ONMEAS®

Rev.A2

AT5104/08/10/20

Multi-Channel Resistance Meter



User's Guide

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Applent Instruments.Ltd
Changzhou,
Jiangsu,
China,
Rev.A2 January, 2005
Rev.B0 January, 2008

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1. Unpacking and Preparation

This chapter describes how to set up and start the AT5108/AT5110/AT5120 Multi-Channel Resistance Meter.

- Incoming Inspection
- Power Requirements
- Setting up the Fuse
- How to Remove the Handle
- Environmental Requirements
- Cleaning

1.1 Incoming Inspection

After you receive the instrument, carry out 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.
Referring to <Packing List> in the packing box, check that all packaged items supplied with the meter have been provided as per the specified optioned.

NOTE

If an abnormality is detected, contact the company and transport the meter to your nearest Applent Instruments sales or service office. For inspection by the transport company, save the packing box, shock-absorbing material, and packaged items as you received them.

1.2 Setting up Fuse

~Line: 110VAC/220VAC, 50Hz/60Hz
Fuse: 250V 1A Slow Blow

Please use the following fuse type.
UL/CSA type, Slow-Blow, 5×20-mm miniature fuse, 1A, 250 V



When you need a fuse, contact your nearest Applent Instruments sales or service office. To verify and replace the fuse, remove the power cable and pull out the fuse holder.

1.3 Environmental Requirements

Set up the AT5108/AT5110/AT5120 where the following environmental requirements are satisfied.

Operating Environments
Ensure that the operating environment meets the following requirements.
Temperature: 0°C to 55°C

Temperature range at calibration: 23°C±5°C (<1°C deviation from the temperature when performing calibration)

Humidity: 15% to 85% at wet bulb temperature ≤ 40°C (non-condensation)

Altitude: 0 to 2,000m

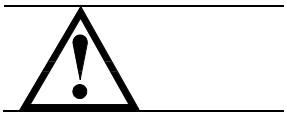
Vibration: Max. 0.5 G, 5 Hz to 500 Hz

1.4 Cleaning

To prevent electrical shock, disconnect the AT5108/AT5110/AT5120 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 AT5108/AT5110/AT5120 internally.

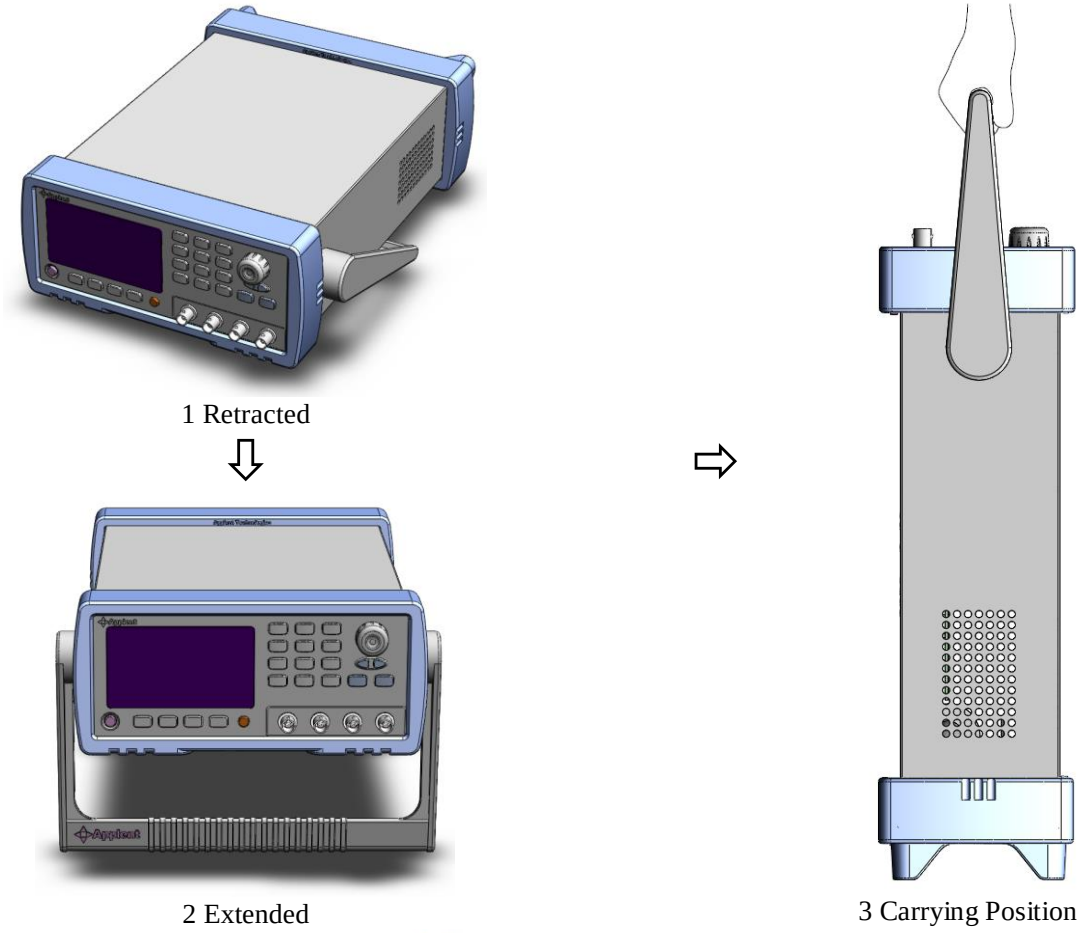


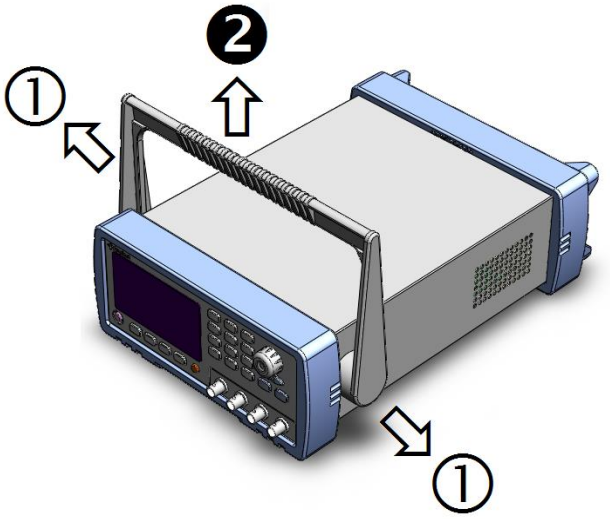
WARNING: Don't Use Organic Solvents (such as alcohol or gasoline) to clean the Instrument.

1.5 How to Remove the Handle

A handle kit is attached to the AT5108/AT5110/AT5120:

Figure 1-1 How to remove the handle





Remove Handle（*Lift the handle perpendicular to the unit while pulling it in the direction of 1.*）

2. Overview

This chapter contains general information about AT5110 .The information is organized as follows

- Introduction
- Main Specifications
- Feature overview

2.1 Introduction

Thank you for purchasing AT5108/AT5110/AT5120 Multi-Channel Resistance Meter.

AT5108/AT5110/AT5120 is a high-precision wide-range, high-performance ARM microprocessor-controlled multi-channel resistance meter. Its measurement range of 1μΩ ~ 300kΩ, the maximum display number 30000.

Computer remote control commands compatible with SCPI (Standard Command for Programmable Instrument Programmable Instruments standard command set), complete and efficient remote control and data acquisition functions.

With its built-in comparator, the AT5108/AT5110/AT5120 can output comparison/decision results for sorting components into a maximum of ten channels. Furthermore, by using the handler interface, the AT5108/AT5110/AT5120 can be easily combined with a component handler, and a system controller to fully automate component testing, sorting, and quality-control data processing.

AT5108/AT5110/AT5120 measures of high, medium and low-value resistor; various switch contact resistance; connector contact resistance; relay line package and the contact resistance; transformers, inductors, motors, deflection coil winding resistance; wire resistance; cars, boats, aircraft riveting metal resistance; printed version of the line and pore of resistance and so on.

2.2 Main Specifications and Features

2.2.1 Ranging

Auto, Hold and Nominal range. Total 8 Ranges.
About Nominal ranges: (Applent new definition): The AT5108/AT5110/AT5120 will automatically select the best range according to the nominal value.

2.2.2 Measurement Speed

Slow:	3.4s/10-Channel
Medium:	830ms/10-Channel
Fast:	350ms/10-Channel
Ultra:	230ms/10-Channel

2.2.3 Trigger Mode

Include Internal, Manual, External and Bus Trigger.

2.2.4 Basic Accuracy

Slow Speed: 0.05%

Medium、Fast and Ultra：0.2%

2.2.5 Correction

Zero correction for all ranges to eliminate lead resistance's effect.

2.3 Main Functions

2.3.1 Correction Function

SHORT correction:
Eliminates measurement errors brought about by stray parasitic impedance in the test fixtures.

