondary parameter limits can be sorted into an auxiliary bin.

To take full advantage of the comparator, LCR-7000 Series is equipped with a handler interface for use in conjunction with the comparator. All 10 bin signals can output to your PLC via the handler interface.

To activate the [BIN SETUP] root directory mode, touch the [BIN SETUP] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

In the [BIN SETUP] page, you can configure each of the following controls with touch the corresponding field.

- Comparator ON/OFF [COMP] *1
 - Measurement Function [FUNC] *1
 - Primary parameter total bins [BINS]
 - Primary parameter comparator limit mode [MODE]
 - Auxiliary bin ON/OFF [AUX] *1Nominal value [NOMINAL]
 - Beep feature [BEEP]
-

NOTE

*1. These settings can also be set in the [BIN MEAS] page.

[BIN SETUP] Page

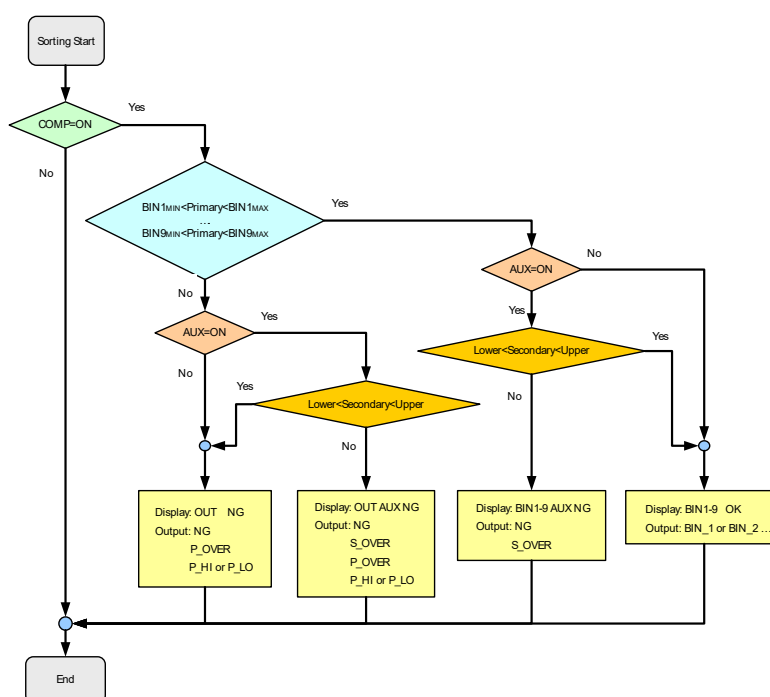
[BIN SETUP]		BIN	LOWER	UPPER	
COMP	FUNC	1	-5.00000 %	5.00000 %	BIN MEAS
ON	LS-R	2	-10.0000 %	10.0000 %	BIN COUNT
BINS	MODE	3	-15.0000 %	15.0000 %	
9-BINS	PER	4	-20.0000 %	20.0000 %	GO NO GO
AUX	NOMINAL	5	-25.0000 %	25.0000 %	
ON	27.0000 mH	6	-30.0000 %	30.0000 %	
BEEP		7	-35.0000 %	35.0000 %	
PASS		8	-40.0000 %	40.0000 %	
		9	-50.0000 %	50.0000 %	
		2nd	10.0000	15.0000	
SAVE SCR	MEAS	FILE	SYSTEM	KEY LOCK	RETURN

Comparator Function [COMP]

LCR-7000 Series' built-in comparator can sort DUTs into a maximum of 10 bins (BIN1 to BIN9 and OUT), using a maximum of nine pairs of primary parameter limits and one pair of secondary parameter limits.

A DUT can be sorted into the auxiliary BIN (AUX) when the primary parameter is within the limits but the secondary parameter is not.

Page Comparator Workflow



Procedure for setting the comparator function

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [BIN SETUP] select-key.
- Step 3. Touch the [COMP] field.
- Step 4. Touch the select-keys to turn on/off the comparator.

Select-key	Function
OFF	Turns OFF the COMP function
ON	Turns ON the COMP function

Measurement Function [FUNC]

The LCR-7000 Series simultaneously measures four components of the complex impedance (parameters) in a measurement cycle. These include primary parameter, secondary parameter and two monitor parameters.

BIN measure only sorts the primary and secondary parameters, and sets the primary and secondary parameters.

Please refer to the 0[MEAS DISPLAY] Page section on page 25 for details.

Procedure for setting the measurement function [FUNC]

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [BIN SETUP] select-key.
- Step 3. Touch the [FUNC] field.
- Step 4. Touch the measurement function on the right side of the screen or switch to other functions.

Total Number of Bins [BINS]

LCR-7000 series specify nine bins (1-BINS to 9-BINS).

To choose total number of the bins

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [BIN SETUP] soft-key.
- Step 3. Touch the [BINS] field.
- Step 4. Touch the select-keys to select beep tone.

Select-key	Function
1-BINS	Set to 1 bin
2-BINS	Set to 2 bins
3-BINS	Set to 3 bins
4-BINS	Set to 4 bins

5-BINS	Set to 5 bins
6-BINS	Set to 6 bins
7-BINS	Set to 7 bins
8-BINS	Set to 8 bins
9-BINS	Set to 9 bins

Comparator limit mode [MODE]

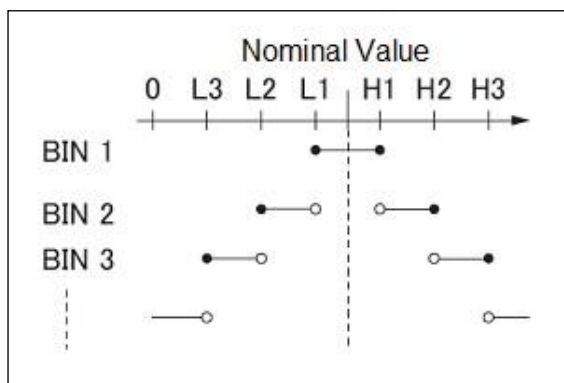
You can specify the primary parameter limit values in one of the following 3 ways:

- Tolerance mode [%][Δ]
In tolerance mode, the comparison limit values are based on the deviations from the specified nominal value, which can be specified in the [NOM] field. You configure the tolerance mode limit values as a deviation percentage (%) or absolute (Δ) parameter value.
- Sequential mode [SEQ]
In sequential mode, the comparison limit values are based on the absolute value of the measurement. When you configure these limit values, you must first define the minimum value and then the maximum value.
- Nominal Value [NOM]
Sets the nominal value (reference value) for the ABS and PER compare modes. Use the number keys to enter the value and the unit.

Absolute mode [ABS]

Absolute value (Δ) = UNKNOWN value – nominal value

Absolute mode

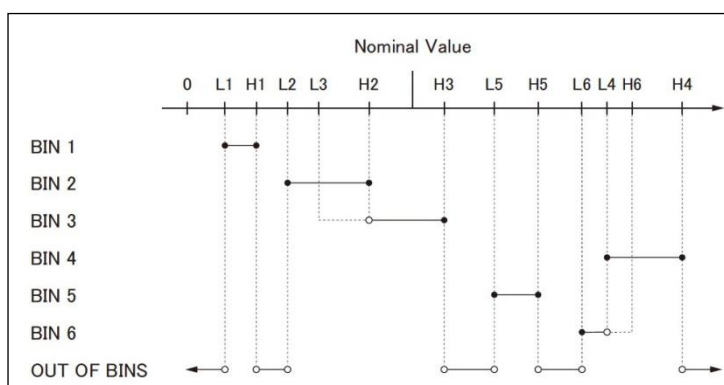


- Includes the point
- Excludes the point

Percentage mode [PER]

Deviation percentages (%) = Absolute value (Δ) / nominal value $\times$ 100 %

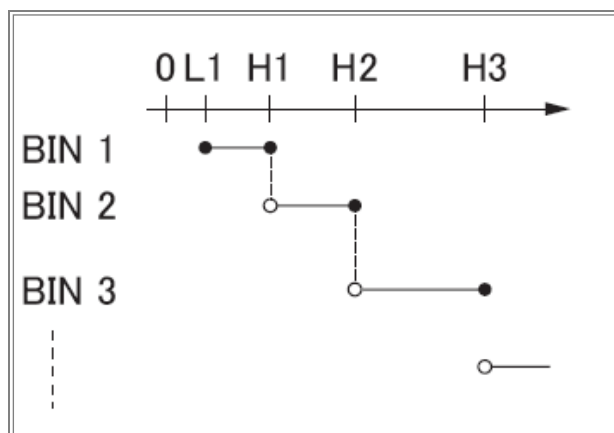
Percentage mode



- Includes the point
- Excludes the point

Sequential mode [SEQ]

Sequential mode



- Includes the point
- Excludes the point

In Sequential mode, the comparison limit values are based on the absolute value of the measurement. The nominal value does not need to participate in operation.

To set up the comparator limit mode

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [BIN SETUP] select-key.
- Step 3. Touch the [MODE] field.
- Step 4. Touch the select-keys to select comparator mode.

Select-key	Function
ABS	Absolute parameter values
PER	Deviation percentages
SEQ	Sequential mode

Auxiliary Bin [AUX]

After AUX is turned on, DUTs that do not fall within the primary parameter limit values are sorted as OUT. In addition, DUTs that fall within the primary parameter limits but are out of the secondary parameter limits are sorted into the auxiliary (AUX) bin.

Procedure for setting the auxiliary bin

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [BIN SETUP] soft-key.
- Step 3. Touch the [AUX] field.
- Step 4. Touch the select-keys to turn on/off the auxiliary bin.

Select-key	Function
ON	Turns ON the auxiliary bin
OFF	Turns OFF the auxiliary bin

Nominal value [NOMINAL]

You must configure the nominal value when you use tolerance mode as the limit mode for the primary parameter.

In sequential mode the nominal value does not affect sorting. In sequential mode, you do not need to configure the nominal value.

To enter the nominal value

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [BIN SETUP] soft-key.
- Step 3. Touch the [NOMINAL] field.
- Step 4. Touch the [INPUT] use the input keys to enter the nominal value and touch the select-keys to select the unit.

Beep feature [BEEP]

The beep feature behaves differently depending on which beep mode is in effect.

To set up the beep feature

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [BIN SETUP] select-key.
- Step 3. Touch the [BEEP] field.
- Step 4. Touch the select-keys to set beep feature.

Select-key	Function
OFF	Turns the beep feature off
PASS	Beep when the comparator sorting result is OK
FAIL	Beep when the comparator sorting result is NG

Lower and Upper Limits

LCR-7000 Series built-in comparator can sort DUTs into a maximum 10 levels (Bin1 through Bin9 and OUT) using up to nine sets of primary parameter limits along with one set of secondary parameter limits.

To enter the limit values for tolerance mode

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [BIN SETUP] select-key.
- Step 3. Touch the [BIN 1-LOWER] field
- Step 4. Touch the [INPUT] use the input keys to enter the limit value.

When in the ABS and SEQ mode, please enter the unit using the soft-keys. When in the PER mode, the unit is %.
- Step 5. Repeat Step 4 touch the [BIN 1-UPPER] until you have entered all bin limit values.
- Step 6. Touch the [2nd-LOWER] field and enter the lower limit value for the secondary parameter.
- Step 7. Touch the [2nd-UPPER] field to enter the upper limit value.

Select-key	Function
INPUT	Turn on the numeric keypad and set limit value.
DELETE	Clear field values.
DELETE LINE	Clear the LOWER and UPPER field values for BIN.
CLEAR TABLE	Clear all BIN and AUX field values.

[LIST SETUP] Page

Touch the [SETUP] key and touch the [LIST SETUP] select-key to open the [LIST SETUP] page.

The List Measure feature can perform automatic sweep measurements by sweeping the frequency or signal level through a maximum 10 list points.

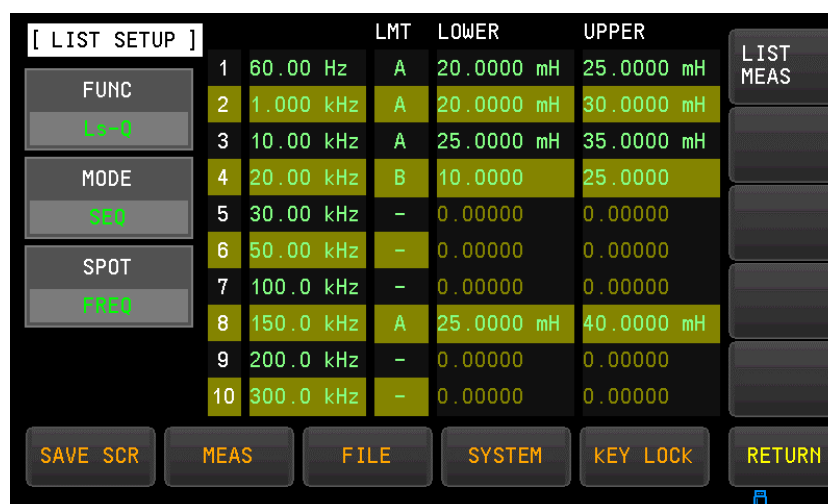
Before using the List Measure feature, you must configure the list setup.

To activate the [LIST SETUP] root directory mode, touch the [LIST SETUP] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

In the [LIST SETUP] page, you can configure each of the following list measurement controls with touch the corresponding field.

- Function mode [FUNC]
- Test mode [MODE]
- Measurement Parameter [SPOT]
- Limit parameter selection [LMT]
- Lower and upper limits [LOWER] [UPPER]

[LIST SETUP] Page



Measurement Function [FUNC]

The LCR-7000 Series simultaneously measures four components of the complex impedance (parameters) in a measurement cycle. These include primary parameter, secondary parameter and two monitor parameters.

LIST measurements only measure and judge primary and secondary parameters.

Please refer to the 0[MEAS DISPLAY] Page section on page 25 for details.

Procedure for setting the measurement function [FUNC]

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [LIST SETUP] select-key.
- Step 3. Touch the [FUNC] field.
- Step 4. Touch the measurement function on the right side of the screen or switch to other functions.

Test Mode [MODE]

The [LIST MEAS] page will execute a list of up to 10 swept frequency or amplitude tests.

When [MODE] is set to SEQ and [TRIG] is set to MAN, the [LIST MEAS] function will automatically execute each test step on the list in sequence until the last step is executed. The meter will then wait for the trigger button to be depressed before repeating the process.

When [MODE] is set to STEP and [TRIG] is set to MAN, the [LIST MEAS] function will automatically execute the first test step. The meter will then wait for the trigger button to be depressed before executing the next step. This process is repeated for each step on the list.

Select-key	Function
SEQ	Sequence measures all step by one trigger.
STEP	Measure one step by one trigger.

There are 4 available trigger modes in the [LIST MEAS] page.

Trigger Mode	Function
INT	Trigger by the meter's internal trigger source.
MAN	Trigger by pressing the trigger button.
EXT	Trigger by sending a signal to the trigger pin on the handler interface.
BUS	Trigger by the RS-232/USB/LAN port.

Measurement Parameter [SPOT]

The list parameter used for the list measurement can be the measurement frequency or the signal level [V/A]. Use the list point field to specify the list measurement parameter.

To specify the list sweep measurement parameter

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [LIST SETUP] select-key.
- Step 3. Touch the [SPOT] field.
- Step 4. Touch the select-keys to select list measurement parameter.

Select-key	Function
FREQ	Uses frequency as the list measurement parameter
VOLTAGE	Uses voltage (Vac) as the list measurement parameter
CURRENT	Uses current (Iac) as the list measurement parameter

Limit parameter selection [LMT] and Lower and Upper Limits [LOWER] [UPPER]

The List measurement feature supports up to 10 list points as well as measurement limit values. Each list point can be turned on or off.

To configure the list points:

- Step 1. Touch the [SETUP] key.
 - Step 2. Touch the [LIST SETUP] select-key.
 - Step 3. Touch the one of the list points fields (1 to 10).
 - Step 4. Touch the select-keys to input/off the current point.
-

Select-key	Function
OFF	Turn on current point.
INPUT	Turn on the numeric keypad and set measurement condition value.
OFF	Turn off current point.

Step 5. Enter the list point value (maybe the frequency value or the signal level voltage/current value). When you enter the frequency value, the select-key labels change to unit labels (Hz, kHz). When you enter the signal level voltage value, you don't need to enter units. When you enter the signal level current value, the select-key labels change to unit labels (μ A, mA).

Step 6. Touch the LMT field.

Step 7. Configure the limit parameter by touch the appropriate select-key.

Select-key	Function
PRIMARY A	Uses the primary parameter as the limit parameter.
2NDARY B	Uses the secondary parameter as the limit parameter.
OFF	Turns OFF the limit feature.

Step 8. Touch the [LOWER] field and touch the [INPUT] select-keys enter the lower limit value.

Step 10. Touch the [UPPER] field and touch the [INPUT] select-keys enter the upper limit value.

Step 11. Repeat Step 4 to Step 10.

[SWEEP SETUP] Page

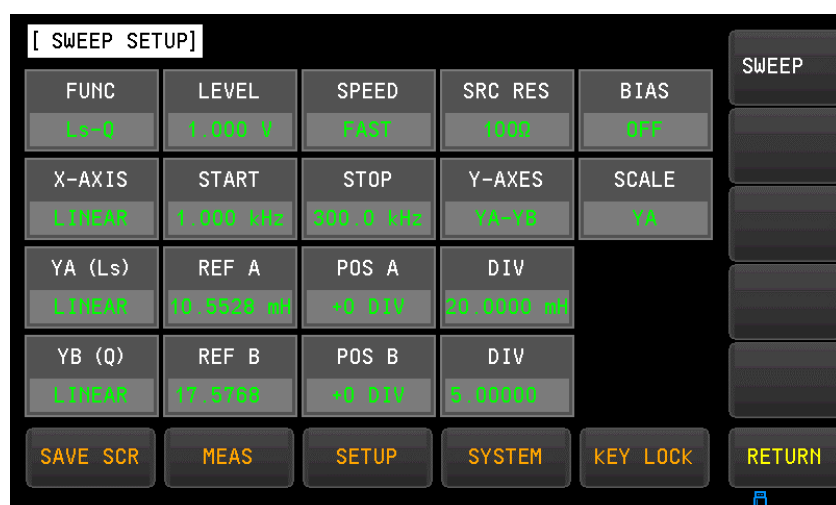
Touch the [SWEEP SETUP] select-key, the [SWEEP SETUP] page appears. Set all parameters for SWEEP frequency scan measurement, including the frequency range and scale display method of the X-axis, and the scale display method and settings for the primary/secondary (A/B) parameters of the Y-axis.

To activate the [SWEEP SETUP] root directory mode, touch the [SWEEP SETUP] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

In the [SWEEP SETUP] page, you can configure each of the following sweep controls with touch the corresponding field.

- FUNC, FREQ, LEVEL, RANGE, SPEED:
These conditions can be set from [MEAS SETUP] page.

[SWEEP SETUP] Page



X-axis scale modes [X-AXIS]

The X-axis scale shows 2 modes LINEAR and LOG.

- Step 1. Touch the [SWEEP] select-key.
 Step 2. Touch the [SWEEP SETUP] select-key.
 Step 3. Touch the [X-AXIS] field.

Select-key	Function
LINEAR	The starting value to the ending value, equal to 251 points
LOG	The starting value to the ending value, use the logarithm to distinguish 257 points.

X-axis scale modes [START] [STOP]

Start and stop frequency value of sweep.

- Step 1. Touch the [SWEEP] select-key.
 Step 2. Touch the [SWEEP SETUP] select-key.
 Step 3. Touch the [START] and [STOP] field.

Select-key	Function
INPUT FREQ	Turn on the numeric keypad and set any frequency value.
MIN	Set the minimum frequency. (10 Hz)
MAX	Set the maximum frequency. This varies depending on the instrument model.

Display graphics [Y-AXES]

Display sweep graphics A and B, or A or B.

- Step 1. Touch the [SWEEP] select-key.
 Step 2. Touch the [SWEEP SETUP] select-key.
 Step 3. Touch the [Y-AXES] field.

