ONMEAS®

Rev.A1

AT9320

Hipot Tester



User's Guide

Scan QR code for operation video

Safety Summary

⚠Warning⚠Danger: If any of the following abnormal situations occur, please stop the operation and disconnect the power cord immediately. Contact the sales department of Onmeas for repair. Failure to do so may result in fire or pose a risk of electric shock to the operator.

- Abnormal instrument operation.
- Unusual noise, odor, smoke, or flash during operation.
- Excessive heat or electric shock during use.
- Damaged power cord, power switch, or power socket.
- Foreign objects or liquids entering the instrument.

Security Infomation

⚠Warning⚠Danger: To avoid potential electric shock and ensure personal safety, please follow the instructions below when operating the instrument.

Disclaimer	Onmeas shall not be held responsible for any personal injury or property damage caused by failure to comply with these instructions.
Groud The Instrument	To prevent the risk of electric shock, ensure the power cord is properly grounded.
DO NOT Operate In Explosive Atmosphere	Do not use the instrument in environments containing flammable or explosive gases, vapors, or excessive dust. Using any electronic equipment in such environments poses serious risks to personal safety.
DO NOT Open The Instrument Casing	Non-qualified personnel must not attempt to open the instrument casing. Even after powering off, residual charge may remain in the circuitry, posing a risk of electric shock.
DO NOT Operate in Strong Electromagnetic Field	Do not use the instrument in areas with strong magnetic or electric fields. Electromagnetic pulses may cause malfunctions or even fire hazards.
DO NOT Use Near Sensitive Equipment	If used near sensitive testing or receiving equipment, electrical discharge noise from DUT (Device Under Test) breakdown may interfere with them. When testing above 3 kV, the electric field between test leads may ionize air and generate corona discharge, causing wideband RF interference. To reduce this effect: Keep sufficient distance between test leads. Keep test leads away from conductive surfaces, especially sharp metal points.
DO NOT Using An Instrument That Is Not Working Properly	If the instrument does not work normally and its danger is unpredictable, please disconnect the power cord, do not use it again, and do not try to repair it by yourself.
DO NOT Use the instrument beyond the way specified in this manual	Beyond the range, the protective measures provided by the instrument will become invalid.

Limited Warranty and Liability

Onmeas Ltd. ((shortened form Onmeas)) guarantees that every instrument you purchase is fully qualified in quality and measurement. This warranty does not cover fuses and damage caused by negligence, misuse, contamination, accidental or abnormal use.This warranty applies only to the original purchaser and is not transferable.

Onmeas provides a one-year free warranty from the date of shipment, which also includes VFD or LCD. During the warranty period, the instrument is damaged due to improper operation by the user, and the maintenance cost shall be borne by the user.After one year until the life of the instrument, Onmeas will provide maintenance for a fee.For VFD or LCD replacement, the fee is charged at the current cost price. If the product is found to be damaged, please contact Onmeas for information on agreeing to return or exchange.After that, please send this product to the seller for return. Be sure to state the reason for the damage to the product, and prepay postage and insurance to the destination.For the repair or replacement of the product within the warranty period, Onmeas will be responsible for the return shipping cost.For the repair of non-guaranteed products, Onmeas will estimate the repair cost, and only carry out the repair under the premise of obtaining your consent. All costs incurred by the repair will be borne by the user, including the return shipping cost.

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANT ABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ONMEAS SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, WHETHER ARISING FROM BREACH OF WARRANTY OR BASED ON CONTRACT, TORT, RELIANCE OR ANY OTHER THEORY.

Onmeas Ltd.
Jiangsu, China
October 2009
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1. Installation and Setup Guide

Thank you for purchasing our product! Please read this chapter carefully before use. It covers the following topics:

- Main Functions and Packing List
- Power Requirements
- Operating Environment
- Cleaning
- Fuse Replacement

1.1 Packing List

Before using the instrument, please make sure to:

1. Check whether the instrument has any visible damage such as dents or scratches.
2. Verify the contents of the package against the packing list to ensure no accessories are missing.

Table 1-1 Standard Accessories

ITEM	QUANTITY
Hipot Test Lead	1
Hipot Ground Lead	1
Power Cord	1
AT9320 Series User Manual	1
RS232 Interface Cable	1

If any damage or missing accessories are found, please contact Onmeas Sales Department or your distributor immediately.

1.2 Power Requirements

The AT9320 must be operated only under the following power conditions:
Voltage: 85VAC-250VAC
Frequency: 50Hz~400Hz



Warning: To prevent electric shock, ensure the power cord is properly grounded. If replacing the power cord, make sure the ground connection is secure.

1.3 Operation Environment

The AT9320 must be operated under the following environmental conditions:

Temperature: 0℃ ~ 55℃

Humidity: < 70%RH at 23 °C

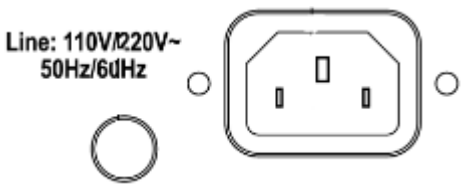
1.4 Cleaning

To avoid the risk of electric shock, disconnect the power cord before cleaning.
Use a clean cloth slightly moistened with water to wipe the outer casing and front panel.
Do not attempt to clean the internal components of the instrument.

Caution:
Don't Use solvents such as alcohol or gasoline to clean the Instrument.

1.5 Fuce Replacement

Figure 1-1 Fuse Holder on rear panel



To prevent electric shock, always turn off the power switch and unplug the AC power cord before checking or replacing a fuse. Ensure that the replacement fuse matches the specifications stated in the user manual, including type, rating, and characteristics. Using an incorrect fuse or bypassing it may cause permanent damage to the instrument.

Table 1-2 Fuse Specifications

Input Voltage Range	Frequency Range	Fuse (Slow-Blow)	Rated Power
110V	47-63Hz	5A	300VA
220V		3A	

2. Overview

In this chapter, you will learn about:

- Safety Regulations
- Product Features

2.1 Safety Regulations



This instrument generates a high test voltage of 5 kV, which can cause serious injury or even death.
When operating the instrument, extreme caution must be exercised and all notices, warnings, and instructions provided in this chapter must be strictly followed.

2.1.1 Workstation Setup

➢ Workstation Location

The workstation must be located in a non-public, open area that is not part of the general traffic flow, to keep unauthorized personnel away. The area must be clearly separated from other equipment and must be clearly marked as a **"High Voltage Test Workstation."** During testing, a warning sign must be displayed:
"Danger! Testing in Progress. Unauthorized Personnel Keep Away!"

➢ Input Power

Ensure the instrument is properly connected to electrical ground (earth) for safety.
The workstation must have a dedicated power switch, installed at the entrance in a visible location, and clearly labeled so that all personnel can easily identify and access it.
In the event of an emergency, the power can be cut off immediately before addressing the issue.

➢ Work Area Requirements

Use **insulated workbenches or tables**.
There should be **no metallic objects** between the operator and the Device Under Test (DUT).
The layout must **not require the operator to reach over or across the DUT** to operate the instrument.
The work area must be kept **clean and organized**.
Unused equipment and test leads should be stored in designated areas.
All personnel must be able to easily **distinguish between DUTs, test-ready units, and tested units**.
Flammable or corrosive gases must not be present, and the instrument must **not be operated near flammable materials**.

2.1.2 Operator Requirements

➢ Personnel Qualifications

Operating this series of test instruments involves significant risk.
Improper operation may result in serious or fatal injury.
All operators must receive formal training and strictly follow the procedures in this user manual.

➢ Safety Discipline

Operators must receive ongoing safety education and training to ensure they understand the

importance of safe operating practices and strictly adhere to all safety regulations when using the tester.

➢ Dress Code

Operators must not wear clothing with metal decorations, or metal accessories such as rings, bracelets, or watches, as these pose a risk of electric shock.
Insulated gloves must be worn at all times during operation of the test equipment.

➢ Medical Regulations

This series of test instruments must never be operated by individuals with heart conditions or those wearing pacemakers or other cardiac devices.

2.1.3 Prohibited Operating Behaviors

✓ Do Not Power Cycle Repeatedly

After switching off the power, wait several seconds before turning it back on.
Avoid rapid or frequent ON/OFF switching of the power supply, as this may prevent the instrument's protection mechanisms from functioning correctly.
Do not switch off the power during high voltage output unless it is an emergency or special condition.

✓ Do Not Short the Output to Groud

Be careful not to short the high-voltage test leads to any grounded AC power lines or other nearby grounded equipment (e.g., conveyors).
A short circuit can cause the instrument's chassis to carry hazardous high voltage.

✓ Do Not Apply External Voltage to the Output Terminal

Do not connect any external voltage source to the instrument's output terminal.
The instrument does not have a discharge capability when idle.
Connecting external voltage may damage the instrument.

2.1.4 Precautions During Test

● Interrupting (Pausing) a Test

To change test conditions, first press [STOP] to exit the test-ready state.
If you need to pause for an extended time or leave the workstation, turn off the power switch to avoid accidental activation and ensure safety.

● Live Parts During High Voltage Testing

During high-voltage testing, the test leads, probes, and DUT (Device Under Test) are all energized. Although the instrument includes a discharge circuit, residual charge may still pose an electric shock risk after output is turned off. To avoid electric shock:
Ensure no part of the DUT, test lead, or probe contacts anything other than the test circuit.
Wait until the high voltage indicator light turns off before touching or removing the DUT.
Do not attempt to disassemble or remove the DUT during the test or discharge process.
Once the test ends, the instrument begins forced discharge automatically.
In most cases, the circuit voltage will drop to a safe level. For DUTs with large capacitance or special structure, the standard discharge time may be insufficient. In such cases, technical personnel must revise the test method to ensure complete discharge.



Discharge Time Formula

Discharge time is calculated as: $t = -\ln(30 / U) \times R \times C$

Where

t = Discharge time (seconds)
30 V = Safe residual voltage
U = Set test voltage (V)
R = Insulation resistance of DUT (~2 kΩ when connected to the tester)
C = Capacitance of DUT (F)

Discharge is mainly required for DC high-voltage tests.
Discharge time depends on the DUT's properties.
For example, a 1 μF capacitor charged to 6000 V will discharge to 30 V in ~0.1 s through a 2 kΩ path.
The instrument is preset with a fixed discharge time of 0.2 s to ensure safe discharge.It takes about 0.1s to discharge the capacitor to 30V. The fixed discharge time of the instrument is 0.2s to ensure that the device is completely discharged.

- Conditions for Long-Term Reliable Use

Due to the instrument's compact size and power amplifier module design, its internal voltage generation unit has limited heat dissipation capacity.
To avoid overheating:
Operate the instrument within the recommended temperature and ventilation range.
If the cooling fan has been running continuously for over 30 minutes, stop operation to allow cooldown.
Continued operation beyond this limit may cause damage to the voltage amplifier module due to overheating.

Table 2-1 Required conditions for withstanding voltage (Hipot) Test

Ambient Temperature	Power Max		Pause Time	Output Time Limit
T≤40℃	ACW	>6mA	At least equal to output time	Maximum 1 minute
		<4mA	Not Required	Continuous output allowed
	DCW	>3mA	At least equal to output time	Maximum 1 minute
		<2mA	At least equal to charge wait time	Continuous output allowed

Note: Test time <= output time <= Voltage rise time + Test time + Voltage fall time

2.2 Key Functions

2.2.1 Product Overview

The AT9320 AC/DC Hipot and Insulation Tester features a 5-inch full-color LCD touchscreen and is powered by a high-performance 32-bit ARM processor.
Compact in size and lightweight (15 kg), it offers excellent cost-performance and user-friendly operation.
The AT9320 is widely applicable for safety testing of household appliances, transformers, electrical devices, and electronic components.
Equipped with a HANDLER (PLC) interface and RS-232C communication port, it supports PC data communication and remote control, making it ideal for automated testing to enhance production efficiency.

