Hantek

User Manual

2026.1

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Hantek certified DAQ4000A series data collectors meet China's national industry standards and industry standards, and have passed CE certification and UKCA certification.

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1 Safety Requirements

1.1 Summary of general safety matters

Read the following safety precautions carefully to avoid injury and to prevent damage to this product or any product connected to this product. In order to avoid possible hazards, please be sure to use this product according to the regulations.

- **Only professionally authorized personnel should carry out maintenance.**

- **Before switching on the power**

Verify that all safety precautions have been taken. Make all connections to the device before powering it on.

- **Use the right power cord.**

Use only the power cord approved by the country of the product.

- **Before power on and power off**

Before powering the instrument, make sure that all signal sources connected to the module are turned off. Turn on the signal source after the instrument is powered on. Turn off the signal before the instrument is powered off.

- **Ground the product.**

To avoid electric shock, the product is grounded through the grounding conductor of the power cable. The grounding conductor must be connected to the ground. Before connecting the input or output end of the product, ensure that the product is properly grounded.

- **View all terminal ratings.**

To avoid fire or excessive current shock, check all ratings and marking instructions on the product. Please consult the product manual for rating details before connecting the product.

- **Do not open the lid.**

Do not run the product with the cover or panel open.

- **Avoid circuit exposure.**

Do not touch exposed connectors and components after the power is turned on.

- **Do not operate if you suspect that the product has malfunctioned.**

If you suspect this product has been damaged, disconnect the power cord and have a qualified service provider inspect it.

- **Maintain proper ventilation.**
- **Do not operate in humid environments.**
- **Do not operate in a flammable and explosive environment.**
- **Please keep the product surface clean and dry.**

Warn:

This instrument is a sensitive measuring instrument that may suffer from performance losses when exposed to the surrounding continuous electromagnetic environment.

1.2 Security terms and symbols

Security terms and symbols

Danger:
Indicates that this operation may cause immediate damage to you.

Warning:

Indicates that this operation may not cause immediate damage to you.

Attention:

Indicates that if you do so, you may cause damage to the product or other property.

Safety terms on products:

Warning:
Indicates potential damage that may occur if you do not perform this operation.

Safety symbols on products:

Warn

Case grounding end

Environmental protection life period identification

1.3 Class of measurement

Class of measurement

This instrument can be measured under measurement category I.

Warning:

This instrument is only permitted for use in specified measurement categories.

Measurement category definition

- **Measurement Category I** refers to the measurement on a circuit that is not directly connected to the main power supply. For example, measurements are made for circuits not derived from main power supply, especially those derived from protected (internal) main power supply. In the latter case, the instantaneous stress changes. Therefore, users should understand the instantaneous tolerance of the device.
- **Measurement Category II** refers to the measurements performed on circuits directly connected to low voltage devices. For example, measurements are made on household appliances, portable tools and similar devices.
- **Measurement Category III** refers to the measurements taken in construction equipment. For example, power distribution boards, circuit breakers, circuits (including cables, busbars, junction boxes, switches, sockets) in fixed equipment, as well as industrial use equipment and certain other equipment (e.g., fixed motors permanently connected to fixtures) Take measurements on.
- **Measurement Category IV** refers to the measurements performed on the source of a low voltage device. For example, the electric meter, the measurement on the main overpower protection device and the measurement on the pulse control unit.

1.4 Ventilation requirements

To ensure adequate ventilation, when using instruments in a workbench or rack, make sure that at least 10 cm of gap should be left on both sides, above and behind it.

Attention:

Poor ventilation can cause the temperature of the instrument to rise, which in turn causes the instrument to damage. Good ventilation should be maintained during use and the ventilation openings should be checked regularly.

1.5 Working environment

Operating temperature range

0℃ - 55℃

Operating humidity range

At 40°C, up to 80% RH (no condensation) and at 55°C, linearly decreasing to 50% RH (no condensation)

Storage temperature range

-40℃ - 70℃

Up to 50% RH at 55 °C (no condensation)

Warning:

To avoid the risk of short circuits in the instrument or electric shock, do not operate the instrument in a humid environment.

Altitude

When operating and when not operating: up to 3,000m.
Installation (Overvoltage) Category This product is powered by a main power supply that complies with Installation (Overvoltage) Category II.

Warning:

Make sure no overvoltage (such as voltage caused by lightning) reaches the product. Otherwise the operator may be at risk of electric shock.
Installation (overvoltage) category definition
Installation (overvoltage) Category I refers to the signal level, which is suitable for device measurement terminals connected to the source circuit, in which measures have been taken to limit the instantaneous voltage to a corresponding low level.
Installation (overvoltage) Category II refers to the local distribution level, which is suitable for devices connected to mains (AC power).

Pollution degree

Category 2

Definition of pollution degree

- **Pollution degree 1:** No pollution, or only dry non-conductive pollution occurs. This pollution level has no effect. For example: a clean room or an office environment controlled by air conditioning.
- **Pollution degree 2:** Generally, only dry non-conductive pollution occurs.

Sometimes temporary conduction due to condensation may occur. For example: general indoor environment.

- **Pollution degree 3:** Conductive pollution occurs, or dry non-conductive pollution becomes conductive due to condensation. For example: an outdoor environment with a sheath.
- **Pollution degree 4:** Permanent conductivity pollution is generated through conductive dust, rain or snow. For example: outdoor places.

Security level

Level 1 – Grounding Products

1.6 Maintenance and cleaning

Maintenance:

When storing or placing a data collector, do not allow the LCD monitor to be exposed to direct sunlight for a long time**.**

Clean:

Click to check the data collector and test line frequently according to the operating conditions. Please click to clean the outer surface of the instrument according to the following steps:
1) Use a lint-free rag to remove dust from the outside of the data collector and test line. Be careful to avoid scratching the smooth display filter material.
2) Use a soft cloth soaked in water to clean the data collector. For a more thorough cleaning, use 75% isopropanol aqueous solvent.

Attention:

To avoid damaging the surface of the data collector or test cable, do not use any corrosive or chemical cleaning reagents.

Warning:

Before re-energizing, please make sure the instrument is dry to avoid electrical short circuits or even personal injury caused by moisture.

1.7 Environmental precautions

The following symbols indicate that this product complies with the requirements set by WEEE Directive 2002/96/EC.

Equipment recycling:

The production of this equipment requires the extraction and use of natural resources. If the scrapping of this product is improperly treated, certain substances contained in the equipment may be harmful to the environment or human health. To avoid releasing harmful substances into the environment and to reduce the use of natural resources, it is recommended to recycle this product in an appropriate manner to ensure that most of the materials can be reused correctly.

2 Product Features

Product Features

- 4.3-inch TFT LCD screen, easy to set up and view data;
- Supports 6 and a half-digit sampling accuracy;
- Basic DCV accuracy is 0.003%;
- Each system has up to 120 channels;
- Scan rates up to 450 channels/second;
- Measure and convert 14 different input signals: including temperature (thermocouple, RTD and thermistor), strain, DC voltage, AC voltage, 2- and 4-wire resistors, frequency and period, DC and AC current, capacitors and diodes;
- There are rich interfaces, equipped with LAN, USB, RS232/485 and GPIB interfaces;
- Free PC software, easy to configure and control tests;
- Supports USB storage for copying/recording data in stand-alone operation.

Up to 120 channels; fastest scanning rate of 450 channels per second; supports 6 and a half bit sampling accuracy; can simultaneously test voltage (AC/DC), current (AC/DC), resistor (2-wire and 4-wire systems) , strain, frequency, period, capacitor, capacitor, temperature (10 types of thermocouples/thermistors); 13 acquisition control cards are available to meet different application needs; equipped with LAN, USB, RS232/485 and GPIB interfaces , rich communication interfaces.

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3 Document Overview

This document is used to guide users to quickly understand the front and rear panels, user interface, and basic operation methods of the DAQ4000A series internal resistance tester.

Note:

The latest version of this manual can be downloaded at (http://www.hantek.com).

Document ID: 202601

Software Version:

Software upgrades may modify or add product features. Please visit the Hantek website for the latest version.

Document Format Conventions:

1 Button

Use "square brackets + text (bold)" to denote front panel buttons, such as **[Utility]** for the "Utility" button.

2 Menu

Use "Menu Text (Bold) + Blue" to denote a menu option. For example, "**Advanced**" indicates clicking the "Advanced" option on the instrument's current operation interface to enter the "Advanced" function configuration menu.

3 Operating Steps

Use hyphens and arrows "->" to indicate the next step. For example, **[Channel]-> Channel Label** means clicking the **[Channel]** button followed by clicking the **Channel Label** function key.

4 Button

Label	Button	Label	Button
	Direction key		Home key
	Confirm key		Menu soft key

Table 3-1 Button

Document content conventions:

The DAQ4000A Series Internal Resistance Testers include the following models. Unless otherwise specified, this manual uses the DAQ4070A as an example to illustrate the DAQ4000A Series and its basic operation.

Model	Sampling frequency	Number of channels	Communica-tion Interface	Measurement Item
DAQ4070A/ DAQ4070B	450 Channel/s econd	120	LAN,USB, RS232/485, optional GPIB	Voltage (AC/DC), Current (AC/DC), Resistance (2-wire and 4-wire systems), Strain, Frequency Period, Capacitance, Temperature (10 types of thermocouples/thermistors)
DAQ4080A	450 Channel/s econd	360	LAN,USB, RS232/485, optional GPIB	Voltage (AC/DC), Current (AC/DC), Resistance (2-wire and 4-wire systems), Strain, Frequency Period, Capacitance, Temperature (10 types of thermocouples/thermistors)
DAQ4090A	450 Channel/s econd	600	LAN,USB, RS232/485, optional GPIB	Voltage (AC/DC), Current (AC/DC), Resistance (2-wire and 4-wire systems), Strain, Frequency Period, Capacitance, Temperature (10 types of thermocouples/thermistors)

Table 3-1 Model table

4 Quick Start Guide

4.1 General examination

Inspect shipping packaging

Upon receiving the data collector, please inspect the device according to the following steps: Check for any damage caused during transportation. If you find severe damage to the packaging carton or foam protective padding, retain it until the entire unit and accessories have passed electrical and mechanical testing.

Check the attachment

For details regarding the included accessories, please refer to Appendix A: Models and Accessories at the end of this manual. If any accessories are missing or damaged, please contact the authorized dealer responsible for this product.

Inspect the entire machine

If you notice any damage to the instrument's exterior, abnormal operation, or failure to pass performance testing, please contact the authorized dealer responsible for this product.

4.2 Preparation before use

4.2.1 Connect the power supply

This series of data loggers accepts AC power input with the following specifications: **100–240 VAC** (main power voltage fluctuations must not exceed ±10%), **50/60/400 Hz**, maximum power consumption **75 VA**. Connect the data logger to the power source using the power cord provided in the accessories. Press the power switch in the lower left corner of the front panel to turn on the instrument. If the instrument does not power on, verify that the power cord is securely connected and ensure the instrument is plugged into a live power source.

Warning:

To avoid electric shock, ensure the instrument is properly grounded.

Turn on the instrument

Before connecting the instrument to power, carefully verify that all signal sources

are turned off. Connect the instrument to power to turn it on. Only after the instrument has successfully powered up should you turn on the corresponding signal sources and proceed with subsequent operations. When shutting down the instrument, first turn off the signal sources, then disconnect the power supply. Following this sequence ensures proper instrument operation and minimizes the risk of malfunction. Connect the power cord and communication cable as needed. Press the On/Off switch on the front panel to turn on the instrument.

Turn off the instrument

With the instrument turned on, press the On/Off switch on the front panel to turn off the instrument.

4.2.2 Adjust the handle

To adjust the instrument's handles, grasp the handles on both sides of the instrument and pull outward, then rotate the handles.

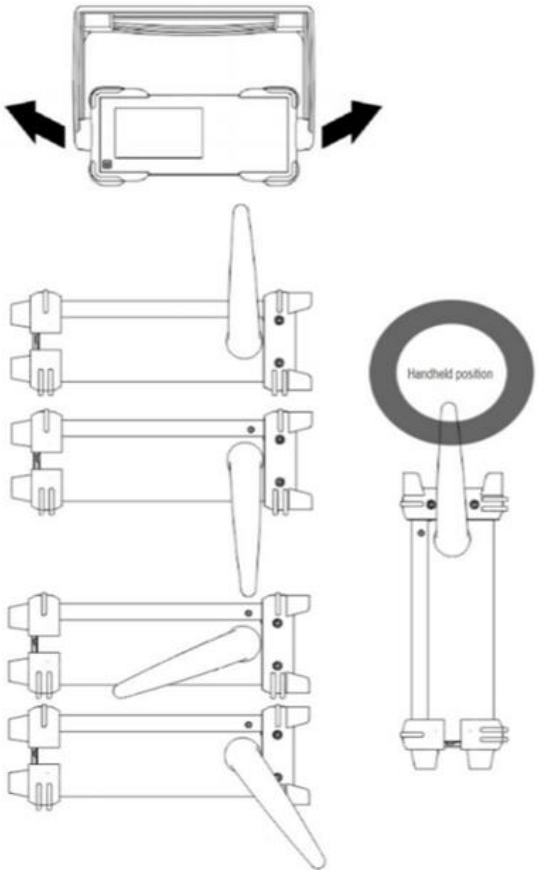


Table 4-1 Adjust the handle

4.3 Module circuit connection installation and removal

- To ensure safety and prevent electric shock accidents, the rated value of the test leads used must be capable of withstanding the highest voltage applied to any channel.
- Before disassembling the module housing, all power supplies connected to external devices linked to the module must be turned off.
- When any channel of the module is connected to a hazardous voltage source, all internal channel wiring must be rated to withstand the highest applied voltage.
- When any channel is connected to a hazardous voltage source, thermocouples connected to any other channel on the module shall be rated to withstand the maximum voltage, or additional insulation shall be added to achieve this rating. Conductive parts shall be isolated using thermal grease or thermal tape rated to withstand the maximum applied voltage.
- When the device under test is connected to the signal source, it is strictly prohibited to install, move, or remove any thermocouples.