Select-key	Function
YA-YB	Display sweep graphics A and B.
YA	Display sweep graphics A.
YB	Display sweep graphics B.

Y-axis scale set [SCALE]

The scale of the Y-axis is displayed with the setting of trace A or trace B.

- Step 1. Touch the [SWEEP] select-key.
 Step 2. Touch the [SWEEP SETUP] select-key.
 Step 3. Touch the [SCALE] field.

Select-key	Function
YA	Adjust with the trace A setting
YB	Adjust with the trace B setting

Y-axis scale modes [YA] [YB]

The Y-axis scale shows 2 modes LINEAR and LOG of trace A or trace B.

- Step 1. Touch the [SWEEP] select-key.
 Step 2. Touch the [SWEEP SETUP] select-key.
 Step 3. Touch the [YA] or [YB] field.

Select-key	Function
LINEAR	The Y-axis uses equal scales.
LOG	The Y-axis uses a logarithmic scale.

Reference point [REF A] [REF B]

Set the Y-axis reference point scale for trace A or B.

- Step 1. Touch the [SWEEP] select-key.
- Step 2. Touch the [SWEEP SETUP] select-key.
- Step 3. Touch the [REF A] or [REF B] field.
- Step 4. Touch the [INPUT] select-key to enter the Reference point values.

Graphic position [POS A] [POS B]

Move the graphic of trace A or trace B.

- Step 1. Touch the [SWEEP] select-key.
- Step 2. Touch the [SWEEP SETUP] select-key.
- Step 3. Touch the [POS A] or [POS B] field.
- Step 4. Touch the [INCR+] or [DECL-] select-key to Move the graphic up or down.

Division scale [DIV A] [DIV B]

Set the Y-axis single-division scale value of trace A or trace B.

- Step 1. Touch the [SWEEP] select-key.
- Step 2. Touch the [SWEEP SETUP] select-key.
- Step 3. Touch the [DIV A] or [DIV B] field.
- Step 4. Touch the [INCR+] or [DECL-] select-key increases or decreases the scale value.

[SAVE TO USB]

SWEEP measurement data is too large to be stored in the instrument's internal data buffer; it can only be stored on an external USB flash drive. Insert the USB DISK into the instrument's USB port and touch the [SAVE SCR] key in the lower left corner of the LCD screen to save both the measurement values and the graph.

The records will be saved in a subdirectory named SWEEP DATA, whose parent directory name is the same as the LCR-7000 model you are using. Please refer to the following example:

Example: F:\LCR-7300\SWEEP
DATA\SWEEP0001.CSV and SWEEP001.BMP

System Configurations

This section includes the following information:

- SYSTEM CONFIG page
 - SYSTEM INFO page
 - SYSTEM SERVICE page
 - LAN CONFIG page
-

[SYSTEM CONFIG] Page

Touch the [SYSTEM] bottom key, the [SYSTEM CONFIG] page appears.

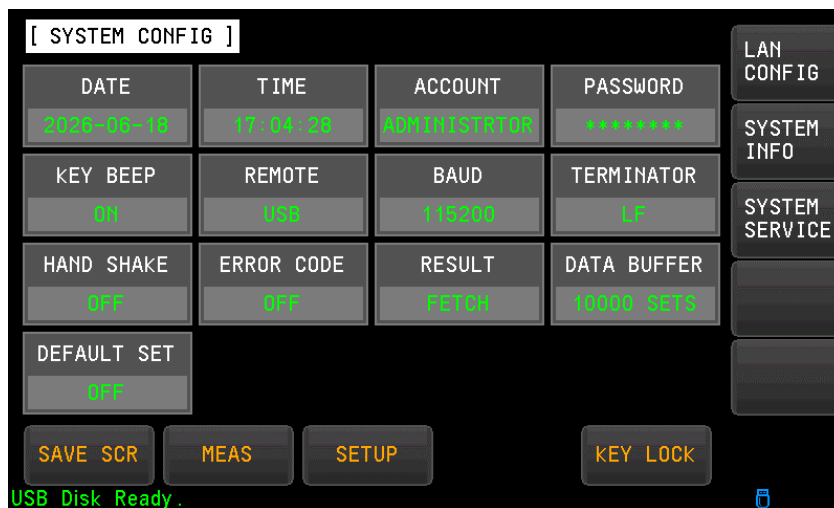
To activate the [SYSTEM CONFIG] root directory mode, touch the [SYSTEM CONFIG] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

The following information can be configured in the [SYSTEM CONFIG] page.

- System date and time configuration [DATE/TIME]
- Account settings [ACCOUNT]
- Key Beep setting [KEY BEEP]
- Remote control interface [REMOTE]
- Baud rate setting [BAUD]
- [TERMINATOR]
- [HAND SHAKE]
- [ERROR CODE]
- [RESULT]

- [DATA BUFFER]
- [DEFAULT SET]

[SYSTEM CONFIG] Page



Setting the system date and time

LCR-7000 Series features a built-in 24-hour clock.

To change the date

Step 1. Touch the [SYSTEM] key.

Step 2. Touch the [DATE] field.

Step 3. Touch the select-keys to edit date.

Select-key	Function
YEAR INCR+	Increases the year in steps of 1.
YEAR DECR-	Decreases the year in steps of 1.
MONTH INCR+	Increases the month in steps of 1.
MONTH DECR-	Decreases the month in steps of 1.
DAY INCR+	Increases the day in steps of 1.
DAY DECR-	Decreases the day in steps of 1.

To change the time

Step 1. Touch the [SYSTEM] key.

Step 2. Touch the [TIME] field.

Step 3. Touch the select-keys to edit time.

Select-key	Function
HOUR INCR+	Increases the hour in steps of 1.
HOUR DECR-	Decreases the hour in steps of 1.
MINUTE INCR+	Increases the minute in steps of 1.
MINUTE INCR-	Decreases the minute in steps of 1.
SECOND DECR+	Increases the second in steps of 1.
SECOND DECR-	Decreases the second in steps of 1.

Account and Password Setting

The LCR-7000 Series has two accounts, administrator, and user.

Administrator: All functions can be configured by the administrator except [SYSTEM SERVICE] page.

User: All functions can be configured by user except the [SYSTEM SERVICE] page and the [FILE] page.

To Change Account

Step 1. Touch the [SYSTEM] key.

Step 2. Touch the [ACCOUNT] field.

Step 3. Touch the select-keys to change account.

Select-key	Function
ADMIN	Administrator
USER	User

Switch user mode to administrator mode, you must input a correct password.

To Change Administrator's Password

- Step 1. Touch the [SYSTEM] key.
- Step 2. Touch the [ADMINISTRATOR] field.
When the ACCOUNT field is [USER], you should change to [ADMINISTRATOR].
- Step 3. Touch the select-keys to change the password or delete the password.

Select-key	Function
CHANGE PWD.	Input password (less than 9 numbers).
DELETE PWD.	The password will be removed.

NOTE

If you forget your password, please contact your local GW Instek distributor or GWInstek at www.gwinstek.com / marketing@goodwill.com.tw.

KEY BEEP Setting

Key tone settings.

To set up the beep feature

- Step 1. Touch the [SYSTEM] key.
- Step 2. Touch the [KEY BEEP] field.
- Step 3. Touch the select-keys to set the beep settings.

Select-key	Function
ON	Turn on the key beep feature.
OFF	Turn off the key beep feature.

Remote control interface

Selection the interface for PC/PLC remote control.

To set up the remote

Step 1. Touch the [SYSTEM] key.

Step 2. Touch the [REMOTE] field.

Step 3. Touch the select-keys to set the remote settings.

Select-key	Function
RS232	Select RS-232 port as remote
USB	Select USB port as remote control
LAN	Select LAN port as remote control



Note

Only one mode is supported. Before selecting either a remote-control mode, please connect its corresponding cable to appropriate port on the rear panel of the device.

For other setting items about remote control mode, please refer to chapter “Remote control” on page 119.

After the device detects the signal change on RS-232 or USB or LAN interface, the device will immediately communicate with the host at the setting serial transmission rate, and the keyboard will be locked as well.

In order to be able to communicate correctly, please confirm whether the setting serial transmission rate and stop bit or IP address are set correctly. Otherwise, the device won't be able to communicate with host computer correctly.

Baud rate

Before you can control the LCR-7000 Series remotely via the built-in RS-232/USB controller, you must configure the RS-232 RS-232/USB baud rate.

The LCR-7000 built-in RS-232/USB interface uses the SCPI language.

RS-232/USB configuration is as follows:

Data bits: 8-bit

Stop bits: 1-bit

Parity: none

To set up the baud rate

Step 1. Touch the [SYSTEM] key.

Step 2. Touch the [BAUD] field.

Step 3. Touch the select-keys to select the baud rate.

Select-key	Function
9600	Sets the baud rate to 9600.
19200	Sets the baud rate to 19200.
38400	Sets the baud rate to 38400.
57600	Sets the baud rate to 57600.
115200	Sets the baud rate to 115200.

TERMINATOR

The command terminator EOL uses the ASCII Line Feed character by default. (LF, Decimal 10, Hex 0x0A, or ASCII '\n')

The EOL of the command and the EOL of the command return data are the same.

The terminator (EOL) can change the three types:

1. LF (Line feed, Hex 0x0A).
2. CR (Carriage Return, Hex 0x0D).
3. CR+LF.

The LCR-7000 PC software can support all types.

To set up the terminator

Step 1. Touch the [SYSTEM] key.

Step 2. Touch the [TERMINATOR] field.

Step 3. Touch the select-keys to select the terminator.

Select-key	Function
LF	Set up the EOL to LF(0x0Ah).
CR	Set up the EOL to CR(0x0Dh).
CR+LF	Set up the EOL to CR+LF.

Hand Shake

If handshaking is turned on, the meter will return the commands it received from the PC first before returning the result string of the command.

Example: PC sends idn?

The meter returns: idn? LCR-7300 RevC1.0

To set up the Hand Shake feature

Step 1. Touch the [SYSTEM] key.

Step 2. Touch the [HAND SHAKE] field.

Step 3. Touch the select-keys to set the handshake setting.

Select-key	Function
OFF	Turn off the Hand Shake feature.
ON	Turn on the Hand Shake feature.

Error Code

If the error code setting is set to on, the meter will return error codes if the wrong command or an invalid command is received to help you to debug your control program.

"*E00", //No error

"*E01", //"Bad command",

"*E02", //"Parameter error",

"*E03", //"Missing parameter",

"*E04", //"buffer overrun",

"*E05", //"Syntax error",

"*E06", //"Invalid separator",

"*E07", //"Invalid multiplier",

"*E08", //"Numeric data error",

"*E09", //"Value too long",

"*E10", // "Invalid command"

"*E11", // "Unknown error"

To set up the Error Code feature

Step 1. Touch the [SYSTEM] key.

Step 2. Touch the [ERROR CODE] field.

Step 3. Touch the select-keys to set the error code setting.

Select-key	Function
OFF	Turn off the Error Code feature.
ON	Turn on the Error Code feature.

Result

If the Result setting is set to Auto, the meter will automatically send out the measurement results each time a test is finished; this setting is convenient especially when the meter is working with a sorting machine. The meter will start a test after receiving the trigger signal and then returns the test result to the sorting machine without the need to receive a 'fetch?' command from either the sorting machine or the control PC.

To set up the Result feature

Step 1. Touch the [SYSTEM] key.

Step 2. Touch the [RESULT] field.

Step 3. Touch the select-keys to set.

Select-key	Function
FETCH	The meter will not send out the test result after the test.
AUTO	The meter will send out the test result after the test.

DATA BUFFER

The data buffer setting sets the maximum number of record counts that the internal buffers can store; Settable range 1 to 10000.

To set up the Data Buffer feature

Step 1. Touch the [SYSTEM] key.

Step 2. Touch the [DATA BUFFER] field.

Step 3. Touch the select-keys to set.

Select-key	Function
INPUT	Turn on the numeric keypad and set buffer value.
MAX	Sets the maximum record counts to be 10000 directly.

DEFAULT SET

To reset setting values (MEAS SETUP) and offset values (OPEN SHORT) to factory default, use the DEFAULT SET setting. The device can be quickly restored to its factory settings.

Default settings:

(MEAS SETUP):

FUNC: Cp-D
FREQ: 1 kHz
LEVEL: 1 V
RANGE: AUTO
TRIG: INT
SPEED: SLOW
SRC RES: 100 Ω
BIAS: OFF
AUTO LCZ: OFF
DELAY: 0 ms
ALC: OFF
AVG: 1
MON1: OFF
MON2: OFF

(OPEN SHORT):

OPEN TEST: ON
SHORT TEST: ON
SPOT: OFF

To reset setting values to factory default:

Step 1. Touch the [SYSTEM] key.

Step 2. Touch the [DEFAULT SET] field.

Step 3. Touch the select-keys to set.

Select-key	Function
ON	To reset to default factory settings
OFF	No reset to factory default settings

[LAN CONFIG] Page

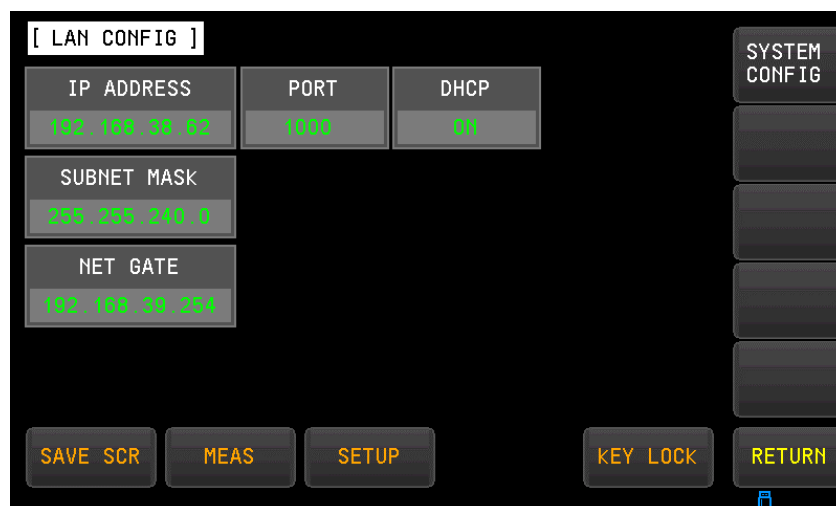
Touch the [SYSTEM] bottom key and touch the [LAN CONFIG] select-key to open [LAN CONFIG] page.

To activate the [LAN CONFIG] root directory mode, touch the [LAN CONFIG] block in the upper left corner of the screen to display the measurement function options on the right side of the screen.

The following information can be configured in the [LAN CONFIG] page.

- [IP ADDRESS]
- [PORT]
- [DHCP]
- [SUBNET MASK]
- [NET GATE]

[LAN CONFIG] Page



IP Address

Configure the LCR-7000 with a unique identification number on the Internet.

To change the ip address

- Step 1. Touch the [SYSTEM] key.
- Step 2. Touch the [LAN CONFIG] select-keys.
- Step 3. Touch the [IP ADDRESS] field.
- Step 4. Touch the [INPUT IP] select-keys to enter ip.

Select-key	Function
INPUT IP	Turn on the numeric keypad and set ip address.

PORT

Configure the LCR-7000's connection port at the IP address.

To change the port

- Step 1. Touch the [SYSTEM] key.
- Step 2. Touch the [LAN CONFIG] select-keys.
- Step 3. Touch the [PORT] field.
- Step 4. Touch the [INPUT PORT] select-keys to enter port.

Select-key	Function
INPUT PORT	Turn on the numeric keypad and set port value.

DHCP

DHCP (Dynamic Host Configuration Protocol) is a network protocol that can automatically assign IP addresses.

To change the DHCP

- Step 1. Touch the [SYSTEM] key.
- Step 2. Touch the [LAN CONFIG] select-keys.
- Step 3. Touch the [DHCP] field.
- Step 4. Touch the select-keys to set DHCP.

Select-key	Function
ON	Automatic setting
OFF	Manual setting

SUBNET MASK

Setting up the LCR-7000 LAN communication subnet mask.

To change the subnet mask

- Step 1. Touch the [SYSTEM] key.
- Step 2. Touch the [LAN CONFIG] select-keys.
- Step 3. Touch the [SUBNET MASK] field.
- Step 4. Touch the [INPUT MASK] select-keys to enter port.

Select-key	Function
INPUT MASK	Turn on the numeric keypad and set subnet mask.

NET GATE

Setting up the LCR-7000 LAN communication net gate.

To change the net gate

- Step 1. Touch the [SYSTEM] key.
- Step 2. Touch the [LAN CONFIG] select-keys.
- Step 3. Touch the [NET GATE] field.
- Step 4. Touch the [INPUT GATE] select-keys to enter port.

Select-key	Function
INPUT GATE	Turn on the numeric keypad and set net gate.

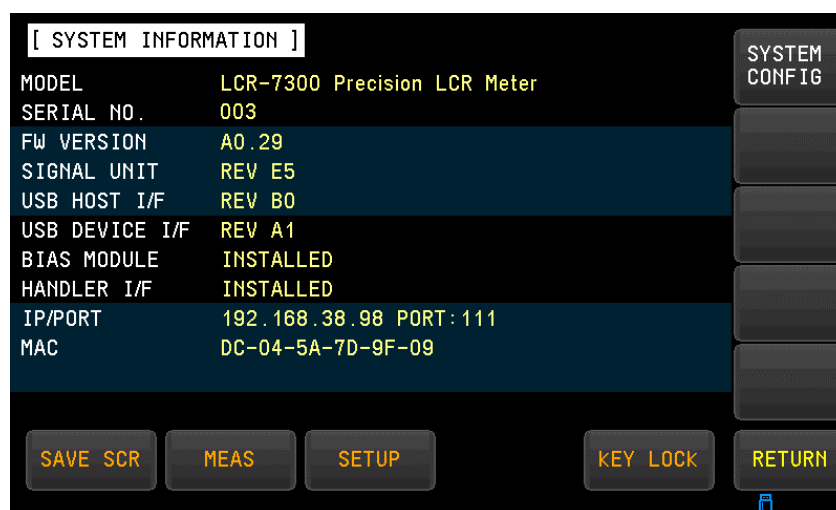
[SYSTEM INFORMATION] Page

Touch the [SYSTEM] bottom key and touch the [SYSTEM INFO] select-key to open [SYSTEM INFORMATION] page.

There are no configurable options in the [SYSTEM INFORMATION] page.

Key information items: Instrument serial number (SERIAL ON.), firmware version (FW VERSION).

[SYSTEM INFORMATION] Page



F

ile Operation

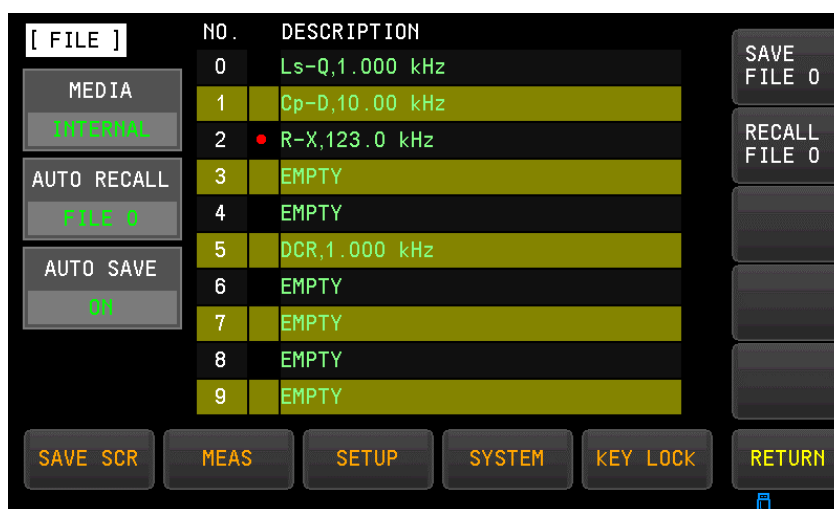
This chapter provides information on the file operation of the LCR-7000 Series.