2.3.2 Comparator Function (Sorting)

The primary parameter can be sorted into ten NG Bin: CH1-CH20
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.

2.4 Measurement Assistance Functions

2.4.1 Key Lock

The front panel keys can be locked.

2.4.2 Interface

RS-232 remote control
Support MAX 115200bps baud rate, Compatible with SCPI, ASCII transmission.
Handler Interface
Full opto-isolator、built-in pull-up resistor input and output port.
Support internal 5V and 24V external power supply.
Input：trigger signal
Output：output all sorting comparator result signal; measuring synchronizing signal （EOC）.

3. Startup

This chapter describes names and functions of the front panel, rear panel, and screen display and provides the basic procedures for operating AT5108/AT5110/AT5120.

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

3.1 Front panel

Figure 3-1 Front panel

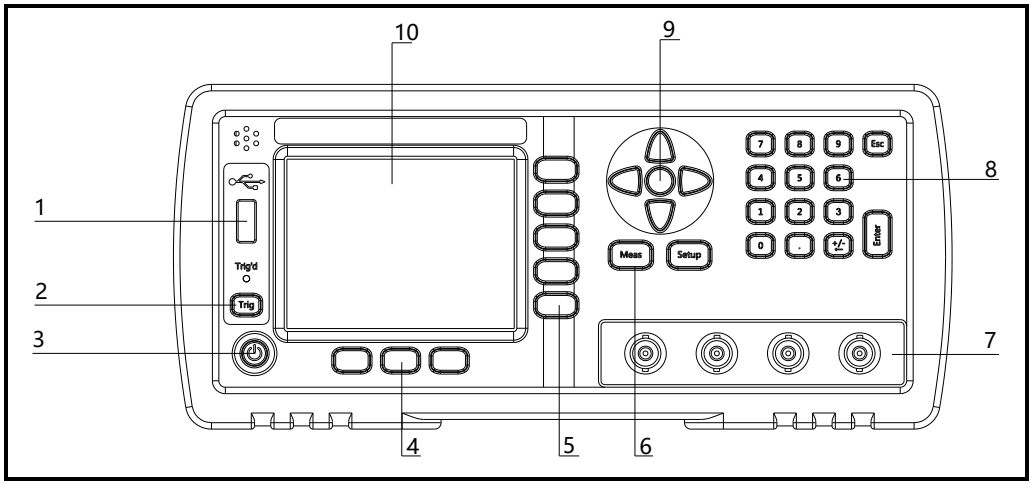


Table 3-1 Front panel description

No.	Description
1	USB Disk Port (USB-Host)
2	Trigger Key
3	Power Switch
4	System Key (Include File, System and Key Lock)
5	Soft Key
6	Menu key
7	UNKNOWN Terminal
8	Entry Key
9	Cursor Key
10	LCD Display

3.2 Rear Panel

Figure 3-2 Rear Panel

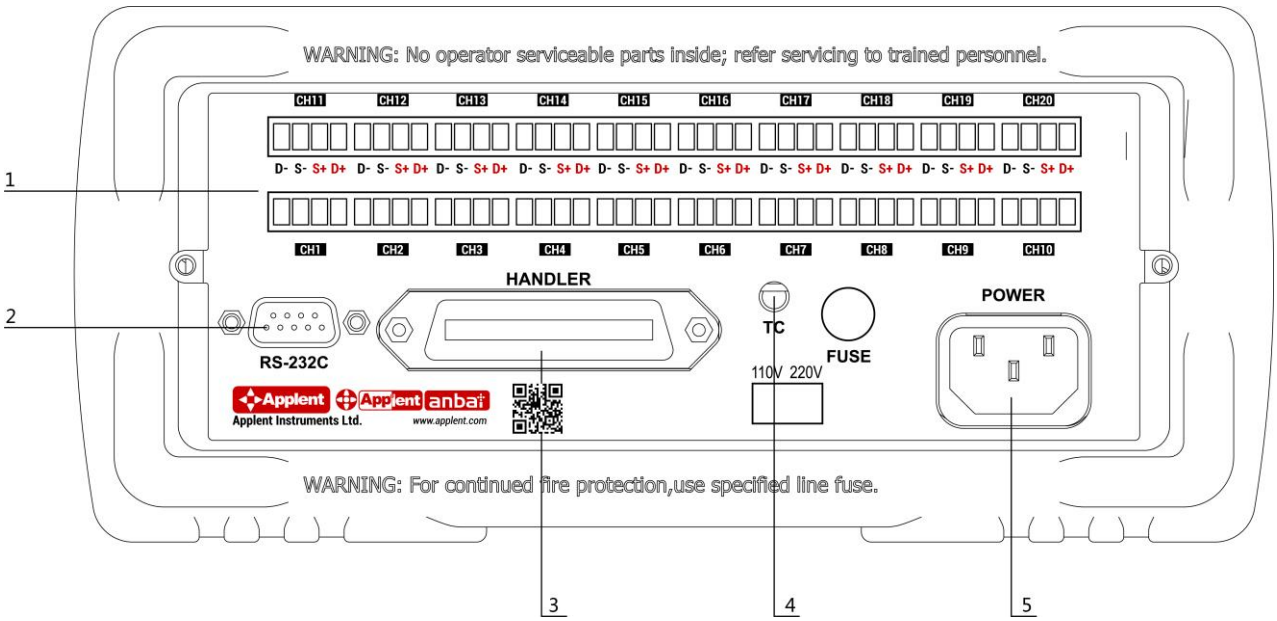


Table 3-2 Rear panel description

No.	Description
1	Test Terminal
2	RS-232C Interface
3	Handler Interface
4	Temperature Compensation Interface
5	AC Power Cord Receptacle

3.3 Power On/Off

3.3.1 Line Power Connection

 Power ON.  Power OFF.

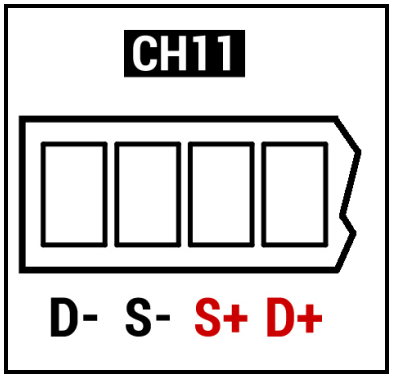
3.4 Warm-up Time

AT5108/AT5110/AT5120 is ready to be used as soon as the power-up sequence has completed. However, to achieve the accuracy rating, warm up the instrument for 15 minutes.

3.5 Connect to Device under Test (DUT)

The test terminals of all channels are on the rear panel.
Please insert test plug into the terminal along the rabbet direction.

Figure 3-3 Test Terminal of Each Channel



Warning:

No putting current source, voltage source directly access to test side. Energy storage device access to testing after discharging.

4. [Meas] Key

4.1 <MEAS DISPLAY> Page

When press the [Meas] key, the <MEAS DISPLAY> page appears.

The following measurement controls can be set.

- TRIG – Trigger Mode
- 01-20 – Set up the corresponding channel

Figure 4-1 AT5110 <MEAS DISPLAY> Page

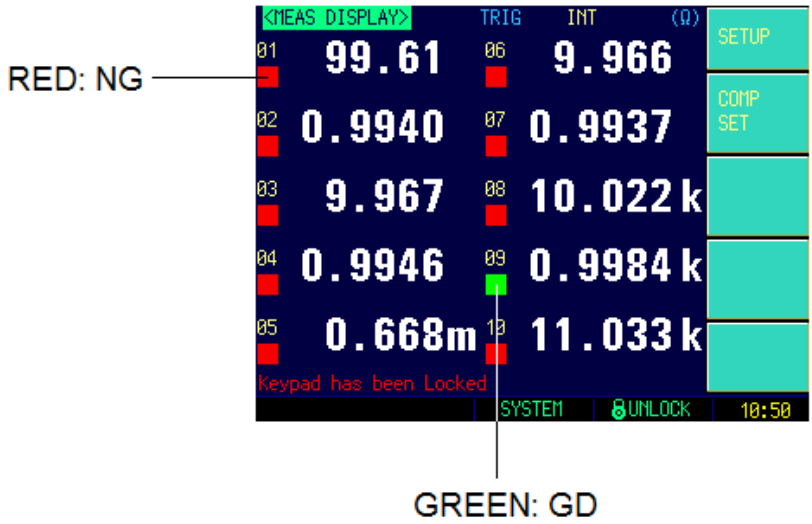


Figure 4-2 AT5120 <MEAS DISPLAY> Page



4.1.1 Trigger Mode [TRIG]

SCPI Command: `TRIGger:SOURce {INT,MAN,EXT,BUS}`

AT5110 supports four trigger modes: INT (internal), EXT (external), MAN (manual) and BUS (RS-232).

Trigger Mode	Description
INT	Continuously repeats the measurement cycle.
MAN	Performs one cycle of measurement each time you press the [Trig] 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.