4.3.1 Installation module

When connecting wires to the module and installing it on the instrument's rear panel, follow the five steps detailed below in sequence:

1. Align the flathead screwdriver with the latch position on the module housing and push forward. Once the latch is successfully released, lift the housing to separate it from the module. Take care to avoid damaging the module or housing due to improper force during this process.
2. Connect the wires to the corresponding terminals on the module using the correct wiring method. Ensure the connection between the wires and terminals is secure, stable, and makes good contact to prevent loose or intermittent connections.
3. Route the wires through the cable sleeve. During this process, ensure the wires do not become tangled, knotted, or scratched by the sleeve. Maintain a neat and smooth arrangement of the wires within the sleeve.
4. Reinstall the module housing. Ensure the housing is fully seated with all clips, slots, and other connection points securely engaged, enabling the housing to effectively protect the internal circuitry.
5. Mount the module into the instrument (on the rear panel), ensuring it is securely and reliably installed within the instrument to function properly within the overall operational system.

4.3.2 Uninstall module

To remove or replace any module, push the clip located at the rear left of the module inward. Once the clip is fully engaged, grasp the module and gently pull it straight out from the corresponding position on the rear panel.

4.3.3 View instrument information

Press **[Home]** -> **Help** -> **About** to obtain the instrument's system information, including product model, serial number, software details, and board model and version number. Additionally, press the **[?]** key on the front panel to instantly retrieve instrument information.

5 Product Introduction

This chapter introduces the front and rear panels of the data collector.

5.1 Front panel overview (DAQ)

Table 5-1 Front panel

1 Power button

2 USB HOST interface

External storage devices (USB drives) can be connected for saving or loading configuration files, storing data records, capturing screenshots, and more.

3 System information

Retrieve the instrument's system information, including product model, serial number, software details, and board model and version number.

4 Restore default settings

Used to restore the instrument to its factory default settings.

5 LCD display

4.3-inch color TFT LCD display shows the menu and parameter settings for the current function, system status, and prompt messages.

6 Measurement operation menu

Used to initiate the measurement.

7 Measurement configuration menu

Parameters used to configure measurements.

8 Connection terminal

9 DMM/DAQ selector switch

10 Measurement parameter shortcut keys (DMM mode)

11 Directional keys and confirmation key

12 Menu soft key

Each soft key corresponds to an item in the menu above it. Pressing any soft key activates the corresponding menu item.

5.2 Rear panel overview

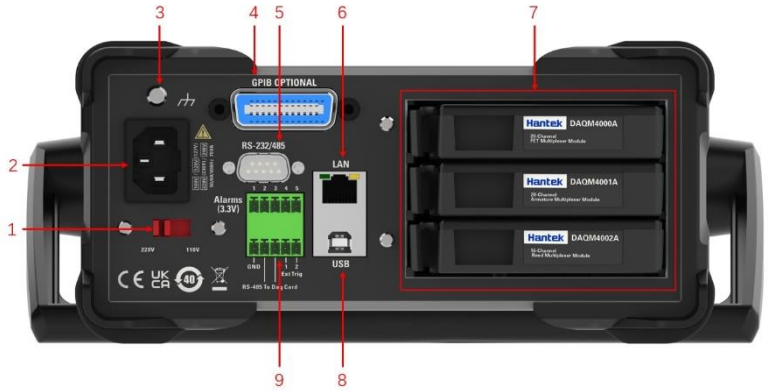


Table 5-2 Rear panel

1 AC selector

2 AC power connector

3 Chassis ground terminal

4 GPIB interface(optional)

5 RS-232/485 interface

6 LAN interface

7 Slot

8 USB device interface

9 Digital I/O

5.3 Front panel menu overview (DAQ)

The table below summarizes the front panel keys and menu structure.

Button	Description
	Press the button lightly to activate scan mode. In this mode, the system will sequentially perform measurement tasks on all enabled channels according to the preset order. To exit scan mode, press and hold the button for 2 seconds.
	Press the button lightly to activate Monitor Mode. In this mode, the system displays real-time measurement data for the selected channel, enabling intuitive viewing of live results. Monitoring channel measurements is primarily used for troubleshooting instrument issues and observing critical signals. You may choose to view monitored measurement data in digital, bar graph, trend graph, or histogram formats. When monitoring is enabled, the key's backlight illuminates. The monitor indicator also displays, and the sampling indicator flashes during monitoring. To exit monitor mode and return to the Home menu page, press this key again on the Monitor menu page.
	Select the data acquisition mode (scan) to use. Configure alarm outputs. Help topic list. Configure various user preferences.
	View scanned memory readings. You can choose from list, trend graph, histogram, or statistics. View the alarm queue. View the error queue.
	Edit channel labels. Toggle the switch on the channel. Select measurement functions and set measurement parameters. Configure advanced measurement features.
	Configure the trigger for each scan.
	Configure the measurement calibration for the current channel (mX+b, %, dBm, or dB).

	Copy the measurement configuration from the selected channel to other channels.
	Configure alarms on the selected channel. This instrument features four configurable alarms.
	Firmware update.
	Overview of the module scan list. View channel switch status. Perform module reset. Add a label to the module.
	File Management Functions. Save and recall instrument state files (with the .sta extension) and preference files (with the .prf extension). Save readings. Save screen images. Perform factory reset and system presets. Record data to a USB drive connected to the front panel. Return the instrument to local control mode when it is in remote mode.

Table 5-3 Front panel menu overview

5.4 Instrument signal identification (DAQ)

Signal device	Description
	A — An alarm exists in the alarm queue. H1234L — A high alarm or low alarm condition has occurred.
	The instrument is in remote mode.
	USB drive icon display
	USB Device Icon Display
	Network icon display

	Monitoring mode is now enabled.

Table 5-4 Instrument signal identification

5.5 Module introduction (DAQ)

The DAQ4000A series is thoughtfully equipped with a comprehensive range of plug-in module options, delivering exceptional measurement, switching, and control capabilities. Plug-in modules communicate efficiently with floating logic modules via an internal isolated digital bus. Multiplexer modules also connect to the internal digital multimeter (DMM) through an internal analog bus. Each module incorporates an independent microprocessor, effectively offloading the host processor's workload. This minimizes backplane communication, significantly boosting data throughput.

DAQM4000A	20-Channel Multiplexer (Solid-State Relay) * Scan speed up to 450 channels/second * 2-wire and 4-wire scanning * Built-in cold-contact technology for 300V switching	The DAQM4000A is a solid-state relay module providing two groups (A/B), each with 10 two-wire channels. All 20 channels can be switched to High (HI) or Low (LO) inputs, providing fully isolated inputs for the built-in digital meter or external potentiometers. During 4-wire resistance measurement, channels in Group A automatically pair with channels in Group B to provide power and sensing connections. The module incorporates built-in cold junction compensation technology, significantly reducing errors caused by thermal variations when measuring thermocouples.
DAQM4001A	20+2 Channel Universal Multiplexer (Armature Relay) * Scan speed up to 80 channels/second * 2-wire and 4-wire scanning * Built-in cold junction compensation * 300V switching * Additional 2 channels for direct current measurement (1A/CH)	The DAQM4001A is a comprehensive multiplexer for universal scanning. A single module can mix 2-wire and 4-wire channels; additionally, two extra current input channels are available for AC and DC current measurements without requiring external shunt resistors (maximum 1A per channel). With 22 channels, dense multifunction switching, and a scan rate of up to 80 channels per second, the DAQM4001A is suitable for a wide range of data acquisition applications.

DAQM4003A	20-Channel Actuator/General-Purpose Switch *SPDT (C-Type) Self-Locking Relay *300V, 1A Excitation and Control	The DAQM4003A features 20 independent single-pole double-throw (SPDT) relays. It can switch power circuits for test subjects, control indicators, and status lights, as well as energize external power relays and solenoids. Combined with matrix and multiplexer modules, it forms custom switching systems. Its 300V, 1A contacts can handle up to 50W of power.
DAQM4004A	4x8 Dual-Wire Matrix * Switching speed: 3ms * 32 dual-wire crosspoints * 300V, 1A switching * Up to 96 crosspoints (3 slots)	The DAQM4004A module provides the most flexible connection path between the device under test (DUT) and the test system, allowing different test instruments to connect simultaneously to multiple points on the DUT. The DAQM4004A can connect rows and columns of multiple modules to build larger matrices, such as 8x8, 4x16, and so on. Up to 96 crosspoints can be constructed within a single instrument.
DAQM4005A	Dual-Channel 4-Way RF Multiplexer (50Ω) *2GHz bandwidth *Includes BNC-to-SMB adapter cable	The DAQM4005A provides broadband switching functionality for high-frequency and pulsed signals. It can be used to route test signals between the device under test and signal generators, oscilloscopes, spectrum analyzers, or other instruments. This module functions as two independent 1x4 multiplexers, each featuring a common shield and a center conductor for switching. Connections can be made directly to SMB inputs with 2GHz usable bandwidth, or to a BNC-to-SMB adapter providing 1GHz bandwidth. For applications requiring larger topologies, multiple switch groups can be cascaded to create a 16:1 multiplexer within a single instrument.
DAQM4008A	40-Channel Single-Ended Multiplexer * Scan speed up to 80 channels per second * Single-wire switching suitable for common-low applications	The DAQM4008A can switch 40 single-wire inputs per module for applications such as battery testing, module characterization, and bench testing. Low-voltage connections are isolated from ground and can be floated up to 300V. The DAQM4008A also supports all 2-wire internal measurements except current.

DAQM4009A	4-channel *800 kSa/s *24-bit	The DAQM4009A is a four-channel digitizer module that provides four synchronous sampling channels with a sampling rate up to 800 kSa/s and a maximum resolution of 24 bits. Input channels can be configured as differential or single-ended inputs. Each channel can supply up to 4 mA of constant current to power external IEPE sensors.
DAQM4014A	8 channels *Scan rate up to 20 channels per second	The maximum input (DC) current is 2A. The DAQM4014A module performs continuous current measurement, ensuring that any interruption in the current path during measurement is extremely brief and does not affect the circuit under test.
DAQM4015A	8 channels *Scan rate up to 15 channels per second	The DAQM4015A is a 1500V high-voltage measurement card capable of measuring maximum input voltages of AC 1100V/DC 1500V, with a current limit of 10mA (1500V). Since the card internally provides equivalent protection up to tens of megohms, additional external current limiting measures are generally unnecessary within the specified voltage range.
DAQM4016A	8 channels *Scan rate up to 15 channels per second	The DAQM4016A is a 2000V high-voltage measurement card capable of measuring maximum input voltages of AC 1500V/DC 2000V, with a current limit of 1mA (at 2000V). Since the card internally provides equivalent protection up to tens of megohms, external current limiting measures are generally unnecessary within the specified voltage range.

Table 5-5 Module feature overview

Switch Module	DAQM4000A	DAQM4001A	DAQM4003A	DAQM4004A	DAQM4005A	DAQM4008A
Number of channels	20	20+2	20(SPDT)	4×8 (2-wire)	Dual 1×4 (50Ω)	40 (1 line)
Scanning speed	450 Channel/ second	80Channel/ second				80Channel/ second
On/Off speed	650Channel/ second	120Channel/ second	120Channel/ second	120Channel/ second	60Channel/ second	120Channel/ second
AC/DC voltage	√	√	×	×	×	√

Temperature - Thermocouple	√	√	×	×	×	×
Temperature 2-Wire RTD	×	√	×	×	×	√
Temperature 4-Wire RTD	×	√	×	×	×	×
Temperature - Thermistor	×	√	×	×	×	√
AC/DC current	×	√	×	×	×	×
Frequency/Period	√	√	×	×	×	√
2-wire resistor	√	√	×	×	×	√
4-wire resistor	√	√	×	×	×	×
Capacitor	×	√	×	×	×	√
Maximum input voltage	300V	300V	300V	300V	42V	300V
Maximum input current	0.02A	1A	1A	1A	0.7A	1A
Input power	2.4W	50W	50W	50W	50W	50W

Switch Module	DAQM4009A	DAQM4011A	DAQM4014A	DAQM4015A	DAQM4016A
Number of channels	4	24	8	8	8
Scanning speed	800k Sampling rate	25Channel/second to 18Channel/second	20Channel/second	15Channel/second	15Channel/second
On/Off speed	800k Sampling rate		120Channel / second		
AC/DC voltage	√	×		√	√
Temperature - Thermocouple		√			
Temperature 2-Wire RTD		×			
Temperature 4-Wire RTD		×			
Temperature - Thermistor		×			

AC/DC current	×	×	√		
Frequency/Period	×	×			
2-wire resistor	×	×			
4-wire resistor	×	×			
Capacitor	×	×			
Maximum input voltage	36V			AC1100V/DC1500V	AC1400V/DC2000V
Maximum input current			DC2A	10mA(1500V)	1mA(2000V)
Input power					

Table 5-6 Module functionality

6 Button Introduction (DAQ)

This chapter provides a detailed introduction to the functions and usage of each button in the data acquisition system.

6.1 [Scan/Start] button

Press the **[Scan/Start]** key on the front panel to initiate any scanning operation or perform a single scan in manual trigger mode. During scanning, the backlight of the **[Scan/Start]** key illuminates. To stop scanning, press and hold the **[Scan/Start]** key for more than 2 seconds. In scan data acquisition mode, "Scan stopped" will display when the operation concludes.

Note: In Scan mode, when the "Log to USB" function in the [Save/Recall] menu is enabled, the instrument will only initiate scanning if it detects a USB drive connected to the front panel USB port.

6.2 [Monitor] menu

In Scan mode, press the **[Monitor]** key to monitor measurement data for the selected channel. When monitoring is enabled, the **[Monitor]** key backlight illuminates and the monitoring indicator displays synchronously; during monitoring, the sampling indicator flashes continuously.

Scan mode supports the following four display formats for monitoring data: Number, Bar Meter, Trend Chart, and Histogram. To configure the display format, press the **Display** soft key to select the desired display mode. The soft keys are shown below.

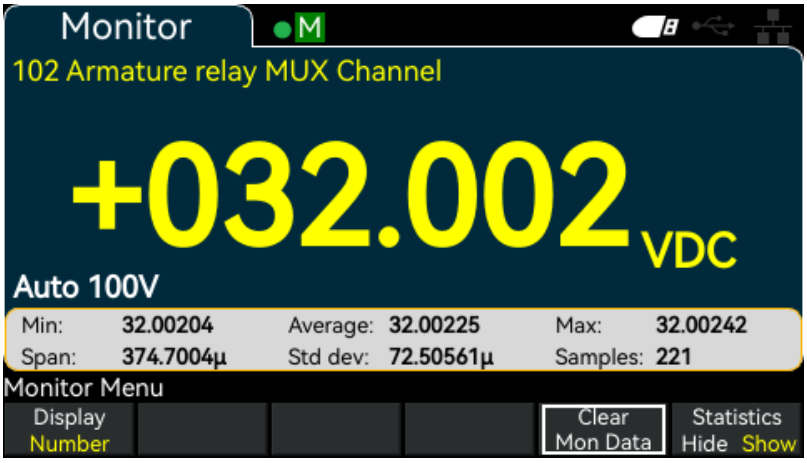


Table 6-1 Monitor menu

6.2.1 Digital

Set the display mode to **Number** to show readings as numeric values.