You can save up to 10 files into the internal non-volatile memory.

[FILE] Page

Touch the [SETUP] button then touch the bottom [FILE] button and the [FILE] page will appear.

[FILE] Page



On this page, you can touch the corresponding field to configure the following controls.

- Recall a file when the instrument starts up [AUTO RECALL].
- Automatically save a file when the instrument shuts down [AUTO SAVE].

[MEDIA]

The Media field is used to select the media source from either the meter's internal memory or an external USB flash drive. A maximum of up to 10 files can be accessed from either source.

To select file source

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [FILE] bottom key.
- Step 3. Touch the [MEDIA] field.
- Step 4. Use the select-keys to select the source.

Select-key	Function
INTERNAL MEMORY	To access files from the meter's internal memory.
USB MEMORY	To access files from the external USB flash drive.

Recall a File at Startup [AUTO RECALL]

You can recall file0 or the current file when the instrument starts up.

To select auto recall file

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [FILE] bottom key.
- Step 3. Touch the [AUTO RECALL] field.
- Step 4. Use the select-keys to select the recall option.

Select-key	Function
LAST FILE	Last used file will be recalled at next startup.
FILE 0	File 0 will be recalled at next instrument startup.

Auto save data to last file [AUTO SAVE]

You can save the modified data into the last used file when the instrument power key is pressed.

To turn on/off the AUTO SAVE function

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [FILE] bottom key.
- Step 3. Touch the [AUTO SAVE] field.
- Step 4. Use the select-keys to select the save option.

Select-key	Function
ON	Auto save function will be enabled.
OFF	Turn off the auto save function.

File operation

To choose a file to operate

- Step 1. Touch the [SETUP] key.
- Step 2. Touch the [FILE] bottom key.
- Step 3. Touch a file field (File name from 0 to 9).
- Step 4. Use the select-keys to perform an operation.

Select-key	Function
SAVE	Save user configuration data into currently selected file.
RECALL	Recall configuration data from currently selected file.
ERASE	Erase the selected file. The user configuration data will be reset to the default at the next startup.
MODIFY DES	Modify the file description.

Handler Interface

This chapter provides information about the LCR-7000 Series' built-in handler interface. It includes:

- Pin Assignment
 - Circuit Diagram
 - Timing Chart
-

The LCR-7000 Series' built-in handler interface outputs signals that indicate the end of a measurement cycle, the result of bin sorting by the comparator.

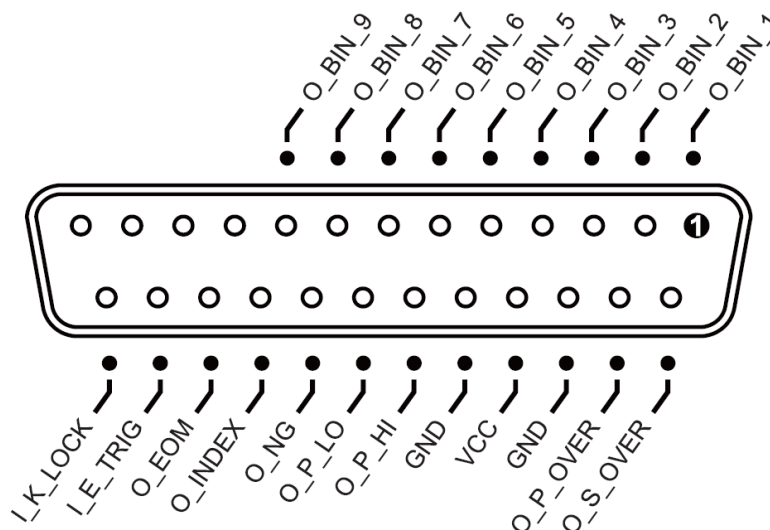
In addition, the instrument accepts input of external trigger.

You can use these signals to easily integrate the LCR-7000 Series with a component handler or system controller.

This means that you can fully automate such tasks as component inspection, component sorting, and processing of quality management data for higher manufacturing efficiency.

Pin Assignment

Pin Assignment



Output Pins

Handler Interface Signals ~ Output Pins

Pin	Pin names	Signal descriptions
1	O_BIN_1	The sorting result is within bin1. Active low.
2	O_BIN_2	The sorting result is within bin2. Active low.
3	O_BIN_3	The sorting result is within bin3. Active low.
4	O_BIN_4	The sorting result is within bin4. Active low.
5	O_BIN_5	The sorting result is within bin5. Active low.
6	O_BIN_6	The sorting result is within bin6. Active low.
7	O_BIN_7	The sorting result is within bin7. Active low.
8	O_BIN_8	The sorting result is within bin8. Active low.
9	O_BIN_9	The sorting result is within bin9. Active low.
10		NC
11		NC

12		NC
13		NC
14	O_S_OVER	Over fail occurs on the secondary measurement parameter. Active low. (The signal on this pin is available only after AUX is turned on.)
15	O_P_OVER	Over fail occurs on the primary measurement parameter. Active low. The logic state of this pin = O_P_HI OR O_P_LO.
19	O_P_HI	Hi fail occurs on the primary measurement parameter. Active low.
20	O_P_LO	Low fail occurs on the primary measurement parameter. Active low.
21	O_NG	The overall test result is an over failure. Active low. The logic state of this pin = O_S_OVER OR O_P_OVER.
22	O_INDEX	This pin indicates that AD conversion is still ongoing. It is not yet finished when it is low.
23	O_EOM	A low level on this pin indicates that the test is still ongoing and not yet finished.

Input Pins

Handler Interface Signals ~ Input Pins

Pin	Pin names	Signal descriptions
24	I_E_TRIG	External trigger input, Active on a rising edge.
25	I_K_LOCK	Key pad lock signal. Low on this pin locks the key pad on the front panel while a high level on this pin unlocks the key pad.

Power Pins

Handler Interface Signals ~ Power Pins

Pin	Pin names	Signal descriptions
16,18	GND	GND pin for external power input
17	VCC	VCC pin for external power input

Connection

Electrical parameters

Interface DC power requirements: +12.4 V to 36 V, 0.2 A (Min).

Output circuit: Built-in pull-up resistors are internally connected to the collector pin of the output transistors. The output pins are isolated by photocouplers.

Input pins: Isolated by photocouplers.



WARNING

Warning: To avoid damaging the interface, ensure the external power does not exceed the (+12.4 to 36) V input range.

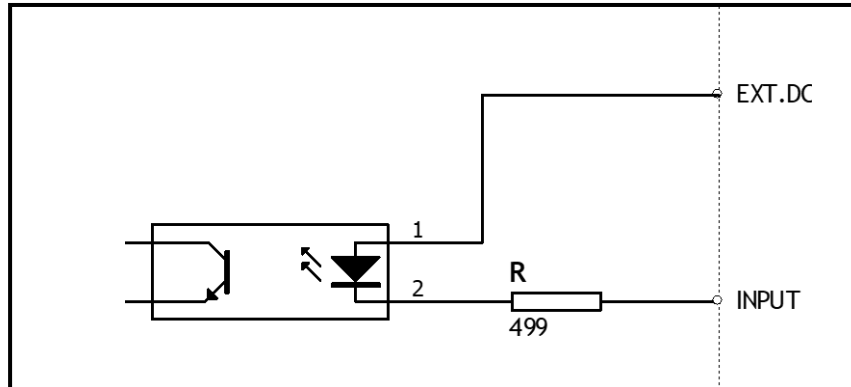
To avoid damaging the interface, turn off the meter before making any wired connections to this interface.

If users need to use the output pins of this interface to drive external relays, do use only small signal relays. Because the output pins of this interface are driven by photocouplers, the fan-out current is not sufficient to drive big relays; external transistors need to be used when users want to use the signals on these output pins to control big relays. The coil of the external relays must be in parallel with a flyback diode.

Circuit of input pins

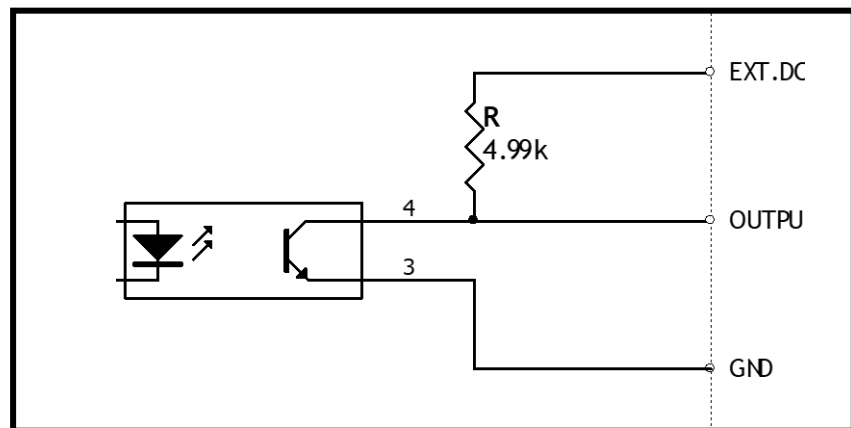
Circuit of input pins

Sink Current: (5 to 50) mA.



Circuit of output pins

Circuit of output pins (Bin sorting, Index, EOM)

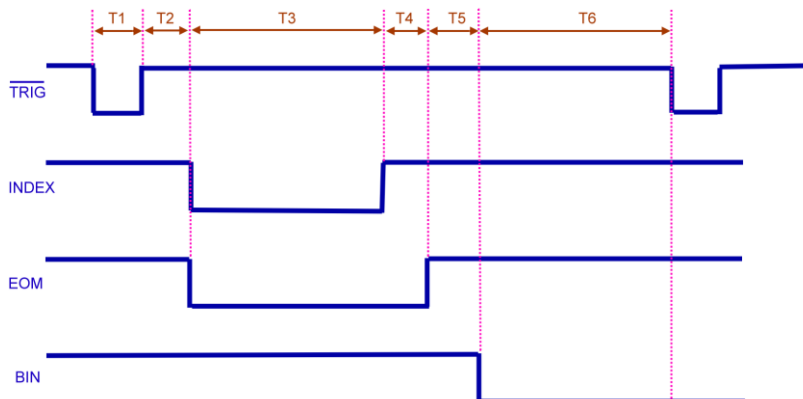


Maximum sourcing current: 5 mA.

Maximum sinking current: 50 mA

Timing Chart for Handler Interface

Timing chart



Timing Definitions

Time segment			Minimum value
T1	Trigger pulse width		1 ms
T2	Measurement time	Trigger delay time	< 10 μ s
T3		Analog Measurement time	Depends on settings
T4		Digital math time	1 ms
T5		Bin output delay time	200 μ s
T6	Trigger wait time after the output		0 s

E

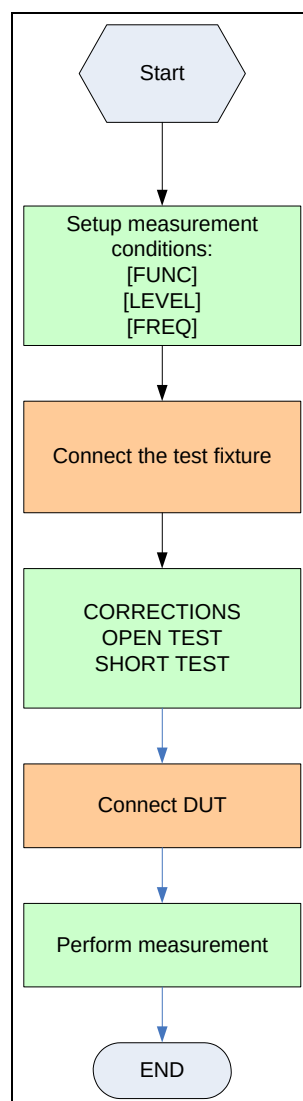
xamples

This chapter covers basic measurement procedures as well as basic L, C, and R measurement theory. It also offers various measurement hints. After the descriptions of basic measurement procedures, practical measurement examples are shown using LCR-7000 Series.

Basic Measurement Procedure

The following flow chart shows the basic procedures used to measure the impedance of capacitors, inductors, resistors, and other components. Follow the procedures to perform impedance measurements while referring to the items noted to the right side of each step.

Basic Measurement Procedure



Example

This paragraph describes a practical example of measuring a ceramic capacitor.

The basic procedure flow to perform this measurement is the same as the Basic Measurement Procedure described previously. In this example, a ceramic capacitor is measured under the following conditions.

Sample (DUT) Ceramic capacitor Measurement Conditions:

- Function: Cs-D
- Test Frequency: 1 kHz
- Test Signal Level: 1 V

Step 1. Turn the LCR-7000 Series ON.

Step 2. Set up the measurement conditions by filling in the fields on the MEAS DISPLAY page.

- Touch the [FUNC] field and choose Cs-D.
- Touch the [FREQ] field and input 1 kHz.
- Touch the [LEVEL] field and input 1 V.

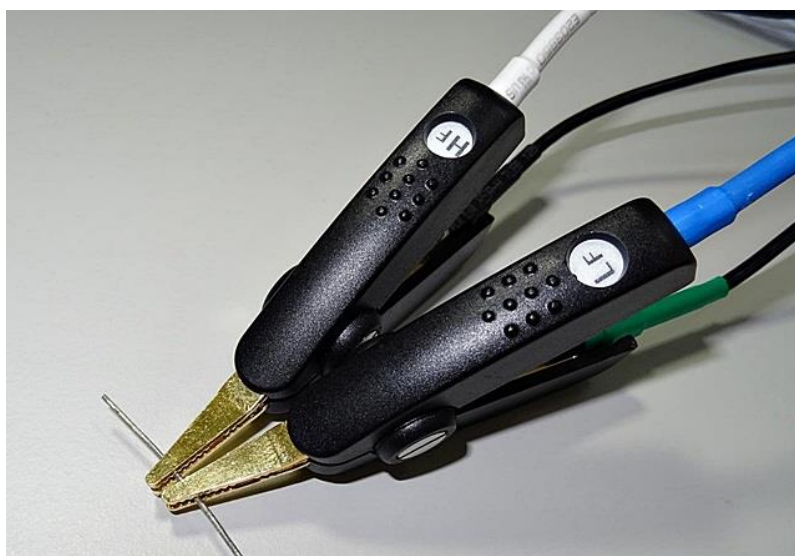
Step 3. Connect the test fixture to the LCR-7000 Series.

Step 4. To compensate for the test fixture, a user correction is required.
Don't connect any DUT to the unit, as shown below:

1. Touch the [MEAS] key and the [OPEN SHORT] select-key.
2. Touch the [OPEN] or [SPOT] field.
3. Don't connect the clips to anything, as shown here:



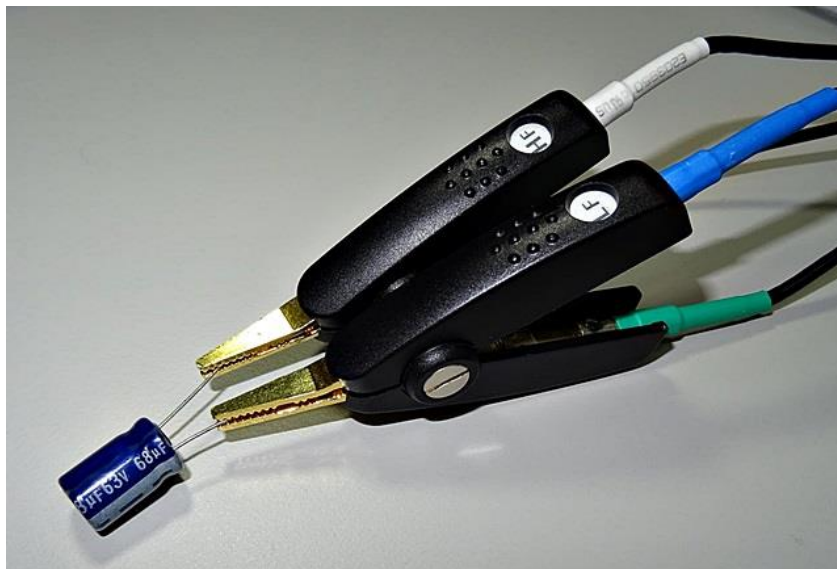
4. Touch the [MEAS OPEN] select-key and then the [OK] select-key. Wait until the "Correction finished" message is displayed.
5. Touch the [ON] select-key if the OPEN field is set to OFF.
6. Touch the [SHORT] or [SPOT] field.
7. Connect the clips to a shorting bar as shown below:



8. Touch the [MEAS SHORT] select-key and then the [OK] select-key. Wait until the "Correction finished" message is displayed.
9. Touch the [ON] select-key if the

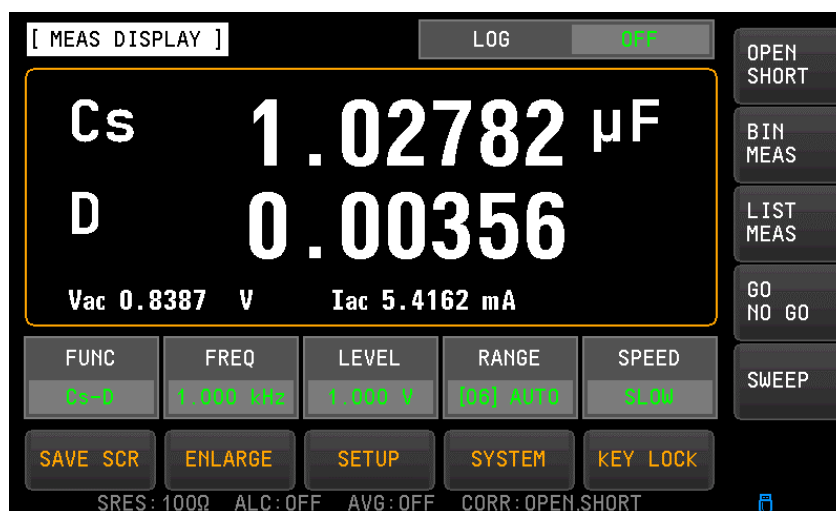
SHORT field is set to OFF.

Step 5. Connect the DUT to the test fixture as shown below:



Step 6. Touch the [MEAS] key. Measurements are performed continuously by the internal trigger, and the measured Cs and D values of the capacitors are displayed as shown below:

Measurement results



R Remote Control

This chapter provides the following information to remotely control the LCR-7000 Series via the RS-232 or USB and LAN:

- RS-232 Interface
- USB Interface
- Install USB Driver
- LAN Interface

The device uses the RS-232 interface or USB interface or LAN interface to communicate with the computer to complete all device's functions. With standard SCPI commands, users can easily create various acquisition system which are suitable for themselves.

RS-232 Interface

You can connect a controller (i.e., PC and PLC) to the RS-232 interface using a GWINSTEK RS-232 DB-9 cable. The serial port uses the transmit (TXD), receive (RXD) and signal ground (GND) lines of the RS-232 standard. It does not use the hardware handshaking lines CTS and RTS.



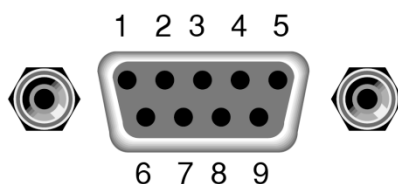
NOTE:

Only use a GWINSTEK (null modem) DB-9 cable.

Cable length should not exceed 2 m.

To avoid electrical shock, turn off the power when plugging and unplugging the DB-9 cable.

The RS-232 connector on the real panel



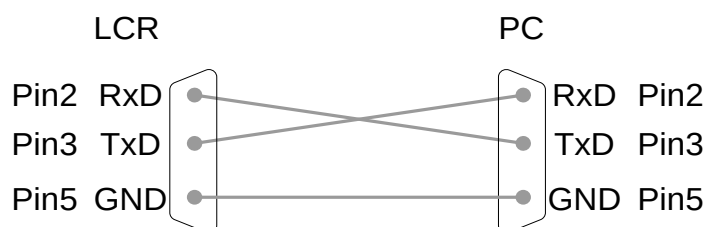
Pin 2: RxD

Pin 3: TxD

Pin 5: GND

Pin 1, 4, 6 to 9: No Connection

PC - LCR-7000 Series connection uses a null modem connection



- Make sure the controller you connect to LCR-7000 Series also uses these settings. The RS-232 interface transfers data using:

Data bits: 8 bits

Stop bits: 1 bit

Parity: none

Baud rate: (1200 to 115200) bit/s

USB Interface

You can connect a controller (i.e., PC and PLC) to the USB interface using a type A-C USB cable.