	Please refer to the Handler section.
BUS	Performs one cycle of measurement each time it receives a trigger command sent via RS-232.

Procedure for choosing trigger mode [TRIG]

Step 1. Press the [Meas] key

Step 2. Use the cursor key to select [TRIG] field

Step 3. Use the soft keys to select desired trigger mode.

Soft key	Function
INT	Internal Trigger Mode
MAN	Manual Trigger Mode
EXT	External Trigger Mode
BUS	BUS Trigger Mode

4.1.2 Channel Setup

SCPI Command: `FUNCtion:SCAN {ON,OFF,<channel no>}`

Each channel can be turned ON/OFF or fixed to single channel measurement.

Procedure for setting the channel

Step 1. Press the [Meas] key

Step 2. Use the cursor key to select [01]~[10] field

Step 3. Use the soft keys to select desired working mode of corresponding channel.

Soft key	Function
OFF	This channel will be turned off.
ON	Turn on this channel
SCAN	Change to scan mode
SINGLE	Only measure this channel.

5. [Setup] Key

This section includes the following information:

- SETUP page
- Temperature Compensation Setup
- SHORT Correction
- Comparator Setup

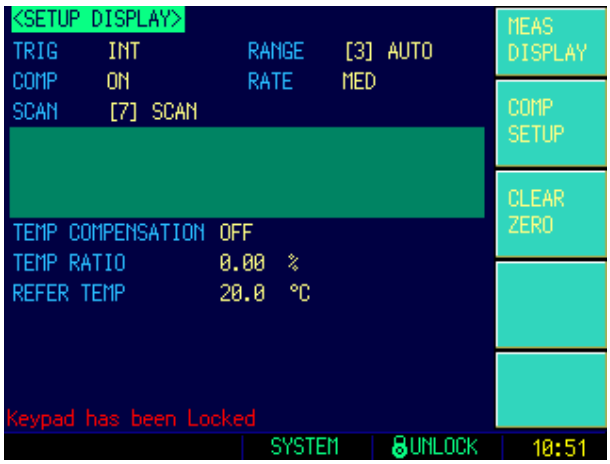
Every time or everywhere you can press the [Setup] key to open the <SETUP> page.

5.1 <SETUP> Page

NOTE

In <SETUP> page, the Instrument does not display test result and sorting result, and testing is continuing.

Figure 5-1 < SETUP> Page



In the <SETUP> Page, you can configure each of the following measurement controls with the cursor placed in the corresponding field.

- Trigger Mode [TRIG] *1
- Comparator ON/OFF [COMP]
- [RANGE]
- Measurement Speed [SPEED]
- [SCAN] mode
- Temperature Compensation ON/OFF [TEMP]
- Temperature Coefficient [COEFFICIENT]
- Reference Temperature [REFER TEMP]

NOTE: *1. These two settings can be set in <MEAS DISPLAY> page.
Please refer Sector 4.1 <MEAS DISPLAY> Page to set.

5.1.1 Trigger Mode [TRIG]

SCPI Command: `TRIGger:SOURce {INT,MAN,EXT,BUS}`

AT5110 supports four trigger modes: INT (internal), EXT (external), MAN (manual)

and BUS (RS-232).

Trigger Mode	Description
INT	Continuously repeats the measurement cycle.
MAN	Performs one cycle of measurement each time you press the [Trig] 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. Please refer to the Handler section.
BUS	Performs one cycle of measurement each time it receives a trigger command sent via RS-232.

Procedure for choosing trigger mode [TRIG]

Step 1. Press the [Meas] key

Step 2. Use the cursor key to select [TRIG] field

Step 3. Use the soft keys to select desired trigger mode.

Soft key	Function
INT	Internal Trigger Mode
MAN	Manual Trigger Mode
EXT	External Trigger Mode
BUS	BUS Trigger Mode

5.1.2 Range [RANGE]

SCPI Command: `FUNCtion:RANGe {<range number>,min,max}`

SCPI Command: `FUNCtion:RANGe:MODE {AUTO,HOLD,NOMinal}`

Table 5-1 Range Mode

Mode	Function overview	Advantage	Disadvantage
Auto range	Sets the optimum range automatically.	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 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	

Table 5-2 Effective measurement range

Range No.	Range	Measurement range	Up	Down
0	10mΩ	0.0000mΩ~30.000mΩ	↓ 30mΩ	↑ 29mΩ
1	100mΩ	29.000mΩ~300.00mΩ	↓ 300mΩ	↑ 290mΩ
2	1Ω	290.00mΩ~3.0000Ω	↓ 3Ω	↑ 2.9Ω
3	10Ω	2.9000Ω~30.000Ω	↓	↑

4	100Ω	29.000Ω~300.00Ω	30Ω ↓	29Ω ↑
5	1kΩ	290.00Ω~3.0000kΩ	300Ω ↓	290Ω ↑
6	10kΩ	2.9000kΩ~30.000kΩ	3kΩ ↓	2.9kΩ ↑
7	100kΩ	29.000kΩ~300.00kΩ	30kΩ ↓ 300kΩ	29kΩ ↑ 290kΩ

Procedure for setting the range [RANGE]

Step 1. Press the [Setup] key

Step 2. Use the cursor key to select [RANGE] field

Step 3. Use the soft keys to select the range mode or range.

Soft key	Function
AUTO RANGE	
HOLD RANGE	
NORMINAL RANGE	
INCR +	Increments the range in the HOLD mode
DECR -	Decrements the range in the HOLD mode

5.1.3 Measurement Speed [RATE]

SCPI Command: `FUNCtion:RATE {SLOW,MED,FAST,ULTRA}`

SLOW, MED, FAST, ULTRA can be selected for AT5110.

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

When in Range-Hold mode:

Slow: 3.4s/10-Channel

Medium: 830ms/10-Channel

Fast: 350ms/10-Channel

Ultra: 230ms/10-Channel

Procedure for setting measurement speed mode

Step 1. Press the [Setup] key

Step 2. Use the cursor key to select [RATE] field

Step 3. Use the soft keys to set measurement speed

Soft key	Function
SLOW	3.4s/10-Channel
MED	830ms/10-Channel
FAST	350ms/10-Channel
ULTRA	230ms/10-Channel

5.1.4 Turn the Comparator ON/OFF [COMP]

The comparator feature can be turned OFF. After the comparator feature is turned OFF, the comparator result won't be displayed on <MEAS DISPLAY> screen and all handler functions will be turned off.

Procedure for turning ON/OFF the comparator [COMP]

Step 1. Press the [Setup] key

Step 2. Use the cursor key to select [COMP] field

Step 3. Use the soft keys to turn ON/OFF the comparator feature.

Soft key	Function
OFF	
ON	

5.1.5 [SCAN] mode

SCPI Command: `FUNCtion:SCAN {ON,OFF,<channel number>}`

When the scan mode is set to SCAN, all channels will be measured one by one.

When the scan mode is set to SINGLE, only specified channel can be measured and displayed.

Procedure for setting scan mode

Step 1. Press the [Setup] key

Step 2. Use the cursor key to select [SCAN] field

Step 3. Use the soft keys to set scan mode

Soft key	Function
SCAN	
SINGLE	
INC +	Increase the channel number
DEC -	Decrease the channel number

5.1.6 Turn Temperature Compensation ON/OFF

SCPI Command: `FUNCtion:TC {ON,OFF,1, 0}`

The AT5110 built in Temperature Compensation Interface.

The Temperature Compensation Formula is:

$$F2 = \frac{100 + \alpha \times (T - To)}{100} \times F1$$

Where,

T0: Reference Temperature

T: Current Room Temperature

α: Temperature coefficient of reference temperature (%)

F1: Without compensation value

F2: Temperature compensated value

Procedure for turning the temperature compensation ON/OFF

Step 1. Press the [Setup] key

Step 2. Use the cursor key to select [TEMP COMPENSATION] field

Step 3. Use the soft keys to turn on/off

Soft key	Function
ON	
OFF	

5.1.7 Temperature [COEFFICIENT] α

SCPI Command: `FUNCtion:TC:COEFficient <float>`

Before using the Temperature Compensation Function, you must enter the coefficient of the DUT material. Such as the coefficient of copper is 0.393%.

Procedure for inputting the coefficient:

Step 1. Press the [Setup] key

Step 2. Use the cursor key to select [COEFFICIENT] field

Step 3. Enter the coefficient value by using the entry keys and press the Enter to confirm.

5.1.8 Reference Temperature [REFER TEMP]

SCPI Command: `FUNCtion:TC:REFEr <float>`

The temperature unit is Celsius degree.

Procedure for inputting the reference temperature:

Step 1. Press the [Setup] key

Step 2. Use the cursor key to select [REFER TEMP] field

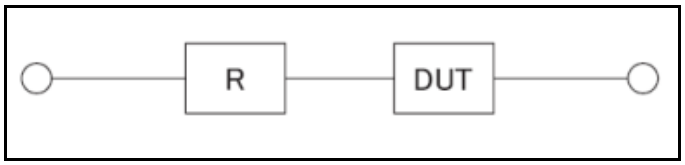
Step 3. Enter the temperature value by using the entry keys and press the Enter to confirm.