2.2.2 Product Features

The AT9320 provides 5 kVAC / 20 mA Withstanding Voltage (ACW), 6 kVDC / 10 mA Withstanding Voltage (DCW) and Insulation Resistance Testing.
System Architecture:
The instrument's high-voltage generation module consists of:
DA Reference Voltage Source
Controllable Sine Wave Generator
Class AB Power Amplifier

40–600 Hz High-Voltage Transformer
Closed-Loop Output Voltage Control
DA Reference: Ensures controllable output voltage amplitude.
Controllable Sine Generator: Allows setting output frequency to 50 Hz or 60 Hz during AC testing, not limited by line frequency.
Linear Class AB Amplifier: Offers low waveform distortion, simple control, and high reliability.
High-Voltage Transformer (40–600 Hz):
Generates a 600 Hz AC source, which is rectified to form DC output with significantly lower ripple compared to traditional variac-based testers—ideal for DC and insulation resistance testing.
Closed-Loop Voltage Control: Ensures excellent load regulation and stable, reliable test results.

The AT9320 series supports not only standalone AC Hipot, DC Hipot, and insulation resistance tests, but also multi-step automated sequence testing through user-defined test programs.

3. Getting Started

In this chapter, you will learn about:

- Front panel: Including buttons and est terminal.
- Rear panel: Power and interface descriptions
- Power-On and Initialization: Including self-check, default values and time
- Starting a Test: how to connect to the test terminals.

3.1 Front Panel Overview

Figure 3-1 Front panel

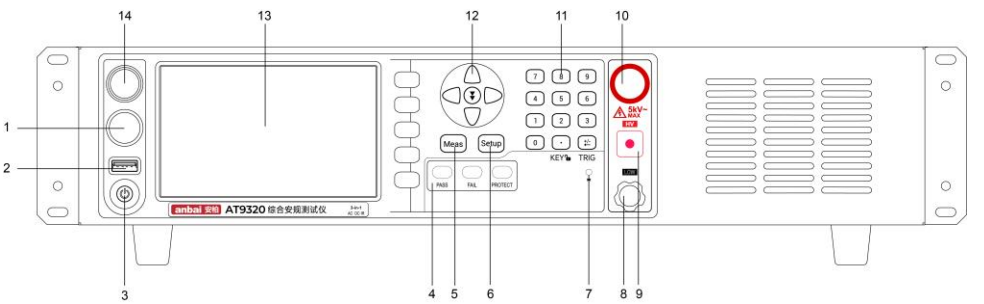


Table 3-1 Front panel functional description

NO	Function
1	Stop Button
2	USB Flash Drive Port
3	Power Switch
4	PASS, FAIL, and PROTECTION Indicator Lights
5	Main Function Key: MEAS (Measurement)
6	Main Function Key: SETUP
7	Trigger indicator light
8	Low terminal
9	High Voltage Output Terminal and HV Warning Lamp
10	High-Voltage Terminal
11	Numeric Keypad
12	Cursor keys
13	LCD Display window
14	Start button

3.1.1 Rear Panel Overview

Figure 3-2 Rear Panel

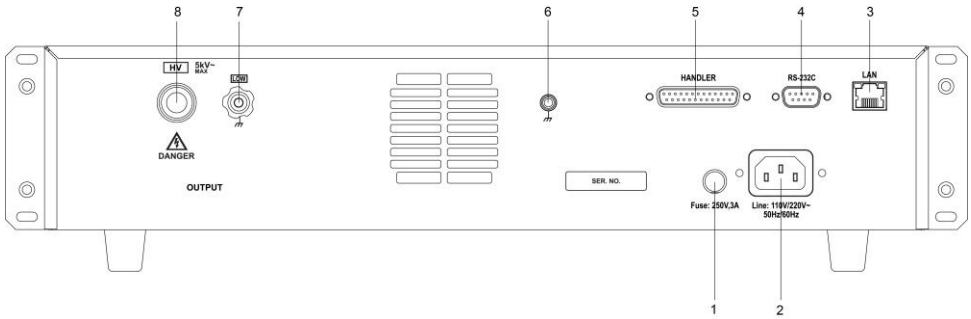


Table 3-2 Back panel function description

NO	Function
1	Fuse Holder
2	Power Socket
3	LAN Interface
4	RS-232C Interface
5	HANDLER（PLC） Interface
6	Ground Terminal
7	Low-Voltage Terminal
8	High-Voltage Terminal

3.2 Power-On and Initialization

The “+” button at the lower-left corner of the front panel serves as the Power Switch.

The AT9320 uses a soft-start mechanism:

To power on: Press the Power button. When the POWER LED turns green, release the button.

To power off: Press the Power button again. When the POWER LED turns off, release the button.

3.3 Test Terminal Connect

Connect the hipot test lead to the L and N lines of the DUT (Device Under Test).

Connect the hipot ground lead to the ground line or chassis of the DUT.

4. [Setup] Settings Page

In this chapter, you will learn how to configure all available test settings:

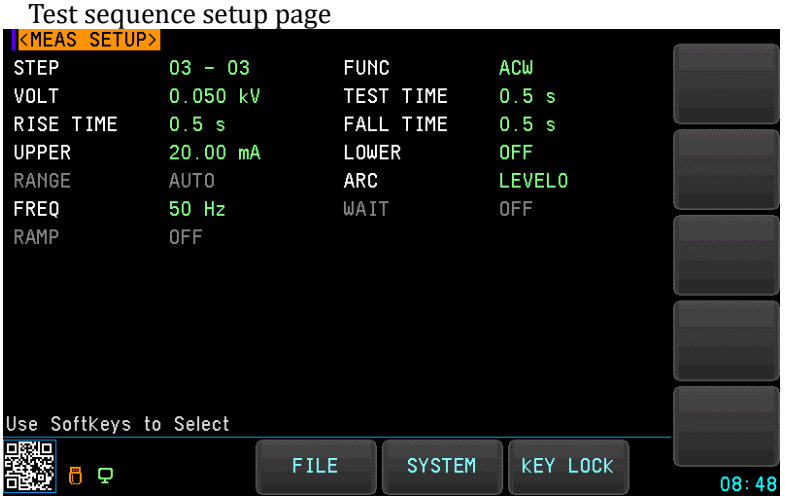
- Test sequence setup
- AC withstanding voltage test parameters
- DC withstand voltage test parameters
- Insulation resistance test parameters

When the instrument is in high-voltage OFF state, press the [Setup] key to enter the main settings page.

4.1 Test Sequence Setup

All measurement-related configurations are performed on the <Measurement Settings> page.

Figure 4-1 Test sequence setup page



Total Step 1 – Current Step 1: Indicates the test sequence — "Total number of steps – Current step index".
For example, "1–1" means one step in total and the current step is the first.

Table 4-1 Test plan editing functions

KEY	FUNCTION	REMARKS
F1	INSERT	Adds a new test item after the current item. All subsequent steps move down one position.
F2	DELETE	Delete the current item. All subsequent steps move up one position.
F3	NEW	Creates a new blank test plan. A default test item is automatically added. Remember to save your custom test plan..
F4	PREVIOUS STEP	Navigate to the test parameters of the previous step
F5	NEXT STEP	Navigate to the test parameters of the next step.

As shown in Figure 4-1, the current test item is set to AC Withstanding Voltage.
You can use the cursor keys to select the [Function] field and switch the test type to DC Withstanding Voltage or Insulation Resistance.

For convenience, pressing the [Start] key from this interface will immediately enter the [Measurement Display] page and begin the test using the current test plan.

4.1.1 AC Withstanding Voltage (ACW) Test Parameter Settings

Figure 4-2 ACW test parameter settings page



Table 4-2 AC Withstanding Voltage (ACW) Test Parameters

PARAMETER	VALUE RANGE	DESCRIPTION
VOLT	0.050 ~ 5.000kV	AC high-voltage test setting
UPPC	0.001 ~ 20.00mA	Upper limit of leakage current during ACW testing
LOWC	0.001 ~ 20.00mA	Lower limit of leakage current (must be less than UPPC)
	OFF	N Set to OFF if not required
ARC	1-9 level	1 – 9 level （Corresponding current 20mA, 18mA, 16mA, 14mA, 12mA, 10mA, 7.7mA, 5.5mA, 2.8mA）
	OFF	OFF disables arc detection
TIME	0.1~999.9S	ACW test duration
	OFF	Set to off for no time limit
RISE	0.1~999.9S	Time for voltage ramp-up
	OFF	OFF = default 0.1 s, combined with total test time
FALL	0.1~999.9S	Time for voltage ramp-down
	OFF	OFF = immediate cutoff after test (DUT may remain charged)
FREQ	50/60HZ	Operating frequency of the AC test voltage

4.1.2 DC Withstanding Voltage (DCW) Test Parameter Settings

Figure 4-3 DCW test parameter settings page

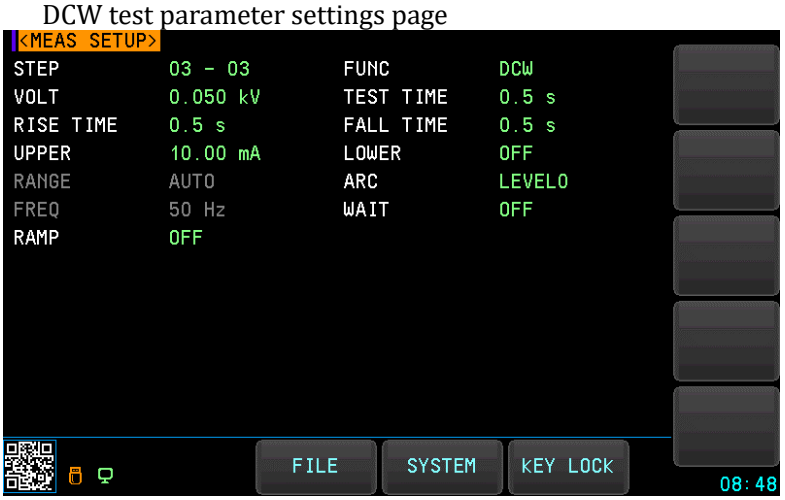


Table 4-3 DC Withstanding Voltage (DCW) Test Parameters

PARA	VALUE RANGE	REMARK
VOLT	0.050 ~ 6.000kV	DC high-voltage test setting
UPPC	0.1uA ~ 10.00mA	Upper limit of leakage current during DCW testing
LOWC	0.1uA ~ 10.00mA	Lower limit of leakage current (must be less than UPPC)
	OFF	Set to OFF if not required
ARC	1-9 level	1 – 9 level (Corresponding current 20mA, 18mA, 16mA, 14mA, 12mA, 10mA, 7.7mA, 5.5mA, 2.8mA)
	OFF	Set to OFF to disable
TIME	0.1~999.9S	DCW test duration.
	OFF	Set to OFF for no time limit
RISE	0.1~999.9S	Voltage ramp-up time.
	OFF	OFF = default 0.1 s, combined with total test time
FALL	0.1~999.9S	Voltage ramp-down time.
	OFF	OFF = immediate cutoff after test (DUT may remain charged)
WAIT	0.1 ~ 999.9S	Pre-charge wait time for DUT.
	OFF	Set to OFF if charging is not required
RAMP	ON	When ON, current limit is evaluated during ramp-up.
	OFF	When OFF, limit is not checked during ramp-up, but still enforced after

4.1.3 IR Test Parameter Settings

Figure 4-4 IR Test Parameters

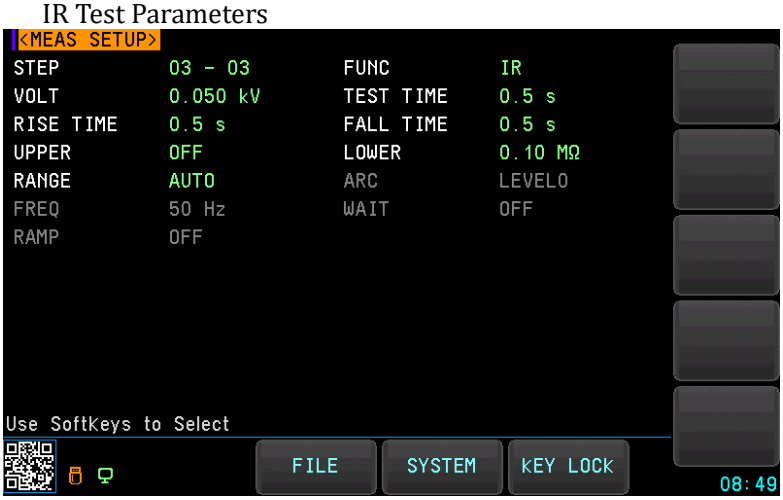


Table 4-4 IR parameter description

PARA	RANGE	REMARK
VOLT	0.050 ~ 1.000kV	Test voltage for insulation resistance
UPPC	0.1M ~ 10.00G	Upper resistance limit
	OFF	Set to OFF to disable upper limit check
LOWC	0.1M ~ 10.00G	Lower resistance limit (must be less than upper limit)
TIME	0.1~999.9S	Test duration.
	OFF	Set to OFF for no time limit
RISE	0.1~999.9S	Voltage rise time.
	OFF	OFF = default 0.1 s, included in total test time
FALL	0.1~999.9S	Voltage fall time.
	OFF	OFF = output cuts off immediately (DUT may remain charged)
RANG	AUTO	Automatic range for improved accuracy (minimum test time: 1 s due to range switching)
	2uA	Fixed range mode: Select based on I = U / R to speed up testing.
	20uA	
	200uA	
	2mA	
	10mA	

5. [Meas] Display Page

The main measurement interface includes:

- The <**Meas Display**> page
- Test function principles and usage instructions

5.1 <MEAS DISP>Page

Press【Meas】 key to enter【MEAS DISP】Page.