This virtual port can perform the same functions as RS232 and use the same settings as the RS232 port. It supports USB2.0 and below version.

The USB device port on the rear panel is used for remote control. The USB port is configured as VCP interface.

The USB port on the LCR-7000 series will appear as a virtual COM port to a connected PC. Any terminal program that can communicate via a serial port can be used for remote control.



NOTE:

Only use a type A-C USB cable.

Cable length should not exceed 2 m.

To avoid electrical shock, turn off the power when plugging and unplugging the USB cable.

- Make sure the controller you connect to LCR-7000 Series also uses these settings. The USB interface transfers data using:

PC connector: Type A, host

LCR-7000 series connector: Rear panel Type C, slave

Speed: 1.1/2.0 (full speed/high speed)

USB Class: VCP (Virtual Communications Port)

Hardware flow control: Off

Data bits: 8-bit

Stop bits: 1-bit

Parity: none

Baud rate: (9600 to 115200) bit/s

Install USB Driver

The USB driver needs to be installed when using the USB port for remote control. The USB interface creates a virtual COM port when connected to a PC.

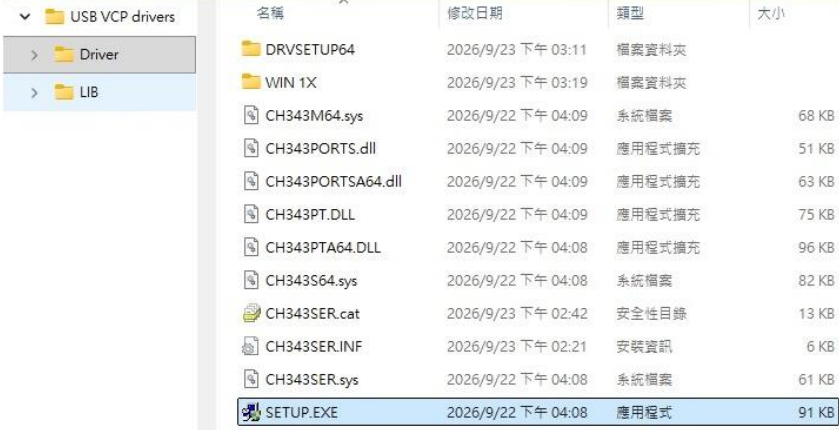
First, please download the USB driver for the LCR-7000 from the GWINSTEK website.

Website: <https://www.gwinstek.com/en-global/products/detail/LCR-7000>

USB Driver: USB_VCP_driver_LCR-7000.zip
(USB VCP Drivers)

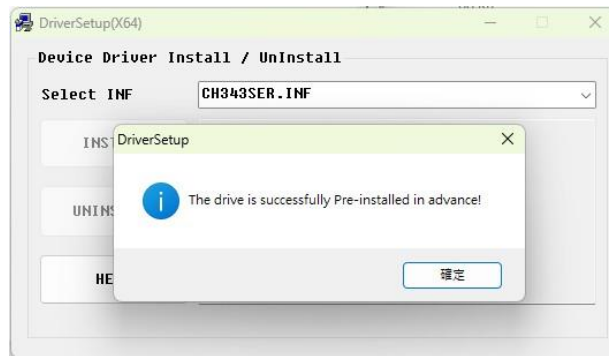
STEP 1. Copy the "USB VCP drivers" file to your computer.

STEP 2. Run the "USB VCP drivers\Driver\SETUP.EXE" file.



名稱	修改日期	類型	大小
DRVSETUP64	2026/9/23 下午 03:11	檔案資料夾	
WIN 1X	2026/9/23 下午 03:19	檔案資料夾	
CH343M64.sys	2026/9/22 下午 04:09	系統檔案	68 KB
CH343PORTS.dll	2026/9/22 下午 04:09	應用程式擴充	51 KB
CH343PORTSA64.dll	2026/9/22 下午 04:09	應用程式擴充	63 KB
CH343PT.DLL	2026/9/22 下午 04:09	應用程式擴充	75 KB
CH343PTA64.DLL	2026/9/22 下午 04:08	應用程式擴充	96 KB
CH343S64.sys	2026/9/22 下午 04:08	系統檔案	82 KB
CH343SER.cat	2026/9/23 下午 02:42	安全性目錄	13 KB
CH343SER.INF	2026/9/23 下午 02:21	安裝資訊	6 KB
CH343SER.sys	2026/9/22 下午 04:08	系統檔案	61 KB
SETUP.EXE	2026/9/22 下午 04:08	應用程式	91 KB

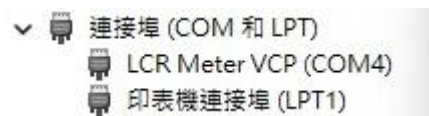
STEP 3. In the installation software, click the "INSTALL" button to install the USB driver. The installation will complete when the message "The drive is successfully pre-installed in advance!" is displayed.



- STEP 4. Power on the LCR-7000, connect a USB Type-A to Type-C cable to the USB Type-C port on the LCR-7000's rear panel, and connect the other end of the cable to the PC's USB Type-A port.

Go to the Windows Device Manager.

- STEP 5. The LCR-7000 will appear as "LCR Meter VCP" and its assigned COM port will now show up under the "Ports (COM & LPT)" node.



- STEP 6. Done.



NOTE:

- If the driver for the device can't be installed automatically, please download the USB driver for the LCR-7000 from the GWINSTEK website.
- To avoid electrical shock, turn off the power when plugging and unplugging the DB9 cable.
- If the driver installation is completed correctly, the number of USB serial port will be displayed.
- You need to remember this port number because you will use it when programming.
- SCPI commands can be operated through RS-232C or USB or LAN port.

LAN Interface

You can connect a PC to the LAN interface using a LAN cable.

The instrument supports IEEE 802.3 (100 Mbps) via an RJ-45 interface and uses TCP communication.

Supports SCPI control of instruments by sending SCPI strings via LAN.

Before communication, you need to set remote communication to LAN on the instrument's [SYSTEM CONFIG] page. You also need to configure IP/PORT parameters in [LAN CONFIG], or use DHCP for automatic configuration.



NOTE:

Please use good quality, preferably insulated, network cables to ensure excellent communication quality.

To avoid electrical shock, turn off the power when plugging and unplugging the network cable.

C Command Reference

Terminator

The instrument supports four end-of-line (EOI) characters:

LF (hexadecimal: 0x0A)

CR (hexadecimal: 0x0D)

CR+LF (hexadecimal: 0x0D 0x0A)

NUL (hexadecimal: 0x00)

The end-of-line character can be selected in the system configuration page; the instrument's factory default is LF.

Notation Conventions and Definitions

The following conventions and definitions are used in this chapter to describe RS-232 operation.

< > Angular brackets enclose words or characters that are used to symbolize a program code parameter or an RS-232 command.

[] A square bracket indicates that the enclosed items are optional.

\n Command Terminator

Command Structure

The LCR-7000 commands are divided into two types: Common commands and SCPI commands.

The common commands are defined in IEEE std. 488.2-1987, and these commands are common for all devices. The SCPI commands are used to control all of the LCR-7000's functions.

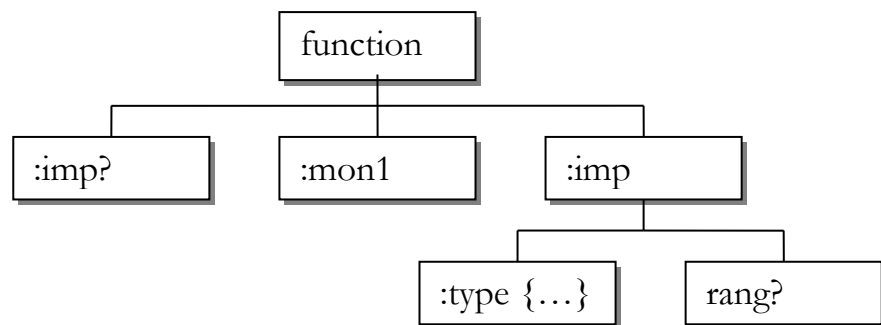
The SCPI commands are tree structured, three levels deep. The

highest-level commands are called the subsystem commands in this manual. So, the lower-level commands are legal only when the subsystem commands have been selected.

A colon (:) is used to separate the higher-level commands and the lower-level commands.

Semicolon (;) A semicolon does not change the current path but separates two commands in the same message.

Command Tree Example



Example: `function:imp:type Cp-D`

function	Subsystem	Command
imp	Level 2	
type	Level 3	
Cp-D	Parameter	

The basic rules of the command tree are as follows.

- Letter case (upper and lower) is ignored.
For example,
FUNCTION: IMPEDANCE=
function:impedance
- Spaces (_ used to indicate a space) must not be placed before and/or after the colon (:).
For example,
❌ func_:_imp → ✅ func:imp
- The command can be completely spelled out or in abbreviated form. (The rules for command abbreviation are described later in this section)
For example,

function: impedance=func:imp

.

- The command header should be followed by a question mark (?) to generate a query for that command.

For example,

function:imp?

- Command abbreviations:
- Every command and character parameter has at least two forms, a short form and a long form. In some cases they will be the same. The short form is obtained using the following rules.

A) If the long form has four characters or less, the long form and short form are the same.

B) If the long form has more than 4 characters:

(a) If the 4th character is a vowel, the short form is the first 3 characters of the long form.

For example:

comparator abbreviated to comp

current abbreviated to curr

range abbreviated to rang

(b) If the 4th character is not a vowel, the short form is the first 4 characters.

For example:

resistance abbreviated to res

volume abbreviated to vol

- If the long form mnemonic is defined as a phrase rather than a single word, then the long form mnemonic is the first character of the first word(s) followed by the entire last word. The above rules, when the long form mnemonic is a single word, are then applied to the resulting long form mnemonic to obtain the short form.

For example:

PercentTolerance abbreviated to ptol

Header and Parameters

The commands consist of a command header and parameters. (See the following.)

Example: `comp:nom 100.0e3`

Header Parameter

Headers can be of the long form or the short form. The long form allows easier understanding of the program code and the short form allows more efficient use of the computer.

Parameters may be of two types as follows.

(A) Character Data and String Data Character data consists of ASCII characters. The abbreviation rules are the same as the rules for command headers.

(B) Numeric Data

(a) **NR1** integer: For example, 1,+123,-123

(b) **NR2** fix float: For example, 1.23,+1.23,-1.23

(c) **NR3** floating point: For example, 1.23e3, 5.67e-3, 123k, 1.23M, 2.34G,

The available range for numeric data is 9.9E37. When numeric data is used as a parameter, the suffix multiplier mnemonics and suffix units (The suffix multiplier must be used with the suffix unit.) can be used for some commands as follows.

Multiplier Mnemonics

Definition	Mnemonic
1E18 (EXA)	EX
1E15 (PETA)	PE
1E12 (TERA)	T
1E9 (GIGA)	G
1E6 (MEGA)	MA
1E3 (KILO)	K

1E-3 (MILLI)	M
1E-6 (MICRO)	U
1E-9 (NANO)	N
1E-12 (PICO)	P
1E-15 (PEMTO)	F
1E-18 (ATTO)	A

Command Reference

All commands in this reference are fully explained and listed in the following functional command order.

- DISPlay Subsystem
- FUNCTion Subsystem
- FREQuency Subsystem
- VOLTage Subsystem
- APERTure Subsystem
- FETCh Subsystem
- COMParator Subsystem
- LIST Subsystem
- CORRection Subsystem
- TRIGger Subsystem
- BIAS Subsystem
- Sweep Subsystem
- FILE Subsystem
- ERRor Subsystem
- Common Command:
- *TRG
- *IDN?
- *SAV
- *RCL

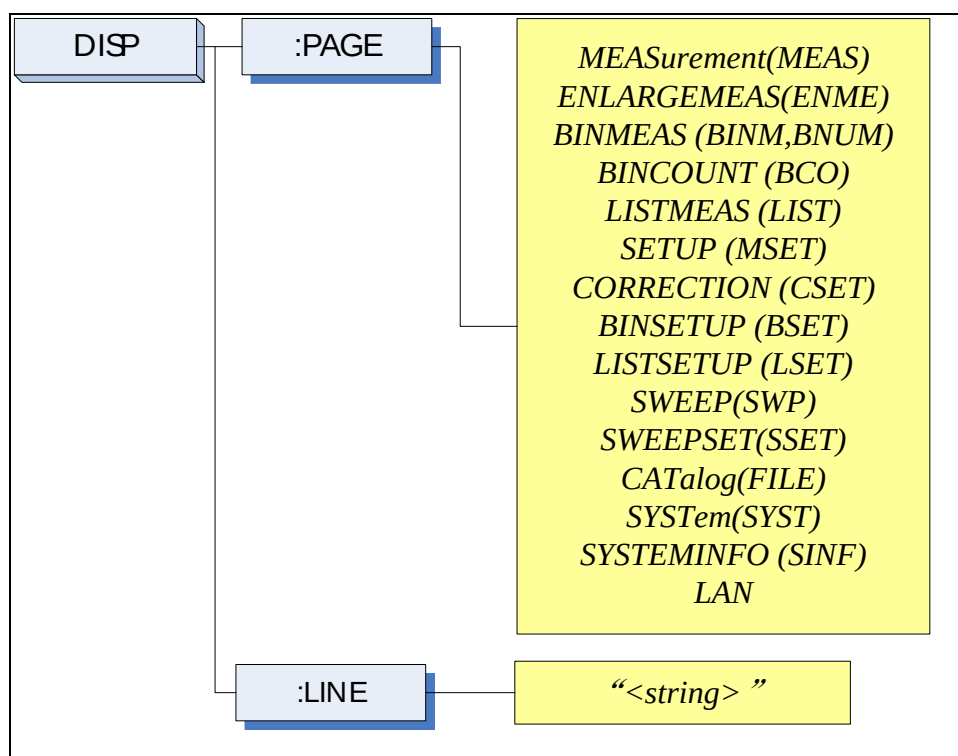
The explanation of each subsystem command is patterned as follows.

1. Subsystem command name
2. Command Tree (Subsystem command only)
3. Compound Command Name
4. Command Description
5. Command Syntax
6. Example Using the Above Command Syntax
7. Query Syntax
8. Query Response
9. Example Using the Above Query Syntax
10. Constraints

DISPlay Subsystem

The DISP Subsystem command group sets the display page.

Command Tree Example



DISP:LINE

The :LINE command enters an arbitrary comment line of up to 30 ASCII characters in the comment field.

Command Syntax	DISP:LINE "<string>"
Parameter	Where, <string> is ASCII character string (30 ASCII characters)
Example	SEND> DISP:LINE "This is a comment."

DISP:PAGE

The :PAGE command sets the display page.

The :PAGE? Query returns the abbreviated page name currently displayed on the LCD screen.

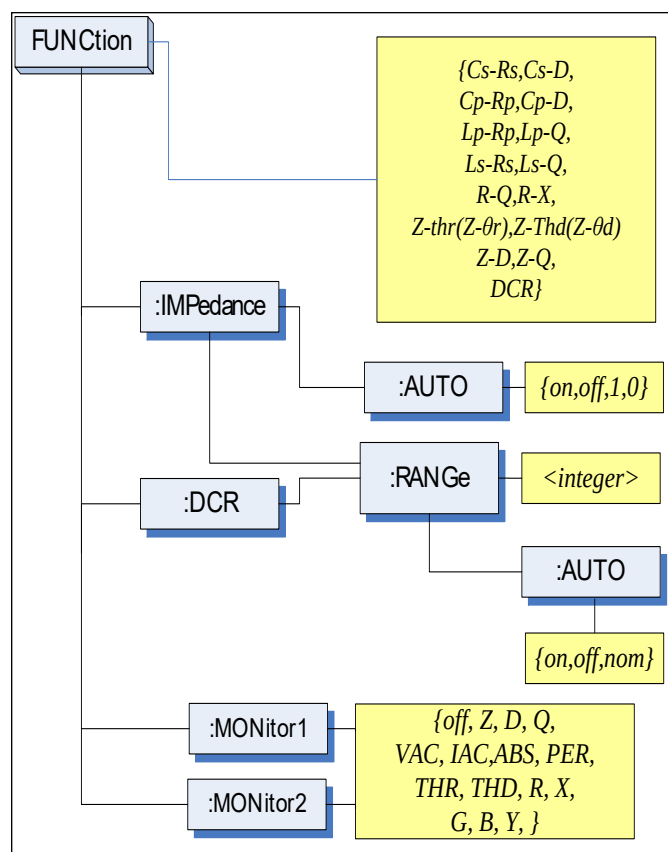
Command Syntax	DISP:PAGE <page name>
Parameter	Where, <page name> is: MEASurement [or MEAS] Sets the display page to MEAS DISPLAY. ENLARGE[or ENLA] Sets the display page to ENLARGE DISPLAY. BINMEAS [or BINM] Sets the display page to BIN MEAS. BINCOUNT [or BCO] Sets the display page to BIN COUNT. LISTMEAS [or LIST] Sets the display page to LIST MEAS. SETUP [or MSET] Sets the display page to MEAS SETUP. CORRECTION [or CSET] Sets the display page to CORRECTION. BINSETUP [or BSET] Sets the display page to BIN SETUP. LISTSETUP [or LSET] Sets the display page to LIST SETUP. SWEEP[or SWP] Sets the display page to SWEEP. SWEEPSET[or SSET] Sets the display page to SWEEP SETUP. CATalog [or FILE] Sets the display page to FILE SYSTem [or SYST] Sets the display page to SYSTEM CONFIG. SYSTEMINFO [or SINF] Sets the display page to SYSTEM INFORMATION. [LAN] Sets the display page to LAN CONFIG.
Example	SEND> DISP:PAGE SYST<NL> //Set to the SYSEMT CONFIG.
Query Syntax	DISP:PAGE?

Query Response	<page name><NL>
Example	SEND> DISP:PAGE?<NL> RET> SYST<NL>
Note	DISP:PAGE The command needs to be executed separately because of the long execution time to avoid the instrument ignoring the subsequent commands. SEND> DISP:PAGE MEAS;FREQ 10k<NL> //Setting is wrong SEND> DISP:PAGE MEAS<NL> //Setting is correct FREQ 10k <NL>

FUNction Subsystem

The FUNction subsystem command group sets the measurement function, the measurement range, monitors parameter control.

FUNCTION Subsystem Tree



FUNCTION

The FUNCTION command sets the measurement function.

Command Syntax	FUNC <function>
Parameter	Where, <function> is: Cs-Rs, Cs-D, Cp-Rp, Cp-D, Lp-Rp, Lp-Q, Ls-Rs, Ls-Q, Rs-Q, Rp-Q, R-X, DCR, Z- θ r(or Z-thr)*1, Z- θ d(Z-thd) *1, Z-D, Z-Q. (*1: θ is ASCII Hex 0xE9)
Example	SEND> FUNC Cp-D<NL> //Set measurement function to Cp-D
Query Syntax	FUNC?
Query Response	<function>
Example	SEND> FUNC?<NL> RET> Cp-D<NL>

FUNCTION:IMPedance:AUTO

The FUNCTION:IMPedance:AUTO command sets the impedance's LCZ Automatic selection.

Command Syntax	FUNC:IMPedance:AUTO {ON,OFF, 0,1}
Example	SEND> FUNC:IMP:AUTO ON<NL>
Query Syntax	FUNC:IMPedance:AUTO?
Query Response	{on,off}<NL>
Example	SEND> FUNC:IMP:AUTO?<NL> RET> off<NL>

FUNcTion:IMPedance:RANGe

The FUNcTion:IMPedance:RANGe command sets the impedance's measurement range.