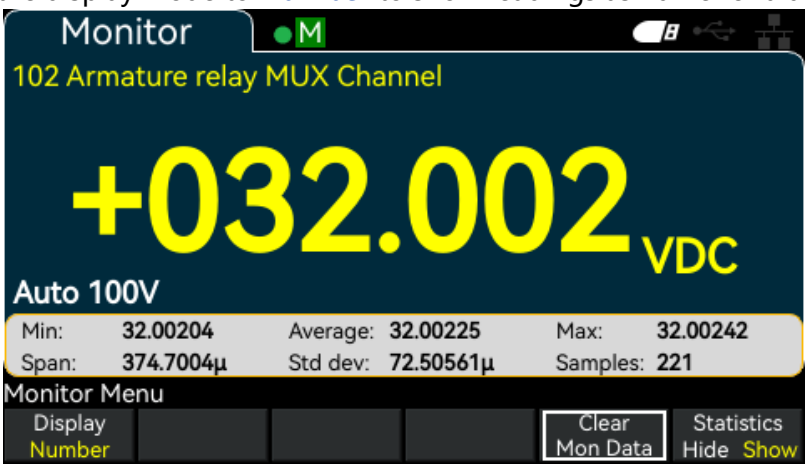


Table 6-2 Monitor-Number

Soft key	Description
Clear Mon Data	Press the **Clear Mon Data** softkey to clear the statistics for the monitored channel. **Note:** The Clear Mon Data softkey will only appear when Statistics is set to Show.
Statistics Hide/Show	Show: Display measurement statistics for the monitoring channel. Hide: Hide measurement statistics for the monitoring channel. **Note:** Monitoring channel statistics will be cleared under the following conditions: when monitoring mode is activated, when the monitoring channel changes, or when the configuration of the monitoring channel changes.

Table 6-3 Monitor-Number meter

6.2.2 Bar meter

Display mode is set to **Bar Meter**, with a moving bar added below the standard digital display.

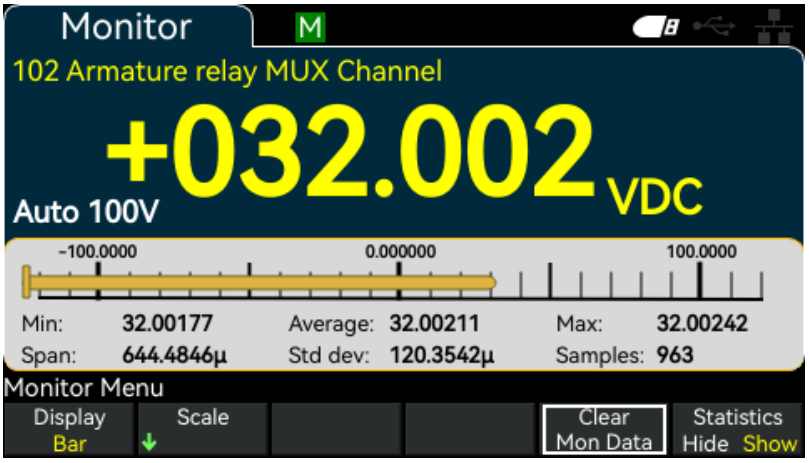


Figure 6-1 Monitor-Bar

Soft key		Description
Scale	Default	Default is used to set the scale to the measurement range.
	Manual	Manual allows you to configure scales as High and Low values, or as a Span centered on a Center value. For example, a scale with a Low value of -100 Ω and a High value of 100 Ω can also be specified as a Span of 200 Ω with a Center value of 0 Ω.
	Limits	Limits are used to set the scale to alarm limits. **Note:** This soft key is only available when an alarm is configured on the selected channel by pressing the **[Alarm]** key on the front panel. Limits are used to set the scale to alarm thresholds.
Clear Mon Data		Press the **Clear Mon Data** softkey to clear the statistics for the monitored channel. **Note:** The Clear Mon Data softkey will only appear when Statistics is set to Show.
Statistics Hide/Show		Press the **Statistics** softkey to hide or display measurement statistics for the monitoring channel. The monitoring channel statistics will be cleared under the following conditions: when monitoring mode is activated, when the monitoring channel changes, or when the configuration of the monitoring channel changes.

Table 6-4 Monitor-Bar meter

6.2.3 Trend chart

Select **Trend Chart** as the display mode to show readings in a trend chart format,

providing an intuitive visualization of how data changes over time.

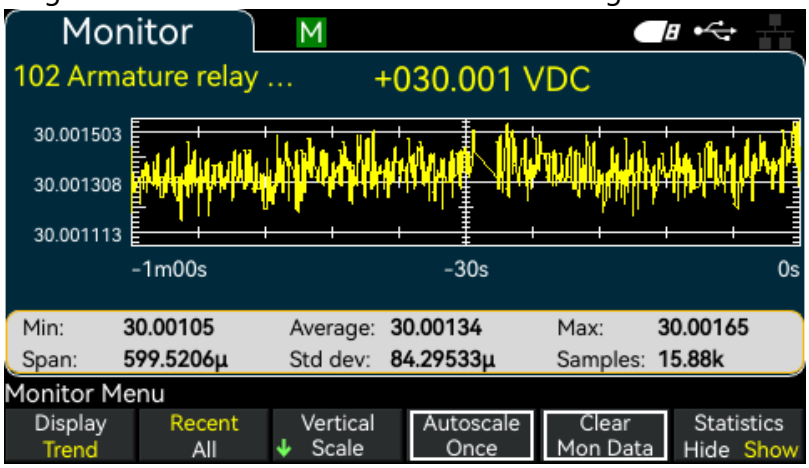


Figure 6-2 Monitor-Trend chart

Soft key		Description
Recent/All		The Recent/All soft keys specify the display range for trend graphs: Selecting "All" shows all measurement results, while selecting "Recent" displays only the latest measurements. Neither mode clears the reading memory. In All mode, the trend graph displays all acquired readings, progressively building from left to right. When the display fills, historical data on the left automatically compresses, with new data continuously added to the right side of the screen. In Recent mode, the trend graph displays only the latest measurement data within the specified time range.
Vertical Scale	Default	Default sets the scale to the measurement range.
	Auto	Auto automatically adjusts the scale based on the line currently displayed on the screen.
	Manual	Manual allows you to configure the scale with High and Low values, or as a Span centered on a Center value. For example, a scale from 0 V Low to 5 V High corresponds to a 2.5 V Center and a 5 V Span.
	Limits	Limits sets the scale to alarm limits. **Note:** This softkey is only available when alarms are configured on the selected channel by pressing the **[Alarm]** key on the front panel.
Autoscale Once		Press the **Autoscale Once** soft key to automatically scale the vertical axis of the trend graph once based on the scanned memory reading displayed on the screen. This also sets the Vertical Scale mode to

Soft key	Description
	Manual.
Clear Mon Data	Press the **Clear Mon Data** softkey to clear the statistics for the monitored channel. **Note:** The Clear Mon Data softkey will only appear when Statistics is set to Show.
Statistics Hide/Show	Press the **Statistics** softkey to hide or display measurement statistics for the monitoring channel. The monitoring channel statistics will be cleared under the following conditions: when monitoring mode is activated, when the monitoring channel is changed, or when the configuration of the monitoring channel is altered.

Table 6-5 Monitor-Bar meter

6.2.4 Histogram

Select **Histogram** display mode to visually represent the distribution of measurement data. Each data set is intuitively displayed as a corresponding bar in the histogram.

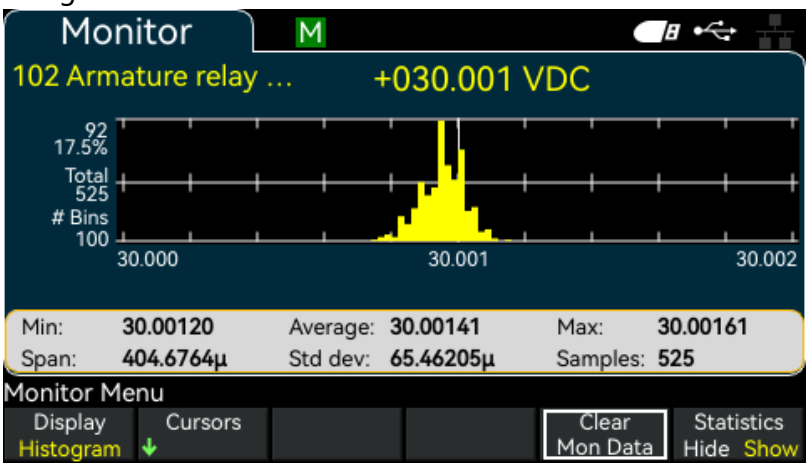


Figure 6-3 Monitor-Histogram

Soft key		Description
Cursors	Cursors Off/On	Press the **Cursors** soft key to enable (On) or disable (Off) the histogram cursors.
	B1	Use the arrow keys to adjust the position of cursor B1 (purple vertical dashed line).
	B2	Use the arrow keys to adjust the position of the B2 cursor (green vertical dashed line).
Clear Mon Data		Press the **Clear Mon Data** softkey to clear statistics related to the monitoring channel.

Soft key	Description
	Note: The Clear Mon Data softkey will only appear when Statistics is set to Show.
Statistics Hide/Show	Press the **Statistics** softkey to hide or display measurement statistics for the monitoring channel. The monitoring channel statistics will be cleared under the following conditions: when monitoring mode is activated, when the monitoring channel changes, or when the configuration of the monitoring channel changes.

Table 6-6 Monitor- Histogram

6.3 [Home] menu

On the Home screen, the main display shows the instrument's current status and an overview of operations. Within the Home menu, you can access the instrument's help information and configure various settings, such as acquisition mode, alarm output, and user settings.

Press the **[Home]** key to access the instrument's Home interface.

Note: When Monitor mode is disabled, the instrument will return to the "Home" menu page.

Figure 6-4 Home screen

6.3.1 Scan mode

Click the **Acquire->Scan**, enter data acquisition mode.

Soft key		Description
Acquire	Scan	Perform continuous scanning and measurement on all configured channels.

Table 6-7 Data acquisition mode

6.3.2 Alarm output

Click **Alarm Out** to configure the four alarm outputs accordingly.

Figure 6-5 Home screen -Alarm out

The digital I/O interface on the rear panel of the instrument features four TTL-compatible alarm outputs. These hardware outputs can trigger external alarm lights and sirens, or transmit TTL-compatible pulses to control systems. Alarms can be assigned to any configured channel, and multiple channels can be assigned to the same alarm number. Each alarm output line represents the logical "or" of all channels assigned to that alarm number—meaning an alarm on any associated channel will send a pulse to that output line.

Soft key		Description
Clear	Alarm 1	Clear the status of alarm 1 output line.
	Alarm 2	Clear the status of alarm 2 output line.
	Alarm 3	Clear the status of alarm 3 output line.
	Alarm 4	Clear the status of alarm 4 output line.
Clear All		Clear the status of all alarm output lines (Alarms 1 through 4).
Mode	Latch	When the Monitor value exceeds the limit, the alarm output is acknowledged and remains in that state. To change the current alarm output status, press the **clear** soft key to clear it.
	Track	When the monitor value exceeds the limit, the alarm output status is confirmed. This confirmed status is maintained only if subsequent readings persistently exceed the limit. When readings return within the limit, the system automatically clears the alarm output status.
Out Alarm	Neg	Configure the alarm output lines (Alarms 1 to 4) to indicate an alarm at 0 V (low level compatible with TTL).

Soft key	Description
Pos	Configure the alarm output lines (Alarm 1 to 4) to indicate alarms at 3.3 V (a high level compatible with TTL).

Table 6-8 Alarm out

6.3.3 Help

Click **Help** -> **About** in sequence to view device information (such as Machine Model, Machine Series, Machine Version, and Machine Version).

6.3.4 User settings

Click **User Settings** to configure user preferences that control how users interact with the instrument. User preferences include [I/O], [Power On], [Display Options], [Date/Time], and [Sounds]. These settings are stored in non-volatile memory and can be saved in a preferences (.prf) file.

6.3.5 I/O

Users can configure remote I/O parameters via LAN, USB, RS232/485, and GPIB (optional) interfaces.

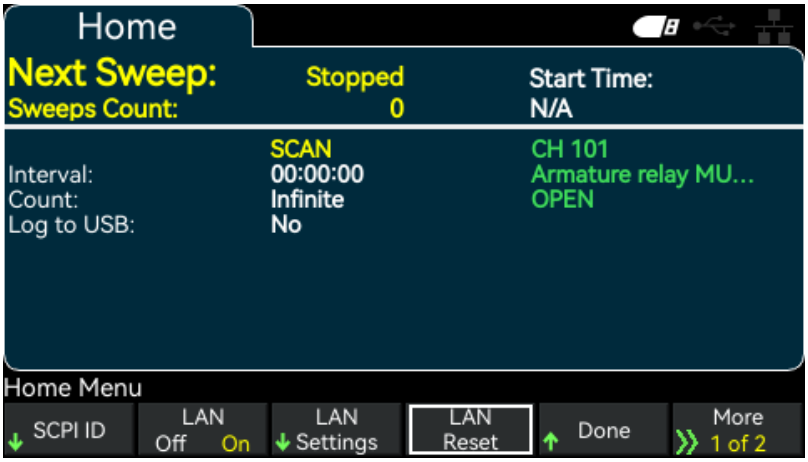


Figure 6-6 Home screen-I/O

Soft key	Description
SCPI ID	SCPI ID identifies the manufacturer and model returned by an identifier query (*IDN? command). Serial numbers and version information remain unaffected.
LAN On/Off	Enable or disable the LAN interface
LAN Setting	Click **LAN Settings** to view the current LAN Status, IP Address, Subnet Mask, and Gateway on the front panel. If the instrument enters remote mode, all LAN changes will be disabled.