Figure 5-1 <MEAS DISP>page（Example: ACW Voltage Test）



On this screen, you can press [START] to initiate a high-voltage test on the DUT (Device Under Test). For safety and measurement accuracy, this page is intended for display only—parameter settings cannot be modified via front panel keys, though touchscreen editing of parameters for the current step is supported. All test parameters must be properly configured in the Setup interface. During testing, real-time measurement data is displayed. After a test is completed, if the [STOP] key has not been pressed, the screen continues to display the results of the last test.

Display Elements:
Center Area (Large Font):
• Top Value: Output high voltage, displayed in kilovolts (kV)
• Bottom Value: Measured current (or insulation resistance at the LOW terminal), shown in mA, μA, MΩ, or GΩ

Upper Section (Small Font):
Left Side:

Test status: OFF, RISE, TEST, or FALL
Comparison results: PASS, UPPER, LOWER
Alarms: ARC, SHORT, GFI

Right Side:

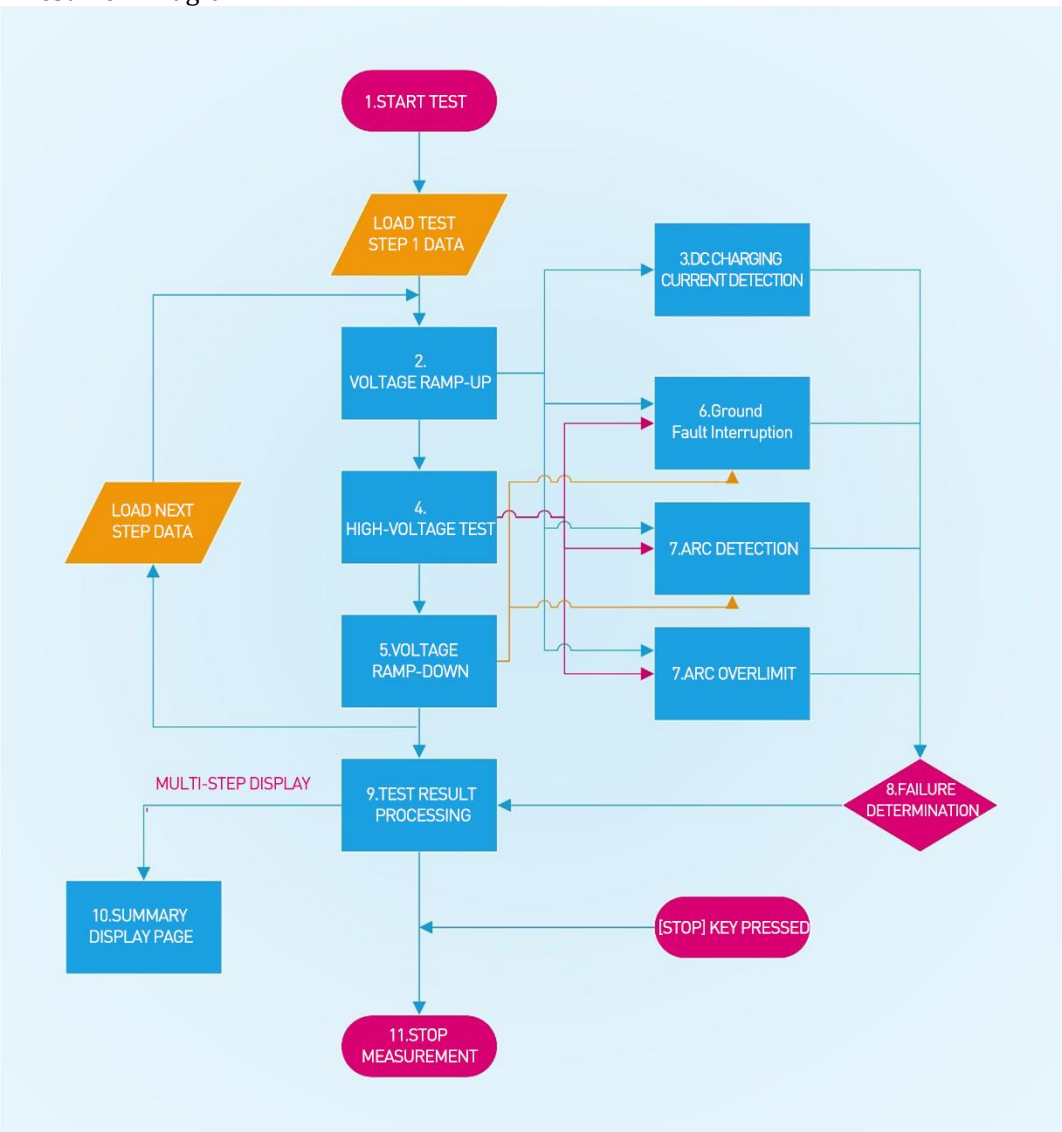
Remaining time of the current test step (in seconds, S)
If test time is disabled, this counter shows elapsed time since entering the test state (stops incrementing after 999.9 seconds)

If a FAIL condition is not triggered, the test must be manually stopped using the [Stop] key

This intuitive layout allows the user to visually assess test status and DUT response at a glance.

5.2 Test Function Principles and Usage Instructions

Figure 5-2 Test Flow Diagram



5.2.1 Starting the Test

In test mode, after confirming that all test conditions are met and the DUT (Device Under Test) is correctly connected, press the [START] key to initiate the test.

5.2.2 Voltage Ramp-Up

Some DUTs are sensitive to sudden voltage changes.
When this function is enabled, the instrument starts with zero voltage output.
Upon starting, the instrument gradually increases the voltage in steps, using 0.1 s increments.
The voltage step per interval is calculated as:
$\Delta V = V / (10 \times S)$
Where:

- V = test voltage

- S = rise time in seconds

If the voltage rise time (RISE) is set to OFF, the default rise time is 0.1 seconds.

5.2.3 DC Charging Current Detection

This function is primarily used to verify proper DUT connection.
Most DUTs exhibit capacitive behavior. In DC mode, during the voltage rise time, the DUT undergoes a charging phase, during which the charging current is significantly higher than the nominal test current.
As the DUT becomes charged, the current rapidly decreases.
By detecting the presence of this initial charging current, the instrument can determine whether the DUT is securely connected.
To use this function reliably, set the test wait time (WAIT) longer than the expected charging time to avoid false detection results.

5.2.4 High-Voltage Test

Performs a high-voltage test on the DUT. At this stage, the test circuit should be correctly connected, and the measurement results should reflect the actual withstanding current without interference from secondary factors.

5.2.5 Voltage Ramp-Down

Similar to voltage ramp-up, the ramp-down process is determined by the characteristics of the DUT.
At the end of the high-voltage test, the instrument controls the voltage ramp-down in 0.1 s increments.
The voltage step for ramp-down is calculated as:
$\Delta V = -V / (10 \times S)$
Where V is the test voltage, and S is the fall time.
If fall time (FALL) is set to OFF, the default fall time is 0.1 seconds.

5.2.6 Ground Fault Interruption

Ground current detection monitors current flowing through the instrument chassis to prevent electric shock.
When high voltage is applied, any current returning from the output terminal through the human body to the chassis could cause serious injury.
GFI response logic:

- When GFI is enabled, a ground current greater than 0.5 mA is judged as an electric shock condition.
- If such a condition is detected, the instrument will stop high-voltage output within 0.3 seconds, exit the test state, and display GFI.



A ground current of 30 mA during actual shock can cause loss of consciousness or death. It is strongly recommended to enable GFI where the application allows.

5.2.7 Overcurrent and Arc Detection Functions

Overcurrent conditions include: low current failure, high current failure, extreme overcurrent (short), arc detection (ARC)

- Low Current Failure Detection
  Used to detect disconnection at the low terminal. During testing, the DUT is expected to have some leakage current. If the measured leakage current is below the configured lower limit, it is considered a failure (e.g., DUT not connected). If the DUT inherently has extremely low leakage, this function should be disabled. When triggered, the result displays LOW FAIL. This check is only valid in test mode, with a sampling interval of 100 ms.

- High Current Failure Detection
  Most commonly used overcurrent protection. If the measured leakage current exceeds the upper limit, the DUT is considered to have insufficient insulation and the test fails. When triggered, the result displays HI FAIL. Sampling rate: every 100 ms.

- Extreme Overcurrent Detection (SHORT)
  When insulation breakdown occurs, current may rise too rapidly for the sampling circuit to capture. If the current peak exceeds the instrument's rated output range, the system triggers an extreme overcurrent event. Result: Displays SHORT. Data: Last valid measurement within the 100 ms prior to the fault. Threshold: Approx. 2× instrument current rating, or 1.5× peak for AC. FALL time setting is ignored, and this protection cannot be disabled

- Arc Detection (ARC)
  ARC detection is especially useful when testing coil-type components. It identifies brief local discharges in the high-voltage test circuit, which cause short-duration current oscillations. Since these are superimposed on the normal test current and occur in short spikes, they cannot be detected by conventional current measurement. The ARC detection circuit filters out the DC component and responds only to fast current pulses. Because of low-pass filtering and the random nature of arc events, the ARC function provides a qualitative indication of arcing, rather than precise measurement. Triggered result displays ARC; Output: Final valid data from the last successful test step before the fault; ARC levels may be affected by test environment, lead layout, or parasitic capacitance, so use with care

5.2.8 Failure Determination

- During testing, if the measured current exceeds the instrument's maximum allowable output, or a potential safety hazard is detected, the instrument will immediately shut down the voltage output. After the internal software identifies the fault cause, the DUT will be determined as failed.
- If the test results exceed the configured limits of the current test step, the instrument will also determine that the DUT fails.
  The instrument will immediately stop the test, cut off high-voltage output, and enter the failure result handling procedure.

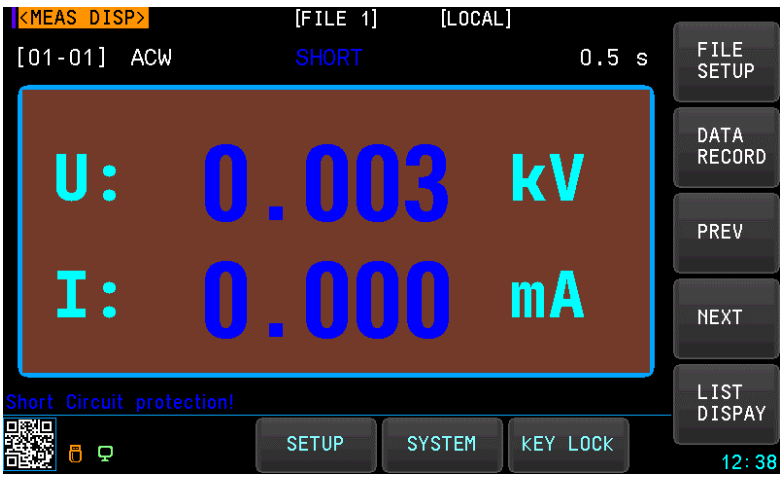
5.2.9 Test Result Processing

If the test completes successfully and all parameters are within the defined limits, the instrument will display PASS, and the PASS indicator light will turn on.
If any over-limit condition occurs during the test, the instrument will display a FAIL status along with the failure type, and the FAIL indicator light will turn on.