Command Syntax	FUNC:IMPedance:RANGe <0-8,MIN,MAX>
Parameter	Where, <0-8,MIN, MAX> is: 0-8 The range number MIN =Range 0 MAX =Range 8
Example	SEND> FUNC:IMP:RANG 2<NL> // Set measurement range to [2] 10k Ω .
Query Syntax	FUNC:IMPedance:RANGe?
Query Response	<0-8><NL>
Example	SEND> FUNC:IMP:RANG?<NL> RET> 0<NL>

FUNcTion:DCR:RANGe

The FUNcTion:DCR:RANGe command sets the DCR's measurement range.

Command Syntax	FUNC:DCR:RANGe <0-8,MIN,MAX>
Parameter	Where, <0-8,MIN, MAX> is: 0-8 The range number MIN =Range 0 MAX =Range 8
Example	SEND> FUNC:DCR:RANG 2<NL> // Set DCR range to [2] 10k Ω .
Query Syntax	FUNC:DCR:RANGe?
Query Response	<0-8><NL>
Example	SEND> FUNC:DCR:RANG?<NL> RET> 0<NL>

FUNcTion:RANGe:AUTO

The FUNcTion:RANGe:AUTO command sets the auto range to ON or OFF.

Command Syntax	FUNC:RANGe:AUTO {off(hold),on(auto),NOMinal}
Parameter	Where, {off(hold),on(auto),NOMinal} is: off(or hold): Sets the auto range to off. on(or auto): Sets the auto range to on. NOMinal: Sets the range No.
Example	SEND> FUNC:RANG:AUTO AUTO<NL> //Sets to auto range. SEND> FUNC:RANG:AUTO off<NL> //Sets auto range to off.
Query Syntax	FUNC:RANGe:AUTO?
Query Response	{HOLD,AUTO,NOM}
Example	SEND> FUNC:RANG:AUTO?<NL> RET> auto<NL>

FUNcTion:MONitor 1 /2

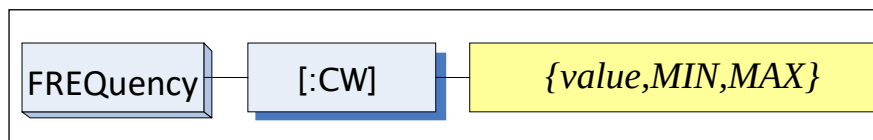
The FUNcTion:MONitor1 and FUNcTion:MONitor2 commands set the two monitor parameter.

Command Syntax	FUNC:MONitor1 {off, Z, D, Q, THR, THD, R, X, G, B, Y, ABS, PER VAC, IAC} FUNC:MONitor2 {off, Z, D, Q, THR, THD, R, X, G, B, Y, ABS, PER VAC, IAC}
Parameter	Where, {off, Z, D, Q, THR, THD, R, X, G, B, Y, ABS, PER VAC, IAC}
Example	SEND> FUNC:MON1 Z<NL>
Query Syntax	FUNC:MON1? FUNC:MON2?
Query Response	{off, Z, D, Q, THR, THD, R, X, G, B, Y, ABS, PER VAC, IAC}
Example	SEND> FUNC:MON1?<NL> RET> off<NL>

FREQuency Subsystem

The FREQuency command sets the oscillator frequency. The FREQuency? query returns the current test frequency setting.

FREQ Subsystem Command Tree

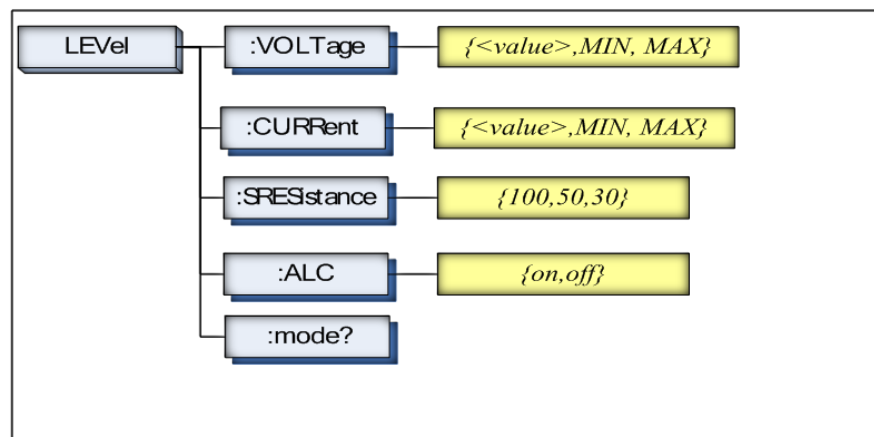


Command Syntax	FREQ[:CW] {<value>,MIN,MAX}
Parameter	Where, <value> Is the numeric data (NR1 integer, NR2fix float or NR3 floating point). MIN Sets to the minimum value MAX Sets to the maximum value
Example	SEND> FREQ 1K<NL> // Set to 1kHz, the Hz cannot be added.
Query Syntax	FREQ[:CW]?
Query Response	<NR3><NL> NR3 floating point
Example	SEND> FREQ?<NL> RET> 1.000000E+03<NL>
Note	A suffix multiplier (k) can be used with this command. But the suffix unit Hz can't be used. This command CANNOT be used in LIST SWEEP DISPLAY page and CORRECTION page.

LEVel Subsystem

The Level subsystem sets the oscillator's output voltage/current level and source output impedance.

LEVel Subsystem Command Tree



LEVel:VOLTage (=VOLTage[:LEVel])

The LEVel:VOLTage or VOLTage[:LEVel] command sets the oscillator's output voltage level.

Command Syntax	LEVel:VOLTage {<value>,MIN,MAX} or VOLTage:LEVel {<value>,MIN,MAX}
Parameter	Where, <value> Is the numeric data (NR1, NR2 or NR3). MIN Sets to the minimum value of voltage. MAX Sets to the maximum value of voltage.
Example	SEND> LEV:VOLT 0.3<NL> //Set to 0.3V, V unit suffix cannot be used.
Query Syntax	LEVel:VOLTage? or VOLTage:LEVel?
Query Response	<NR3> NR3 floating point
Example	SEND> VOLT?<NL> RET> 1.000e+00<NL>
Note	The V unit suffix can't be used. This command CANNOT be used in LIST MEAS page and CORRECTION page.

LEVel:CURRent (=CURRent[:LEVel])

The LEVel:CURRent or CURRent[:LEVel] command sets the oscillator's output current level.

Command Syntax	LEVel:CURRent {<value>,MIN,MAX} or CURRent:LEVel {<value>,MIN,MAX}
Parameter	Where, <value> Is the numeric data (NR1, NR2 or NR3). MIN Sets to the minimum value of current. MAX Sets to the maximum value of current.
Example	SEND> LEV:CURR 1m<NL> //Set to 1mA. The A unit suffix cannot be used.
Query Syntax	LEVel:CURRent? or CURRent:LEVel?
Query Response	<NR3> NR3 floating point
Example	SEND> CURR?<NL> RET> 1.000e+00<NL>
Note	The A unit suffix cannot be used. This command CANNOT be used in LIST MEAS page and CORRECTION page.

LEVel:SRESistance (= VOLTage:SRESistance)

The LEVel:SRESistance or VOLTage:SRESistance command sets the source output impedance.

Command Syntax	LEVel:SRESistance {30,50,100} VOLTage:SRESistance {30,50,100}
Parameter	{30,50,100} Where, 30 Sets the output impedance to 30Ω 50 Sets the output impedance to 50Ω 100 Sets the output impedance to 100Ω
Example	SEND> LEV:SRES 30<NL> //Set to 30Ω, the unit Ω cannot be added.
Query Syntax	VOLTage:SRES? or LEVel:SRES?

Query Response	<NR1> NR1 integer
Example	SEND> LEV:SRES?<NL> RET> 30<NL>
Note	The suffix unit Ω can't be used with this command. This command CANNOT be used in LIST SWEEP, DISPLAY page and CORRECTION page.

LEVel:ALC (=AMPlitude:ALC)

The LEVel:ALC or AMPlitude:ALC command enables the Automatic Level Control (ALC).

Command Syntax	LEVel:ALC {on,1,off,0} AMPlitude:ALC {on,1,off,0}
Parameter	{on,1,off,0} Where, on (1) Enable ALC off(0) Turn off the ALC.
Example	SEND> LEV:ALC on<NL>
Query Syntax	LEV:ALC? or AMP:ALC?
Query Response	{on,off}
Example	SEND> LEV:ALC?<NL> RET> off<NL>
Note	This command CANNOT be used in LIST MEAS page, CORRECTION page and DCR mode.

LEVel:MODe?

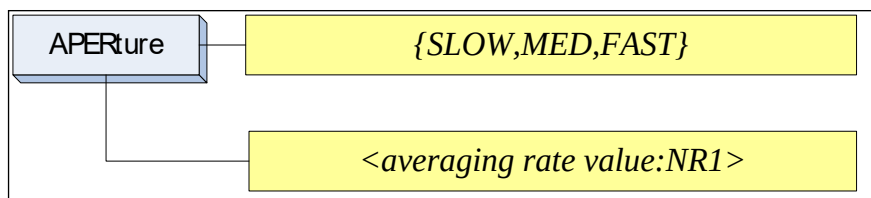
The LEVel:MODe? query returns the level mode.

Query Syntax	LEVel:MODe?
Query Response	{volt, curr}
Example	SEND> LEVel:MODe?<NL> RET> volt

APERture Subsystem

The APERture subsystem command sets the integration time of the ADC and the averaging rate.

APERture Subsystem Command Tree



Command Syntax	APERture {SLOW,MED,FAST} APERture <value> SPEED(spdc) {SLOW,MED,FAST} SPEED(spdc) <value>
Parameter	Where, SLOW Set test speed to slow MED Set test speed to medium FAST Set test speed to fast <value> NR1(0 to 256): Averaging rate (0=OFF=1)
Example	SEND> APER FAST<NL> SEND> APER 10<NL>
Query Syntax	APER?
Query Response	{SLOW,MED,FAST},<avg value>
Example	SEND> APER?<NL> RET> slow,0<NL>

APERture:RATE?

The APERture:RATE? query returns the current integration time.

Query Syntax	APER:RATE?
Query Response	SLOW
Example	SEND> APER:RATE?<NL> RET> slow<NL>

APERture:AVG?

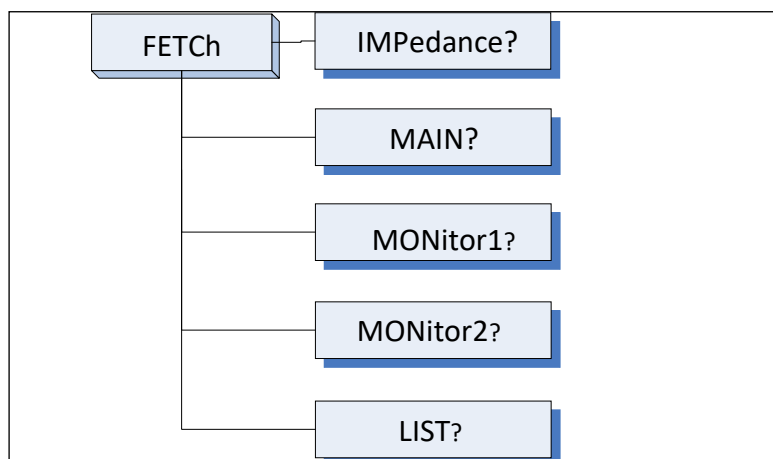
The APERture:AVG? query returns the averaging rate settings.

Query Syntax	APER:AVG?
Query Response	<NR1> Integer (0 to 256)
Example	SEND> APER:AVG?<NL> RET> 0<NL>

FETCh Subsystem

The FETCh subsystem command group is a sensor-only command which retrieves the measurement data taken by measurement(s) initiated by a trigger, and places the data into the output buffer.

FETCh Subsystem Command Tree



FETCh?

The FETCh? query sets the latest measurement data of the primary, secondary parameters and comparator result into the output buffer.

Query Syntax	FETCh?
Query Response	<NR3:primary value>,<NR3:secondary value>,<comparator result>
Example	SEND> FETC?<NL> RET> +2.61788e-11,+5.45442e-01,BIN1,AUX-OK,OK <NL> RET> +1.23434e+05,OUT ,NG <NL> //DCR & Comp on.

When in the [LIST MEAS] page view, the following description for the FETCh query is applicable:

The FETCh? query sets the latest LIST measurement data of the primary parameters, secondary parameters and comparator results into the output buffer.

Query Syntax	FETCh?
Query Response	<NR3:primary value>,<NR3:secondary value>,<CMP result>
Example	SEND> FETC?<NL> RET> -2.98524e-12,+3.27673e+00,L <NL> RET> -1.00000e+20,-1.00000e+20,- <NL> //The STEP is OFF

FETCh:IMPedance?

The FETCh:IMPedance? query sets the latest measurement data of the primary parameter, secondary parameter, monitor1 and monitor2 results into the output buffer.

Query Syntax	FETCh:IMPedance?
Query Response	<NR3:primary value>,<NR3:secondary value>,<NR3:monitor1>,<NR3:monitor2>,<comparator result>
Example	SEND> FETC:IMP?<NL> RET> +2.61788e-11,+5.45442e-01,+3.88651e+05,+0.00000e+00,BIN1,AUX-OK, OK<NL> RET> +1.23434e+05,BIN1,OK<NL> //DCR & Comp on.

FETCh:MAIN?

The FETCh:MAIN? query sets the latest measurement data of the primary and secondary parameters.

Query Syntax	FETCh:MAIN?
Query Response	<NR3:primary value>,<NR3:secondary value>
Example	SEND> FETC:MAIN?<NL> RET> +2.02100e-11,+1.64422e-01<NL> //LCR Primary,Secondary RET> +1.23434e+05<NL> //DCR

FETCh:MONitor1? /2?

The FETCh:MONitor1? and FETCh:MONitor2 set the latest measurement data of the monitor1 and monitor2 parameters into the output buffer.

Query Syntax	FETCh:MONitor1? and FETCh:MONitor2?
Query Response	<NR3: monitor1/2 value>
Example	SEND> FETC:MON1?<NL> RET> +3.88651e+05<NL> RET> +0.00000e+00<NL> // 0: The monitor 1 is OFF

FETCh:MONitor?

The FETCh:MONitor? sets the latest measurement data of the monitor1 and monitor2 parameters into the output buffer.

Query Syntax	FETCh:MONitor?
Query Response	<NR3: monitor1/2 value>
Example	SEND> FETC:MON?<NL> RET> +3.88651e+05,+0.00000e+00<NL> (0: The monitor 2 is OFF)

FETCh:LIST?

The FETCh:LIST? query sets the latest LIST measurement data of the primary parameters, secondary parameters and comparator results into the output buffer. Only applicable when in the [LIST MEAS] page view.

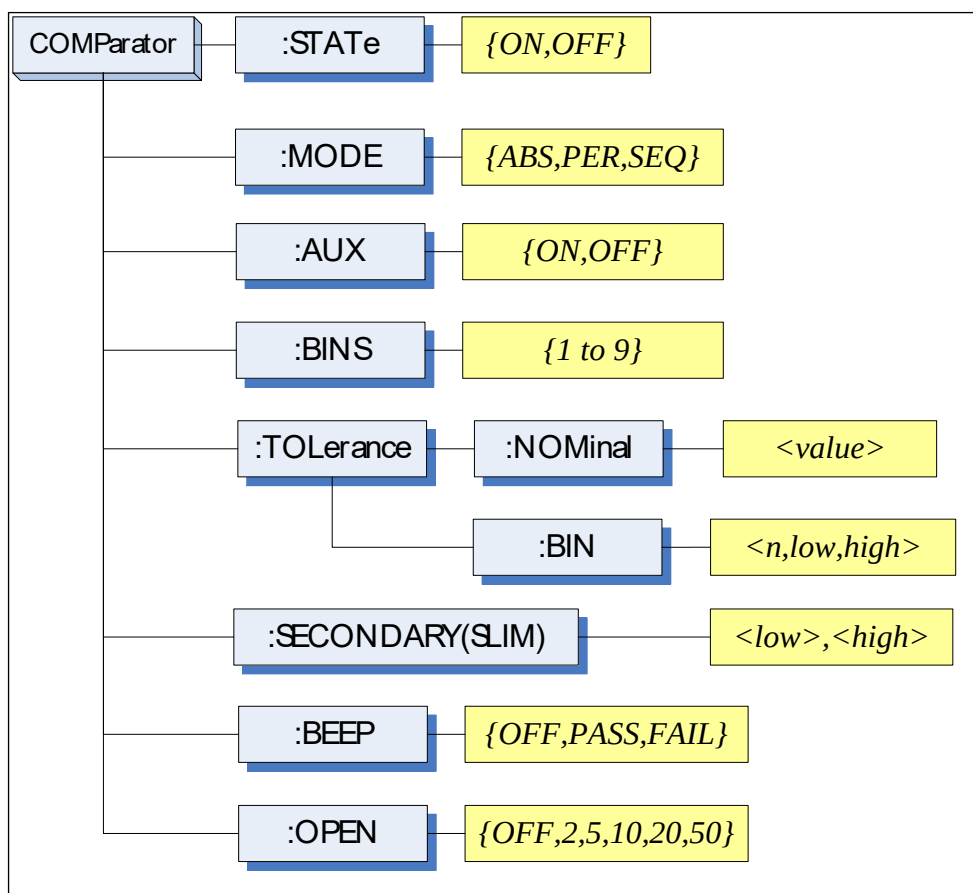
Query Syntax	FETCh:LIST?
Query Response	<spot no>,<NR3:primary value>,<NR3:secondary value>,<CMP result> // spot no:01-10
Example	SEND> FETC:LIST?<NL> RET> 01,-2.98524e-12,+3.27673e+00,L,02,+7.11030e-12,+3.48450e-

	01,P,03,+7.11322e-12,+5.14944e-02,H,04,- 1.00000e+20,-1.00000e+20,-,05,-1.00000e+20,- 1.00000e+20,-,06,-1.00000e+20,-1.00000e+20,-,07,- 1.00000e+20,-1.00000e+20,-,08,-1.00000e+20,- 1.00000e+20,-,09,-1.00000e+20,-1.00000e+20,-,10,- 1.00000e+20,-1.00000e+20,-<NL> (-1.00000e+20: The STEP is OFF)
Query Syntax	FETCh:LIST? <spot no>
Query Response	<spot no>,<NR3:primary value>,<NR3:secondary value>,<CMP result>
Example	SEND> FETCh:LIST? 2<NL> RET> 02,+7.11030e-12,+3.48450e-01,P<NL> (-1.00000e+20: The STEP is OFF)

COMParator Subsystem

The COMParator subsystem command group sets the comparator function, including its ON/OFF setting, limit mode, and limit values.

COMParator Subsystem Command Tree



COMParator:STATe

The COMParator:STATe command sets the comparator function to ON or OFF.

Command Syntax	COMParator:STATe {ON,OFF,1,0}
Parameter	Where, ON or 1 Sets the comparator to ON OFF or 0 Sets the comparator to OFF
Example	SEND> COMP:STAT OFF<NL>
Query Syntax	COMParator:STATe?
Query Response	{on,off}
Example	SEND> COMP:STAT?<NL> RET> on<NL>

COMParator:MODE

The :COMParator:MODE command sets the limit mode of the comparator function.

Command Syntax	COMParator:MODE {ABS,PER,SEQ}
Parameter	Where,{ABS,PER,SEQ} is: ABS Absolute tolerance mode PER Percent tolerance mode SEQ Sequential mode
Example	SEND> COMP:MODE PER<NL>
Query Syntax	COMParator:MODE?
Query Response	{abs,per,seq}
Example	SEND> COMP:MODE?<NL> RET> abs<NL>

COMParator:AUX

The COMParator:AUX command sets the auxiliary BIN counting function of the comparator to ON or OFF.