5.2 Short Correction

SCPI Command: `CORRect:SHORt`

The short correction feature of the AT5108/AT5110/AT5120 compensates for any residual resistance that may exist within the interval from the calibration plane, which is determined by the selected cable length, to the DUT connecting points (see Figure 5-2)

Figure 5-2 Residual Resistance



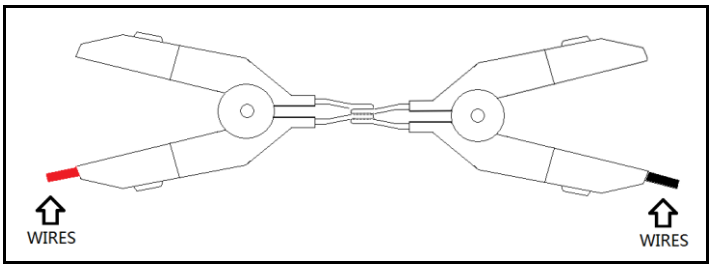
To perform short correction

Step 1. Press the [Setup] key

Step 3. Press the [Clear Zero] soft key.

Step 4. Press [MEAS SHORT] soft key, a dialog message displays “Short-circuit the test terminals”.

Please make sure the test clips short-circuit is like the following way:



Step 5. Press [OK] soft key. The AT5108/AT5110/AT5120 measures short resistance at the all ranges.

During the measurement, an “SHORT measurement in progress” dialog message is shown on the display.

When the measurement has finished, a message “Correction finished” will be displayed.

5.3 <Comparator> Page

Press [Setup] key and press [Comp Setup] soft key to open <COMPARATOR> page.

Figure 5-3 <COMPARATOR> Page



This page allows you to configure the AT5110's /AT5120's built-in comparator.

AT5110's/AT5120's built-in comparator can sort each channel's DUTs into their respective NG bin (CH1 through CH20 and NG (All Channel).

To take full advantage of the comparator, AT5108/AT5110/AT5120 is equipped with a handler interface for use in conjunction with the comparator. All CH1~CH20 NG signal can output to yours PLC via the handler interface.

In the <COMPARATOR> page, you can configure each of the following controls with the cursor placed in the corresponding field.

- Turn ON/OFF the Comparator [COMP] *1
- Comparator limit mode [MODE]
- Nominal value [NOM]

NOTE:

*1. This setting can also be set in the <SETUP> page.

5.3.1 Turn the Comparator ON/OFF [COMP]

The comparator feature can be turned OFF. After the comparator feature is turned OFF, the comparator result won't be displayed on <MEAS DISPLAY> screen and all handler functions will be turned off.

Procedure for turning ON/OFF the comparator [COMP]

Step 1. Press the [Meas] or [Setup] key and then press soft key [COMP SETUP]

Step 2. Use the cursor key to select [COMP] field

Step 3. Use the soft keys to turn ON/OFF the comparator feature.

Soft key	Function
OFF	
ON	

5.3.2 Comparator limit mode [MODE]

SCPI Command: `COMParator:MODE {ABS,PER,SEQ}`

You can specify the primary parameter limit values via one of the following 2 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 have to first define the minimum value and then the maximum value.

Tolerance mode

Tolerance mode includes deviation percentage (%) or absolute (Δ).

Absolute value (Δ) = UNKNOWN value – nominal value

Deviation percentages (%) = Absolute value (Δ) / nominal value × 100%

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. Press the [Meas] or [Setup] key

Step 2. Press the [COMP SETUP] soft key

Step 3. Use the cursor key to select [MODE] field

Step 4. Use the soft keys to select comparator mode

Soft key	Function
ABS	Absolute parameter values
PER	Deviation percentages.
SEQ	Sequential mode.

5.3.3 Nominal value for tolerance mode

`COMParator:NOMinal <float value>`

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

In sequential mode the nominal value does not affect sorting. In sequential mode you can configure nominal value or not, but if you have set the Range Mode to [NOM] the nominal value must be configured.

To enter the nominal value

Step 1. Press the [Meas] or [Setup] key

Step 2. Press the [COMP SETUP] soft key

Step 3. Use the cursor key to select [NOM] field

Step 4. Enter the nominal value using the entry keys.
Use the soft key to select unit.

5.3.4 【Beep】

SCPI command: `COMParator:BEEP {OFF,GD,NG}`

Due to limitation of display page, beep setting is not display in <Comp> page, please set up in <SYSTEM CONFIGURATION> page.

5.3.5 Lower and upper Limits

SCPI Command: `COMParator:CH <1~20>,<LOW>,<HIGH>`

To enter the limit values

Step 1. Press the [Meas] or [Setup] key

Step 2. Press the [COMP SETUP] soft key

Step 3. Use the cursor key to select [CHANNEL 01 LOW] field

Step 4. Enter the limit value by using the entry keys.
When in the ABS and SEQ mode, please enter the unit by using the soft keys.
When in the PER mode, the unit is %.

Step 5. Repeat Step 4 by using the cursor keys until you have entered all limit values.

6. System Configurations

This section includes the following information:

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

6.1 <SYSTEM CONFIG> Page

When press the [Meas] or [Setup] key followed by [SYSTEM] bottom soft key, the <SYSTEM CONFIG> page appears.

Following information can be configured in the <SYSTEM CONFIG> page.

- LANGUAGE
- System date and time configuration [DATE/TIME]
- Account settings [ACCOUNT]
- Beep setting [BEEP]
- RS-232 Baud rate setting [BAUD]
- RS-232 Shake Hand [SHAKE HAND]
- RS-232 Result Send Mode [RESULT SEND]
- RS-232 Data Format and Handler EOC Mode [DATA/EOC]

Figure 6-1 <SYSTEM CONFIG> Page



6.1.1 To change system【LANGUAGE】

SCPI command: **SYSTem:LANGuage {ENGLISH,CHINESE,EN,CN}**

Chinese and English is available.

■ **To change language**

Step 1 Enter < SYSTEM CONFIG > page

Step 2 Use cursor key to select【LANGUAGE】field

Step 3 Use soft key to select language:

Soft key	Function
[CHN]	Chinese
ENGLISH	English

6.1.2 Setting the system date and time

AT5110 features a built-in 24-hour clock.

To change the date

Step 1. Press the [Meas] or [Setup] key

Step 2. Press the [SYSTEM] bottom soft key.

Step 3. Use the cursor key to select date field

Step 4. Use the soft keys to edit date

Soft 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.
DAY INCR+	Increases the day in steps of 1.
DAY DECR-	Decreases the day in steps of 1.

To change the time

Step 1. Press the [Meas] or [Setup] key

Step 2. Press the [SYSTEM] bottom soft key.

Step 3. Use the cursor key to select time field

Step 4. Use the soft keys to edit time

Soft 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.

6.1.3 Account Setting

The AT5110 has two accounts, administrator and user.

Administrator: All functions can be configured by administrator except <SYSTEM SERVICE> page.

User: All functions can be configured by user except < SYSTEM SERVICE> page and <FILE> page.

To Change Account

Step 1. Press the [Meas] or [Setup] key

Step 2. Press the [SYSTEM] bottom soft key.

Step 3. Use the cursor key to select date field

Step 4. Use the soft keys to change account.

Soft 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. Press the [Meas] or [Setup] key

Step 2. Press the [SYSTEM] bottom soft key.

Step 3. Use the cursor key to select [ADMIN] field.
When the account field is [USER], you should change to [ADMIN].

Step 4. Use the soft keys to change password or delete password.

Soft key	Function
CHANGE PASSWORD	Input password(less than 9 numbers).
DELETE PASSWORD	The password will be removed.

NOTE: If you forget your password, please send an E-Mail to tech@applent.com.

6.1.4 Beep Feature

SCPI Command: `COMParator:BEEP {OFF,GD,NG}`

To set up the beep feature

Step 1. Press the [Meas] or [Setup] key

Step 2. Press the [SYSTEM] bottom soft key.

Step 3. Use the cursor key to select [BEEP] field

Step 4. Use the soft keys to set beep feature

Soft key	Function
OFF	Turn off the beep feature.
GD	Beep while the comparator sorting result is GD
NG	Beep while the comparator sorting result is NG

6.1.5 RS-232 Baud Rate [BAUD]

Before you can control the AT5110 by issuing RS-232 commands from built-in RS-232 controller connected via its DB-9 connector, you have to configure the RS-232 baud rate.

The AT5110's built-in RS-232 interface uses the SCPI language.

The configuration of RS-232

RS-232 configuration is as follows:

Data bits: 8-bit

Stop bits: 1-bit

Parity: none

To set up the baud rate

Step 1. Press the [Meas] or [Setup] key

Step 2. Press the [SYSTEM] bottom soft key.