Figure 5-2 <PASS>



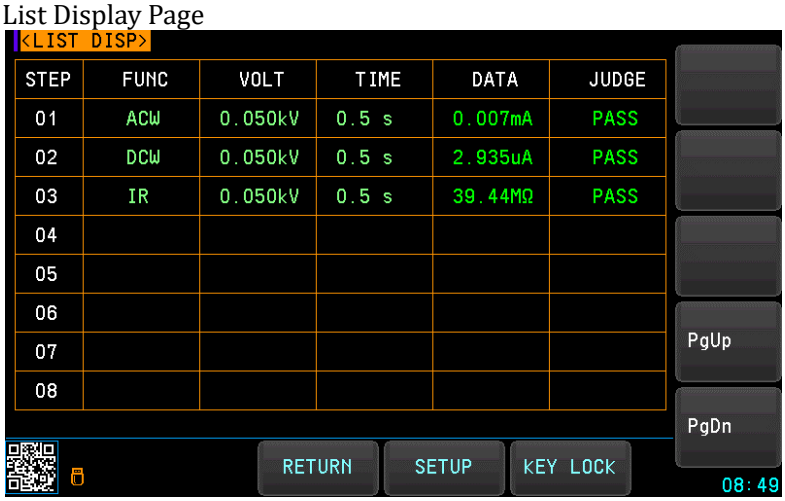
Figure 5-3 <SHORT>



5.2.10 List Display Page

When multiple test steps are executed, the results are displayed in a list format, providing a clear and intuitive overview.

Figure 5-5 List Display Page



After a test plan has completed, users can review the data via the [DATA RECORD] option on the display page or from the sidebar on the [MEAS SETUP] **page**.

5.2.11 Stopping the Test

At any stage during the test process, pressing the [STOP] key will immediately terminate the test. When the test is stopped manually, no result judgment (PASS/FAIL) will be generated. However, the instrument retains the most recent data prior to the stop command, and this data can be queried via software after the test ends.

6. [SYSTEM] Page

In this chapter, you will learn how to configure the system-level settings of the instrument:

- <SYSTEM CONFIG> Page
- <SYSTEM INFORMATION> Page

When the high voltage is off, press the [SETUP] key. In the sidebar of the main page, select [SYSTEM SETUP] to access system settings.

6.1 SYSTEM CONFIG

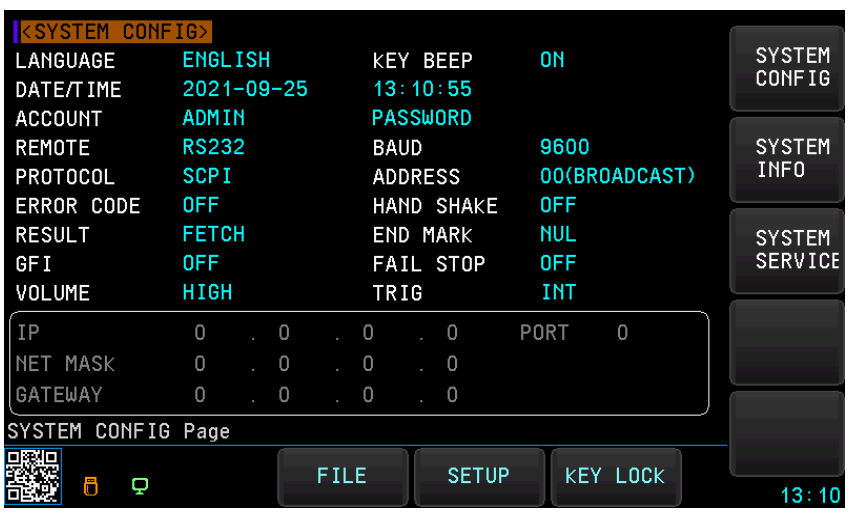
On the [SETUP] page, press the [SYSTEM SETUP] key to enter the <SYSTEM CONFIG> page

The system configuration page includes the following settings:

- LANGUAGE
- DATA/TIME
- ACCOUNT
- BAUD
- BEEP
- GFI
- ADDR

All settings on this page are automatically saved in the system and reloaded on next startup.

Figure 6-1 <SYSTEM CONFIG>



6.1.1 【LANGUAGE】

`command: SYSTem:LANGuage {ENGLISH,CHINESE,EN,CN}`

Instrument supports Chinese and English.

■ **Step of setting the language**

STEP 1 Enter <SYSTEM CONFIG> page

STEP 2 Use cursor keys to select [LANGUAGE] field

STEP 3 Use the function keys to select language

Function Key	Language
中文[CHN]	Chinese

ENGLISH	English

6.1.2 [DATE],[TIME]

The instrument uses a 24-hour clock format.

■ **To set the date:**

STEP 1 Enter the <SYSTEM CONFIG> page
STEP 2 Use the cursor keys to select [DATE] field
STEP 3 Use function keys to adjust the date:

Function Key	Function
YEAR INCR+	+1 year
YEAR DECR-	-1 year
MONTH INCR+	+1 month
MONTH DECR-	-1 month
DAY INCR+	+1 day
DAY INCR-	-1 day

■ **To Set the Time:**

STEP 1 Enter <SYSTEM CONFIG> page
STEP 2 Use cursor keys to select [TIME] field
STEP 3 Use function keys to adjust the time:

Function Key	Function
HOUR INCR+	+1 Hour
HOUR DECR-	-1 Hour
MINUTE INCR+	+1 Minute
MINUTE DECR-	-1Minute
SECOND INCR+	+1Second
SECOND DECR-	-1 Second

6.1.3 [ACCOUNT] Settings

The instrument supports two user modes:
Administrator - All functions accessible except [System Service]. Parameters saved to system memory 5 seconds after setting.
User - All functions accessible except [System Service] and [File]. Any changes made are not saved and will revert to the administrator settings upon restart.

■ **Steps to Change Account Mode:**

STEP 1 Enter <SYSTEM CONFIG> page
STEP 2 Use cursor keys to select the [ACCOUNT] field
STEP 3 Use the function keys to switch modes:

Function Key	Function
Administrator	Full access except [System Service] page. If the administrator password is lost, please contact Applent Sales Department.
User	No access to [System Service] and [File] pages; cannot save settings

■ **Administrator Password Settings:**

STEP 1 Enter the <SYSTEM CONFIG> page
STEP 2 Use cursor keys to select [PASSWORD] field
STEP 3 Use the function keys to manage the password:

Function Key	Function
CHANGE PASSWORD	Enter a numeric password (up to 9 digits). Passwords may contain numbers and symbols
DELETE PASSWORD	Removes the password protection for the Administrator account

6.1.4 【BAUD】Rate Settings

The instrument features a built-in RS-232 interface. Once a signal is detected on RS-232, the instrument immediately begins communication at the selected baud rate, and the keypad is locked.
To ensure proper communication, the baud rate must match that of the host computer. A mismatch will result in failed communication.
The RS-232 interface uses SCPI command syntax.
Communication parameters:

- Data bits: 8
- Stop bits: 1
- Parity: None
- Baud Rate: Configurable

Steps to Set Baud Rate:

STEP 1 Enter the <SYSTEM CONFIG> page
STEP 2 Use the cursor keys to select [BAUD] field
STEP 3 Use the function keys to select:

Function Key	Baud Rate Decription
1200	Use this when working with opto-isolated communication converters
9600	Standard speed
38400	Moderate speed
57600	Faster transfer speed
115200	Recommended high-speed baud rate for PC communication

6.1.5 【GFI】Setting

This setting enables ground fault detection (GFI), also referred to as the “Electric Shock Protection” or “Protective Ground Monitoring”.

Steps to Configure GFI:

STEP 1 Enter the <SYSTEM CONFIG> page
STEP 2 Use cursor keys to select the [GFI] field
STEP 3 Usethe function keys to enable/disable:

Function Key	Function
OFF	GFI function disabled
ON	GFI function enabled

6.1.6 【BEEP】Setting

Step to Configure Beeper:

STEP 1 Enter the <SYSTEM CONFIG> page
STEP 2 Use cursor keys to select [BEEP] field
STEP 3 Use the function keys to choose:

Function Key	Function
OFF	Beep is disabled
SOUND	Large beep (main) is enabled
LOW	Small beep (soft tone) is enabled

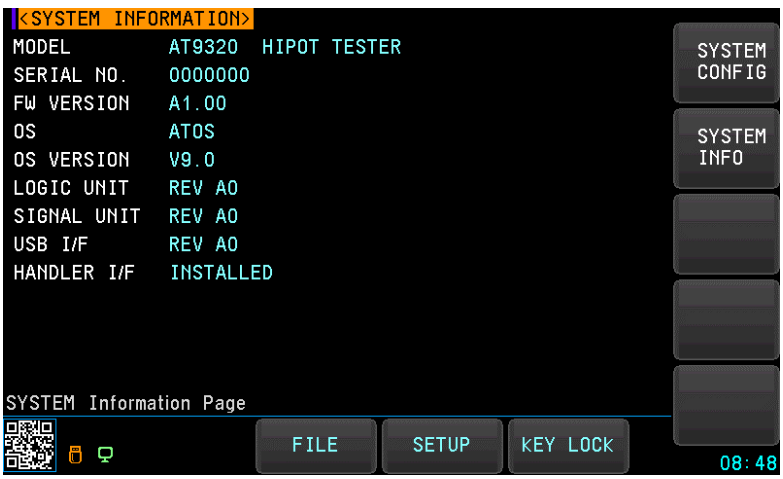
6.1.7 Touchscreen Calibration

Press [TOUCH CALIBRATION], then follow the on-screen prompts to tap designated points for calibration. Calibration is completed once all points have been accurately pressed.

6.2 SYSTEM INFORMATION PAGE

From either the [MEAS] or [SETUP] main page, enter the <SYSTEM CONFIG> page, press the [SYSTEM INFO] key to enter <SYSTEN INFORMATION PAGE>.
The System Information page is read-only. No user-configurable options are available.

Figure 6-2 <SYSTEM INFORMATION>



7. [FILE] Page

In this chapter, you will learn how to manage files on the instrument:

- Storage Devices
- File Auto-Load on Startup
- Auto-save Functionality
- File Management Operations

Users can save up to 10 files in the instrument's internal non-volatile memory.

7.1 [FILE] Page

From the [MEAS] or [SETUP] page, press the [FILE SETUP] to enter the <FILE> page.

Figure 7-1 <FILE>



On this page, you can move the cursor to different fields to configure the following functions:

- Select files from internal memory or external USB disk
- Choose which file to automatically load on power-up

7.1.1 [MEDIA] Setting

The memory function allows you to select files from the instrument memory or external U disk. Up to 10 files can be accessed.

■ **Steps to set the Media**

STEP 1 Enter <FILE> page

STEP 2 Use cursor keys to select [MEDIA] field

STEP 3 Use the function keys to select

Function Key	Function
Internal	Access instrument memory files
External	Access external USB drive files

7.1.2 [RECALL] Setting

Recall FILE1 or the current file when the instrument is powered on.