Command Syntax	COMParator:AUX {ON,OFF,1,0}
Parameter	Where,{ON,OFF,1,0} is: ON or 1 Set the AUX BIN to ON OFF or 0 Set the AUX BIN to OFF
Example	SEND> COMP:AUX OFF<NL>
Query Syntax	COMParator:AUX?
Query Response	{on,off}
Example	SEND> COMP:AUX?<NL> RET> on<NL>

COMParator:BINS

The COMParator:BINS command sets the total number of bins.

Command Syntax	COMParator:BINS <value>
Parameter	Where,{value} is: NR1 (1 to 9)
Example	SEND> COMP:BINS 3<NL>
Query Syntax	COMParator:BINS?
Query Response	<NR1> (1 to 9)
Example	SEND> COMP:BINS?<NL> RET> 3<NL>

COMParator:TOLerance:NOMinal

The COMParator:TOLerance:NOMinal command sets the nominal value for the tolerance mode of the comparator function.

Command Syntax	COMParator:TOLerance:NOMinal <value>
Parameter	Where,<value> is: NR1, NR2 or NR3 A suffix multiplier can be used with this command. But the suffix unit F/ Ω /H can't be used.
Example	SEND> COMP:TOL:NOM 100N<NL> SEND> COMP:TOL:NOM 1E-6<NL>
Query Syntax	COMParator:TOLerance:NOMinal?
Query Response	<NR3>
Example	SEND> COMP:TOL:NOM?<NL> RET> 1.00000e-06<NL>

COMParator:TOLerance:BIN

The COMParator:TOLerance:BIN command sets the low/high limit values of each BIN for the comparator function tolerance mode.

Command Syntax	COMParator:TOLerance:BIN <n>,<low limit>,<high limit>
Parameter	Where,<n>,<low limit>,<high limit> is: n NR1 (1 to 9): Bin number low limit NR1,NR2 or NR3: low limit value high limit NR1,NR2 or NR3: high limit value
Example	SEND> COMP:TOL:BIN 1,100P,200P<NL> SEND> COMP:TOL:BIN 2,200E-6,300E-6<NL>
Query Syntax	COMParator:TOLerance:BIN? <n>
Parameter	Where,<n> is: NR1 (1 to 9): Bin number
Query Response	<NR3:low limit>,<NR3:high limit>
Example	SEND> COMP:TOL:BIN? 2<NL> RET> 1.00000e-06,2.00000E-6<NL>

COMParator:SLIM

The COMParator:SLIM or COMParator:secondary command sets the LOW/HIGH limit values for the secondary parameter.

Command Syntax	COMParator:SLIM <low value>,<high value> COMParator:secondary <low value>,<high value>
Parameter	Where, <low value>,<high value> is: <low value> NR1,NR2 or NR3: low limit value <high value> NR1,NR2 or NR3: high limit value A suffix multiplier can be used with this command.
Example	SEND> COMP:SLIM 0.0001,0.0010<NL>
Query Syntax	COMParator:SLIM? COMParator:secondary?
Query Response	<NR3:low limit>,<NR3:high limit>
Example	SEND> COMP:SLIM?<NL> RET> 1.00000e-04,1.00000e-03<NL>

COMParator:BEEP

The :COMParator:BEEP command sets beep mode of the comparator function.

Command Syntax	COMParator:BEEP {OFF,PASS,FAIL}
Parameter	Where, OFF Turns the beeper off. PASS Sounds a beep when the test is passed (BIN1~BIN9). FAIL Sounds a beep when the test is failed (OUT).
Example	SEND> COMP:BEEP PASS<NL>
Query Syntax	COMParator:BEEP?
Query Response	{OFF,PASS,FAIL}
Example	SEND> COMP:BEEP?<NL> RET> OFF<NL>

COMParator:OPEN

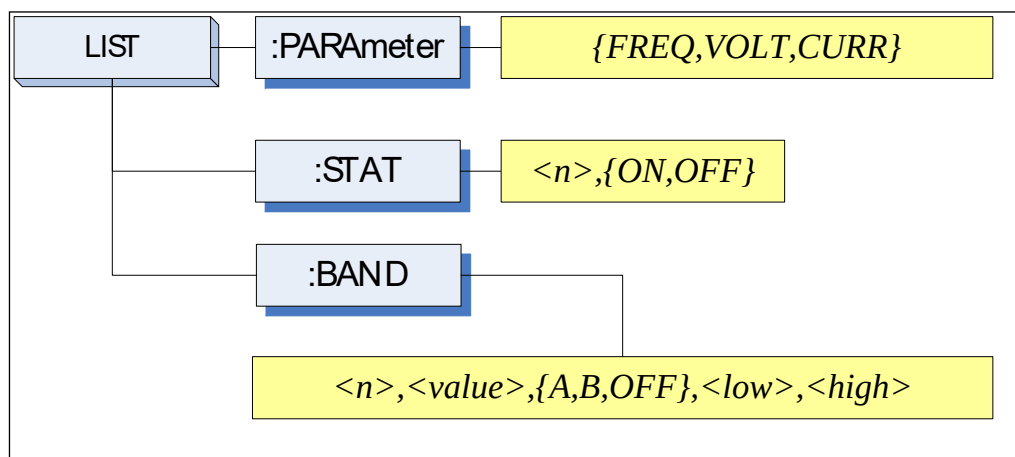
The :COMParator:OPEN command selects the open condition for main parameter.

Command Syntax	COMParator:OPEN {OFF,2,5,10,20,50}
Parameter	Where, OFF Turns the beeper off. 2,5,10,20,50 The percent range value
Example	SEND> COMP:OPEN 2<NL>
Query Syntax	COMParator:OPEN?
Query Response	{OFF,2,5,10,20,50}
Example	SEND> COMP:OPEN?<NL> RET> OFF<NL>

LIST Subsystem

The LIST or SWEEP Subsystem command group sets the List Sweep measurement function, including the sweep point setting and limit values for the limit function.

LIST Subsystem Command Tree



LIST:PARAMeter

The LIST:PARAMeter command sets the list sweep parameter.

Command Syntax	LIST:PARAMeter {FREQ,VOLT,CURR}
Parameter	Where, {FREQ,LEVEL} is: FREQ Sets the sweep parameter to frequency VOLT Sets the sweep parameter to voltage level CURR Sets the sweep parameter to current level
Example	SEND> LIST:PARA VOLT<NL>
Query Syntax	LIST:PARAMeter?
Query Response	{FREQ,VOLT,CURR}
Example	SEND> LIST:PARA?<NL> RET> FREQ<NL>

LIST:STAT

The LIST:STAT command turns on/off the specified sweep point.

Command Syntax	LIST:STAT <n>,{ON,OFF,1,0}
Parameter	Where,<n> is: n NR1(1 to 10): List sweep point ON or 1 Set this point to ON OFF or 0 Set this point to OFF
Example	SEND> LIST:STAT 1,ON<NL>
Query Syntax	LIST:STAT? <n>
Parameter	Where,<n> is: n NR1(1 to 10): List sweep point
Query Response	{on,off}
Example	SEND> LIST:STAT? 1<NL> RET> on<NL>

LIST:BAND

The LIST:BAND command sets the List Sweep point value, limit mode and low/high limit values.

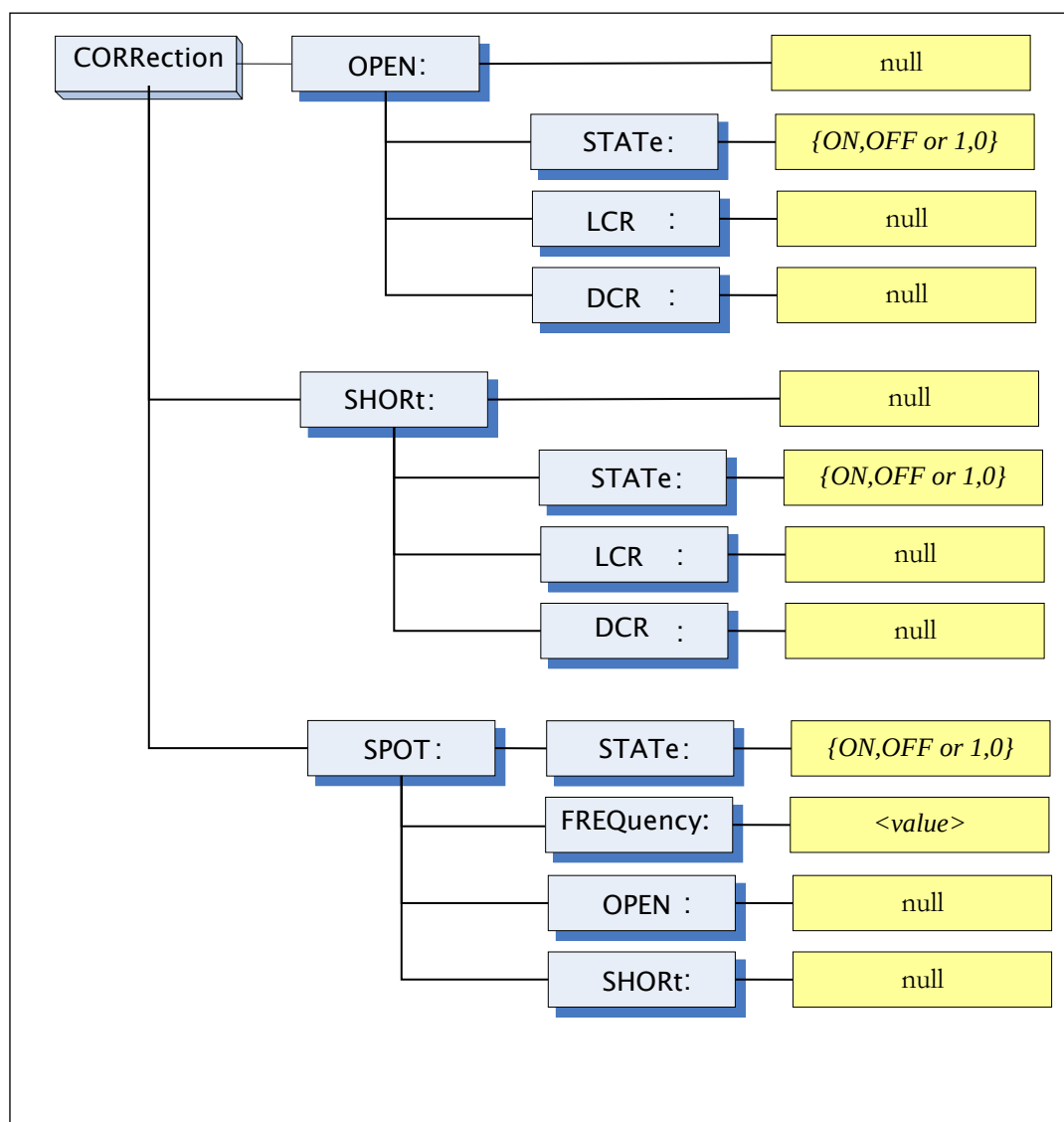
Command Syntax	LIST:BAND <n>,<point value>,{A,B,OFF},<low>,<high>
Parameter	Where, <n>,<point value>,{A,B,OFF},<low>,<high> is: n NR1(1 to 10): List sweep point <point value> Sweep point value (frequency value or signal level voltage value) A Uses the primary parameter as the limit parameter. B Uses the secondary parameter as the limit parameter. OFF Turn off the List Sweep's comparator function <low> NR1,NR2 or NR3: low limit value <high> NR1,NR2 or NR3: high limit value Note: The suffix multipliers can be used with this command. But the suffix units CANNOT be added.
Example	<pre>SEND> LIST:BAND 1,1k,A,1n,2n<NL> SEND> LIST:BAND 2,10k,A,1E-9,2E-9<NL></pre>
Query Syntax	LIST:BAND? <n>
Parameter	Where,<n> is: n NR1(1 to 10): List sweep point
Query Response	{on,off},<point value>,{A,B,-},<NR3:low>,<NR4:high>
Example	<pre>SEND> LIST:BAND? 1<NL> RET> on,1.00000e+03,A,1.000000E-9,2.000000E-9<NL></pre>

CORRection Subsystem

The CORRection subsystem command group sets the correction function, including the OPEN, SHORT and SPOT correction settings.

Note The CORRection subsystem CANNOT work in [LIST MEAS] page.

CORRection Subsystem Command Tree



CORRection:OPEN

The CORRection:OPEN command execute all preset OPEN correction data measurement points.

Command Syntax	CORRection:OPEN
Example	SEND> CORRection:OPEN<NL> RET> open<NL> // Run pass/fail<NL> //Finish or Undone

CORRection:OPEN:STaTe

The CORRection:OPEN:STaTe command sets the OPEN correction function to ON or OFF.

Command Syntax	CORRection:OPEN:STaTe {ON,OFF or 1,0}
Parameter	ON, 1 Set up the function is ON OFF, 0 Set up the function is OFF
Example	SEND> CORR:OPEN:STaTe ON<NL> RET> null
Query Syntax	CORRection:OPEN:STaTe?
Query Response	{on,off}
Example	SEND> CORR:OPEN:STaTe?<NL> RET> on<NL>

CORRection:OPEN:LCR

The CORRection:OPEN:LCR command execute all preset OPEN correction data measurement points (AC).

Command Syntax	CORRection:OPEN:LCR
Example	SEND> CORRection:OPEN:LCR<NL> RET> LCR open<NL> // Run pass/fail<NL> //Finish or Undone

CORRection:OPEN:DCR

The CORRection:OPEN:DCR command execute all preset OPEN correction data measurement points (DC).

Command Syntax	CORRection:OPEN:DCR
Example	SEND> CORRection:OPEN:DCR<NL> RET> DCR open<NL> // Run pass/fail<NL> //Finish or Undone

CORRection:SHORT

The CORRection:SHORT command execute all preset SHORT correction data measurement points.

Command Syntax	CORRection:SHORT
Example	SEND> CORRection:SHOR<NL> RET> short<NL>

CORRection:SHORT:STATe

The CORRection:SHORT:STATe command sets the SHORT correction function to ON or OFF.

Command Syntax	CORRection:SHORT:STATe {ON,OFF or 1,0}
Parameter	ON, 1 Set up the function is ON OFF, 0 Set up the function is OFF
Example	SEND> CORR:SHOR:STATe ON<NL> RET> null
Query Syntax	CORRection:SHOR:STATe?
Query Response	{on,off}
Example	SEND> CORR:SHOR:STATe?<NL> RET> on<NL>

CORRection:SHORT:LCR

The CORRection:SHORT:LCR command execute all preset SHORT correction data measurement points (AC).

Command Syntax	CORRection:SHORT:LCR
Example	SEND> CORRection:SHORT:LCR<NL> RET> LCR short<NL> // Run pass/fail<NL> //Finish or Undone

CORRection:SHORT:DCR

The CORRection:SHORT:DCR command execute all preset SHORT correction data measurement points (DC).

Command Syntax	CORRection:SHORT:DCR
Example	SEND> CORRection:SHORT:DCR<NL> RET> DCR short<NL> // Run pass/fail<NL> //Finish or Undone

CORRection:SPOT:STATe

The CORRection:SPOT:STATe command sets the SOPT correction function to ON or OFF.

Command Syntax	CORRection:SOPT:STATe {ON,OFF or 1,0}
Parameter	ON, 1 Set up the function is ON OFF, 0 Set up the function is OFF
Example	SEND> CORR:SPOT:STATe ON<NL> RET> null
Query Syntax	CORRection:SPOT:STATe?
Query Response	{on,off}
Example	SEND> CORR:SPOT:STATe?<NL> RET> on<NL>

CORRection:SPOT:FREQuency

The CORRection:SPOT:FREQuency command sets the frequency point for the specified frequency point correction.

Command Syntax	CORRection:SPOT:FREQuency <value>
Parameter	value NR1,NR2 or NR3:Frequency value. A suffix multiplier can be used with this command. But the unit "Hz" cannot be added.
Example	SEND> CORR:SPOT:FREQ 100<NL> SEND> CORR:SPOT:FREQ 10k<NL>
Query Syntax	CORRection:SPOT:FREQuency?
Query Response	<NR3>
Example	SEND> CORR:SPOT:FREQ?<NL> RET> 1.000000e+03<NL>

CORRection:SPOT:OPEN

This command executes the OPEN correction data measure for the specified frequency correction.

Command Syntax	CORRection:SPOT:OPEN
Example	SEND> CORR:SPOT:OPEN<NL> RET> pass/fail<NL> //Finish or Undone

CORRection:SPOT:SHORT

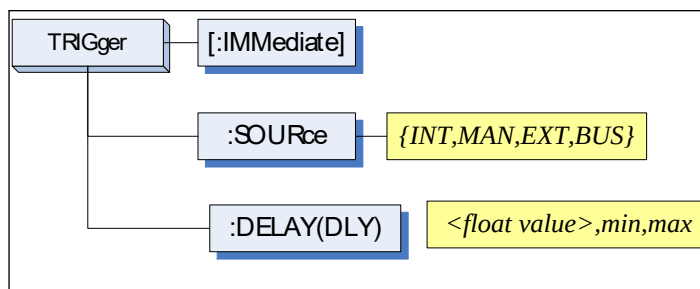
This command executes the SHORT correction data measure for the specified frequency correction.

Command Syntax	CORRection:SPOT:SHORT
Example	SEND> CORR:SPOT:SHOR<NL> RET> pass/fail<NL> //Finish or Undone

TRIGger Subsystem

The TRIGger subsystem command group is used to enable a measurement or a sweep measurement, and to set the trigger mode.

TRIGger Subsystem Command Tree



TRIGger[:IMMediate]

The TRIGger:IMMediate command causes the trigger to execute a measurement or a sweep measurement, regardless of the trigger state.

Command Syntax	TRIGger[:IMMediate]
Example	SEND> TRIG<NL>
Note	This command can be ONLY used in BUS trigger mode.

TRIGger:SOURce

The TRIGger:SOURce command sets the trigger mode.

Command Syntax	TRIGger:SOURce {INT,MAN,EXT,BUS}
Parameter	Where, {INT,MAN,EXT,BUS} is INT Internal Trigger Mode MAN Manual Trigger Mode EXT External Trigger Mode BUS BUS Trigger Mode
Example	SEND> TRIG:SOUR BUS<NL>
Query Syntax	TRIGger:SOURce?
Query Response	{INT,MAN,EXT,BUS}
Example	SEND> TRIG:SOUR?<NL> RET> INT<NL>

TRIGger:DELAY

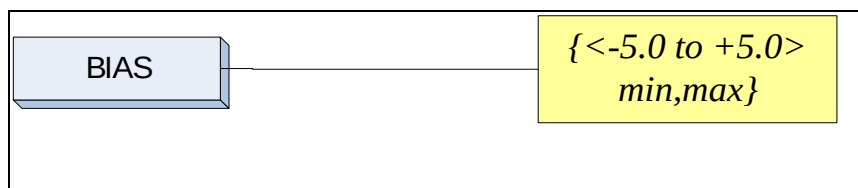
The TRIGger:DELAY command sets the trigger delay time.

Command Syntax	TRIGger:DELAY {<float>,min,max} TRIGger:DLY {<float>,min,max}
Parameter	Where, is float value:from 1ms to 60.00s min: =0ms max: =60.000s
Example	SEND> TRIG:DLY 1<NL> //1.000s
Query Syntax	TRIGger:DELAY? TRIGger:DLY?
Query Response	{0.000s~60.00s}
Example	SEND> TRIG:DLY?<NL> RET> 1.000s<NL>

BIAS Subsystem

The BIAS subsystem command group sets the DC BIAS switch to ON or OFF, and sets the DC bias voltage value.