Step 3. Use the cursor key to select [BAUD] field

Step 4. Use the soft keys to select baud rate.

Soft key	Function
1200	
9600	

38400	
57600	
115200	Recommend

6.1.6 RS-232 Shake Hand [SHAKE HAND]

AT5110 support software “shake hand”. AT5110 will return the whole command to host and then response the command when the [SHAKE HAND] is turned ON.

To turn ON the “Shake Hand”:

Step 1. Press the [Meas] or [Setup] key

Step 2. Press the [SYSTEM] bottom soft key.

Step 3. Use the cursor key to select [SHAKE HAND] field

Step 4. Use the soft keys to turn ON.

Soft key	Function
ON	
OFF	

NOTE: If you use Applent Software, please make sure that the [SHAKE HAND] is turned OFF.

6.1.7 RS-232 Result Send Mode [RESULT SEND]

SCPI Command: `SYSTem:SENDmode {FETCH,AUTO}`

When you set the [RESULT SEND] to AUTO, the test result will be sent to host every end of measurement instead of by sending “FETCH?” command.

- When the [DATA/EOC] field is set to [ALL CHANNELS], all channels’ results will return to host after end of measurement of all channels.

  The format is:

+9.9651e+01,NG,+9.9481e-01,GD,+9.9726e+00,NG,+9.9481e-01,GD,+7.6770e-04,NG,+9.9726e+00,NG,+1.0000e+20,GD,+1.0040e+04,NG,+9.9933e+02,NG,+1.1169e+04,NG <NL>

…

Where,

“+1.0000e+20” stands for overload or open.

- When the [DATA/EOC] field is set to [ONE BY ONE], current channel’s result will return to host after end of measurement of this channel.

  The format like this:

  +9.9651e+01,NG <NL>

  +9.9481e-01,GD <NL>

  +9.9726e+00,NG <NL>

To set up the result send mode:

Step 1. Press the [Meas] or [Setup] key

Step 2. Press the [SYSTEM] bottom soft key.

Step 3. Use the cursor key to select [RESULT SEND] field

Step 4. Use the soft keys to turn ON.

Soft key	Function
FETCH	Acquire the test result by sending “FETCH?” command only.
AUTO	AT5110 return the result every EOM

6.1.8 Data format and EOC mode [DATA/EOC]

SCPI Command: `SYSTem:DATAmode {ALL,ONE}`

When the [RESULT SEND] field is set to [AUTO], the data format will return to host depended on this field. Furthermore, the EOC signal of the handler interface depends on this field.

To set up the data format and EOC mode:

Step 1. Press the [Meas] or [Setup] key

Step 2. Press the [SYSTEM] bottom soft key.

Step 3. Use the cursor key to select [DATA/EOC] field

Step 4. Use the soft keys to turn ON.

Soft key	Function
ALL CHANNELS	
ONE BY ONE	

6.2 <SYSTEM INFO> Page

When press the [Meas] or [Setup] key followed by [SYSTEM] bottom soft key, and press [SYSTEM INFO] soft key, the <SYSTEM INFO> page appears.

There are no configurable options in the <SYSTEM INFO> page.

Figure 6-2 <SYSTEM INFO> Page



7. Handler Interface

This chapter provides information of AT5110's/AT5120's built-in handler interface. Including:

- Pin Assignment
- Circuit Diagram
- Timing Chart

The AT5110's/AT5120's 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 AT5108/AT5110/AT5120 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.

7.1 Pin Assignment

Figure 7-1 Pin Assignment

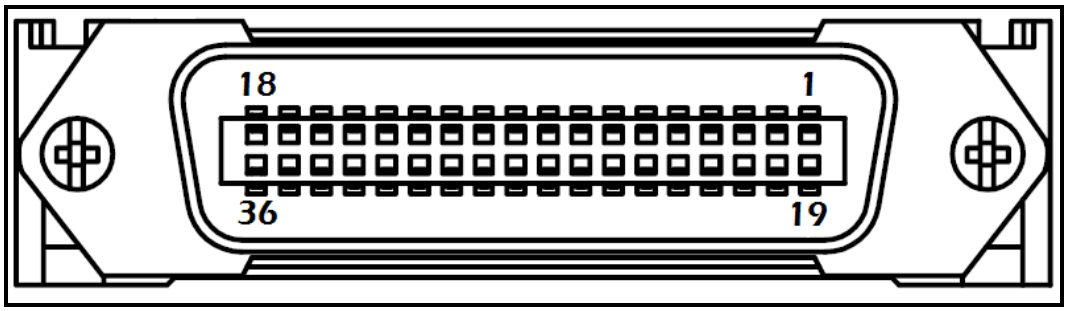


Table 7-1 Description of Handler Interface Signals

Pin	Name	Overview
1	CH8	1：GD, 0：NG
2	CH9	1：GD, 0：NG
3	CH10	1：GD, 0：NG
5	NG	NG output for all channels 1：GD, 0：NG
7	EOC	0：measuring，1：finished
19	CH7	1：GD, 0：NG
20	CH6	1：GD, 0：NG

21	CH5	1：GD, 0：NG
22	CH4	1：GD, 0：NG
23	CH3	1：GD, 0：NG
24	CH2	1：GD, 0：NG
25	CH1	1：GD, 0：NG
8	CH11	1：GD, 0：NG; (AT5120 valid)
9	CH12	1：GD, 0：NG; (AT5120 valid)
10	CH13	1：GD, 0：NG; (AT5120 valid)
11	CH14	1：GD, 0：NG; (AT5120 valid)
12	CH16	1：GD, 0：NG; (AT5120 valid)
13	CH16	1：GD, 0：NG; (AT5120 valid)
14	CH17	1：GD, 0：NG; (AT5120 valid)
15	CH18	1：GD, 0：NG; (AT5120 valid)
16	CH19	1：GD, 0：NG; (AT5120 valid)
17	CH20	1：GD, 0：NG; (AT5120 valid)

■ Input terminal

Table 7-1 input terminal pin description

Pin	Name	Overview
18	Trigger input	Trigger input terminal, built-in 0.25W,499Ω current-limiting resistance

■ supply terminal

表 7-2 supply terminal pin description

Pin	Name	Overview
27-30	GND	External power supply input GND
33-34	External VCC	External power supply input positive terminal
35-36	*Internal VCC*	*Internal VCC* power supply *plus end* (5V,1A)

7.2 Connection

■ Use external power supply（recommend）

Please use external power supply and connect the following pins:

VCC：33-34

GND：27-30

Internal power supply 35-36：float

■ Use internal power supply

Under state of unknown or uncertain for power consumption, please do not use internal power supply, otherwise the instrument cannot work normally.
Under state of knowing small power consumption, users can use internal power supply to work, but it may cause the decreasing of instrument’s antijamming capability.

Internal power supply： 5V MAX 1A

Use internal power supply and connect the following pins:

VCC（5V）： 34-35

GND: 27-30

■ Electrical Characteristics

power requirement：+3.3V~35VDC

Output Signal：Collector output of built-in pull-up resistor. Darlington drive, LOW level valid.

MAX voltage：Supply voltage

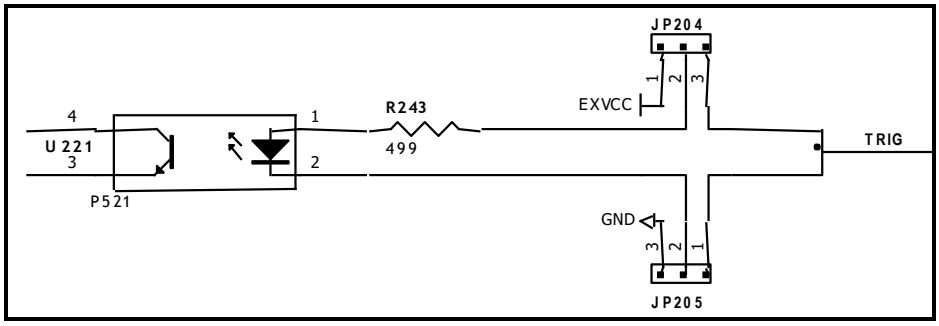
Input Signal:： Opto-isolator. LOW level valid.

MAX current： 50mA

Note：To avoid damage to interface, supply voltage cannot exceed power requirement.
To avoid damage to interface, please connect wires after power is turned off.
Output signal can control signal and small power consumption relay, but for big power consumption relay, please do not use internal power supply.

■ Typical Circuit Diagram of Handler Interface Input signals.