■ **Steps to configure the Recall:**

STEP 1 Enter the <FILE> page

STEP 2 Use cursor keys to select [RECALL] field

STEP 3 Use function key to select

Function Key	Function
LAST FILE	Recall the last used file at boot
FILE1	Recall FILE1 at boot

7.1.3 [FILE] Operations

- **Steps to Perfom File Operation:**

STEP 1 Enter the <FILE> page

STEP 2 Use the cursor keys to select [FILE]

STEP 3 Use Function keys to select

Function Key	Function
SAVE	Save user settings data to the currently selected file
RECALL	Load setup data from the currently selected file
DELETE	Delete the selected file, and restore the default value of the setting data next time you start up
MODIFYDES	Modify file description

8. Handler（PLC）Interface

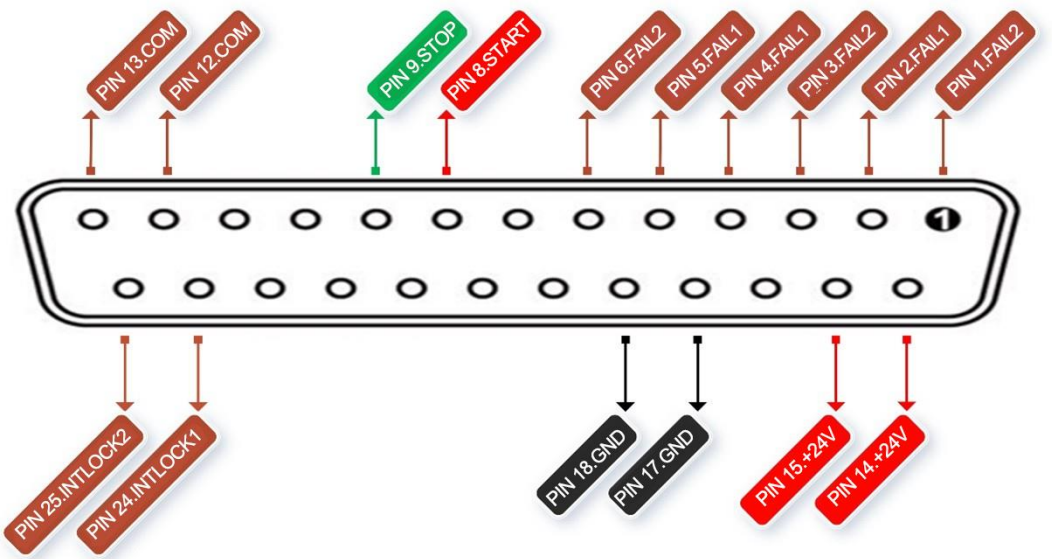
In this chapter, you will learn:

- Terminals Layout and Signal Description
- How to connect the interface and understand the circuit diagrams

The instrument provides a fully functional Handler interface, allowing seamless integration with the user's control system for automated operations.

8.1 Terminals Layout and Signal Definitions

Figure 8-1 Terminal Block



- START, STOP, COM form the remote input control group. These are switch-type inputs, active when closed.
- TEST, PASS, FAIL form the remote output control group. These are switch-type outputs, active when closed.
- PIN 14-15 provide an auxiliary power output of approximately +24 V, current < 1 A. This can be used to drive indicator lights, photoelectric switches, small solenoid valves, etc. (Refer to Figure 8-4 for usage).
- INTLOCK is a reserved signal for multi-instrument test setups. It is not functional in standard operation.

8.2 Connection Method

- Interface Principle

Figure 8-2 Handler Interface internal circuit structure

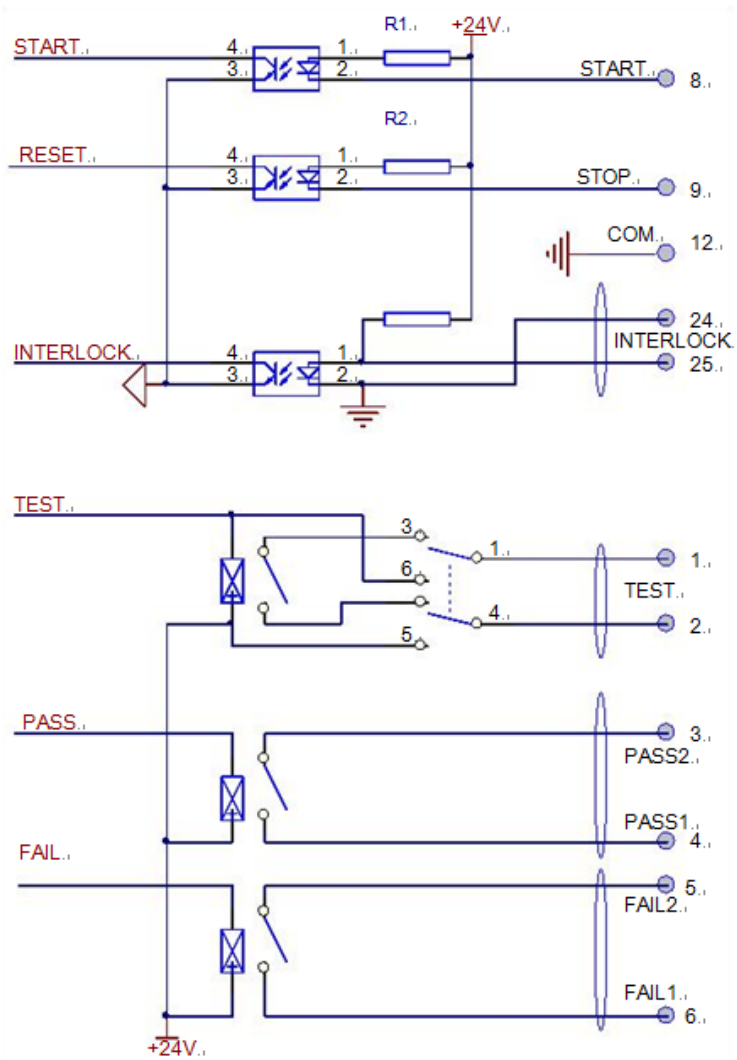
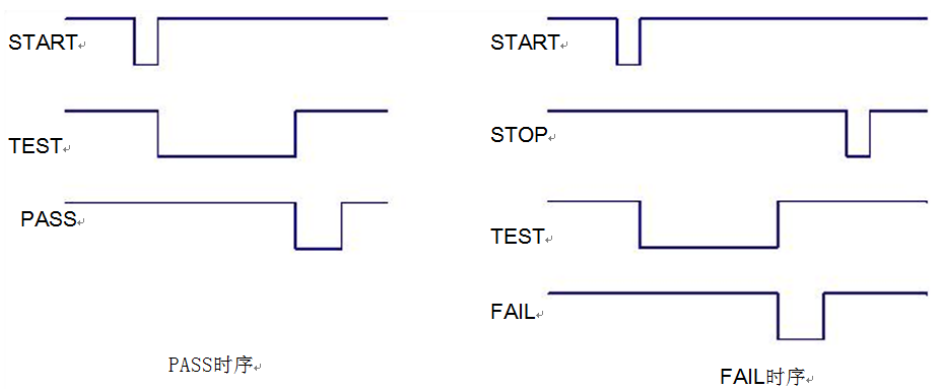


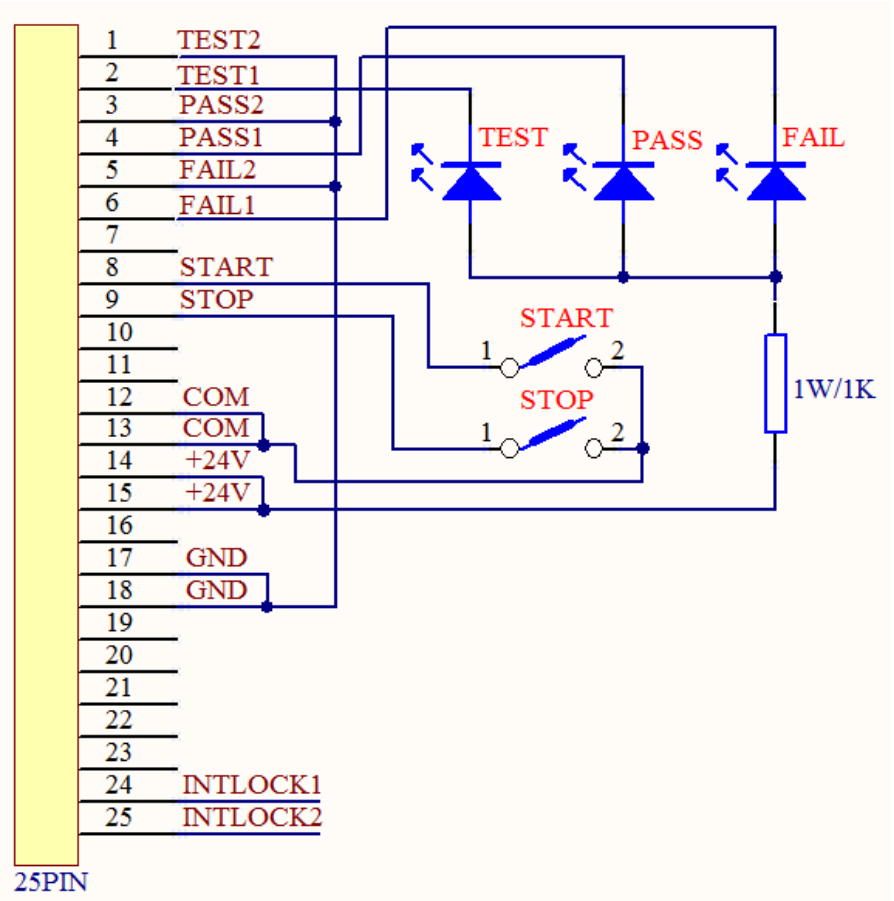
Figure 8-3 Handler Interface default test timing



■ Instrument interface usage

The control interface is generally used for remote control and test synchronization or indication.

Figure 8-4 Instrument interface external connection



Note:

Switches can be replaced with optically isolated devices (e.g., optocouplers). Refer to the diagram for current direction (COM = low side).

The indicator lamps shown can be replaced with other load devices, provided current flow is consistent with power direction.

Internal Power Supply Characteristics:

(a) Derived from AC power via rectification and filtering. No voltage regulation. Output ≈ 24 V. Confirm before use.

(b) Instantaneous current must not exceed 1 A. For continuous operation, keep current below 0.5 A. Use an external power source for higher loads.

(c) If external control signals exceed 220 V or 2 A, the internal relays cannot support them. External relays or isolation are required.

9. Remote Communication

In this chapter you will learn:

- Overview of the RS-232C Interface
- RS-232 Connection
- Handshaking protocol
- SCPI command language

The instrument uses a standard RS-232 interface to communicate with a computer and supports full control over all instrument functions.

Using standard SCPI commands, users can easily build custom data acquisition or automation systems.

9.1 RS-232C

RS-232 is a widely adopted serial communication standard, also known as asynchronous serial communication, used for data exchange between computers and peripherals.

- RS stands for Recommended Standard, and 232 is the standard number.
- It was first issued by the Electronic Industries Association (EIA) in 1969.
- Data is transmitted one bit at a time over a single data line.

While the original specification used 25-pin connectors, most modern computers use 9-pin DB-9 connectors.

Common RS-232 Signals

Signal Name	Symbol	DB-25 Pin	DB-9 Pin
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

The instrument uses a minimal RS-232 subset as shown below:

Table 9-1 RS-232 Minimal Subset Used by Instrument

Signal Name	Symbol	DB-9 Pin
Transmit Data	TXD	2
Receive Data	RXD	3
Ground	GND	5

9.2 RS232C Connection

The RS-232 interface can be connected directly to a controller (such as a PC or industrial control

computer) via a straight-through DB-9 cable.

Note: Do not use a null modem cable.

You may fabricate your own or purchase a 9-pin straight-through cable from Applent.

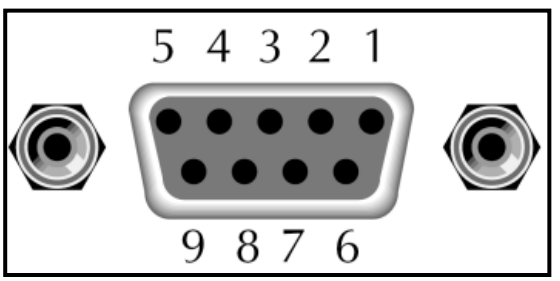
Wiring Tip for DIY 3-Wire Cables:

If you're using a PC's built-in DB-9 port, short the following pins on the PC side:

Pin 4–6

Pin 7–8

Figure 9-1 The RS-232 connector in the real panel



Suggestion: To prevent electrical shock or damage, power off the instrument when connecting or disconnecting the cable.