Soft key	Description
	Click **Modify Settings** to configure the IP configuration method, IP address, subnet mask, and gateway. Select **Manual** to manually configure the key parameters required for network operation. Select **DHCP** to automatically obtain the key parameters required for network operation from a DHCP server (such as a router or gateway). Click **IP Address** to enter a static IP address for the device in the format of four decimal integers separated by periods. Each byte is a decimal value without leading zeros (e.g., 192.168.1.127). Click **Subnet Mask** to configure a subnet mask in four decimal-separated bytes, used to distinguish network bits from host bits within the IP address (e.g., 255.255.255.0). Click **Gateway** to configure the gateway address as a four-byte integer separated by periods, serving as the entry/exit point for data transmission between different networks (e.g., 0.0.0.0).
LAN Reset	Please refer to the LAN reset.
USB Setting	Click **Show USB ID** to display the USB address string.
Baud	Set the baud rate. Available baud rates are 9600, 19200, 38400, and 57600.
GPIB (Optional)	Set the GPIB address. The address range that can be set is from 1 to 30.

Table 6-9 I/O parameter settings

Note: After completing certain LAN settings, a restart may be required to activate the configuration. If this is the case, the instrument will briefly display a prompt message. Therefore, carefully monitor the display when modifying LAN settings.

6.3.6 Power on

Press **[Home]** -> **User Settings** -> **Power On** to configure the power-on state and power-on message.

Soft key		Description
Power On	Last	The instrument automatically saves the status prior to shutdown. Upon restarting, the data acquisition system will automatically restore the status from before the previous shutdown.
	Factory Defaults	After powering on, the instrument will automatically restore to its factory default settings.

Soft key	Description
Power On Message	Power On Message is used to set the message displayed when the instrument is powered on and when you press **[Home]->Help->About**. Use the front panel arrow keys and the **[OK]** key to select letters. Then press **Done** to exit and save the message.

Table 6-10 Power on settings

6.3.7 Display options

Figure 6-7 Home interface-Display options

Click **Display Options** to configure the instrument's display.

Click **Display** to enable or disable the screen display. If you turn off the display, press any key on the front panel to turn it back on.

Click **Brightness** to adjust the screen display brightness (10% to 100%).

Click **Colors** to select the screen display scheme.

Click **Scrn Svr** to enable or disable the screen saver. By default, the screen saver dims the display after prolonged inactivity to extend the display's lifespan.

6.3.8 Date/Time

Tap **Date/Time** to set the date and time (in 24-hour format). Use the arrow keys to set the year, month, day, hour, and minute.

6.3.9 Sounds

Click **Sounds** to configure the buzzer and keypress sounds.

6.4 [View] menu

Press **[View]** on the front panel to view scanned memory readings, the alarm

queue, or the error queue.

Figure 6-8 View interface

Note: The options in the **[View]** menu depend on the data acquisition mode selected in the **[Home]** menu (**[Home]** -> **Acquire** -> **Scan**).

6.4.1 [View] menu in scan mode

Select Display Mode

Press the **Display** soft key to select the display mode. Display modes include List, Trend Chart, Histogram, and Statistics.

List

Click **Display**->**List** in sequence to display scanned memory readings in list format. Use the up and down arrow keys to scroll through readings on different pages. Press the left arrow key to return the list to the first page, and press the right arrow key to jump to the last page.

Figure 6-9 List interface

Soft key		Description
Browse	First Page	Press the **First Page** soft key to return the scan list to the first page.

Soft key		Description
	Last Sweep	Press the **Last Sweep** soft key to display the reading from the most recent scan.

Table 6-11 Browse menu

Trend Chart

Click **Display->Trend Chart** in sequence to display scanned memory readings in trend chart format. To configure the trend chart, press the **Settings** softkey to display the trend chart settings menu.

Soft key		Description
Vertical Scale	Default	Used to set the scale to the measurement range.
	Auto	The scale automatically adjusts according to the line currently displayed on the screen.
	Manual	Allows you to configure the scale as High and Low values, or as a Span centered around a Center value. For example, a scale ranging from 0 V Low to 10 V High corresponds to a 5 V Center and a 5 V Span.
Autoscale Once		Press the Autoscale Once softkey to automatically scale the vertical axis of the trend graph once based on the scanned memory reading displayed on the screen. When **Autoscale Once** is pressed, the Vertical Scale mode automatically switches to Manual.
Advanced	Pan	Press the **Pan** soft key to scroll the memory reading displayed on the screen. Each press of the directional key moves the cursor one display pixel. **Note:** The number of pixels displayed for data varies depending on the zoom level.
	Zoom	Press the **Zoom** soft key and use the up/down arrow keys to select the zoom level (expressed as a percentage). The zoom percentage for the trend graph can be configured to 0.1%, 0.2%, 0.5%, 1%, 2%, 5%, 10%, 20%, 50%, 100%, 200%, 500%, or 1000%. **Note:** To pan one reading at a time, set the zoom level to 1000%.
	Cursors	Display and control the X1, X2, Y1, Y2, and trace cursors (displayed as lines) on the trend graph. The X cursor is a vertical line along the sample or time axis, while the Y cursor is a horizontal line along the measurement (amplitude) axis. Press the **Off** softkey to disable the displayed

Soft key		Description
		cursors. Press the **X Only** softkey to display the X1 and X2 cursors. Press the **X1** or **X2** softkey and use the arrow keys to adjust the cursor position along the X-axis (time). To maintain a fixed distance between the X1 and X2 cursors, press the **ΔX Lock** softkey to toggle it to "On". The value of each point and the change between two points are displayed below the trend graph. Press the **Y Only** softkey to display the Y1 and Y2 cursors. Press the **Y1** or **Y2** softkey and use the arrow keys to adjust the cursor position along the Y-axis (amplitude). To maintain a fixed distance between the Y1 and Y2 cursors, press the **ΔY Lock** softkey to toggle it to "On". To set the Y1 or Y2 cursor to a value that places it within the trend graph view, press the Y1 or Y2 softkey, then press the Place Yn on Screen softkey. The value of each point and the change between two points are displayed below the trend graph. Press **Track Reading at X** to view the time and amplitude values of any two points on the trend graph. First, use the X1 and X2 softkeys to select two readings, placing the X1 and X2 cursors along the time axis at the relevant points. The Y1 and Y2 cursors will automatically track the positions of the X1 and X2 cursors respectively, displaying the amplitude axis values for each. The value at each point and the change between the two points are displayed below the trend graph. You can also toggle the ΔX Lock softkey to keep the X1 and X2 cursors at a fixed distance.
	Reset Pan	Press the **Reset Pan** soft key to set the center reading to "0".

Table 6-12 Trend chart menu

Histogram

Click **Display->Histogram** in sequence to display the scanned memory readings in histogram format.

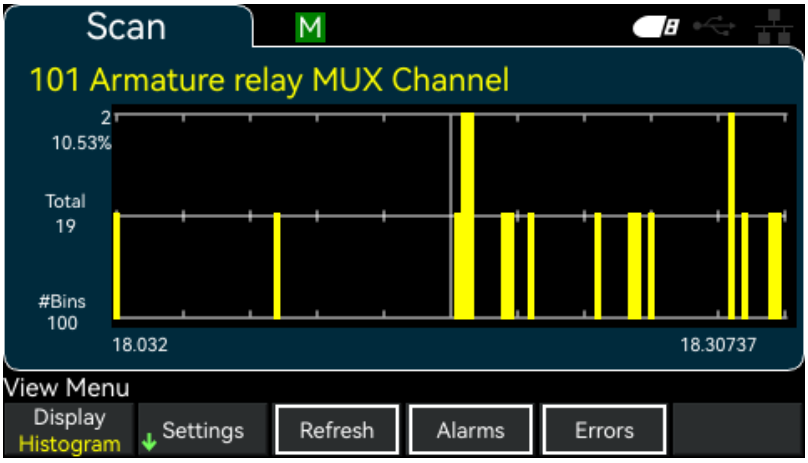


Figure 6-10 Histogram interface

Press the **Settings** soft key to access the cursor menu.

Soft key		Description
Cursors	Cursors Off/On	Press the **Cursors** soft key to enable (On) or disable (Off) the histogram cursor.
	B1	Use the arrow keys to adjust the position of the B1 cursor (purple vertical dashed line).
	B2	Use the arrow keys to adjust the position of the B2 (green vertical dashed line) cursor.

Table 6-13 Cursors menu

Press the **Refresh** soft key to recalculate the histogram, including the new readings.

Statistical Information

Click **Display->Statistics** in sequence to display scanned memory readings for the selected channel in statistical formats (Maximum, Minimum, Peak-to-Peak, Average, and Standard Deviation). Selecting **Statistics** displays statistics for each channel, while selecting **Pk Times** shows the occurrence times of the minimum and maximum peak readings for each channel.

View the alert queue

Click **[View]->Alarms** to display the alarm queue, including readings and timestamps. To view the alarm queue, first configure alarm limits for the selected channel using the **[Alarm]** key on the front panel. For details, refer to the **[Alarm]** menu.

View Error Queue

Click **[View]->Errors** to display the error queue. After reading the errors, the error indicator will clear. When the front panel error indicator (ERR) illuminates, it indicates that one or more command syntax, execution, or hardware errors have been detected.

6.5 [Channel] menu

Multiplexing Module: Supports multiple common measurement functions. You can configure the measurement function on the selected channel by pressing **[Channel]->Measure**.

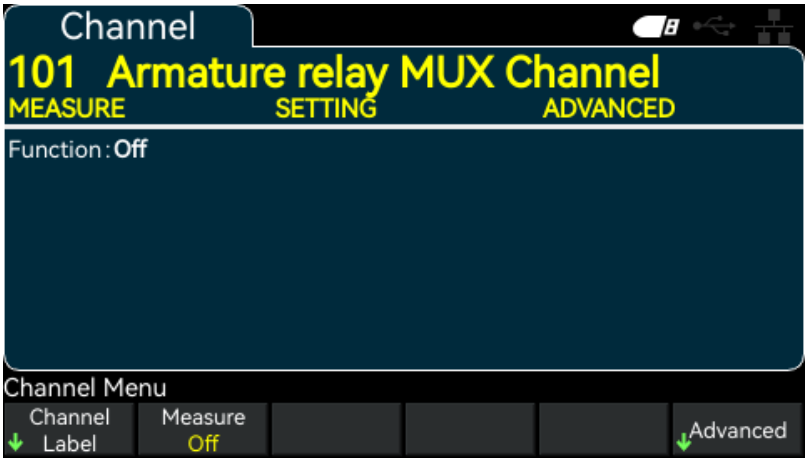


Figure 6-11 Channel interface

In Scan data acquisition mode, selecting Off indicates that the measurement function is disabled for the currently selected channel.

6.5.1 Temp

This section describes how to configure the selected channel for temperature measurement. Temperature measurement requires the use of a temperature transducer probe. Supported probes include thermocouples, thermistors, and resistance temperature detectors (RTDs).

Thermocouple

1. Connect the thermocouple to the module's terminals.

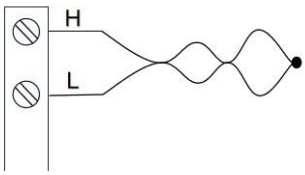


Figure 6-12 Thermocouple wiring diagram

2. Press **[Channel]->Measure**, then select TEMP from the menu.
3. Press the **Units** softkey to specify the temperature measurement unit as °C (Celsius), °F (Fahrenheit), or K (Kelvin). You may use different temperature units on the same instrument and on different channels within the same module.
4. Press **Sensor Settings->Sensor**, specify the type of frequency converter probe to be used as TCouple, then press the **Type** softkey to select the thermocouple

type. Supported types include J (default), K, E, T, N, R, B, and S.

5. Press the **Integrated** soft key to select whether the measurement integration time is specified in terms of power line cycle periods (NPLC). Only 1, 10, and 100 PLCs enable common-mode (power-frequency noise) suppression. Selecting 100 PLCs provides optimal noise suppression and resolution but results in the slowest measurement speed.

Soft key		Description
Integrate	NPLC	Set the integration time to 0.02, 0.2, 1, 10, and 100 power line cycles (PLC). Only 1 PLC and longer durations achieve common-mode (power-frequency noise) suppression. Selecting 100 PLC provides optimal noise suppression and resolution.

Table 6-14 Integrate menu

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key		Description
Auto Zero Off/On		Auto Zero provides the most accurate measurement results but requires additional measurement time to perform the zero measurement. When Auto Zero is enabled (On), the instrument internally measures the offset after each measurement. It then subtracts this measured value from the preceding reading. This prevents offset voltage present in the instrument's input circuitry from affecting measurement accuracy. When Auto Zero is disabled (Off), the instrument measures the offset once and subtracts this offset from all subsequent measurements. A new offset measurement is taken whenever you change the function, range, or integration time.
Reference	Internal External Fixed	Thermocouple measurements require specifying the reference junction temperature. You can enter a known fixed reference junction temperature (typically used for external reference junctions), use the module's internal measurement temperature as the reference junction temperature, or use an external thermistor or RTD measurement. Select the reference junction source as Internal, External, or Fixed.
Open Check Off/On		Enable (On) or disable (Off) the thermocouple check function, which verifies that the thermocouple is correctly connected for measurement. When enabled, the instrument performs resistance measurements at various temperature conditions to

Soft key	Description
	check for open circuits. If an open circuit is detected, the result will display as "+Overload". Without this check, measurements on an open circuit may produce voltage readings close to zero, resulting in invalid temperature readings. **Note:** This setting is only available when Scan is selected as the acquisition mode.
Delay Auto/Time	Set the delay between channels in the scan list to either Auto or Manual. If Auto is selected, the instrument will automatically determine the channel delay based on the measurement function, range, integration time, and AC filter settings. If Time is selected, a specified delay (in milliseconds) will be inserted between the relay closing and the actual measurement on each channel, in addition to any inherent delay caused by the relay settling time. **Note:** This setting is only available when Scan is selected as the capture mode.

Table 6-15 Advanced menu

2-wire and 4-wire thermistors

Note: This feature is only available when Scan is selected as the capture mode.