Figure 7-1 Schematic（Trig）

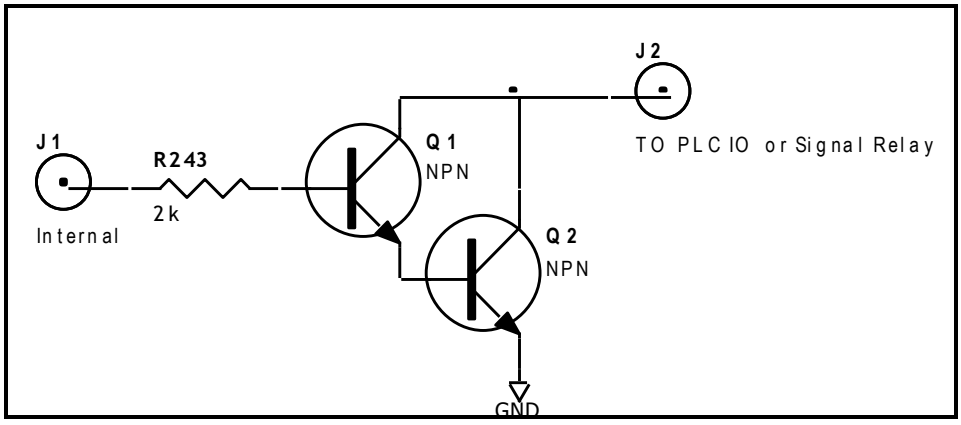


In figure: JP204 and JP205, factory configuration is 1-2 short circuit, trigger signal is rising edge trigger.

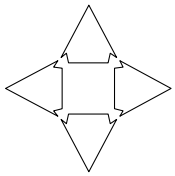
If trigger signal use falling edge trigger, please short circuit 2-3 for JP204 and JP205, and external VCC can be floating.

■ Typical Circuit Diagram of Handler Interface Output signals.

Figure 7-2 Schematic



8. Remote Control



This chapter provides the following information to remotely control the AT5108/AT5110/AT5120 via the RS-232C or USB interface.

- About RS-232C
- About USB Interface
- Select Baud Rate.
- About SCPI

AT5108/AT5110/AT5120 can use the RS-232 interface or USB interface to communicate with the computer to complete all the instrument functions.

8.1 About RS-232C

RS-232 is currently widely used serial communications standard, is also called asynchronous serial communications standard, it is applied to realize communication of PC and PC、 PC and peripheral. RS is the English abbreviation for “Recommended Standard” (recommended standard), 232 is standard number, this standard is officially announced by EIA in 1969.

Most configuration of serial port is not based on RS-232 standard: each port use 25-core or 9- core connector (now all PC use 9-core connector). The most common RS-232 signal is as below:

Table 8-1 Common RS-232 signal

Signal	Mark	25-core connector Pin No	9-core connector Pin No
Request To Send	RTS	4	7
Clear To Send	CTS	5	8
Data Set Ready	DSR	6	6
Data Carrier Detect	DCD	8	1
Data Terminal Ready	DTR	20	4
Transmit Data	TXD	2	3
Receive Data	RXD	3	2
Ground	GND	7	5
Request To Send	RTS	4	7

In addition, there is MAX subset for RS232, it is convenient to connect 3-wire, and widely used by industrial control, and instrument also adopts this connection method.

Table 8-2 RS-232 Standard minimum subset

Signal	Mark	9-core connector Pin No
Transmit Data	TXD	2
Receive Data	RXD	3
Ground	GND	5

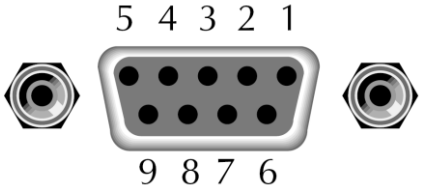
8.1.1 RS232C Connection

RS-232 serial interface can be connected to serial interface of controller (such as PC or PLC) by DB-9 cable.

Tip: instrument cannot use null modem cable.
Users can make it or buy 9-core cable from Applent Instruments.
If users make 3-core cable, should pay attention to:

•If using PC's built-in DB9 port, probably users need to short circuit 4-6、7-8 on PC port's DB-9 connector (pin).

Figure 8-1 RS-232 connector on rear panel



In order to avoid electrical shock, please disconnect power when insert and pull the connector.

TIP

■ Instrument's default communications setting:

Transmission mode: includes full duplex asynchronous communication of start bits and stop bits

Data bits: 8-bit

Stop bits: 1-bit

Parity bits: None

8.2 Handshake Protocol

Instrument adopts software handshake to reduce phenomenon of possible data loss or data error during communication.

Instrument can start using software handshake, high-level language software engineer should strictly do it according to the following handshake protocol to program communication software:

- Instrument terminator only accepts ASCII format, command response also returns ASCII code.
- **Command string that sent by host must be ended with NL ('\n') mark, instrument terminator will begin performing command string only after it receives end mark.**
- Instrument can set command handshake: instrument will return an identification code after it receives command and finishes processing.

8.3 SCPI Language

SCPI-Standard Commands for Programmable Instruments is a common command that Applent adopts and it is used to test instrument. SCPI is also called TMSL-Test and Measurement System Language, which is developed by Agilent Technologies according to IEEE488.2, so far it is widely used by equipment manufacturers.



Instrument built-in terminator is responsible for parsing user's various command formats. Because terminator is on the basis of SCPI protocol, but it is not fully consistent with SCPI, please read "SCPI command" chapter before using instrument.

9. SCPI Command Reference

This chapter includes the following content:

- **Terminator**
- **Command Syntax**
- **Query Syntax**
- **Query Response**
- **Command Reference**

This chapter provides descriptions of instrument's available SCPI commands sets, listed in functional subsystem order.

9.1 Terminator

Host can send a string of command to instrument, instrument terminator will begin parsing after it captures end mark（\n）or after input buffer overflows.

For example: Legal command string:

AAA:BBB CCC,DDD,EEE

Instrument terminator is responsible for parsing and performing all commands, before programming, users must know about parsing rules.

9.1.1 Terminator Rules

1. Terminator only parses and responds ASCII code's data.
2. **Command string must be ended with NL (' \n' ASCII 0x0A) mark, terminator will begin performing command string only after it receives end mark or after** buffer overflows.
3. If command handshake is turned on, every time terminator receives one string, it will promptly return this string to the host, only when host receives this returned string, can it continues sending the next string.
4. After terminator parses error, it will promptly stop parsing, and the current command is canceled.
5. When terminator parses the query command, it will terminate parsing this command string, the latter command string will be ignored.
6. When parsing command string, terminator is case insensitive.
7. Terminator supports command abbreviated form, please refer to the latter chapter regarding abbreviation norms.

9.1.2 Notation Conventions and Definitions

This chapter employs some marks, these marks are not a part of command tree; they are only for better understanding of command string.

< >	*the character in <> means this command's parameter*
[ ]	*the character in [] means optional command*

{}	*When there includes several parameter items in {}, means that users can only choose one item from it.*
( )	*the abbreviated form of parameter is put in ()*
Capital letter	*Abbreviated form of command.*

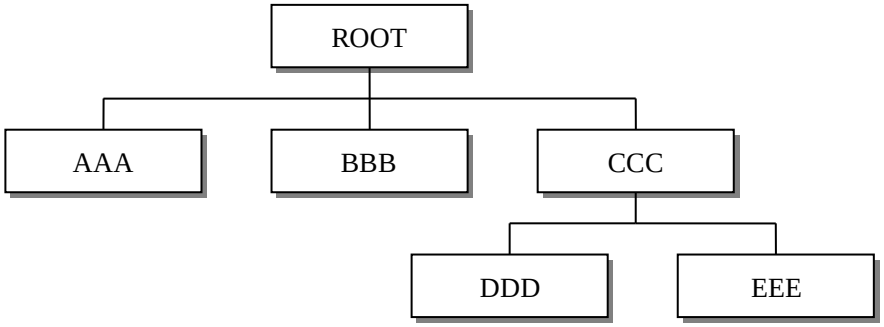
9.1.3 Command Structure

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.

Figure 9-1 Command Tree Example



Example

ROOT:CCC:DDD ppp

ROOT Subsystem Command

CCC Level 2

DDD Level 3

ppp Parameter

9.2 Header and Parameters

A command tree consists of header and parameters, it uses a space（ASCII: 20H）to separate in the middle.

Example

AAA:BBB 1.234

Header [Parameter]

9.2.1 Header

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.

9.2.2 Parameter

- Single command word, no parameter.
  Example: AAA:BBB
- Parameter can be character string form, the abbreviation rules are the same as the rules for command.
  Example: AAA:BBB 1.23
- Parameter can be numeric form
  - <*integer*> integer 123, +123, -123
  - <*float*> floating number

1. <Fixfloat>: fixed point floating number: 1.23, -1.23

2. <Scifloat>: scientific notation floating number: 1.23E+4, +1.23e-4

3. <Mpfloat>: multiplier expressed by floating number: 1.23k, 1.23M,1.23G,1.23u

Table 9-1 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

Multiplier is Case Insensitive, its writing style is different from standard name.

9.2.3 Separator

Instrument terminator only accepts allowed separators, terminator will occur E5 error if beyond this separator, and these separators include:

: colon, used for separate command tree, or restart command tree.