Default Communication Settings:

Mode: Full-duplex asynchronous (with start/stop bits)

Data Bits: 8

Stop Bits: 1

Parity: None

9.3 Handshaking Protocol

Because the instrument uses a minimal RS-232 subset and does not support hardware handshaking, it provides software handshaking to help avoid communication errors or data loss.

Developers using high-level programming languages should adhere to the following protocol:

Commands and responses must be in ASCII format.

All command strings must be terminated with a newline (\n, ASCII 0x0A). The parser will only begin execution after receiving this terminator.

Optional instruction-level handshaking:

The instrument echoes back each received character to the host.

The host must wait for the echoed character before sending the next one.

Troubleshooting Tips

If the host does not receive data from the instrument:

Ensure software handshaking is enabled in the System Settings page.

Verify the serial cable connection is correct.

Check your host-side program for correct COM port, data format, and baud rate settings.

If the instrument is still executing a previous command, wait before retrying.
If the issue persists, please contact Applent technical support.

9.4 SCPI Language

SCPI (Standard Commands for Programmable Instruments) is a widely adopted universal command set used to control test and measurement equipment.
Also known as TMSL (Test and Measurement System Language), SCPI was originally developed by Agilent Technologies based on IEEE 488.2.
Onmeas use a built-in command parser that supports SCPI-like syntax.



NOTE:
Although SCPI is the basis of the instrument's parser, it is not fully SCPI compliant.
Before use, please refer to the "SCPI Command Reference" chapter for detailed syntax and usage.

10. SCPI Command Reference

This chapter includes the following content:

- Command String Parsing-Understand how the command parser works
- Command Syntax-Rules for writing command lines
- Query Syntax-Rules for writing query commands
- Query Responses-formatting of Command Responses
- Command Reference-Detailed descriptions of supported commands

This chapter provides a full reference to all SCPI commands supported by the instrument.
Using these commands, users can fully control all instrument functions via remote communication.

10.1 Command String Parsing

The host can send a series of SCPI commands to the instrument.
The instrument's command parser starts executing the command string once a newline character (\n) is received, or when the input buffer overflows.
Example of a valid command string:
AAA:BBB CCC;DDD EEE;:FFF
The parser handles all command interpretation and execution. Before writing your software, it's important to understand the parser's behavior and rules.

10.1.1 Command Parsing Rules

The command parser only accepts ASCII data for command input and output.
A command string must end with a newline (NL, ASCII 0x0A). Parsing begins only after this character or on buffer overflow.
If instruction handshake is enabled, the parser echoes each character back to the host as it is received. The host must wait for the echo before sending the next character.
If an error is encountered during parsing, the parser aborts the entire command string, and no part of it is executed.
If a query command (ending in ?) is detected, the parser executes the query immediately and ignores the remainder of the string.
SCPI parsing is case-insensitive.
Abbreviated commands are supported. See later sections for valid abbreviations.

10.1.2 Symbol Conventions and Definitions

Certain special symbols are used in this documentation to clarify command formats. These are not part of the actual command structure:
< > : Angle brackets denote a required parameter
[ ] : Square brackets denote an optional item
{ } : Curly brackets contain mutually exclusive options (choose one only)
( ) : Parentheses contain command abbreviation forms
Uppercase : Represents the abbreviated form of a command keyword

10.1.3 Command Tree Structure

SCPI commands follow a hierarchical tree structure, typically up to three levels deep.

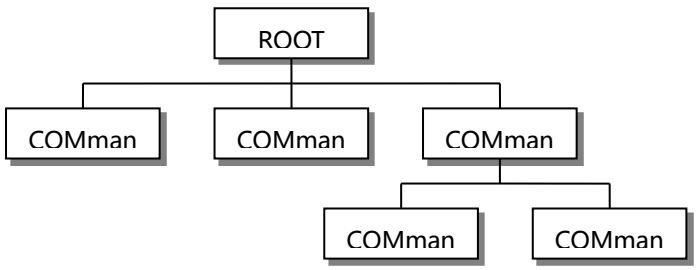
In this structure:

The top level is called a subsystem command.

Lower-level commands are valid only after a subsystem is selected.

Colon (:) is used to separate higher-level and lower-level command nodes.

Figure 10-1 Command Tree Example



Example:

ROOT:COMmand3:COMmand5 ppp

ROOT Subsystem Command

COMmand3 Level 2

COMmand5 Level 3

ppp Parameter

10.2 Commands and Parameters

An SCPI command line consists of a command and an optional [parameter], separated by a single space (ASCII code: 0x20).

Example: comp:nom 100.0e3

Command Parameter

10.2.1 Command

A command keyword can be written in either long form or abbreviated form. Long form improves readability for engineers. Abbreviated form is preferred for compact code and scripting.

10.2.2 Parameters

No Parameter

Some commands consist of just a single command word with no parameter.

Example: AAA:BBB

Parameters as Strings or Numeric Values

Strings follow the same abbreviation rules described in the previous section.

Example: AAA:BBB "ON"

Numbers may take one of the following forms:

TYPE	DESCRIPTION	EXAMPLE
<integer>	Integer (positive or negative)	123, +123, -123

<float>	Floating point number	
- <fixfloat>	Fixed-point format	1.23, -1.23
-<scifloat>	Scientific notation (case-insensitive)	1.23E+4, +1.23e-4
- <mpfloat>	Multiplier-prefixed floating-point (SI-style)	1.23k, 1.23M, 1.23u

Table 10-1 Multiplier Abbreviations

Value	Multiplier Symbol
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

Tip: Multiplier symbols are case-insensitive and do not strictly follow standard SI naming.

10.2.3 Delimiters

The instrument's command parser only accepts specific valid delimiters.
If any invalid delimiter is used, the parser will return an "Invalid separator" error.
The following delimiters are supported:

Delimiter	Description	Example
; (semicolon)	Separates two independent commands within a single command string	AAA:BBB 100.0 ; CCC:DDD
: (colon)	Separates levels in a command tree or restarts the tree hierarchy	AAA:BBB:CCC 123.4 ; :DDD:EEE 567.8
? (question mark)	Denotes a query command	AAA?
<space> (ASCII 0x20)	Separates a command and its parameter	AAA:BBB 1.234

10.3 Command Reference

- All commands are organized and interpreted according to their subsystem hierarchy.
  The following subsystems are supported:
- DISPlay – Display control subsystem
- FUNCtion – Measurement function subsystem
- FETCh – Measurement result acquisition subsystem
- FILE – File management subsystem
- SYSTem – System configuration subsystem
- WRITEPARA – Write parameter settings
- READPARA – Read parameter settings

- READDATA – Retrieve measurement data
- STEP – Step switching configuration
- INS – Insert test step
- DEL – Delete test step
- KEYLOCK – Keypad lock configuration

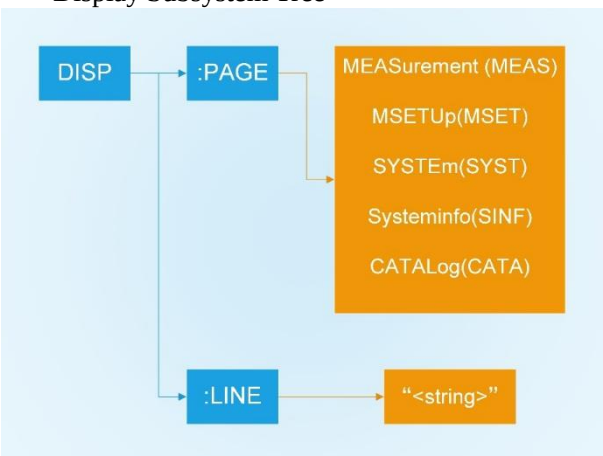
Common Command

IDN? – Query instrument identification information

10.4 Display Subsystem

Display subsystem Can be used to switch between different display pages or to display text on the page tooltip.

Figure 10-2 Display Subsystem Tree



10.4.1.1 DISPlay:PAGE

DISP:PAGE used to switch to the specified page

Command Syntax:	**DISPlay:PAGE <page name>**
Parameter:	<page name> include: **MEASurement** Measure Display **MSETUp** Setup Display **SYSTem** System Display **SYSTEMINFO(SINF)** System Information Display **CATALog(CATA)** File Display
Example:	**send> disp:page mset**<NL> //switch to setting page
Query Syntax:	**DISP:PAGE?**
Query Response:	**<page name> abbreviation** **ACW MEAS** **DCW MEAS** **IR MEAS** **SETUP** **SYST** **SINF** **CATA**
Example:	**send> disp:page?** <NL> **ret> SETUP** <NL>

10.4.1.2 DISP:LINE

DISP:LINE Used to display text in the prompt bar at the bottom of the page, up to 30 characters.

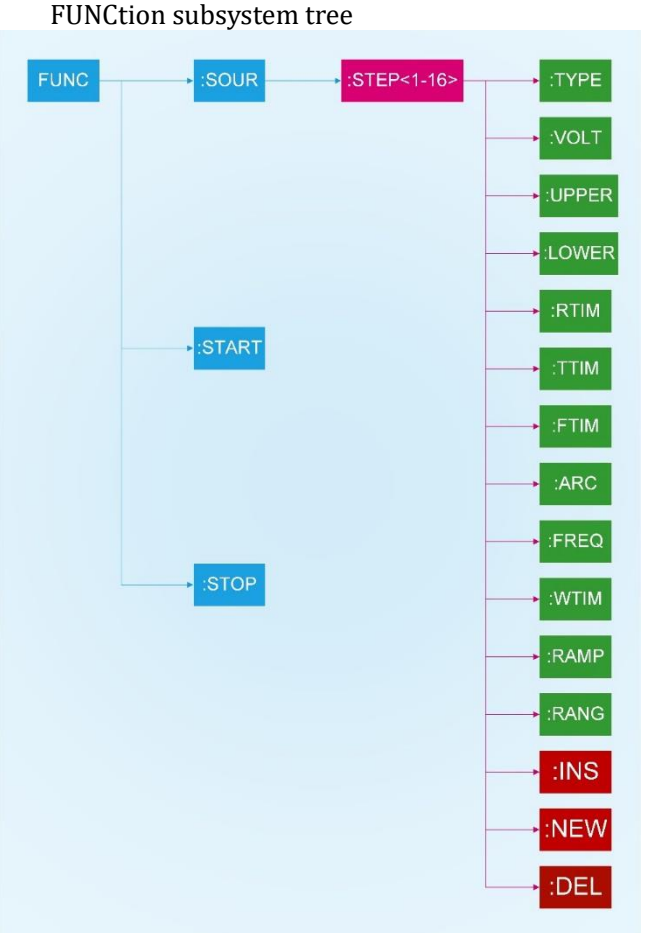
Command Syntax: **DISPlay:LINE <*string*>**

Parameter: **<string>** up to 30 characters

Example: **send> DISP:LINE "This is a Comment."** ***<NL>***

10.5 FUNCtion subsystem

Figure 10-3 FUNCtion subsystem tree



10.5.1.1 High Voltage Start/Stop Command Set

FUNC:START used to starting high voltage output

Command Syntax: **FUNCtion:START**

Example: **send> FUNC:STARt***<NL>*

//Start the test , the function is equivalent yo the [START] button

FUNC:STOP used to stop high voltage output

Command Syntax: **FUNCtion:STOP**

Example: **send> FUNC:STOP***<NL>*

////Stop the test , the function is equivalent yo the [STOP] button

10.5.1.2 Test Step Instruction Set

FUNC:SOUR:STEP? Used to query the cruuent test steps and the total test steps

Command Syntax:	**FUNC:SOUR:STEP?**
Query Response:	**Current step – total steps** **STEP <1-16> - TOTAL <1-16>**
Example:	**send> FUNC:SOUR:STEP?**<NL> ret> **STEP 5 - TOTAL 11** <NL>

FUNC:SOUR:STEP1:INS add a new test item to an existing test plan

Command Syntax:	**FUNC:SOUR:STEP:INS**
Example:	**send> FUNC:SOUR:STEP:INS** <NL> //add a new test item