1. Connect the thermistor to the module's terminals.

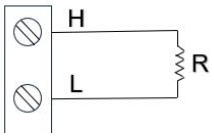


Figure 6-13 2-Wire thermistor

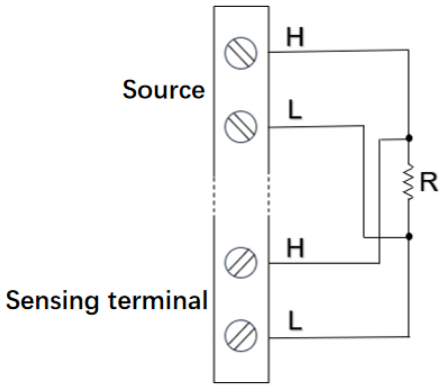


Figure 6-14 4-Wire thermistor

2. Press **[Channel]->Measure**, then select TEMP from the selection menu.
3. Press the **Units** softkey to specify the temperature measurement unit as °C (Celsius), °F (Fahrenheit), or K (Kelvin). You may use different temperature units on the same instrument and on different channels within the same module.
4. Press **Sensor Settings->Sensor,** then select Therm. Next, toggle the 2-Wire/4-Wire soft key to specify the inverter probe type for a 2-wire or 4-wire Therm. Then press the **Type** soft key to select the thermistor type. Supported types include 2.2K, 5K (default), and 10K.
5. **Use as ref** to enable (On) or disable (Off) the currently selected channel as the reference channel for thermocouple measurements using a specified external reference source.
6. Press the **Integrate** soft key to select whether the measurement integration time is specified in terms of power line cycle periods (NPLC). Only 1, 10, and 100 PLCs enable common-mode (power-frequency noise) suppression. Selecting 100 PLCs provides optimal noise suppression and resolution but results in the slowest measurement speed.

Soft key		Description
Integrate	NPLC	Set the integration time to 0.02, 0.2, 1, 10, and 100 power line cycles (PLC). Only 1 PLC and longer durations achieve common-mode (power frequency noise) suppression. Selecting 100 PLC provides optimal noise suppression and resolution.

Table 6-16 Integrate menu

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key	Description
Auto Zero Off/On	Auto Zero provides the most accurate measurement results but requires additional measurement time to perform the zero measurement. When Auto Zero is enabled (On), the instrument internally measures the offset after each measurement. It then subtracts this measured value from the preceding reading. This prevents offset voltage present in the instrument's input circuitry from affecting measurement accuracy. When Auto Zero is disabled (Off), the instrument measures the offset once and subtracts it from all subsequent measurements. A new offset measurement is taken whenever you change the function, range, or integration time. (Auto Zero is not available for 4-wire measurements.)
Low Power Off/On	Select low-power resistance measurement. This yields a smaller current, resulting in lower power dissipation and reduced self-heating effects for the resistor under test. Typically, this current is approximately one-tenth of that

Soft key	Description
	obtained during standard resistance measurements. The approximate current for each measurement range will be displayed at the bottom of the resistance range soft key, e.g., (~1 mA).
Delay Auto/Time	Select whether channel delays in the scan list are determined automatically or manually. If Auto is selected, the instrument will automatically determine channel delays based on the measurement function, range, integration time, and AC filter settings. If Time is selected, a specified delay (in seconds) will be inserted between relay closure and the actual measurement on each channel, in addition to any inherent delays caused by relay settling time.

Table 6-17 Advanced settings menu

2-wire and 4-wire RTD

1.Connect the RTD to the module's terminals.

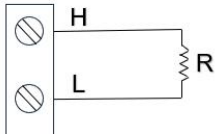


Figure 6-15 2-Wire RTD

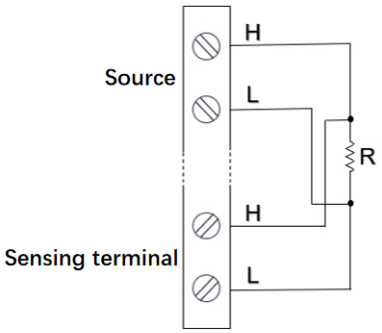


Figure 6-16 4-Wire RTD

2. Press **[Channel]->Measure**, then select TEMP from the selection menu.
3. Press the **Units** softkey to specify the temperature measurement unit as °C (Celsius), °F (Fahrenheit), or K (Kelvin). You may use different temperature units on the same instrument and on different channels within the same module.
4. Press **Sensor Settings->Sensor**, then select RTD. Next, toggle the 2-Wire/4-Wire soft key to specify the inverter probe type as either a 2-wire or 4-wire RTD. Then, toggle the PT100/PT1000 softkey to select the nominal resistance R0 as

either PT100 (100 Ω) or PT1000 (1000 Ω). R0 is the RTD's nominal resistance at 0° C.

Soft key		Description
Integrate	NPLC	Set the integration time to 0.02, 0.2, 1, 10, and 100 power line cycles (PLC). Only 1 PLC and longer durations achieve common-mode (power-frequency noise) suppression. Selecting 100 PLC provides optimal noise suppression and resolution.

Table 6-18 Integrate menu

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key	Description
Auto Zero Off/On	Auto Zero provides the most accurate measurement results but requires additional measurement time to perform the zero measurement. When Auto Zero is enabled (On), the instrument internally measures the offset after each measurement. It then subtracts this measured value from the preceding reading. This prevents offset voltage present in the instrument's input circuitry from affecting measurement accuracy. When Auto Zero is disabled (Off), the instrument measures the offset once and subtracts it from all subsequent measurements. A new offset measurement is taken whenever you change the function, range, or integration time. (Auto Zero is not available for 4-wire measurements.)
OffstComp	Offset compensation eliminates the effects of small DC voltages in the measurement circuit. This is achieved by performing two resistance measurements: one with the current source set to its normal value and another with the current source set to a lower value. The difference between the two measurements is then taken.
Low Power Off/On	Select low-power resistance measurement. This yields a smaller current, resulting in lower power dissipation and reduced self-heating effects in the resistor under test. Typically, this current is approximately one-tenth of that obtained during standard resistance measurements. The approximate current for each measurement range will be displayed at the bottom of the resistance range soft key, e.g., (~1 mA).
Delay Auto/Time	Set the delay between channels in the scan list to either Auto or Manual. If Auto is selected, the instrument will automatically determine the channel delay based on the measurement function, range, integration time, and AC filter

Soft key	Description
	settings. If Time is selected, a specified delay (in milliseconds) will be inserted between the relay closing and the actual measurement on each channel, in addition to any inherent delay caused by the relay settling time.

Table 6-19 Integrate menu

6.5.2 STRAIN

This section describes how to configure selected channels for strain measurement via the front panel. When force is applied to an object, it deforms. The deformation per unit length is called strain (ε). Strain can refer to tensile strain (+) or compressive strain (-). The DAQ4070A supports two types of strain measurement: bridge configuration and direct resistance measurement.

Bridge Configuration

This section describes how to configure selected channels for full-span and half-span bridge strain gauge measurements.

Full Banding

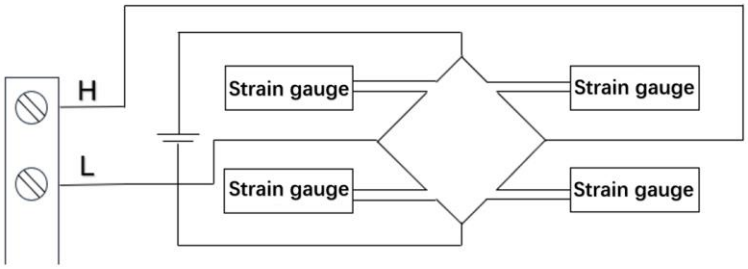


Figure 6-17 Full banding

Half Banding

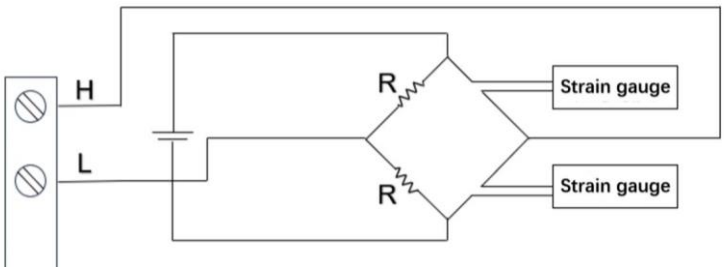


Figure 6-18 Half banding

1. Connect the bridge configuration source to the module's terminal block.
2. Press **[Channel]->Measure**, then select Strain from the dropdown menu.
3. Press **Range** and use the menu soft keys to specify the measurement range. Auto (automatic range adjustment) will automatically select the measurement

range based on the input. Compared to manual ranging, automatic range adjustment is more convenient but results in slower measurement speeds. Automatic range adjustment can increase up to 120% of the current range and decrease to below 10% of the current range.

4. Under **Sense Settings->Sense**, the default is Bridge.

5. Press **Config**, select Full or Half, and specify the strain measurement method as full bridge or half bridge in the bending configuration.

6. Press **Gage Settings**, then use the directional keys and confirmation key to specify various strain gauge settings.

Soft key	Description
Gage Factor	The instrumentation coefficient refers to the ratio of the small change in resistance to the small change in length (strain) along the axis of the strain gauge. The higher the value, the more sensitive the strain gauge. The instrumentation coefficient is a dimensionless quantity. Typical values are approximately 2.
Excitation Voltage	Use the front panel direction keys to specify the fixed excitation voltage applied to the bridge by an external voltage source. This value will be used to convert strain bridge measurements on the selected channel.

Table 6-20 Gage settings menu

7. Press the **Integrate Settings** soft key to select whether the measurement integration time is specified in terms of power line cycle periods (NPLC) or directly in seconds (Time). Only 1, 10, and 100 PLCs enable common-mode (power frequency noise) suppression. Selecting 100 PLCs provides optimal noise suppression and resolution but results in the slowest measurement speed.

Soft key		Description
Integrate	NPLC	Set the integration time to 0.02, 0.2, 1, 10, and 100 power line cycles (PLC). Only 1 PLC and longer durations achieve common-mode (power frequency noise) suppression. Selecting 100 PLC provides optimal noise suppression and resolution.

Table 6-21 Integrate menu

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key	Description
Auto Zero Off/On	Auto Zero provides the most accurate measurement results but requires additional measurement time to perform the zero measurement. When Auto Zero is enabled (On), the instrument internally measures the offset after each measurement. It then subtracts this measured value from the preceding reading. This prevents offset voltage present in the instrument's input

Soft key	Description
	circuitry from affecting measurement accuracy. When Auto Zero is disabled (Off), the instrument measures the offset once and subtracts it from all subsequent measurements. A new offset measurement is taken whenever you change the function, range, or integration time. (Auto Zero is not available for 4-wire measurements.)
Delay Auto/Time	Set the delay between channels in the scan list to either Auto or Manual. If Auto is selected, the instrument will automatically determine the channel delay based on the measurement function, range, integration time, and AC filter settings. If Time is selected, a specified delay (in milliseconds) will be inserted between the relay closing and the actual measurement on each channel, in addition to any inherent delay caused by the relay settling time.

Table 6-22 Advanced menu

Quarter-bridge arrangement

This section describes how to configure the selected channel for a quarter-bridge strain gauge measurement.

Quarter Bridge

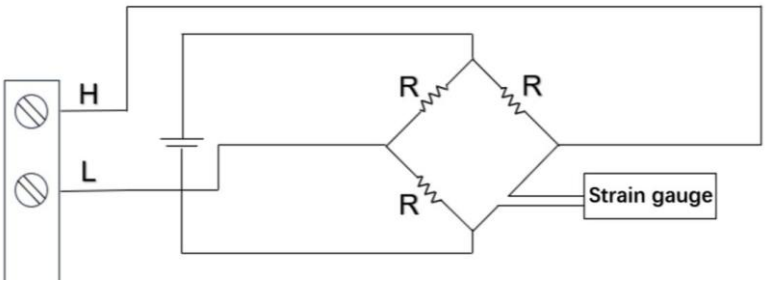


Figure 6-19 Quarter bridge

1. Connect the bridge configuration source to the module's terminals.
2. Press **[Channel]->Measure**, then select STRAIN from the dropdown menu.
3. Press **Range** and use the rotary knob or front panel arrow keys to specify the measurement range. Auto (automatic range adjustment) will automatically select the measurement range based on the input. Compared to manual ranging, automatic range adjustment is more convenient but may result in slower measurement speeds. Automatic range adjustment can increase up to 120% of the current range and decrease to below 10% of the current range.
4. Under **Sense Settings -> Sense**, the default is Bridge.
5. Press **Config**, select Quarter, and specify the strain measurement method as a quarter-bridge configuration.

6. Press **Gage Settings,** then use the directional keys and confirmation key to specify various strain gauge settings.

Soft key	Description
Gage Factor	The instrumentation coefficient refers to the ratio of the small change in resistance to the small change in length (strain) along the axis of the strain gauge. The higher the value, the more sensitive the strain gauge. The instrumentation coefficient is a dimensionless quantity. Typical values are approximately 2.
Excitation Voltage	Use the front panel direction keys to specify the fixed excitation voltage applied to the bridge by an external voltage source. This value will be used to convert strain bridge measurements on the selected channel.

Table 6-23 Gage settings menu

Direct Resistance Method

This section describes how to configure selected channels for 2-wire and 4-wire direct strain gauge measurements. The measurement configuration is identical for both 2-wire and 4-wire direct strain measurements.

2-Wire direct strain

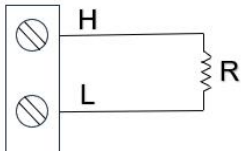


Figure 6-20 2-Wire direct strain

4-Wire direct strain

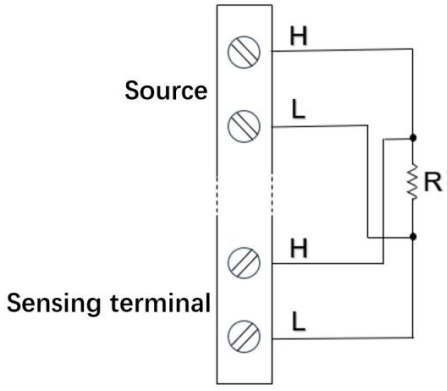


Figure 6-21 4-Wire direct strain

The following describes the measurement method for configuring a 2-wire direct strain gauge.

1. Connect the direct resistance source to the module's terminals.

2. Press **[Channel]->Measure**, then select STRAIN from the selection menu.
3. Under **Sense Settings->Sense**, specify the strain measurement method as 2-wire or 4-wire direct strain.
4. Press **Gage Settings**, then use the directional keys and confirmation key to specify various strain gauge settings.

Soft key	Description
Gage Factor	The instrumentation coefficient refers to the ratio of the small change in resistance to the small change in length (strain) along the axis of the strain gauge. The higher the value, the more sensitive the strain gauge. The instrumentation coefficient is a dimensionless quantity. Typical values are approximately 2.
Gage Ohms	The strain gauge resistance used to convert direct strain measurements on the selected channel.