Example: AAA:BBB:CCC 123.4

? question mark, used for query

Example: AAA?

□ space, used for separate parameter

Example: AAA:BBB□1.234

9.3 Command Reference

All commands in this reference are fully explained and listed in the following functional command order, the following is all subsystem

- DISPlay display SUBSYSTEM
- FUNCtion function SUBSYSTEM
- CORRection correction SUBSYSTEM
- COMParator comparator SUBSYSTEM
- SYSTem system SUBSYSTEM
- TRIGger trigger SUBSYSTEM
- FETCh? Fetch result SUBSYSTEM
- ERRor error information SUBSYSTEM

Common command:

- IDN? Information query SUBSYSTEM
- TRG trigger and acquire data

9.4 DISPlay Subsystem

The DISP Subsystem command group sets the display page.

Figure 9-1 DISP Command Tree

DISPlay	**:PAGE**	**{MEASurement, SETUp, COMParator,SYSTem, SYSTEMINFO(SINF)}**
	:LINE	**<string>**

9.4.1 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 display page to MEAS DISPLAY SETUP [or SETU] Sets display page to SETUP COMParator [or COMP] Sets display page to COMPARATOR SYSTem [or SYST] Sets display page to SYSTEM CONFIG SYSTEMINFO [or SINF] Sets display page to SYSTEM INFORMATION
Example	**SEND> DISP:PAGE SYST<NL> //Set to the SYSEMT CONFIG**
Query Syntax	**DISP:PAGE?**
Query Response	***<page name>***

Example	**SEND> DISP:PAGE?<NL>** **RET> SYST<NL>**

9.4.2 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."** <NL>

9.5 FUNCtion Subsystem

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

Figure 9-2 FUNCtion Subsystem Tree

FUNCtion	**:RANGe**	**{Range Number, max, min}**	
		:MODE	**{AUTO,HOLD,NOMinal}**
	:RATE	**{SLOW,MED,FAST,ULTRA}**	
	:TC	**: COEFficient**	**<float>**
		:REFEr	**<float>**
	:SCAN	**{<channel number>,on,off}**	

9.5.1 FUNCtion:RANGe

The FUNCtion:RANGe command sets the range.

Command Syntax	**FUNC:RANGe <*0-7,MIN,MAX*>**
Parameter	**Where, <0-7,MIN, MAX> is:** **0-7, The range number** **MIN, =Range 0** **MAX, =Range 7**
Example	**SEND> FUNC:RANG 2**<NL> **//Set range to [2] 300mΩ**
Query Syntax	**FUNC:RANGe?**
Query Response	**<*0-7*>**<NL>
Example	**SEND> FUNC:IMP:RANG?**<NL> **RET> 0**<NL>

9.5.2 FUNCtion:RANGe:MODE

The FUNCtion:RANGe:MODE command sets the range mode.

Command Syntax	**FUNCtion:RANGe:MODE *{HOLD, AUTO, NOMinal}***
Parameter	**Where, *{HOLD, AUTO, NOMinal}* is:** **HOLD: Sets the auto range to off.** **AUTO: Sets the auto range to on.** **NOMinal: Sets the range mode to nominal.**
Example	**SEND> FUNC:RANG:MODE AUTO**<NL> **//Sets to auto range.**
Query Syntax	**FUNC:RANGe:AUTO?**

Query Response	{HOLD,AUTO,NOM}
Example	SEND> FUNC:RANG:MODE?<NL> RET> auto<NL>

9.5.3 FUNCtion:RATE

The FUNCtion:RATE command sets the test speed.

Command Syntax	FUNCtion:RATE {SLOW,MED,FAST,ULTRa}
Example	SEND> FUNC:RATE FAST<NL> //Sets to FAST Speed
Query Syntax	FUNC:RATE?
Query Response	{SLOW,MED,FAST,ULTR }
Example	SEND> FUNC:RATE?<NL> RET> ULTR<NL>

9.5.4 FUNCtion:TC

The FUNC:TC command turns the temperature compensation function ON/OFF.

Command Syntax	FUNCtion:TC {on,off,1,0}
Example	SEND> FUNC:TC ON<NL>
Query Syntax	FUNC:TC?
Query Response	{ON,OFF}

9.5.5 FUNCtion:TC: COEFficient

The FUNC:TC:COEF command sets the material coefficient.

Command Syntax	FUNCtion:TC:COEFficient {float}
Example	SEND> FUNC:TC:COEF 0.393<NL> //the unit is %
Query Syntax	FUNC:TC:COEF?
Query Response	{fixfloat}
Example	SEND> FUNC:TC:COEF?<NL> RET> +0.39300

9.5.6 FUNCtion:TC: REFErence

The FUNC:TC:REFE command sets the compensation reference temperature.

Command Syntax	FUNCtion:TC:REFErence {float}
Example	SEND> FUNC:TC:REFE 25<NL> //the unit is Celsius degree ℃
Query Syntax	FUNC:TC:REFE?
Query Response	{fixfloat}
Example	SEND> FUNC:TC:REFE?<NL> RET> +25.00

9.5.7 FUNCtion:SCAN

The FUNC:SCAN command sets the scan mode.

Command Syntax	FUNCtion:SCAN {ON,OFF,<channel number>}
Example	SEND> FUNC:SCAN ON<NL>
Query Syntax	FUNC:SCAN?
Query Response	<channel number>,{SCAN,SINGLE}
Example	SEND> FUNC:SCAN?<NL> RET> 5,SINGLE

9.6 COMParator Subsystem

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

Figure 9-3 COMParator Subsystem Command Tree

COMParator	[:STATe]	{OFF,ON,0,1}
	:BEEP	{OFF,GD,NG}
	:MODE	{ABS,PER,SEQ}
	:NOMinal	<float>
	:CH	<1~10>,<LOW LIMIT>,<HIGH LIMIT>

9.6.1 COMParator:STATe

The COMParator:STATe command sets the comparator function to OFF or the total number of bins..

Command Syntax	COMParator[:STATe] {ON,OFF,1,0}
Example	SEND> COMP:STAT ON<NL> SEND> COMP:STAT 1<NL>
Query Syntax	COMParator:STATe?
Query Response	{on,off}

9.6.2 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>

9.6.3 COMParator:BEEP

COMP:BEEP sets the beep feature.

Command Syntax	COMParator:BEEP <OFF,GD,NG>
Example	SEND> COMP:BEEP GD<NL> SEND> COMP:BEEP OFF<NL>
Query Syntax	COMParator:BEEP?
Query Response	<OFF,GD,NG>
Example	SEND> COMP:BEEP?<NL> RET> OFF<NL>

9.6.4 COMParator:NOMinal

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

Command Syntax	**COMParator:NOMinal <*float*>**
Example	**SEND> COMP:NOM 100m**<NL> **SEND> COMP:NOM 1E-6**<NL>
Query Syntax	**COMParator:NOMinal?**
Query Response	**<scifloat>**
Example	**SEND> COMP:NOM?**<NL> **RET> +1.00000e-03**<NL>

9.6.5 COMParator:CH

The COMParator:CH command sets the low/high limit values of each channel

Command Syntax	**COMParator:CH <1~10>,<*low limit*>,<*high limit*>**
Parameter	**Where,<*n*>,<*low limit*>,<*high limit*> is:** 1~10 Channel number low limit <float> low limit value high limit <float> high limit value
Example	**SEND> COMP:CH 1,1,2**<NL> **SEND> COMP:CH 2,-10,10**<NL>
Query Syntax	**COMParator:CH? <1~10>**
Parameter	**Where,<*1~10*> is:** Channel Number
Query Response	**<float:low limit>,<float:high limit>**
Example	**SEND> COMP:CH? 2**<NL> **RET> 1.000000e-00,2.000000E-00**<NL>

9.7 TRIGger Subsystem

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

Figure 9-4 TRIGger Subsystem Command Tree

TRIGger	**[:IMMediate]**	
	:SOURce	**{INT,MAN,EXT,BUS}**
TRG		

9.7.1 TRIGger[:IMMediate]

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

Refer to Page 11 Sector 2.2.3 Trigger Mode.

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

9.7.2 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? 1<NL>** **RET> INT<NL>**

9.7.3 TRG

The TRG command (trigger command) performs the same function as the Group Execute Trigger command but return the test result.

Command Syntax	***TRG**
Query Response	**<primary value>,<comparator result>**
Example	**SEND> TRG** **RET> +5.566785e-01,BIN01** **RET> +1.00000E+20,BIN00 //OPEN or OVERLOAD**
Note	This command can be used ONLY in BUS trigger mode.

9.8 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.

Figure 9-5 FETCh Subsystem Command Tree

FETCh?	

9.8.1 FETCh?

The FETCh? retrieves the latest measurement data and comparator result.