FUNC:SOUR:STEP1:DEL delete the current test project within an existing test plan

Command Syntax:	**FUNC:SOUR:STEP:DEL**
Example:	send> **FUNC:SOUR:STEP:DEL** <NL> //delete the current test project

FUNC:SOUR:STEP1:NEW creat a new empty test plan to write a new test plan

Command Syntax:	**FUNC:SOUR:STEP:NEW**
Example:	send> **FUNC:SOUR:STEP:NEW** <NL> //creat a new empty test plan

10.5.1.3 Function parameter instruction set

FUNC:SOUR:STEP<1-16>: TYPE In an existing test plan,set the function of the current test step

Command Syntax:	**FUNC:SOUR:STEP<1-16>:TYPE {ACW,DCW,IR}**
Example:	**send> FUNC:SOUR:STEP5:TYPE IR**<NL> //Under the premise of total steps ≥5,set the function of step 5 to IR
Query Syntax:	**FUNC:SOUR:STEP<1-16>:TYPE?**
Query Response:	**{ACW,DCW,IR}**

FUNC:SOUR:STEP<1-16>: VOLT In an existing test plan,set the voltage of the current test step

Command Syntax:	**FUNC:SOUR:STEP<1-16>:VOLT <float>**
Parameter:	**<float>**（date unit is kV）: ACW : 0.050 - 5.000 DCW : 0.050 - 6.000 IR : 0.050 - 1.000
Example:	**send> FUNC:SOUR:STEP5:VOLT 1**<NL> // Under the premise of total steps ≥5,set the Voltage of step 5 to 1kV
Query Syntax:	**FUNC:SOUR:STEP<1-16>:VOLT?**
Query Response:	**<float>**: (data unit is kV) ACW : 0.050 - 5.000 DCW : 0.050 - 6.000 IR : 0.050 - 1.000
Example:	send> **FUNC:SOUR:STEP5:VOLT?**<NL> ret> **1.000** <NL>

FUNC:SOUR:STEP<1-16>: UPPER In an existing test plan,set the upper of the current test step

Command Syntax:	**FUNC:SOUR:STEP<1-16>:UPPER <float>**
Parameter:	**<float>**（data unit is mA / MΩ）: ACW : 0.001 - 20.00 DCW : 0.001 - 10.00 IR : 0 ， 0.1 - 1E4 （where 0 means the upper limit is OFF）
Example:	send> **FUNC:SOUR:STEP5:UPPER 1**<NL> // Under the premise of total steps ≥5,set the upper of step 5 to 1mA
Query Syntax:	**FUNC:SOUR:STEP<1-16>:UPPER?**
Query Response:	**<float>**: (data unit is mA/MΩ)

ACW : 0.001 - 20.00
DCW : 0.001 - 10.00
IR : OFF，0.1 - 1E4

Example: send> **FUNC:SOUR:STEP5:UPPER?**<NL>
ret> **1.000** <NL>

FUNC:SOUR:STEP<1-16>: LOWER In an existing test plan,set the lower of the current test step

Command Syntax: **FUNC:SOUR:STEP<1-16>:LOWER <float>**

Parameter: **<float>**（data unit is mA / MΩ）:
ACW : 0 ， 0.001 - 20.00,（0 means lower limit OFF）
DCW : 0 ， 0.001 - 10.00,（0 means lower limit OFF）
IR: 0.1 - 1E4

Example: send> **FUNC:SOUR:STEP5:LOWER 0.1**<NL>
// Under the premise of total steps ≥5,set the upper of step 5 to 0.1mA

Query Syntax: **FUNC:SOUR:STEP<1-16>:LOWER?**

Query Response: **<float>**:
ACW : OFF， 0.001 - 20.00
DCW : OFF， 0.001 - 10.00
IR : 0.1 - 1E4

Example: send> **FUNC:SOUR:STEP5:LOWER?**<NL>
ret> **0.100mA** <NL>

FUNC:SOUR:STEP<1-16>: RTIM In an existing test plan,set the rise time of the current test step

Command Syntax: **FUNC:SOUR:STEP<1-16>:RTIM <float>**

Parameter: **<1-16>:** step
<float>（data in seconds）: 0，0.1 - 999.9

Example: send> **FUNC:SOUR:STEP5:RTIM 10**<NL>
// Under the premise of total steps ≥5,set the rise time of step 5 to 10s

Query Syntax: **FUNC:SOUR:STEP<1-16>:RTIM?**

Query Response: **<float>**:
OFF，0.1 - 999.9

estExample: send> **FUNC:SOUR:STEP5:RTIM?**<NL>
ret> **10.0s** <NL>

FUNC:SOUR:STEP<1-16>: TTIM In an existing test plan,set the test time of the current test step

Command Syntax: **FUNC:SOUR:STEP<1-16>:TTIM <float>**

Parameter: **<1-16>:** step
<float>（data in seconds）: 0，0.1 - 999.9（0 means continuous testing）

Example: send> **FUNC:SOUR:STEP5:TTIM 10**<NL>
// Under the premise of total steps ≥5,set the test time of step 5 to 10s

Query Syntax: **FUNC:SOUR:STEP<1-16>:TTIM?**

Query Response: **<float>**:
OFF，0.1 - 999.9

Example: send> **FUNC:SOUR:STEP5:TTIM?**<NL>
ret> **10.0s** <NL>

FUNC:SOUR:STEP<1-16>: FTIM In an existing test plan,set the fall time of the current test step

Command Syntax: **FUNC:SOUR:STEP<1-16>:FTIM <float>**

Parameter: **<1-16>:** step
<float>（data in seconds）: 0，0.1 - 999.9

Example: send> **FUNC:SOUR:STEP5:FTIM 10**<NL>
// Under the premise of total steps ≥5,set the fall time of step 5 to 10s

Query Syntax: **FUNC:SOUR:STEP<1-16>:FTIM?**

Query Response: **<float>**:

OFF，0.1 - 999.9

Example: send> **FUNC:SOUR:STEP5:FTIM?**<NL>
ret> **10.0s** <NL>

FUNC:SOUR:STEP<1-16>: ARC In an existing test plan,set the ARC level of the current test step

Command Syntax: **FUNC:SOUR:STEP<1-16>:ARC < *int* >**
Parameter: **< int>**:
0 - 9，（ This function is not available under **IR** ; 0 = OFF）
Example: send> **FUNC:SOUR:STEP5:ARC 1**<NL>
// Under the premise of total steps ≥5,set the ARC level of step 5 to 1
Query Syntax: **FUNC:SOUR:STEP<1-16>ARC?**
Query Response: **<int>**:
OFF，1 - 9
Example: send> **FUNC:SOUR:STEP5:ARC?**<NL>
ret> **LEVEL 1** <NL>

FUNC:SOUR:STEP<1-16>: FREQ In an existing test plan,set the frequence of the current test step

Command Syntax: **FUNC:SOUR:STEP<1-16>:FREQ < *int* >**
Parameter: **< int>**:
50 / 60，（**Only available under ACW**）
Example: send> **FUNC:SOUR:STEP5:FREQ 60**<NL>
// Under the premise of total steps ≥5,set the frequency of step 5 to 60Hz
Query Syntax: **FUNC:SOUR:STEP<1-16>FREQ?**
Query Response: **<int>**:
50 / 60
Example: send> **FUNC:SOUR:STEP5:FREQ?**<NL>
ret> **60HZ** <NL>

FUNC:SOUR:STEP<1-16>: WTIM In an existing test plan,set the waiting time of the current test step

Command Syntax: **FUNC:SOUR:STEP<1-16>:WTIM <float>**
Parameter: **<float>**（data in seconds）：
0，0.1 - 999.9（**Only available under DCW**）
Example: send> **FUNC:SOUR:STEP5:WTIM 10**<NL>
// Under the premise of total steps ≥5,set the waiting time of step 5 to 10s
Query Syntax: **FUNC:SOUR:STEP<1-16>:WTIM?**
Query Response: **<float>**（data in seconds）：
OFF，0.1 - 999.9
Example: send> **FUNC:SOUR:STEP5:WTIM?**<NL>
ret> **10.0s** <NL>

FUNC:SOUR:STEP<1-16>: RAMP In an existing test plan,set the boost judgment of the current test step

Command Syntax: **FUNC:SOUR:STEP<1-16>:RAMP {ON,OFF} (Only available under DCW)**
Example: send> **FUNC:SOUR:STEP5:RAMP ON**<NL>
// Under the premise of total steps ≥5,set the RAMP of step 5 to on
Query Syntax: **FUNC:SOUR:STEP<1-16>:RAMP?**
Query Response: **{ON,OFF}**

FUNC:SOUR:STEP<1-16>: RANG In an existing test plan,set the rang of the current test step

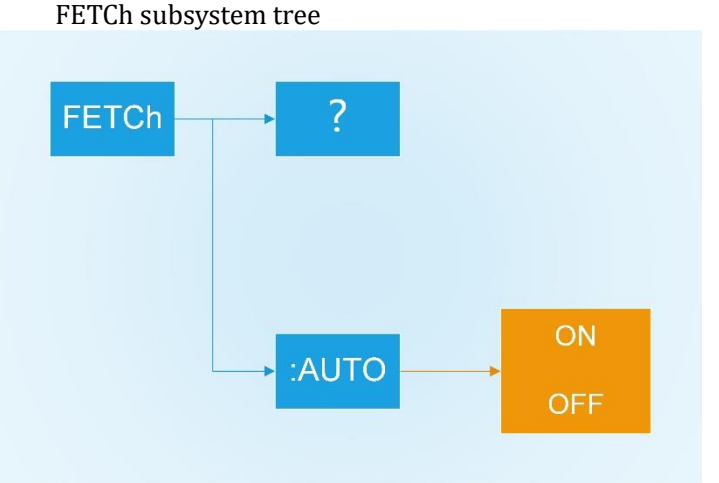
Command Syntax: **FUNC:SOUR:STEP<1-16>:RANG <int> (Only available under IR)**
Parameter: **<int>**:
0 - 5（Where 0 is Auto, 5 is 5mA, 4 is 1mA, 3 is 100uA，2 is 10uA, 1 is 1uA）
Example: send> **FUNC:SOUR:STEP5:RANG 1**<NL>
// Under the premise of total steps ≥5,set the range of step 5 to 1uA

Query Syntax:	**FUNC:SOUR:STEP<1-16>:RANG?**
Query Response:	**<int>:** AUTO，1 - 5
Example:	send> **FUNC:SOUR:STEP5:RANG?**<NL> ret> **Range 1** <NL>

10.6 FETCh Subsystem

The fetch subsystem command set is used to obtain the measurement resukts of the instrument and set the acquisition mode.

Figure 10-4 FETCh subsystem tree



FETCh:AUTO Set whether the instrument returns the result of each measurement.

Command Syntax:	**FETCh:AUTO {ON,OFF}**
Example:	send> **FETCh:AUTO ON**<NL> //Automatic sending of each measurement result

Query Syntax:	**FETCh?**
Example:	send> **FETC?** <NL> ret> **IR,0.050kV,34.59MΩ,PASS;ACW,0.050kV,0.000mA,PASS;** <NL>

10.7 FILE Subsystem

FILE subsystem commands are used to perform file operations.

Figure 10-1 FILE subsystem tree

FILE	*:SAVE*	*<File NO.>*
	:LOAD	*<File NO.>*
	:DELete	*<File NO.>*

10.7.1.1 FILE?

FILE? Command is used to query the file number used by the system.