Table 6-24 Gage settings menu

5. Press the **Integrate Settings** soft key to select whether to specify the measurement integration time in terms of power line cycle periods (NPLC) or directly in seconds (Time). Only 1, 10, and 100 PLCs enable common-mode (power frequency noise) suppression. Selecting 100 PLCs provides optimal noise suppression and resolution but results in the slowest measurement speed.

Soft key		Description
Integrate	NPLC	Set the integration time to 0.02, 0.2, 1, 10, and 100 power line cycles (PLC). Only 1 PLC and longer durations achieve common-mode (power-frequency noise) suppression. Selecting 100 PLC provides optimal noise suppression and resolution.

Table 6-25 Integrate settings menu

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key	Description
Auto Zero Off/On	Auto Zero provides the most accurate measurement results but requires additional measurement time to perform the zero measurement. When Auto Zero is enabled (On), the instrument internally measures the offset after each measurement. It then subtracts this measured value from the preceding reading. This prevents offset voltage present in the instrument's input circuitry from affecting measurement accuracy. When Auto Zero is disabled (Off), the instrument measures the offset once and subtracts it from all subsequent measurements. A new offset measurement is taken whenever you change the function, range, or integration time. (Auto

Soft key	Description
	Zero is not available for 4-wire measurements.)
Delay Auto/Time	Set the delay between channels in the scan list to either Auto or Manual. If Auto is selected, the instrument will automatically determine the channel delay based on the measurement function, range, integration time, and AC filter settings. If Time is selected, a specified delay (in milliseconds) will be inserted between the relay closing and the actual measurement on each channel, in addition to any inherent delay caused by the relay settling time.

Table 6-26 Advanced menu

6.5.3 DCV

This section describes how to configure the selected channel for DC voltage measurement.

DC voltage

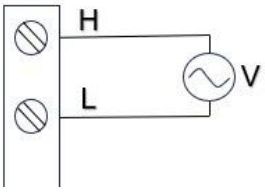


Figure 6-22 DC voltage

1. Connect the voltage source to the module's terminals.
2. Press **[Channel]->Measure**, then select DCV from the selection menu.
3. Press **Range** and use the menu soft keys to specify the measurement range. Auto (automatic range adjustment) will automatically select the measurement range based on the input. Compared to manual ranging, automatic range adjustment is more convenient but may result in slower measurement speeds. Automatic range adjustment can increase up to 120% of the current range and decrease to below 10% of the current range.
4. Press the **Integrate Settings** softkey to select whether the measurement integration time is specified in terms of power line cycle periods (NPLC) or directly in seconds (Time). Only 1, 10, and 100 PLCs enable common-mode (power frequency noise) suppression. Selecting 100 PLCs provides optimal noise suppression and resolution but results in the slowest measurement speed.

Soft key		Description
Integrate	NPLC	Set the integration time to 0.002, 0.02, 0.2, 1, 10, and 100 power line cycles (PLC). Only 1 PLC or longer durations achieve common-mode (power-frequency noise) suppression. Selecting 100 PLC provides optimal noise suppression and resolution.

Table 6-27 Integrate menu

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key	Description
Auto Zero Off/On	Auto Zero provides the most accurate measurement results but requires additional measurement time to perform the zero measurement. When Auto Zero is enabled (On), the instrument internally measures the offset after each measurement. It then subtracts this measured value from the preceding reading. This prevents offset voltage present in the instrument's input circuitry from affecting measurement accuracy. When Auto Zero is disabled (Off), the instrument measures the offset once and subtracts it from all subsequent measurements. A new offset measurement is taken whenever you change the function, range, or integration time. (Auto Zero is not available for 4-wire measurements.)
Input Z 10M/Auto	Specify the input impedance for the measurement terminals, which can be either 10 MΩ (10M) or high impedance (Auto). In "Auto" mode, high impedance (>10 GΩ) is selected for the 100 mV, 1 V, and 10 V ranges, while 10 MΩ is selected for the 100 V and 300 V ranges. **Note:** This setting is only available when Scan is selected as the acquisition mode.
Delay Auto/Time	Set the delay between channels in the scan list to either Auto or Manual. If Auto is selected, the instrument will automatically determine the channel delay based on the measurement function, range, integration time, and AC filter settings. If Time is selected, a specified delay (in milliseconds) will be inserted between the relay closing and the actual measurement on each channel, in addition to any inherent delay caused by the relay settling time.

Table 6-28 Advanced menu

6.5.4 ACV

This section describes how to configure the selected channel for AC voltage measurement.

AC voltage

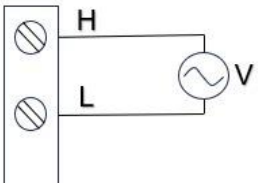


Figure 6-23 AC voltage

Note: The AC voltage measurement option is only available when Scan is selected as the acquisition mode.

1. Connect the AC voltage source to the module's terminals.
2. Press **[Channel]->Measure**, then select ACV from the selection menu.
3. Press **Range** and use the rotary knob or front panel arrow keys to specify the measurement range. Auto (automatic range adjustment) will automatically select the measurement range based on the input. Compared to manual ranging, automatic range adjustment is more convenient but may result in slower measurement speeds. Automatic range adjustment can increase up to 120% of the current range and decrease to below 10% of the current range.

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key	Description
AC Filter	Set the required AC filter. Available AC filter options are 3 Hz, 20 Hz, and 200 Hz. This instrument employs three distinct AC filters, allowing you to optimize low-frequency accuracy or achieve AC stability more rapidly after changes in input signal amplitude. You should generally select the highest frequency filter that is lower than the frequency of the signal being measured, as higher filter frequencies result in faster measurement speeds. For example, when measuring signals between 20 Hz and 200 Hz, use the 20 Hz filter. If measurement speed is not a concern, selecting a lower frequency filter may yield quieter measurements, depending on the specific signal being measured.
Delay Auto/Time	Set the delay between channels in the scan list to either Auto or Manual. If Auto is selected, the instrument will automatically determine the channel delay based on the measurement function, range, integration time, and AC filter settings. If Time is selected, a specified delay (in milliseconds) will be inserted between the relay closing and the actual measurement on each channel, in addition to any inherent delay caused by the relay settling time.

Table 6-29 Advanced menu

6.5.5 DCI

This section describes how to configure the selected channel for DC current measurement.

Note: Before taking measurements, please verify whether the board supports DC current measurement.

Direct current

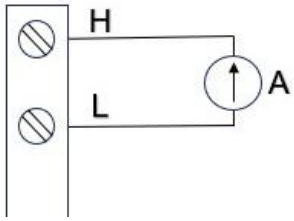


Figure 6-24 Direct current

1. Connect the DC current source to the module's terminals.
2. Press **[Channel]->Measure**, then select DCI from the selection menu.
3. Press **Range** and use the menu soft keys below the display to specify the measurement range. Auto (automatic range adjustment) will automatically select the measurement range based on the input. Compared to manual ranging, automatic range adjustment is more convenient but results in slower measurement speeds. Automatic range adjustment can increase up to 120% of the current range and decrease to below 10% of the current range.
4. Press the **Integrate Settings** softkey to select whether the measurement integration time is specified in terms of power line cycle periods (NPLC) or directly in seconds (Time). Only 1, 10, and 100 PLCs enable common-mode (power frequency noise) suppression. Selecting 100 PLCs provides optimal noise suppression and resolution but results in the slowest measurement speed.

Soft key		Description
Integrate	NPLC	Set the integration time to 0.02, 0.2, 1, 10, and 100 power line cycles (PLC). Only 1 PLC and longer durations achieve common-mode (power frequency noise) suppression. Selecting 100 PLC provides optimal noise suppression and resolution.
	Time	Set the integration time directly in seconds.

Table 6-30 Integrate menu

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key	Description
Auto Zero Off/On	Auto Zero provides the most accurate measurement results but requires additional measurement time to perform the zero measurement. When Auto Zero is enabled (On), the

Soft key	Description
	instrument internally measures the offset after each measurement. It then subtracts this measured value from the preceding reading. This prevents offset voltage present in the instrument's input circuitry from affecting measurement accuracy. When Auto Zero is disabled (Off), the instrument measures the offset once and subtracts it from all subsequent measurements. A new offset measurement is taken whenever you change the function, range, or integration time. (Auto Zero is not available for 4-wire measurements.)
Delay Auto/Time	Set the delay between channels in the scan list to either Auto or Manual. If Auto is selected, the instrument will automatically determine the channel delay based on the measurement function, range, integration time, and AC filter settings. If Time is selected, a specified delay (in milliseconds) will be inserted between the relay closing and the actual measurement on each channel, in addition to any inherent delay caused by the relay settling time.

Table 6-31 Advanced menu

6.5.6 ACI

This section describes how to configure the selected channel for AC current measurement from the front panel.

Note: Before taking measurements, please verify whether the board supports DC current measurement.

Alternating current

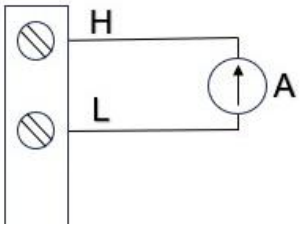


Figure 6-25 Alternating current

1. Connect the current source to the module's terminals.
2. Press **[Channel]->Measure**, then select ACI from the selection menu.
3. Press **Range** and use the menu soft keys at the bottom of the screen to specify the measurement range. Auto (automatic range adjustment) will automatically select the measurement range based on the input. Compared to manual ranging, automatic range adjustment is more convenient but results in slower measurement speeds. Automatic range adjustment can increase up to 120% of the current range and decrease to below 10% of the current range.

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key	Description
AC Filter	Set the required AC filter. Available AC filter options are 3 Hz, 20 Hz, and 200 Hz. This instrument employs three distinct AC filters, allowing you to optimize low-frequency accuracy or achieve AC stability more rapidly after changes in input signal amplitude. You should generally select the highest frequency filter that is lower than the frequency of the signal being measured, as higher filter frequencies result in faster measurement speeds. For example, when measuring signals between 20 Hz and 200 Hz, use the 20 Hz filter. If measurement speed is not a concern, selecting a lower frequency filter may yield quieter measurements, depending on the specific signal being measured.
Delay Auto/Time	Set the delay between channels in the scan list to either Auto or Manual. If Auto is selected, the instrument will automatically determine the channel delay based on the measurement function, range, integration time, and AC filter settings. If Time is selected, a specified delay (in milliseconds) will be inserted between the relay closing and the actual measurement on each channel, in addition to any inherent delay caused by the relay settling time.

Table 6-32 Advanced menu

6.5.7 OHMS

This section describes how to configure the selected channel for 2-wire and 4-wire resistance measurements. The measurement configurations for 2-wire and 4-wire resistance are identical. The following explains how to configure a 2-wire resistance measurement.

2-Wire Resistance

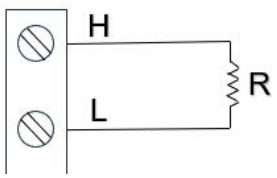


Figure 6-26 2-wire resistor

4-Wire Resistance

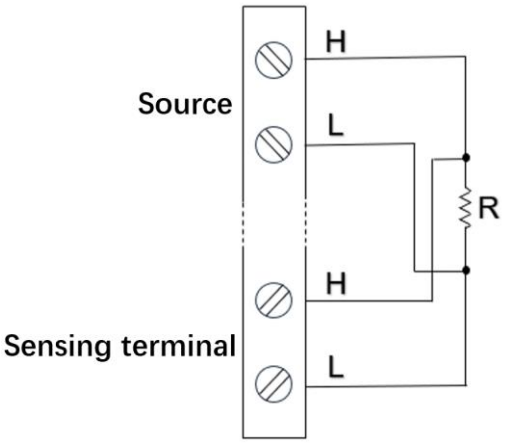


Figure 6-27 4-wire resistor

1. Connect the resistor to the module's terminals.
2. Press **[Channel]->Measure**, then select OHMS or OHMS_4W from the selection menu.
3. Press **Range** and use the menu soft keys at the bottom of the screen to specify the measurement range. Auto (available only when Scan is selected as the data acquisition mode) will automatically select the measurement range based on the input. Compared to manual ranging, auto-ranging is more convenient but results in slower measurement speeds. Auto-ranging can adjust upward to 120% of the current range and downward to below 10% of the current range.
4. Press the **Integrate Settings** softkey to select whether the measurement integration time is specified in terms of power line cycle periods (NPLC) or directly in seconds (Time). Only 1, 10, and 100 PLCs enable common-mode (power frequency noise) suppression. Selecting 100 PLCs provides optimal noise suppression and resolution but results in the slowest measurement speed.

Soft key		Description
Integrate	NPLC	Set the integration time to 0.02, 0.2, 1, 10, and 100 power line cycles (PLC). Only 1 PLC and longer durations achieve common-mode (power frequency noise) suppression. Selecting 100 PLC provides optimal noise suppression and resolution.

Table 6-33 Integrate menu

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key	Description
Auto Zero Off/On	Auto Zero provides the most accurate measurement results but requires additional measurement time to perform the zero measurement. When Auto Zero is enabled (On), the instrument internally measures the offset after each measurement. It then subtracts this measured value from the preceding reading. This prevents offset voltage present in the instrument's input

Soft key	Description
	circuitry from affecting measurement accuracy. When Auto Zero is disabled (Off), the instrument measures the offset once and subtracts it from all subsequent measurements. A new offset measurement is taken whenever you change the function, range, or integration time. (Auto Zero is not available for 4-wire measurements.)
Delay Auto/Time	Set the delay between channels in the scan list to either Auto or Manual. If Auto is selected, the instrument will automatically determine the channel delay based on the measurement function, range, integration time, and AC filter settings. If Time is selected, a specified delay (in milliseconds) will be inserted between the relay closing and the actual measurement on each channel, in addition to any inherent delay caused by the relay settling time.

Table 6-34 Advanced menu

6.5.8 FREQ and PERIOD

This section describes how to configure the selected channel for frequency and period measurements.

Frequency and Period

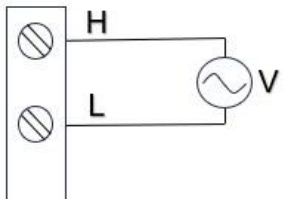


Figure 6-28 Frequency and period

Note: Frequency and period measurement options are only available when Scan is selected as the acquisition mode.