BIAS Subsystem Command Tree

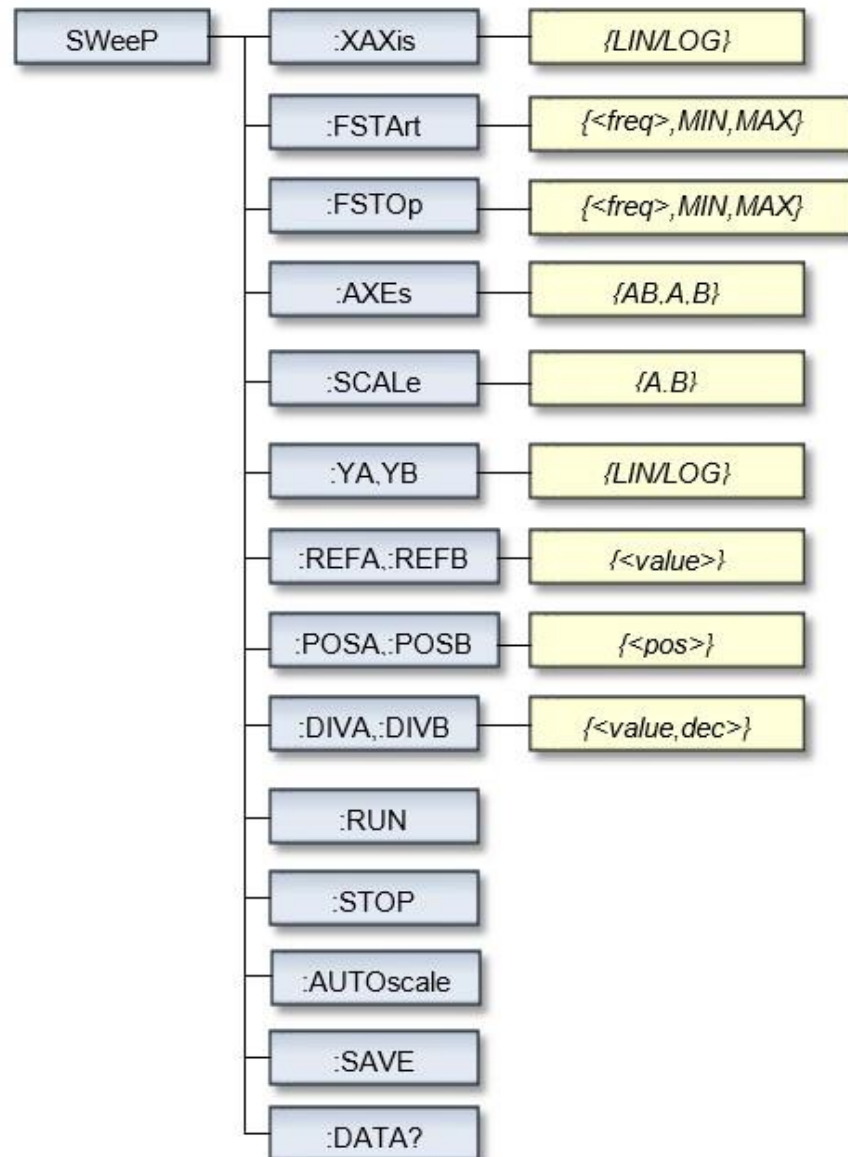


Command Syntax	BIAS {OFF,<-5.0 to +5.0V>,min,max}
Example	SEND> BIAS OFF<NL> SEND> BIAS 2<NL>
Query Syntax	BIAS?
Query Response	<-5.0V~+5.0V>
Example	SEND> BIAS?<NL> RET> OFF<NL>

SWeeP Subsystem

The sweep subsystem sets the sweep frequency range, Y-axis parameters, and reads sweep data.

SWeeP Subsystem Command Tree



SWEEP:XAXis

The SWEEP:XAXis command set the type of X-axis.

Command Syntax	SWEEP:XAXis {LIN,LOG}
Parameter	Where, LIN X-axis frequency points use linear sampling. LOG X-axis frequency points use logarithmic sampling.
Example	SEND> SWP:XAX LIN<NL> //Set to linear type.
Query Syntax	SWP:XAX?
Query Response	{LIN,LOG}
Example	SEND> SWP:XAX?<NL> RET> LIN<NL>

SWEEP:FSTArt

The SWEEP:FSTArt command set the sweep start frequency point.

Command Syntax	SWEEP:FSTArt {<freq>,MIN,MAX}
Parameter	Where, <freq> Is the numeric data (NR1 integer, NR2fix float or NR3 floating point). MIN Set to minimum frequency. MAX Set to maximum frequency
Example	SEND> SWP:FSTA 1k<NL> //Set to start frequency 1kHz
Query Syntax	SWP:FSTA?
Query Response	<NR3><NL> NR3 floating point.
Example	SEND> SWP:FSTA?<NL> RET> 1.000000e+02 <NL>

SWeeP:FSTOp

The SWeeP:FSTOp command set the sweep stop frequency point.

Command Syntax	SWeeP:FSTOp {<freq>,MIN,MAX}
Parameter	Where, <freq> Is the numeric data (NR1 integer, NR2fix float or NR3 floating point). MIN Set to minimum frequency. MAX Set to maximum frequency
Example	SEND> SWP:FSTO 300k<NL> //Set to stop frequency 100kHz
Query Syntax	SWP:FSTO?
Query Response	<NR3><NL> NR3 floating point.
Example	SEND> SWP:FSTO?<NL> RET> 3.000000e+05 <NL>

SWeeP:AXEs

The SWeeP:AXEs command set to display the primary parameter (A) or the secondary parameter (B), or both..

Command Syntax	SWeeP:AXEs {AB,A,B}
Parameter	Where, AB Set to display both A and B curve. A Set to display the primary parameter curve (A). B Set to display the secondary parameter curve (B).
Example	SEND> SWP:AXE AB<NL> //Set to display both
Query Syntax	SWP:AXE?
Query Response	{AB,A,B}
Example	SEND> SWP:AXE?<NL> RET> AB<NL>

SWeeP:SCALE

The SWeeP:SCALE command set to displays A or B trace parameters on the SWEEP display page.

Command Syntax	SWeeP:SCALE {A,B}
Parameter	Where, A Set to display the A trace parameter. B Set to display the B trace parameter.
Example	SEND> SWP:SCAL A<NL> //Set to display A trace
Query Syntax	SWP:SCAL?
Query Response	{A,B}
Example	SEND> SWP:SCAL?<NL> RET> A<NL>

SWeeP:YA / SWeeP:YB

The SWeeP:YA/YB command set the Y-axis type of curve A or B.

Command Syntax	SWeeP:YA {LIN,LOG}/ SWeeP:YB {LIN,LOG}
Parameter	Where, LIN Set the measurement value display to use the Y-axis linear scale. LOG Set the measurement value display to use the Y-axis logarithmic scale.
Example	SEND> SWP:YA LIN<NL> //Set to linear type of curve A.
Query Syntax	SWP:YA? or SWP:YB?
Query Response	{LIN,LOG}
Example	SEND> SWP:YA?<NL> RET> LIN<NL>

SWeeP:REFA / SWeeP:REFB

The SWeeP:REFA/REFB command set the Y-axis center reference point for curve A or B.

Command Syntax	SWeeP:REFA {<vlu>}/ SWeeP:REFB {<vlu>}
Parameter	Where, <vlu> Is the numeric data (NR1 integer, NR2fix float or NR3 floating point).
Example	SEND> SWP:REFA 50<NL> //Set to reference point of curve A.
Query Syntax	SWP:REFA? or SWP:REFB?
Query Response	<NR3><NL> NR3 floating point.
Example	SEND> SWP:REFA?<NL> RET> 5.000000e+01<NL>

SWeeP:POSA / SWeeP:POSB

The SWeeP:POSA/POSB command set the Y-axis position for curve A or B.

Command Syntax	SWeeP:POSA {<pos>}/ SWeeP:POSB {<pos>}
Parameter	Where, <pos> Is the numeric data (NR1 integer).
Example	SEND> SWP:POSA 2<NL> //Set to position of curve A.
Query Syntax	SWP:POSA? or SWP:POSB?
Query Response	<NR1><NL> NR1 integer.
Example	SEND> SWP:POSA?<NL> RET> 2<NL>

SWEEP:DIVA / SWEEP:DIVB

The SWEEP:DIVA/DIVB command set the Y-axis grid scale for curve A or B.

Command Syntax	SWEEP:DIVA {<div/dec>} SWEEP:DIVB {<div/dec>}
Parameter	Where, <div> Is the numeric data when linear type(NR1 integer, NR2fix float or NR3 floating point). <dec> Is the numeric data when logarithmic type(NR1 integer).
Example	SEND> SWP:DIVA 0.02<NL> //Set to grid scale of curve A.
Query Syntax	SWP:DIVA? or SWP:DIVB?
Query Response	DIV: <NR3><NL> NR3 floating point. DEC: <NR1><NL> NR1 integer.
Example	SEND> SWP:DIVA?<NL> RET> 2.000000e-02<NL>

SWEEP:RUN

The SWEEP:RUN command triggers the SWEEP measurement (TRIGGER).

Command Syntax	SWEEP:RUN
Example	SEND> SWP:RUN
Note	If you are not currently on the Sweep Display page, sending "SWEEP:RUN" command will automatically switch the device to that page and start scanning. During the scan, all SWEEP commands except "SWEEP:STOP" are invalid.

SWeeP:STOP

The SWeeP:STOP command stops the SWEEP measurement.

Command Syntax	SWeeP:STOP
Example	SEND> SWP:STOP
Note	During the scanning process, send the "SWEEP:STOP" command to stop the scanning after the current measurement point is completed.

SWeeP:AUTOscale

The SWeeP:AUTOscale command automatically adjusts the Y-axis scale for optimal display of curves A and B.

Command Syntax	SWeeP:AUTOscale
Example	SEND> SWP:AUTO
Note	This function can only be executed on the "SWEEP Display" page when no measurement is being performed.

SWeeP:SAVE

The SWeeP:SAVE command save screen display(BMP) and frequency sweep measurement data(CSV) to USB disk.

Command Syntax	SWeeP:SAVE
Example	SEND> SWP:SAVE
Note	This function can only be executed on the "SWEEP Display" page when no measurement is being performed. Before performing this function, the USB disk must be inserted into the instrument and identify ready.

SWeeP:DATA?

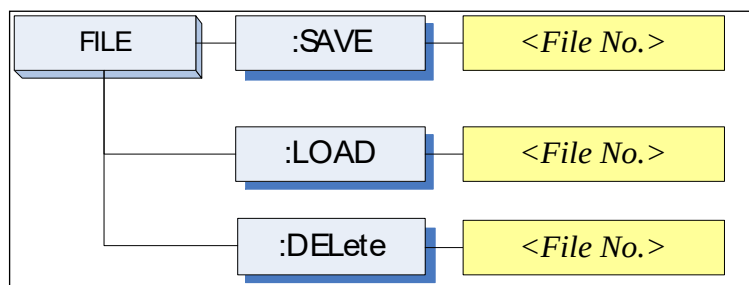
The SWeeP:DATA? command read back SWEEP measurement data.

Command Syntax	SWeeP:DATA?
Example	SEND> SWP:DATA?
Note	This function can only be performed when a SWEEP measurement has not been performed. The read-back data uses the standard IEEE 488.2 defined length arbitrary block response data format: #<d><n><data>. Syntax Structure Explanation: #: The start identifier of the data block. <d>: A non-zero single-digit number indicating the number of characters in the following. <n> field. <n>: A decimal integer representing the total number of bytes of the subsequent actual data <data>. <data>: The actual binary or text data transmitted (the length must strictly match <n>). The read-back data is in ASCII CSV format, containing one column header and all scanned frequency data. Each row of data is formatted as: sequence number, frequency, primary parameter, secondary parameter, and ends with `CR+LF`. Actual Read-back Data: <pre>#510327"No. ","FREQ","Z(OHM)","Phase-d()" 1,1.000E+02,+1.06774E+01,+7.55576E+01 2,1.300E+03,+1.98232E+02,+8.49067E+01 3,2.499E+03,+4.32411E+02,+8.59174E+01 4,3.699E+03,+6.54853E+02,+8.64057E+01 5,4.898E+03,+8.67436E+02,+8.66991E+01 6,6.098E+03,+1.07691E+03,+8.68167E+01 7,7.298E+03,+1.28360E+03,+8.69557E+01 8,8.497E+03,+1.48716E+03,+8.70560E+01 9,9.697E+03,+1.68784E+03,+8.71626E+01 10,1.090E+04,+1.89017E+03,+8.72106E+01 11,1.210E+04,+2.09055E+03,+8.72672E+01</pre>

FILE Subsystem

The FILE subsystem command group executes the file operation.

FILE Subsystem Command Tree



FILE?

The FILE? query returns the file number used by the system.

Query Syntax	FILE?
Query Response	<NR1(0 TO 9): File number>
Example	SEND> FILE?<NL> RET> 0<NL>

FILE:SAVE

The FILE:SAVE command saves all user settings into the currently used file.

Command Syntax	FILE:SAVE
Example	SEND> FILE:SAVE<NL>

The FILE:SAVE <n> command saves all user settings into the specified file.

Command Syntax	FILE:SAVE <File No.>
Parameter	Where, <File No.> is: NR1 (0 to 9)
Example	SEND> FILE:SAVE 0<NL>

FILE:LOAD

The FILE:LOAD command recalls all user settings from the currently used file.

Command Syntax	FILE:LOAD
Example	SEND> FILE:LOAD<NL>

The FILE:LOAD <n> command recalls all user settings from specified file.

Command Syntax	FILE:LOAD <File No.>
Parameter	Where, <File No.> is: NR1 (0 to 9)
Example	SEND> FILE:LOAD 0<NL>

FILE:DELeTe

Command Syntax	FILE:DELeTe <File No.>
Parameter	Where, <File No.> is: NR1 (0 to 9)
Example	SEND> FILE:DELeTe<NL>

FILE:REName

Command Syntax	FILE:REName <File No.>,<string>
Parameter	Where, <File No.> is: NR1 (0 to 9) <string>: File Description (MAX LENGTH = 30)
Example	SEND> FILE:REN 0,ABCD1234<NL>

ERRor Subsystem

ERRor?

The ERRor? retrieves the last error information.

Query Syntax	ERRor?
Query Response	Error string
Example	SEND> ERR?<NL> RET> no error.<NL>

SYSTEM Subsystem

SYSTEM:SHAKehand

The SYSTEM:SHAKehand command feeds back the sent commands.

Command Syntax	SYSTEM:SHAKehand {on,off}
Example	SEND> SYST:SHAK ON<NL>
Query Syntax	SYSTEM:SHAKehand?
Query Response	{on,off}
Example	SEND> SYST:SHAK?<NL> RET> OFF<NL>

SYSTem:CODE

The SYSTem:CODE command feeds back error codes for each sent command.

Command Syntax	SYSTem:CODE {on,off}
Example	SEND> SYST:CODE ON<NL>
Query Syntax	SYSTem:CODE?
Query Response	{on,off}
Example	SEND> SYST:CODE?<NL> RET> OFF<NL>

SYSTem:KEYLock

SYSTem:KEYLock command unlocks the keypad.

Command Syntax	SYST:KEYLOCK OFF or UNLOCK(UNLK)
Example	SEND> UNLOCK<NL>

SYSTem:RESult

SYSTem:RESult command selects the test results send mode.

Command Syntax	SYSTem:RESult {fetch,auto}
Example	SEND> SYST:RES fetch<NL>
Parameter	Where, fetch The test results will be sent back by command "fetch?". auto The results will be sent back by one trig.
Query Syntax	SYSTem:RESult?
Query Response	{FETCH,AUTO}
Example	SEND> SYST:RES? <NL> RET> fetch<NL>

Common Commands

*IDN?

The *IDN? query returns the instrument ID.

Query Syntax	IDN? Or *IDN?
Query Response	<model>,<firmware>,<serial no.>,<manufacturer>

*TRG

The *TRG command (trigger command) performs the same function as the Group Execute Trigger command.

Command Syntax	*TRG
Query Response	<primary value>,<secondary value>,<comparator result>
Example	SEND> *TRG RET> +5.56675e-11,+7.25470e-01,OUT
Note	This command can be used in BUS trigger mode. *TRG = TRIG;;FETC?

*SAV

*SAV = FILE:SAVE

The *SAV command saves all user settings into the currently used file.

Command Syntax	*SAV
Example	SEND> *SAV<NL>

*RCL

*RCL = FILE:LOAD

The *RCL command recalls all user settings from the currently used file.

Command Syntax	*RCL
Example	SEND> *RCL<NL>

S

pecification

This chapter describes the specifications and supplemental performance characteristics of the LCR-7000 Series:

- Specifications
 - Dimensions
-

Accuracy is defined as meeting all the following conditions:

Temperature: $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$

Relative humidity: $< 70\%$

Zeroing: Open and Short Correction
Warm up time is 30 min or more.

1-year calibration cycle.

Basic Accuracy: 0.05 % (Slow/Med), 0.1 % (Fast)

General Specification

Display: RGB color TFT-LCD, Touch,
Size: 127 mm (5 in); resolution:
 800×480

Test Function: Cs-Rs, Cs-D, Cp-Rp, Cp-D, Lp-Rp, Lp-Q, Ls-Rs, Ls-Q,
Rs-Q, Rp-Q, R-X, DCR, Z- θ_r , Z- θ_d , Z-D, Z-Q

Monitor Parameter:	Z, D, Q, Vac, Iac, Δ , $\Delta\%$, θ_r , θ_d , R, X, G, B, Y (2 Parameter)
Measurement Speed:	40 readings per second, 10 readings per second, 3 readings per second
Test Frequency	LCR-7300: 10 Hz to 300 kHz LCR-7200: 10 Hz to 200 kHz LCR-7100: 10 Hz to 100 kHz LCR-7020: 10 Hz to 20 kHz LCR-7002: 10 Hz to 2 kHz

Frequency range and resolution

Frequency range(F)	Resolution
$10.00 \text{ Hz} \leq F \leq 99.99 \text{ Hz}$	0.01 Hz
$100.0 \text{ Hz} \leq F \leq 999.9 \text{ Hz}$	0.1 Hz
$1.000 \text{ kHz} \leq F \leq 9.999 \text{ kHz}$	1 Hz
$10.00 \text{ kHz} \leq F \leq 99.99 \text{ kHz}$	10 Hz
$100.0 \text{ kHz} \leq F \leq 300.0 \text{ kHz}$	100 Hz

Frequency Accuracy: $\pm 0.01 \%$ 4-digit resolution

LCR-7300's open/short trimming frequency point list (Hz)

10	12	15	20	25	30	40	50	60	80
100	120	150	200	250	300	400	500	600	800
1k	1.2 k	1.5 k	2 k	2.5 k	3 k	4 k	5 k	6 k	8 k
10 k	12 k	15 k	20 k	25 k	30 k	40 k	50 k	60 k	80 k
100 k	120 k	150 k	200 k	250 k	300 k				

LCR-7200's open/short trimming frequency point list (Hz)

10	12	15	20	25	30	40	50	60	80
100	120	150	200	250	300	400	500	600	800
1k	1.2 k	1.5 k	2 k	2.5 k	3 k	4 k	5 k	6 k	8 k
10 k	12 k	15 k	20 k	25 k	30 k	40 k	50 k	60 k	80 k
100 k	120 k	150 k	200 k						

LCR-7100's open/short trimming frequency point list (Hz)

10	12	15	20	25	30	40	50	60	80
100	120	150	200	250	300	400	500	600	800
1k	1.2 k	1.5 k	2 k	2.5 k	3 k	4 k	5 k	6 k	8 k
10 k	12 k	15 k	20 k	25 k	30 k	40 k	50 k	60 k	80 k
100 k									

LCR-7020's open/short trimming frequency point list (Hz)

10	12	15	20	25	30	40	50	60	80
100	120	150	200	250	300	400	500	600	800
1k	1.2 k	1.5 k	2 k	2.5 k	3 k	4 k	5 k	6 k	8 k
10 k	12 k	15 k	20 k						

LCR-7002's open/short trimming frequency point list (Hz)

10	12	15	20	25	30	40	50	60	80
100	120	150	200	250	300	400	500	600	800
1 k	1.2 k	1.5 k	2 k						