Command Syntax:	**FILE?**
Query Syntax:	**<int>:**

0 – 9

Example: send> **FILE?**<*NL*>
ret> **1**<*NL*>

10.7.1.2 FILE:SAVE <n>

FILE:SAVE command is used to save the user setting to the current file

Command Syntax: **FILE:SAVE**

Example: send> **FILE:SAVE**<*NL*>

FILE:SAVE <n> command is used to save the user setting to the specified file

Command Syntax: **FILE:SAVE <n>**

Parameter: **<int>**:
0 - 9,

Example: send> **FILE:SAVE 1**<*NL*>

10.7.1.3 FILE:LOAD <n>

FILE:LOAD command is used to load all user setting from the currently used file

Command Syntax: **FILE:LOAD**

Example: send> **FILE:LOAD**<*NL*>

FILE:LOAD <n> command is used to load all user setting from the specified file

Command Syntax: **FILE:LOAD <n>**

Parameter: **<int>**:
0 - 9,

Example: send> **FILE:LOAD 1**<*NL*>

10.7.1.4 FILE:DELete <n>

FILE: DELete command is used to delete all user setting from the currently use file

Command Syntax: **FILE: DELete**

Example: send> **FILE: DELete** <*NL*>

FILE: DELete <n> command is used to delete all user setting from the specified file

Command Syntax: **FILE: DELete <n>**

Parameter: **<int>**:
0 - 9,

Example: send> **FILE: DELete 1**<*NL*>

10.8 SYSTem Subsystem

SYSTem subsystem used to set system-related parameters.

SYSTem subsystem set data is not kept together internally.

Figure 10-2 SYSTem subsystem tree

SYSTem	*:LANGuage*	*{ENGLISH,CHINESE,EN,CH}*
	:GFI	*{ON,OFF}*
	:BEEP	*{ON,OFF}*

10.8.1.1 SYSTem:LANGuage

SYST:LANG Set language。

Command Syntax:	**SYSTem:LANGuage {ENGLISH,CHINESE,EN,CH}**
Example:	send> **SYST:LANG EN**<*NL*> //Set to display in english
Query Syntax:	**SYST:LANG?**
Query Response:	**{ENGLISH,CHINESE}**

10.8.1.2 SYSTem:GFI

SYST:GFI Set electric shock protection status.

Command Syntax:	**SYSTem:GFI {ON,OFF}**
Example:	send> **SYST:GFI ON**<*NL*> //Set electric shock protection on
Query Syntax:	**SYST:GFI?**
Query Response:	**{ON,OFF}**

10.8.1.3 SYSTem:BEEP

SYST:GFI Set beep

Command Syntax:	**SYSTem:BEEP {ON,OFF}**
Example:	send> **SYST:BEEP ON**<*NL*> //Set beep on
Query Syntax:	**SYST:BEEP?**
Query Response:	**{ON,OFF}**

10.9 WRITEPARA

WRITEPARA – Set Test Step Parameters

Command Syntax:

```
WP <STEP,ACW,VOLT,TIME,RISETIME FALLTIME,HIGH,LOW,ARC,FREQ>
WP <STEP,DCW,VOLT,TIME,RISETIME,FALLTIME,HIGH,LOW,ARC,RAMP,WAIT>
WP <STEP,IR,VOLT, TIME,RISETIME,FALLTIME,HIGH,LOW,RANGE>
```

Example:

Send**> WP 1,DCW,1.0,1.0,0.5,0.5,10.0,1.0,0,0,0.0**<*NL*>

// Set step 1 to DC withstand voltage mode:Voltage 1.0kV, Test time 1s, rise time 0.5s, fall time 0.5s, upper limit 10mA, lower limit 1mA, ARC level 0, ramp judgement off, wait time off.

Send **> WP 0,ACW,1.0,1.0,0.5,0.5,10.0,1.0,0,0**<*NL*>

Set step 1 to DC withstand voltage mode: Voltage 1.0kV, Test time 1s, rise time 0.5s, fall time 0.5s, upper limit 10mA, lower limit 1mA, ARC level 0, frequency 50Hz.

Send**> WP 2,IR,1.0,1.0,0.5,0.5,1000.0,1.0,0**<*NL*>

Set step 2 to Insulation Resistance mode: Voltage 1.0kV, Test time 1s, rise time 0.5s, fall time 0.5s, upper limit 1000 MΩ, lower limit 1MΩ, Range Auto.

10.10 READPARA

Query Syntax:

```
RP? <STEP>
```

Query Response:

```
<ACW>,<VOLT>,<TIME>,<RISETIME>,<FALLTIME>,<HIGH>,<LOW>,<ARC>,<FREQ>
<DCW>,<VOLT>,<TIME>,<RISETIME>,<FALLTIME>,<HIGH>,<LOW>,<ARC>,<WAIT>,<RAM
P>
<IR>,<VOLT>,<TIME>,<RISETIME>,<FALLTIME>,<HIGH>,<LOW>,<RANGE>
```

Example:

Send > **RP? 1** <NL>

Response > **DCW,0.050,0.5,0.5,0.5,1.0000,0.00000,0.0,0**<NL>

10.11 READDATA

Query Syntax:

```
RD? <STEP>
```

Query Response:

```
<STEP>,<FUNC>,<VOLT>,<CUR>,<NG>,<STATE>,<TIME>,<LOAD>
STEP: 0~15
FUNC: Test Function ACW,DCW,IR
VOLT: Test Voltage Value
CUR:  ACW,DCW Current Value
      IR  Resistance value
NG:   Test Result Mote
          0- Under test
      1->PASS   quaulified
      2->HI     over threshold
      3->LOW    below threshold
      4->SHORT  short circuit detected during test
      5->GFI       ground  fault  protection  triggered  (electric  shock
prevention)
      6->ARC    arc detection triggered
      7->VOLT   output voltage over limit
STATE:Test Mode
      1->Ramp up/test
      2->TEST
      3->Ramp down
TIME:Test Duration
LOAD: 0-> Stop Testing
          1- Under test
```

Example:

Send > **RP? 1** <NL>

Response > **2,DCW,1.000,1.795u,1,3,0.0,0**<NL>

//Test step 2, Test Function DCW, voltage 1.000kV, current 1.795uA, test result PASS, Voltage ramp-down in progress. Test duration: 0.0 seconds. Test complete.

10.12 STEP

STEP – Set Current Step

Command Syntax :

```
STEP <int>
```

Example:

Send > **STEP 1**<NL> //Set the current step to step 2

Query Syntax:

```
STEP?
```

Query Response:

```
<step>,<totalstep>
Step:      Current step
Totalstep: total step
```

10.13 INS

INS – Insert Test Step

Command

```
INS <int>
```

Syntax :	
Example:	Send > **INS 1**<NL> // Insert a new test step after step 2. Send > **INS**<NL> //Insert a new test step after the current step.

10.14 DEL

DEL – Delete Test Step

Command Syntax :	**DEL <int>**
Example:	Send > **DEL 1**<NL> //Delete step 2 Send > **DEL**<NL> //Delete current step

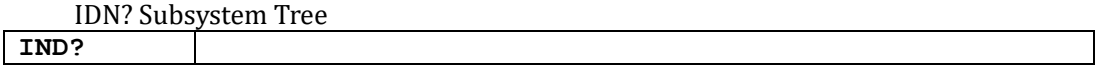
10.15 KEYLOCK

KEYLOCK Enable or Disable Keypad Lock

Command Syntax :	**KEYLOCK <ON,OFF>**
Example:	Send > **KEYLOCK ON**<NL> // Locks the instrument keypad (prevents manual operation).

10.16 IDN? Instrument Identification Query

Figure 10-6 IDN? Subsystem Tree



This command returns the instrument's serial number.

Query Syntax:	**IDN?**
Query Response:	**<MODEL>,<Revision>,<SN>,< Manufacturer>**
Example:	Send > **IDN?** <NL> Response > **APPLENT,AT9320,0000000,A1.00**<NL>

11. SPECIFICATION

In this chapter you will learn about:

- Technical Indicators
- Function Model Overview
- Environmental Requirements
- Dimensions

11.1 Technical Indicators

AT9320 Hipot Tester			
AC Withstand Voltage			
Rate Output	5kV / 20mA		
	Range	Resolution	Accuracy
Output Voltage	0.050kV-5.000kV	0.001 (1V)	± (2%×Reading + 5digital)
Test Current	0.001mA-10.00mA	0.001 / 0.01	± (2%×Reading + 5digital)
Frequency	50Hz or 60Hz， ±0.1%		
Output Waveform	Sine wave，distortion less than 3%（pure resistive load）		
Voltage regulation	±（2%×Reading+5V）（From empty to full）		
DC Withstand Voltage Test			
Rate Output	6kV / 10mA		
	Range	Resolution	Accuracy
Output Voltage	0.050kV-6.000kV	0.001 (1V)	± (2%×Reading + 5digital)
Test Current	0.1uA-5.00mA	0.1 / 0.01	± (2%×Reading + 5digital)
Insulation Resistance Test			
Rate Output	1kV / 10GΩ		
	Range	Resolution	Accuracy
Output Voltage	0.050kV-1.000kV	0.001 (1V)	± (1%×Reading + 2digital)
Measure Range	0.02MΩ-10GΩ		
Measure Accuracy	≥500V	< 500V	
	1MΩ-1GΩ ± (5%Reading+5digital)	0.1MΩ-1GΩ ± (10%Reading+5digital)	
	1GΩ-10GΩ ± (10%Reading+5digital)	1GΩ-10GΩ For reference only, no precision requirements	
General Parameters			
Discharge Function	Automatic discharge after the test is over		
Arc Detection	1-9level (AC / DC)		
Vosltage rise time	0.1s-999.9s		
Vosltage test time	0.1s-999.9s		
Vosltage fall time	0.1s-999.9s		
Interface	Handler interface（PLC interface） , RS232C , LAN , USB		

11.2 Model Function Overview

	ACW	DCW	IR
AT9320	✓	✓	✓
AT9320A	✓	✓	
AT9320B	✓		

11.3 Environmental Requirements

Environment Reference Condiction: temperature 18℃~28℃ humidity ≤ 65% RH
Operating: temperature 10℃~40℃ humidity 10~80% RH
Storage: temperature 0℃~50℃ humidity 10~90% RH

Power supply: 110VAC/220VAC（±10%）

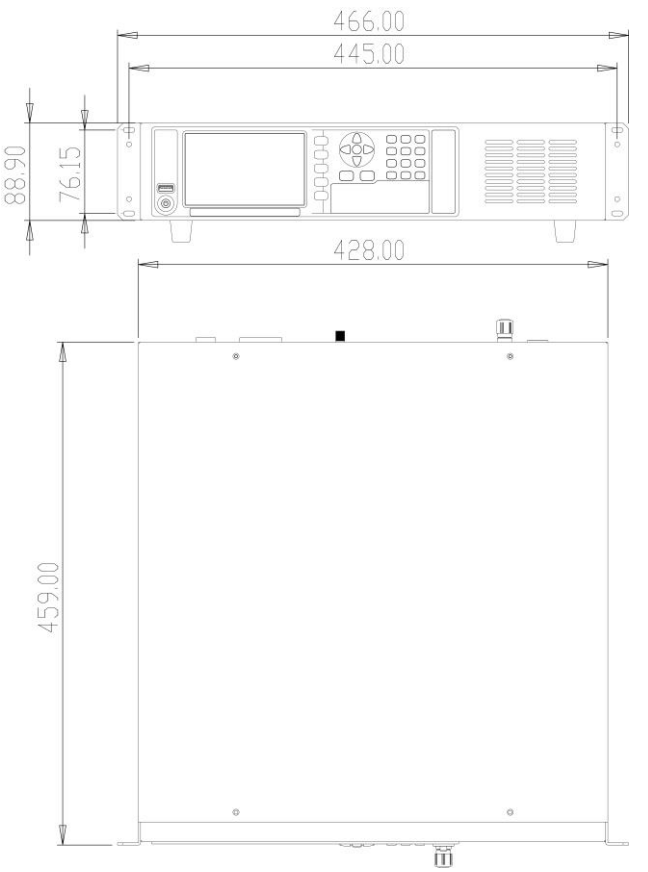
Fuse: 110V 5A Slow-Blow, 220V 3A Slow-Blow

Power Consumption: MAX300VA

Weight: Approx. 15 kg

11.4 Dimensions

(Schematic)



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ONMEAS Ltd.
#14,No. 9 Caoxi Road, Wujin district, Changzhou, Jiangsu province, China.

400-600-1217

TEL：0519-88805550

https://www.onmeas.com

Sales Service Email: sales@onmeas.com

Tech Support Email: tech@onmeascom

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