1. Connect the AC source to the module's terminals.
2. Press **[Channel]->Measure**, then select FREQ or PERIOD from the selection menu.
3. Press **Range** and use the rotary knob or front panel arrow keys to specify the measurement range. Auto (automatic range adjustment) will automatically select the measurement range based on the input. Compared to manual ranging, automatic range adjustment is more convenient but may result in slower measurement speeds. Automatic range adjustment can increase up to 120% of the current range and decrease to below 10% of the current range.
4. Set the **Gate Time** to specify the measurement interval (integration time) as 1

ms, 10 ms, 100 ms, or 1 s.

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key	Description
AC Filter	Set the required AC filter. Available AC filter options are 3 Hz, 20 Hz, and 200 Hz. This instrument employs three distinct AC filters, allowing you to optimize low-frequency accuracy or achieve AC stability more rapidly after changes in input signal amplitude. You should generally select the highest frequency filter that is lower than the frequency of the signal being measured, as higher filter frequencies result in faster measurement speeds. For example, when measuring signals between 20 Hz and 200 Hz, use the 20 Hz filter. If measurement speed is not a concern, selecting a lower frequency filter may yield quieter measurements, depending on the specific signal being measured.
Delay Auto/Time	Set the delay between channels in the scan list to either Auto or Manual. If Auto is selected, the instrument will automatically determine the channel delay based on the measurement function, range, integration time, and AC filter settings. If Time is selected, a specified delay (in milliseconds) will be inserted between the relay closing and the actual measurement on each channel, in addition to any inherent delay caused by the relay settling time.

Table 6-35 Advanced menu

6.5.9 DIODE

This section describes how to configure the selected channel for diode testing.

Diode

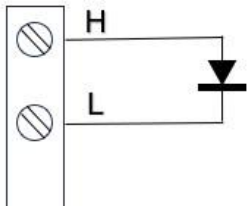


Figure 6-29 Diode

Note: The diode measurement option is only available when Scan is selected as the acquisition mode.

1. Connect the diode source to the module's terminals.
2. Press **[Channel]->Measure**, then select DIODE from the selection menu.

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key	Description
Delay Auto/Time	Set the delay between channels in the scan list to either Auto or Manual. If Auto is selected, the instrument will automatically determine the channel delay based on the measurement function, range, integration time, and AC filter settings. If Time is selected, a specified delay (in milliseconds) will be inserted between the relay closing and the actual measurement on each channel, in addition to any inherent delay caused by the relay settling time.

Table 6-36 Advanced menu

6.5.10 CAP

This section describes how to configure the selected channel for capacitance measurement.

Capacitance

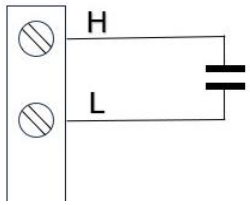


Figure 6-30 Capacitance

1. Connect the capacitor source to the module's terminals.
2. Press **[Channel]->Measure**, then select CAP from the selection menu.
3. Press **Range** and use the menu soft keys at the bottom of the screen to select the measurement range. "Auto" (automatic range adjustment) will automatically select the measurement range based on the input. Compared to manual ranging, automatic range adjustment is more convenient but results in slower measurement speeds. Automatic range adjustment can increase up to 120% of the current range and decrease to below 10% of the current range.

Advanced Settings

Press **Advanced** to configure the advanced settings for the measurement.

Soft key	Description
Delay Auto/Time	Set the delay between channels in the scan list to either Auto or Manual. If Auto is selected, the instrument will automatically determine the channel delay based on the measurement function, range, integration time, and AC filter settings. If Time is selected, a specified delay (in

Soft key	Description
	milliseconds) will be inserted between the relay closing and the actual measurement on each channel, in addition to any inherent delay caused by the relay settling time.

Table 6-37 Advanced menu

6.6 [Interval] menu

Press **[Interval]** on the front panel to configure the trigger source for initiating each scan and the number of scans during the scanning process.

6.6.1 [Interval] in scan mode

Click **[Home]** -> **Acquire** -> **Scan** in sequence to set the data acquisition mode to scan.

Figure 6-31 Scan interface

Select Trigger Source

Press the **Source** soft key to select the trigger source for initiating the scan. Sweeping refers to scanning all channels in the entire scan list.

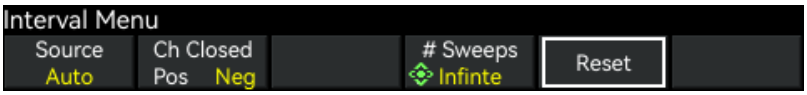


Figure 6-32 Trigger source interface

Soft key		Description
Source	Auto	Select Immediate Trigger. Once scanning is initiated, each sweep will start automatically.
	Time	Set the instrument's internal timer to automatically initiate scanning at specified time intervals. After selecting this option as the trigger source, press the Time softkey to configure the time interval between 0 seconds and 360,000 seconds (100:00:00 hours).
	Manual	Select manual trigger. Press the **[Scan/Start]** button on the front panel once to manually initiate the sweep.
	On Alarm	When an alarm condition is detected during scanning on a monitor channel, DIO channel, or totalizer channel, a sweep will commence. After selecting this option as the trigger source, press the **On Alarm** softkey to specify which of the four alarms will be used to report the alarm condition on the selected channel.

Table 6-38 Trigger source menu

Press the **#Sweeps** softkey to specify the number of times (# Sweeps) the designated instrument will sweep all channels in the scan list, or select continuous sweeping (Infinite).

 # Sweeps (Fixed Number of Sweeps)

After initiating a scan, the instrument can be configured to perform a fixed number of sweeps across all channels in the scan list. The sweep count can be set between 1 and 1,000,000 times. To restore the default sweep count, press the **Reset** button to reset the counter to 1 sweep.

Infinite (Continuous Sweep)

After selecting this mode, the instrument will continuously scan the channels in the scan list indefinitely until manually terminated in one of two ways: either by pressing and holding the **[Scan/Start]** button on the front panel, or by sending the SCPI command "ABORT" to the instrument.

Reset

Reset the instrument sweep count to 1.

6.7 [Math] menu

The **[Math]** menu function of the data collector primarily enables users to perform complex mathematical operations and analyses on collected data, helping them uncover deeper insights and unlock the potential value hidden within the data.

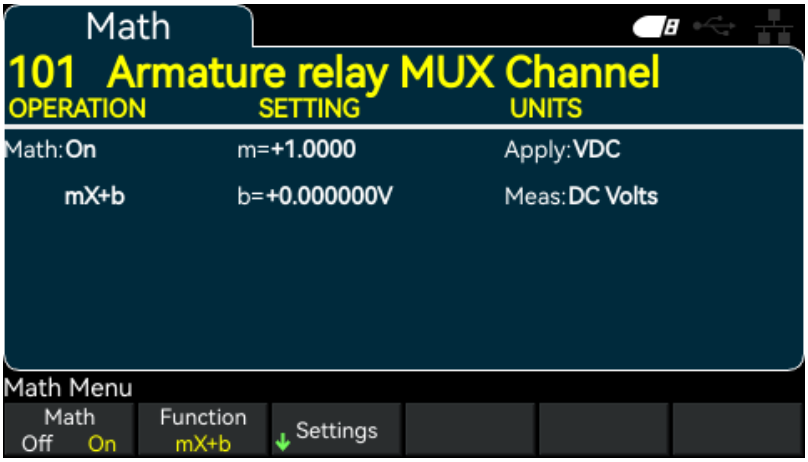


Figure 6-33 Math menu

Note: Before applying any calibration values, ensure the corresponding channel configuration is completed.

On the **[Math]** menu page, press the **Math** softkey to enable (On) or disable (Off) measurement calibration.

Press the **Function** softkey to select a calibration function for the chosen channel. The dBm and dB functions are only available for channels configured

to measure DC or AC voltage.

Figure 6-34 Math menu

After selecting the calibration function, press the **Settings** softkey to configure various calibration parameters. Additionally, the calibration values corresponding to the selected channel will be stored in the device's non-volatile memory, ensuring data is not lost when the device is powered off.

6.7.1 mX+b calibration

When employing the mX+b calibration function, linear calibration can be achieved through offset operations. Specifically, during the scanning process, the gain value (m) and offset value (b) are applied to all readings of the selected channel.

Click **Function** -> **mX+b** in sequence to select the calibration function as mX+b, then press **Settings** to open the configuration menu.

Figure 6-35 mX+b calibration

Soft key		Description
Gain (m)		Use the front panel directional keys to set the gain value.
Offset (b)		Use the front panel arrow keys to set the offset value.
Measure Offset		Press the **Measure Offset** soft key to instantly measure the offset and save the offset value for subsequent measurements.
Clear Offset		Click **Clear Offset** to reset the offset value to zero.
User Units	User Units On/Off	Press **User Units**->**User Units Off/On** to display (On) or hide (Off) user-defined measurement units. Selecting On displays units defined via the **Edit Units** softkey; selecting Off displays the default unit (VDC).
	Edit Units	Under **User Units**->**Edit Units**, you can specify a string containing up to three characters. This string will appear in the standard measurement unit field. These units will subsequently be used for inputting various instrument settings, such as limit values and graph scaling.

Soft key		Description
	Default Units	Pressing **Default Units** restores the unit to the default unit for the selected measurement type. For example, if you configure the selected channel for temperature measurement, pressing this soft key will restore the default unit to °C.

Figure 6-36 mX+b calibration menu

6.7.2 % calibration

Percentage change calculation. The result presents the difference between the measured value and the reference value as a percentage.

Click **Function** -> **%**, select the calibration function as **%**, then press **Settings** to open the configuration menu.

Figure 6-37 % calibration

Soft key	Description
Ref Value	Use the front panel arrow keys to set the reference value.
Measure Reference	Press the **Measure Reference** soft key to instantly measure the reference and save the reference value for subsequent measurements, or press the **Ref Value** soft key to specify the reference value.
Clear Reference	Press the **Clear Reference** soft key to clear the measurement reference value and set the reference value to 1.

Table 6-39 % calibration menu

6.7.3 dBm calibration

Select dBm calibration as the current measurement function. The result is the power supplied to the reference resistor (specified using the Ref R softkey) calculated relative to 1 milliwatt.

Click **Function** -> **dBm** in sequence to select the calibration function as **dBm**, then press **Settings** to open the configuration menu.

Figure 6-38 dbm calibration

Soft key	Description
Ref R	Click **Ref R** to specify the reference resistance value used to convert voltage measurement results into dB. Use the front panel arrow keys to set the reference resistance value. The reference resistance value (Ref R) can be 50, 75, 93, 110, 124, 125, 135, 150, 250, 300, 500, 600 (default), 800, 900, or 1000.

Table 6-40 dBm calibration menu

6.7.4 dB calibration

Select dB calibration as the current measurement function. The result is the difference between the input signal and the stored dB relative reference value (both converted to dBm):

Click **Function** -> **dB** in sequence, select the calibration function as **dB**, then press **Settings** to open the configuration menu.

Figure 6-39 dB calibration

Soft key	Description
Ref R	Click **Ref R** to specify the reference resistance value used to convert voltage measurements into dB. Use the front panel arrow keys to set the reference resistance value. The reference resistance value (Ref R) can be 50, 75, 93, 110, 124, 125, 135, 150, 250, 300, 500, 600 (default), 800, 900, 1000, 1200, or 8000 Ω.
dB Ref Value	Set the reference value using the front panel direction keys.
Measure Reference	Press the **Measure Reference** softkey to instantly measure the reference and save the reference value for subsequent measurements, or press the **dB Ref Value** softkey to specify the reference value.
Clear Reference	Press the **Clear Reference** soft key to restore the reference value to its factory default setting.

Table 6-41 dB calibration menu

6.8 [Copy] menu

Press the **[Copy]** key on the front panel to copy the measurement configuration of the selected channel to other channels. This feature allows you to conveniently set the same measurement configuration for multiple channels. When a

configuration is copied from one channel to another, related settings such as measurement functions, calibration functions, alarm settings, and advanced measurement configurations are automatically synchronized to the target channel.

Note: Before performing this function, the source channel (the channel from which the configuration is to be copied) must be included in the scan list. Copy/paste operations are only applicable to channels with similar measurement functions (e.g., from DCV to DCV).

Copy/paste from a single channel to a single channel (one-to-one)

For example, to copy/paste the measurement configuration from Channel 01 to Channel 02, perform the following steps:

1. Press the **[Channel]** softkey and use the menu softkeys at the bottom of the screen to configure Channel 01 as DCV (default is Auto Range).

Figure 6-40 Channel menu

2. Press **[Copy]** -> **Source Channel(s)**. When displaying Start Channel and End Channel, both will include the selected channel 01, as no other source channels are configured besides this one. Press **Done** to exit this menu.

Figure 6-41 Copy menu

3. Press **Dest.Chan(s)** to select the target channel for pasting. The instrument will automatically select the subsequent channel as the default target channel. In this example, use the front panel arrow keys to set the Start Channel and End Channel to channel 02. Press **Done** to continue.

Figure 6-42 Copy interface

4. Press **Copy Now**. The system will copy the measurement configuration from Channel 01 to Channel 02. The message "X of X channels copied" will appear at the bottom of the screen upon completion. Press **Copy Now** again to repeatedly copy the same configuration to the next selected channel (Channel 03, Channel 04, etc.).

Copy/paste from a single channel to multiple channels (one-to-many)

For example, to copy/paste the measurement configuration from Channel 01 to Channels 02 and 03, perform the following steps:

1. Press the **[Channel]** softkey and use the menu softkeys at the bottom of the screen to configure Channel 01 as DCV (default is Auto Range).
2. Press **[Copy]** -> **Source Channel(s)**. When displaying Start Channel and End Channel, both will include the selected channel 01, as no other source channels are configured besides this one. Press **Done** to exit this menu.
3. Press **Dest.Chan(s)** to select the target channel for pasting. The instrument will automatically select the subsequent channel as the default target channel. In this example, use the front panel arrow keys to set Start Channel to channel 02 and End Channel to channel 03. Press **Done** to continue.

Figure 6-43 Copy interface

4. Press **Copy Now**. The system will simultaneously copy the measurement configuration from Channel 01 to Channels 02 and 03. Upon completion, the message "X of X channels copied" will appear. Press **Copy Now** again to repeatedly copy the same configuration to selected new channels (Channel 04, Channel 05, etc.).