Query Syntax	**FETCh?**
Query Response	**<scifloat>,{GD,NG,xx},** **<scifloat>,{GD,NG,xx},** **<scifloat>,{GD,NG,xx},** **<scifloat>,{GD,NG,xx},** **<scifloat>,{GD,NG,xx},** **<scifloat>,{GD,NG,xx},** **<scifloat>,{GD,NG,xx},** **<scifloat>,{GD,NG,xx},** **<scifloat>,{GD,NG,xx},** **<scifloat>,{GD,NG,xx}**
Example	**SEND> FETC?<NL>** **RET>** **+9.9651e+01,NG,+9.9481e-01,GD,+9.9575e+00,NG,+9.9481e-01,GD** **,+6.0212e-04,NG,+9.9575e+00,NG,+9.9331e-01,GD,+1.0025e+04,N**

	G,+1.0008e+03,NG,+1.1139e+04,NG<NL>

9.9 SYSTem subsystem

Figure 9-6 SYSTem

SYSTem	:SENDmode	{FETCH,AUTO}

9.9.1 SYSTem:LANGuage

Instrument language setup

Command Syntax: SYSTem:LANGuage {ENGLISH,CHINESE,EN,CN}

Example: SEND> SYST:LANG EN //Set as English display

Query Syntax: SYST:LANG?

Query Response: {ENGLISH,CHINESE}

9.9.2 SYSTem:SENDmode

SYST:SEND command sets the RS-232 Result Send Mode.

Please refer to Page.29 Section 6.1.7 RS-232 Result Send Mode [RESULT SEND]

Command Syntax	SYSTem:SENDmode {FETCH,AUTO}
Example	SEND> SYST:SEND AUTO<NL>
Query Syntax	SYST:SEND?
Query Response	<FETCH,AUTO >

9.9.3 SYSTem:DATAmode

SYST:DATA command sets the RS-232 Result Data Format and EOC Mode..

Command Syntax	SYSTem:DATAmode {ALL,ONE}
Example	SEND> SYST:DATA ONE<NL>
Query Syntax	SYST:SEND?
Query Response	<ALL,ONE>

9.10 CORRection Subsystem

The CORRection subsystem command group to execute the short-circuit clear zero correction function.

Figure 9-7 CORRection Subsystem Command Tree

CORRect	:SHORt	

9.10.1 CORRection:SHORt

The CORRection:SHORt command execute the short-circuit clear zero for all ranges.

Command Syntax	CORRection:SHORt
Example	SEND> CORRection:SHOR<NL>

	RET> Short Clear Zero Start. <NL> **RET> PASS**<NL>
Note	**Before sending this command, please short-circuit the terminals.** **Please refer to page 22 section 5.2** Short Correction

9.11 IND? Subsystem

IDN? Subsystem tree

IND?	

IDN? Subsystem is used for return instrument's version.

Query Syntax: **IDN?**

Query Response: **<Model>,**<Version>,<Serial Number>,<Company Name>

Example:

SEND**> IDN?**

RETURN> **5120,REV D1.0,0000000,Applent Instruments**

10. Specification

This chapter describes the specifications and supplemental performance characteristics of the AT5108/AT5110/AT5120：

- Technical Index
- Specifications
- Dimension

Accuracy is defined as meeting all of the following conditions.

Temperature: 23℃±5℃

Humidity: ≤65% R.H.
Zeroing: Open and Short Correction
Warm up time is 30 min or more.
1-year calibration cycle
Test Current Accuracy: 10%

RANGE		Maximum Readers	Resolution	ULTRA,FAST	MEDIUM	SLOW	TEST CURRENT	OPEN VOLTAGE
0	30mΩ	30.000mΩ	1μΩ	0.5%±5	0.2%±5	0.1%±3	670mA	<1V
1	300mΩ	300.00mΩ	10μΩ	0.5%±5	0.1%±3	0.05%±2	670mA	<1V
2	3Ω	3.0000Ω	100μΩ	0.5%±5	0.1%±3	0.05%±2	67mA	<1V
3	30Ω	30.000Ω	1mΩ	0.5%±5	0.1%±3	0.05%±2	6.7mA	<1V
4	300Ω	300.00Ω	10mΩ	0.5%±5	0.1%±3	0.05%±2	670uA	<5V
5	3kΩ	3.000kΩ	100mΩ	0.5%±5	0.1%±3	0.05%±2	670uA	<5V
6	30kΩ	30.000kΩ	1Ω	0.5%±5	0.3%±3	0.1%±2	67uA	<5V
7	300kΩ	300.00kΩ	10Ω	0.8%±10	0.5%±3	0.2%±2	6.7uA	<5V

10.1 General Specification

Display: True color TFT-LCD, Size: 3.5”

Measurement Range: 0.001mΩ~330.00kΩ

Measurement Speed: Under Range Hold Mode:

Slow:	3.4s/10-Channel
Medium:	830ms/10-Channel
Fast:	350ms/10-Channel
Ultra:	230ms/10-Channel

MAX reading: Slow and Medium：30000

Fast and Ultra：3000

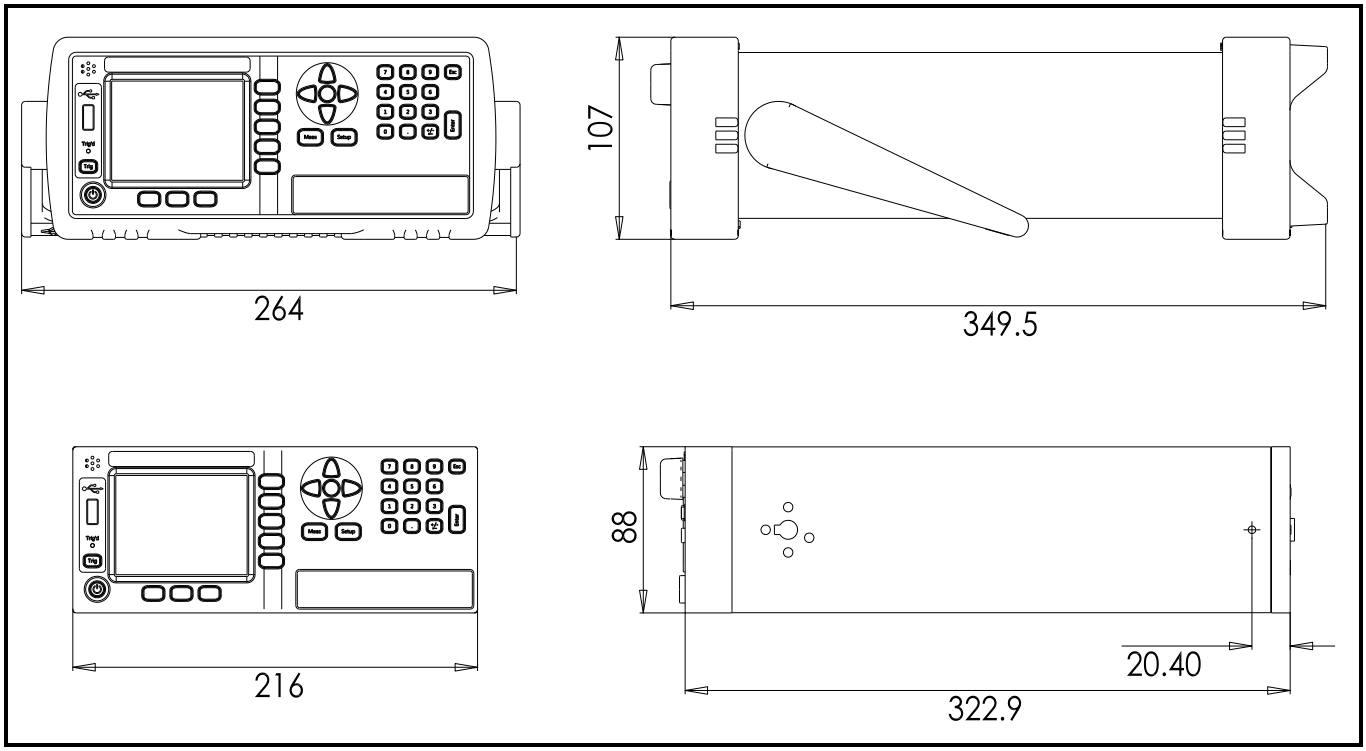
Ranging: Auto, Hold and Nominal range. Total 10 Ranges.
Correction Function: SHORT-CIRCUIT Clear Zero
Comparator: Total 11 Bins, 10 channels NG, 1 bins all channels NG
Beep Feature: OFF/GD/NG
Trigger Mode: Internal, Manual, External and Bus Trigger.
Built-in Interface: Handler interface, RS232 interface, Temperature Compensation interface.
Programming language: SCPI

Environment:

Temperature and humidity range: 15℃~35℃, 80% RH or less
Storage temperature and humidity range: 10℃~40℃,10~90% RH
Power Supply: AC 110V/220V, 48.5Hz-62.5Hz
Fuse: 1A Slow-Blow
Maximum rated power: 20VA
Weight: 3.5kg, net

10.2 Dimensions

Figure 10-1 Dimensions



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