Display Range

Parameter	Display Range
L	0.00001 μ H to 9999.99 H
C	0.00001 pF to 999.999 mF
R, X, Z	0.00001 Ω to 99.9999 M Ω
G, B, Y	0.01 nS to 999.999 S
D	0.00001 to 9.99999
Q	0.00001 to 99999.9
θ_d	-179.999° to 179.999°
θ_r	(-3.14159 to 3.14159) rad
DCR	0.00001 Ω to 99.9999 M Ω
$\Delta\%$	-999.999 % to 999.999 %

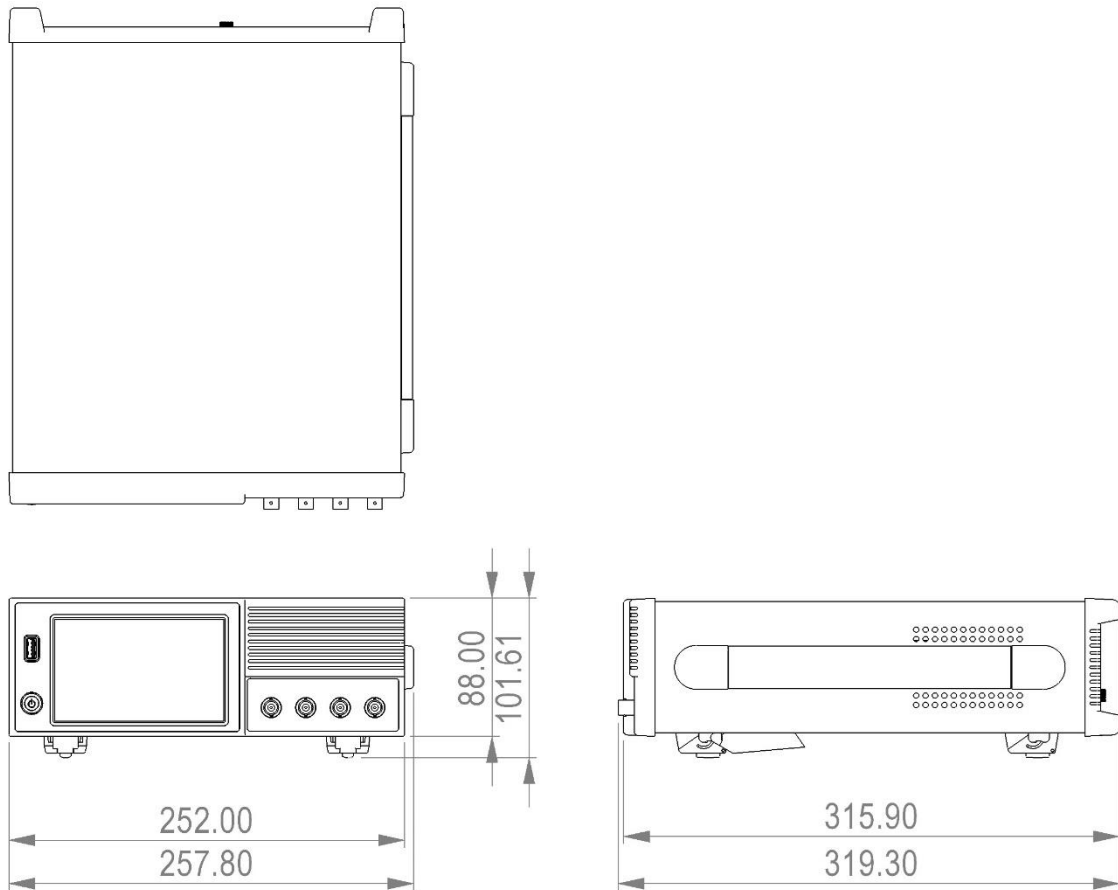
AC Test signal level: 10.00 mV to 2.00 V ($\pm 10\%$)
 CV: 10.00 mV to 2.00 V ($\pm 6\%$)
 100.0 μ A to 20.00 mA ($\pm 10\%$)
 CC: 100.0 μ A to 20.00 mA ($\pm 6\%$) (@2 V Max)

DCR Test signal level: DC voltage: +2 V $\pm$ (0.5%+0.05 V), Output impedance fixed 30 Ω

DC Bias: Internal:	$\pm 5.0 \text{ V } (\pm 3 \%)$
List Test:	10 Step (Frequency/Voltage/Current)
Output impedance:	30 Ω , 50 Ω and 100 Ω
Ranging:	Auto, Hold and Nominal range. Total 9 Ranges.
Equivalent Circuit:	Serial and Parallel
OPEN/SHORT Test:	OPEN/SHORT Zeroing (ALL, SPOT)
Files:	built-in 10 files and USB Disk 10 files, 9999 Log File, 999 Picture File, 10000 Data (.csv)
Beep Feature:	OFF/PASS/FAIL
Trigger Mode:	Internal, Manual, External and Bus Trigger.
Interface:	Handler interface and RS232/USB/LAN interface.

Environment:	Specification Conditions:	Temperature: 23 °C ± 5 °C, Relative Humidity: < 65 %
	Operating Environment:	Temperature: (0 to 40) °C, Relative Humidity: < 70 % (Indoor use only, Altitude: 2000 meters)
	Storage Conditions:	Temperature: (–10 to 70) °C, Relative Humidity: < 80 %
	Power Supply:	AC 100 V to 240 V, 50 Hz to 60 Hz
	Fuse:	250 V, 3 A Slow-Blow
	Maximum rated power:	15 W
	Weight:	3 kg, net

Dimensions



A

ccuracy

This section will explain the meter's accuracy, measurement tolerance and how to test the meter's performance. It includes:

- Accuracy
 - Factors that decide accuracy
-

The meters' accuracy is affected by the tolerances from measurement stability, temperature variation, circuit linearity and the measurement repeatability.

The meter's accuracy verification needs to be done under the following circumstances:

Warming up time: ≥ 30 minutes.

Perform Open/Short calibration correctly after warming up.

Set the meter to auto-ranging mode.

Accuracy

L, C, R |Z| Measurement Accuracy

The accuracies of L , C , R , $|Z|$ is equal to A_e , which is defined by:

$$A_e = \pm [A \times A_r + (K_a + K_b + K_f) \times 100 + K_L] \times K_c [\%]$$

A : Basic measurement accuracy

A_r : Basic accuracy correction factor

K_a : Impedance factor a

K_b : Impedance factor b

K_c : Temperature factor

K_f : Open/short trimming factor

K_L : Test leads' length factor

The method to calculate the accuracy of L and C depends on whether D_x (D measurement value) is ≤ 0.1 or not.

The method to calculate the accuracy of R depends on whether Q_x (Q measurement value) is ≤ 0.1 or not.

When $D_x > 0.1$, L and C 's accuracy factors, A_e , should be multiplied by $\sqrt{1 + D_x^2}$.

When $Q_x > 0.1$, R 's accuracy factor, A_e , should be multiplied by $\sqrt{1 + Q_x^2}$.

Accuracy for D

D 's accuracy is defined below:

$$D_e = \pm \frac{A_e}{100} \text{ (when } D_x \leq 0.1)$$

When $D_x > 0.1$, D_e should be multiplied by $(1 + D_x)$

Accuracy for Q

Q 's accuracy is defined below:

$$Q_e = \pm \frac{Q_x^2 \times D_e}{1 \mp Q_x \times D_e} \text{ (when } Q_x \times D_e < 1)$$

Where:

Q_x is the measured Q value.

D_e is D 's accuracy.

Accuracy for ϑ

θ 's accuracy is defined below:

$$\theta_e = \frac{180}{\pi} \times \frac{A_e}{100} \quad [\text{deg}]$$

Accuracy for R_p

When D_x (the measured D value) ≤ 0.1 , R_p 's accuracy is defined as:

$$R_p = \pm \frac{R_{px} \times D_e}{D_x \mp D_e} \quad [\Omega]$$

Where:

R_{px} is the measured R_p value $[\Omega]$.

D_x is the measured D value.

D_e is D 's accuracy.

Accuracy for Rs

When D_x (measured D value) ≤ 0.1

The accuracy of R_s is defined as:

$$R_{se} = X_x \times D_e \quad [\Omega]$$

$$X_x = 2\pi f L_x = \frac{1}{2\pi f C_x}$$

Where:

X_x is the measured X value $[\Omega]$.

C_x is the measured C value $[F]$.

L_x is the measured L value $[H]$.

D_e is D 's accuracy.

F is the measuring frequency.

Correction factors that affect measurement accuracy

The following will show how to decide the basic accuracy, A :

A is 0.05:

When the RMS measuring voltage is $0.4\text{ V} \leq V_s \leq 1.2\text{ V}$ and the measurement speed is SLOW or MED.

A is 0.1:

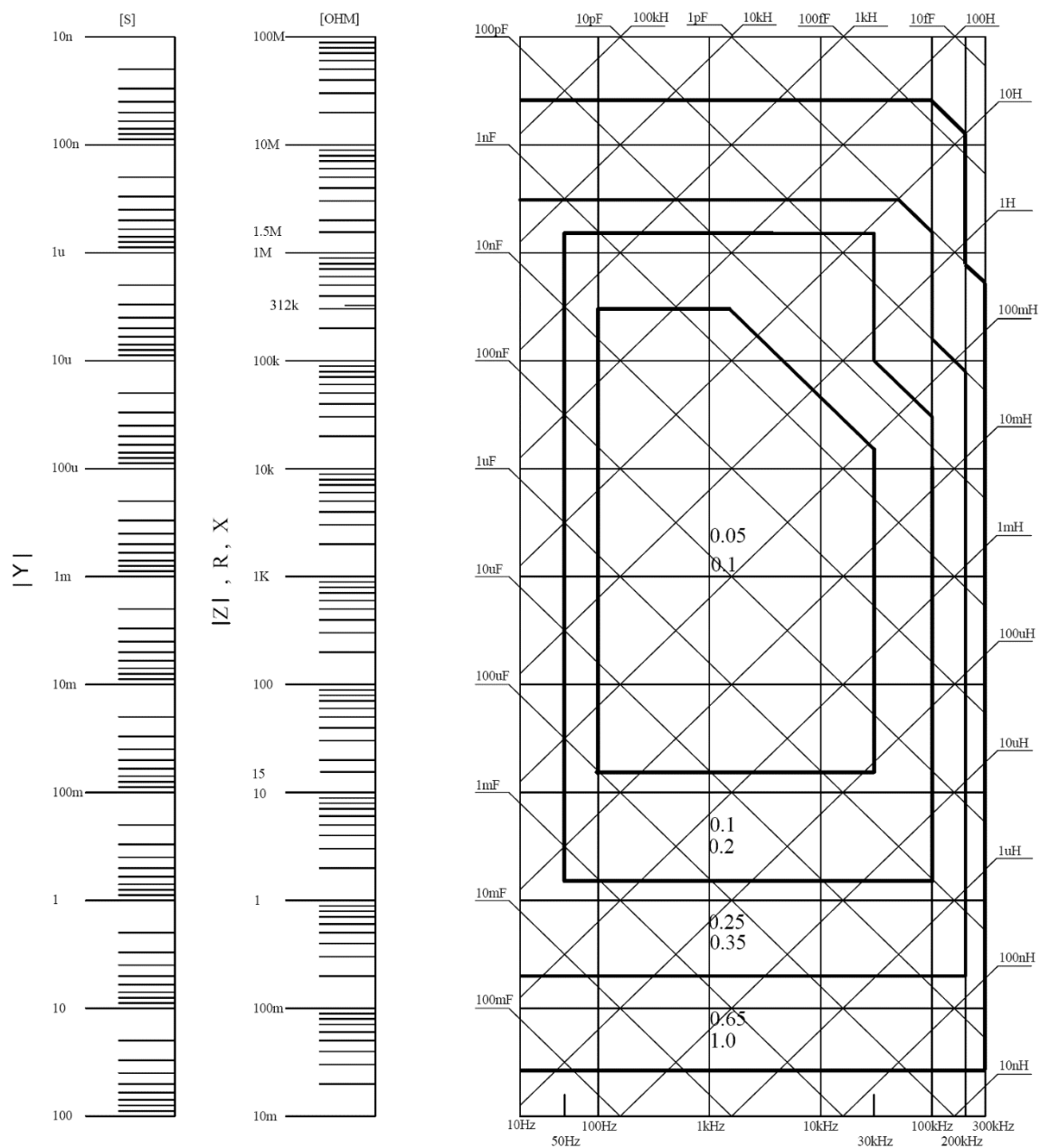
When the RMS measuring voltage is $0.4\text{ V} \leq V_s \leq 1.2\text{ V}$ and the measurement speed is FAST.

When the RMS measuring voltage is $V_s < 0.4\text{ V}$ or $V_s > 1.2\text{ V}$ the basic accuracy, A , should be calculated according to the following description:

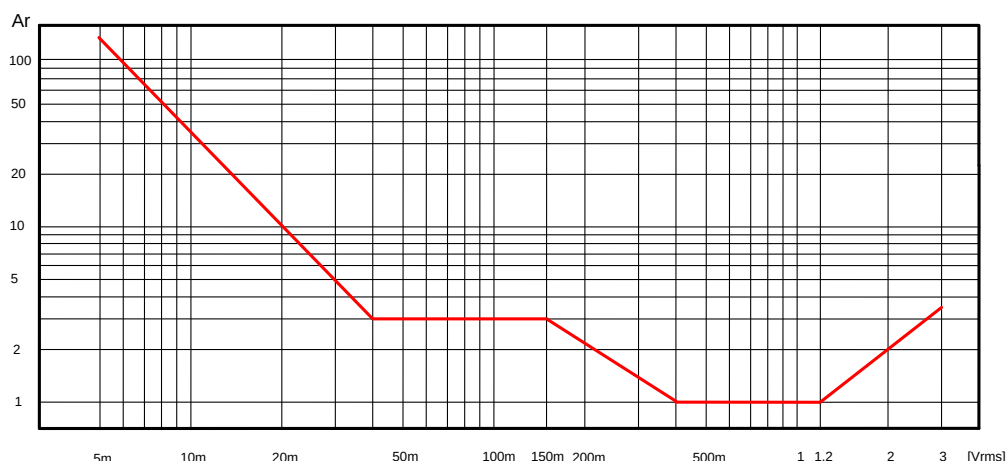
Write down the basic accuracy, A , for the measurement speed currently being used and then write down the correction factor, A_r , according to the amplitude of the measuring signal being currently used (page 186: Table for basic accuracy correction factor A_r).

Let A be multiplied by A_r to get the actual basic accuracy, A , for that moment. V_s represents the amplitude of the measuring signal.

The basic measurement accuracy A



If the accuracy for the spot you are searching for falls right on the line, e.g., the horizontal thick line between values 0.25 and 0.65, then use the smaller value, 0.25, for the basic accuracy of the spot you are searching for.

Table for basic accuracy correction factor A_r 

Impedance correction factors

Measurement speed	Measuring frequency	K_a	K_b
Slow Medium	$f_m < 100 \text{ Hz}$	$(\frac{1 \times 10^{-3}}{ Z_m })(1 + \frac{200}{V_s})(1 + \sqrt{\frac{100}{f_m}})$	$ Z_m (1 \times 10^{-9})(1 + \frac{70}{V_s})(1 + \sqrt{\frac{100}{f_m}})$
	$100 \text{ Hz} \leq f_m \leq 100 \text{ kHz}$	$(\frac{1 \times 10^{-3}}{ Z_m })(1 + \frac{200}{V_s})$	$ Z_m (1 \times 10^{-9})(1 + \frac{70}{V_s})$
	$f_m > 100 \text{ kHz}$	$(\frac{1 \times 10^{-3}}{ Z_m })(2 + \frac{200}{V_s})$	$ Z_m (3 \times 10^{-9})(1 + \frac{70}{V_s})$
Fast	$f_m < 100 \text{ Hz}$	$(\frac{2.5 \times 10^{-3}}{ Z_m })(1 + \frac{400}{V_s})(1 + \sqrt{\frac{100}{f_m}})$	$ Z_m (2 \times 10^{-9})(1 + \frac{100}{V_s})(1 + \sqrt{\frac{100}{f_m}})$
	$100 \text{ Hz} \leq f_m \leq 100 \text{ kHz}$	$(\frac{2.5 \times 10^{-3}}{ Z_m })(1 + \frac{400}{V_s})$	$ Z_m (2 \times 10^{-9})(1 + \frac{100}{V_s})$
	$f_m > 100 \text{ kHz}$	$(\frac{2.5 \times 10^{-3}}{ Z_m })(2 + \frac{400}{V_s})$	$ Z_m (6 \times 10^{-9})(1 + \frac{100}{V_s})$

f_m : Measuring frequency [Hz]

Z_m : The impedance of the DUT [Ω]

V_s : The RMS amplitude of the measuring signal [mV]

When the impedance is less than 500 Ω then use K_a ; K_b can be ignored.

When the impedance is larger than 500 Ω then use K_b ; K_a can be ignored.

Temperature correction factor K_c

Temp (°C)	5		8	18	28	38	
K_c	6	4	2	1	2	4	

Correction factor for interpolated open/short trimming K_f

Test frequency	K_f
When test frequency equals to the open/short trimming frequency	0
When test frequency is not equal to the open/short trimming frequency	0.0003

Please refer to general specification section for what the open/short trimming frequency points are for each LCR-7000 model.

Correction factors for the cable length of test leads K_L

RMS amplitude of the test signal	Cable length of the test leads		
	0 m	1 m	2 m
≤ 1.5 V	0	$2.5 \times 10^{-2} (1 + 0.5 f_m)$	$5 \times 10^{-2} (1 + 0.5 f_m)$
> 1.5 V	0	$2.5 \times 10^{-2} (1 + 0.9 f_m)$	$5 \times 10^{-2} (1 + 1.1 f_m)$

In above table, f_m represents the frequency of the measuring signal [kHz].



NOTE:

Measurement accuracy may be affected if the instrument is used in an area with electromagnetic interference.

If measurements are affected, try changing the operating location to avoid the effects of electromagnetic interference.

- Effect of Radiated Radio frequency electromagnetic fields.
- Effect of Conducted Radio frequency electromagnetic fields.

Certificate Of Compliance

We

GOOD WILL INSTRUMENT CO., LTD.

declare that the CE marking mentioned product satisfies all the technical relations application to the product within the scope of council:

Directive: EMC; LVD; WEEE; RoHS

The product is in conformity with the following standards or other normative documents:

◎ EMC	
EN 61326-1 EN 61326-2-1	Electrical equipment for measurement, control and laboratory use -- EMC requirements
Conducted & Radiated Emission EN 55011 / EN 55032	Electrical Fast Transients EN 61000-4-4
Current Harmonics EN 61000-3-2	Surge Immunity EN 61000-4-5
Voltage Fluctuations EN 61000-3-3	Conducted Susceptibility EN 61000-4-6
Electrostatic Discharge EN 61000-4-2	Power Frequency Magnetic Field EN 61000-4-8
Radiated Immunity EN 61000-4-3	Voltage Dip/ Interruption EN 61000-4-11
◎ Safety	
EN 61010-1 EN 61010-2-030	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

GOOD WILL INSTRUMENT CO., LTD.

No. 7-1, Jhongsing Road, Tucheng Dist., New Taipei City 236, Taiwan

Tel: [+886-2-2268-0389](tel:+886-2-2268-0389)

Fax: [+866-2-2268-0639](tel:+866-2-2268-0639)

Web: www.gwinstek.com

Email: marketing@goodwill.com.tw

GOOD WILL INSTRUMENT (SUZHOU) CO., LTD.

No. 521, Zhujiang Road, Snd, Suzhou Jiangsu 215011, China

Tel: [+86-512-6661-7177](tel:+86-512-6661-7177)

Fax: [+86-512-6661-7277](tel:+86-512-6661-7277)

Web: www.instek.com.cn

Email: marketing@instek.com.cn

GOOD WILL INSTRUMENT EURO B.V.

De Run 5427A, 5504DG Veldhoven, The Netherlands

Tel: [+31\(0\)40-2557790](tel:+31(0)40-2557790)

Fax: [+31\(0\)40-2541194](tel:+31(0)40-2541194)

Email: sales@gw-instek.eu