Figure 6-44 Copy interface

Copy/paste from multiple channels to multiple channels (many-to-many)

For example, to copy/paste measurement configurations from channels 01 to 04 to channels 05 to 08, perform the following steps:

1. Press the **[Channel]** softkey and use the menu softkeys at the bottom of the screen to configure Channel 01 as DCV (default is Auto Range). Configure the source channel as follows:
   – Channels 01 and 02 (DCV, auto-ranging)
   – Channels 03 and 04 (2-wire resistance, range 100Ω)
2. Press **[Copy]** -> **Source Channel(s)**. Use the front panel arrow keys to set Start Channel to channel 01 and End Channel to channel 04. Press **Done** to exit this menu.
3. Press **Dest.Chan(s)** to select the target channel for pasting. The instrument will automatically select the subsequent channel as the default target channel. In this example, use the front panel arrow keys to set the Start Channel to channel 05.

Figure 6-45 Copy interface

The instrument will automatically perform copy/paste operations on the next N target channels based on the N selected source channels. For example, if "Start Channel" is set to channel 06, the selected target channels will be channels 06 through 09. Press **Done** to continue.

Figure 6-46 Copy interface

5. Press the **Copy Now** softkey. The system will copy the measurement configuration from channels 01 to 04 to channels 06 to 09. Upon completion, the message "X of X channels copied" will be displayed. Press **Copy Now** again to repeatedly copy the same configuration to the next set of selected channels (channels 10 to 13, etc.).

Figure 6-47 Copy interface

6.9 [Alarm] menu

Press the **[Alarm]** key on the front panel to configure alarms for the selected channel. This instrument features four configurable alarms. You must configure the channel before setting any alarm limits. If you change the measurement configuration, the system will disable alarms and clear limits. If you plan to use the calibration function on a channel that also uses alarms, be sure to configure the calibration values first.

Configure alarm thresholds on the multiplexing module

1. On the Alarm menu page, press the **Output** softkey to select which of the four alarms will be used to report alarm conditions on the selected channel. You can assign multiple channels to any of the four available alarms (numbered 1 through

4).

Figure 6-48 Alarm menu

2. Press the **Alarm** menu softkey to disable (Off) or specify alarm limits (High, Low, or High and Low), then press **Set Limits** to configure the thresholds. The instrument will generate an alarm when scanned readings or monitored readings exceed the specified limits.

Alarm Soft Key	Set Limits
Off	No - Alarm disabled
High +Low	Specify the limit values as high and low values, or as a central value and the span of the central value.
High	Use the front panel arrow keys to set the upper limit value. The upper limit value must always be greater than or equal to the lower limit value.
Low	Use the front panel arrow keys to set the lower limit value. The lower limit value must always be less than or equal to the upper limit value.

Table 6-42 Alarm menu

3. Press **Clear** to reset the limit value to the default 0.

4.Press **[Scan/Start]** to initiate scanning and save readings to the reading memory. If an alarm occurs on a channel during scanning, the alarm status for that channel is saved in the reading memory when the reading is acquired. Each time a new scan begins, the instrument clears all readings (including alarm data) stored in the reading memory from the previous scan.

5. When alarms are generated, they are also recorded in an alarm queue separate from the reading memory. Press **[View]** -> **Alarms** to display the alarm queue.

Alarm Limit Indicator

The display uses color (red) to indicate limit values and exceedances.

Number

The use of color (red) indicates that the displayed measurement value exceeds the limit.

Figure 6-49 Number-Alarm

Bar Meter

The bar gauge uses the same color scheme (red).

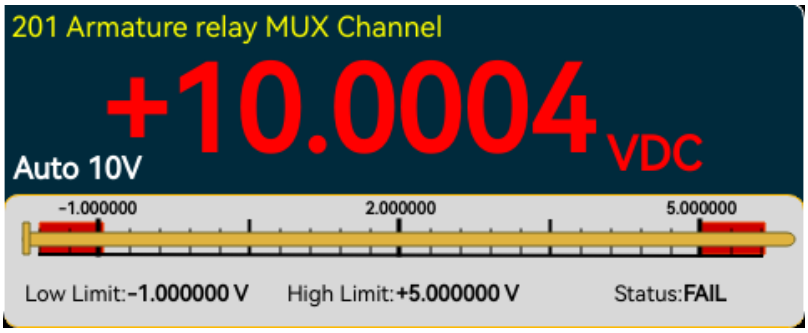


Figure 6-50 Bar meter-Alarm

Trend Chart

The trend chart uses the same color scheme (red).

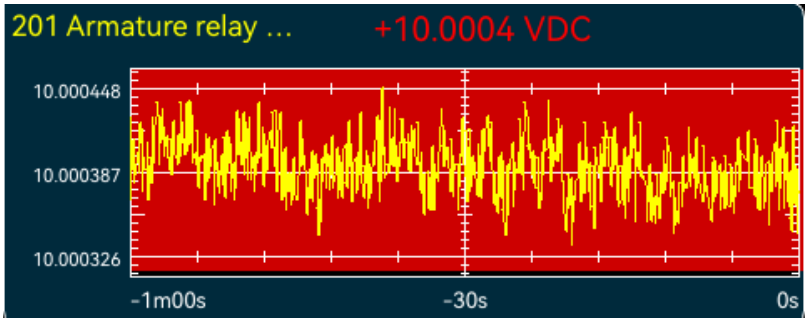


Figure 6-51 Trend chart-Alarm

Histogram

The histogram uses the same color scheme (red).

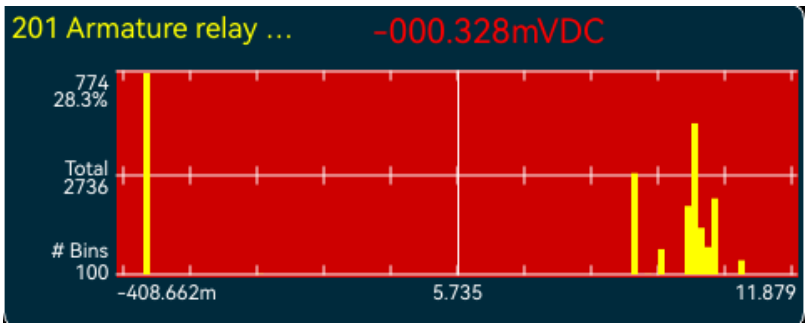


Figure 6-52 Histogram-Alarm

6.10 [Utility] menu

Under the **[Utility]** menu, you can upgrade the instrument.

The upgrade steps are as follows:

Copy the firmware to a USB flash drive and insert it into the USB port on the front panel of the instrument. Click on **[Utility]** ->**Upgrade**, and the screen will pop up with "Why To Upgrade The System Data. Click Yes to complete the upgrade settings. When the progress bar reaches 100%, restart the machine, and the application upgrade is complete.

6.11 [Module] menu

Click the **[Module]** button on the front panel to enter the Module menu. On the Module page, you can view the scanning list of the instrument, reset the module, rename the module's label, and loop the relay of the plug-in module.

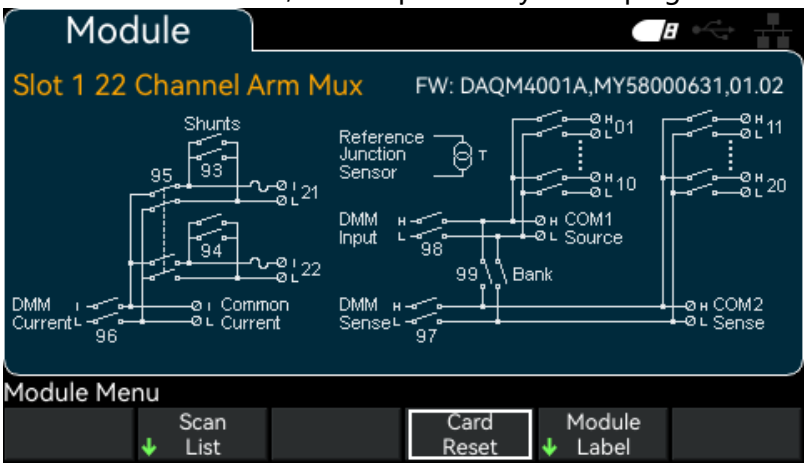


Figure 6-53 Module interface

Scan List

Note: These options are only available when Scan is selected as the data acquisition mode.

Press the **Scan List** soft key to view the available channels in the current module that have been added to the scan list (i.e. Scan Status is ON). To disable the measurement function of all channels under the module and remove them from the scan list, press the **Remove From Scan** soft key. When the content of the channel list exceeds the display range of a single page, you can switch and browse multiple pages of content by operating the direction keys on the front panel.

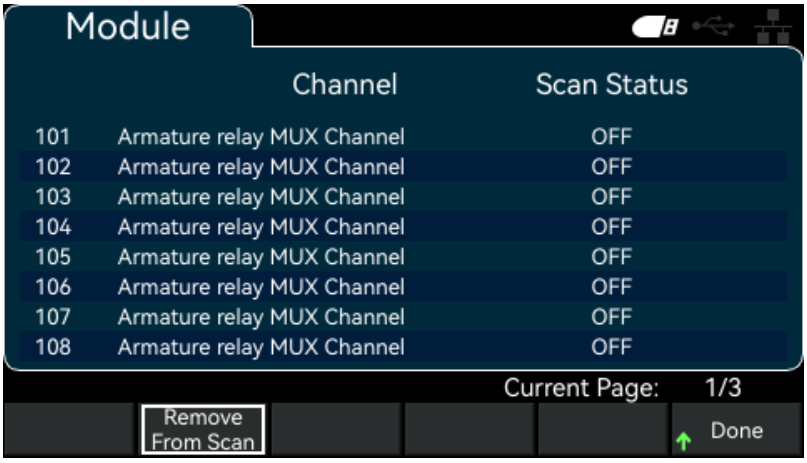


Figure 6-54 Module interface

Card Reset

Note: These options are only available when Scan is selected as the data acquisition mode.

Press the **Card Reset** soft key to reset the module and open all channels on the module, i.e. switch the Switch of all channels from Close to Open.

Figure 6-55 Switch state

Module Label

Press the **Module Label** soft key to assign a label to the currently selected module. Use the front panel directional keys to input characters on the display screen. Please note that only a maximum of 10 characters, including letters, numbers, and special characters, are allowed to be entered for module labels. To reset it to the default module label, press **Module Label** ->**Clear All** ->**Done.**

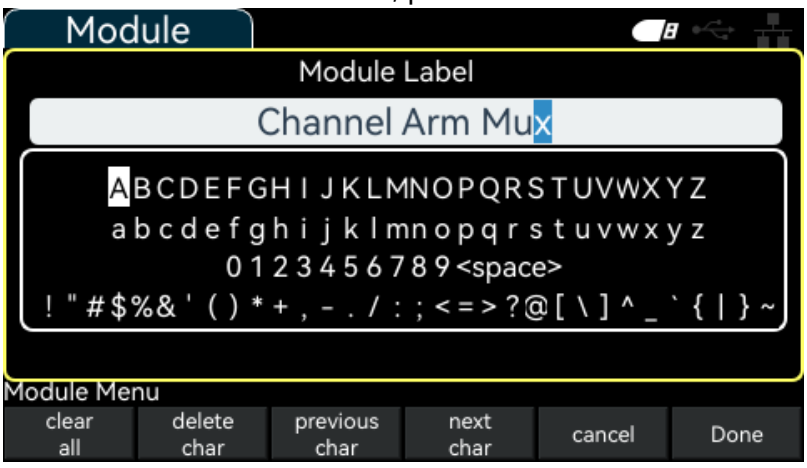


Figure 6-56 Module label page

6.12 [Save/Recall] menu

Press the **[Save/Recall]** button to enter the Save/Recall menu.
On the Save/Recall page, you can perform the following actions: [Manage Files, [Save], [Recall] (including instrument state, reading, and capture display), [Set to Defaults], and [Log to USB].

Figure 6-57 Save/Recall menu

Manage Files

You can create, copy, delete, and rename files and folders in the instrument's internal flash memory or on a USB drive connected to the front panel using the **Manage Files** softkey. Pressing the **Manage Files** softkey displays the following options:

Figure 6-58 Copy menu

Soft Key		Description
Action:	Delete	1. To delete a file or folder, click **Delete->Browse** to navigate the file directory. On the File Systems page, use the front panel arrow keys to locate the desired file or folder within the directory. 2. After highlighting the desired file or folder, press **Select->Perform Delete**.
	Folder	1. To create a new folder, click **Folder->Browse** and navigate the file directory to the location where you wish to create the new folder. 2. Tap **File Name**, enter the desired folder name, then tap **Done**. Tap **Create Folder** to create the folder.
	Copy	1. To copy files or folders, press **Copy->Browse**, navigate to the directory containing the files or folders you wish to copy, then press **Select**. 2. Press **Copy Path**, then select the internal or external path to copy. Press **Select->Perform Copy**.
	Rename	To rename a file or folder, click **Rename->Browse**, navigate to the file or folder you wish to rename, then click **Select**. 2. Tap **New File**, enter a new name, then tap **Done**. Tap **Perform Rename** to rename a file or folder.

Soft Key	Description
Browse	Browse soft keys will open the file directory, where you can select the file or folder to perform an operation on. Use the front panel arrow keys to navigate the file directory. Use the left and right arrow keys to collapse or expand folders. After selecting the target folder, press **Select** to enter it; to exit the folder directory, press **Cancel**.
Copy Path	The Copy Path soft key is used to select the internal or external folder path to be copied. Use the front panel arrow keys to browse the file directory. Use the left and right arrow keys to fold or expand folders.
Perform Copy	The Perform Copy soft key is used to copy selected files or folders to a new location.

Table 6-43 Copy menu

Save

The Save soft key is used to save instrument status, user preferences, and displayed screenshots.

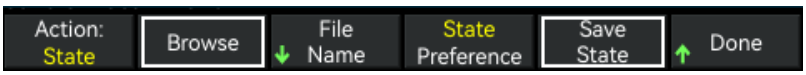


Figure 6-59 Save menu

Note: The option on the 5th soft key will change accordingly with the option selected on the Action soft key.

Soft Key		Description
Action:	State	Save the current instrument state or user preferences. The file can have any name, but the state file ends with the (.sta) extension, and the preference file ends with the (.prf) extension. 1. To save the status of the instrument or user preferences, navigate the file directory to the location where you want to save the file by pressing **State** ->**Browse**, and then press **Select**. 2. Press **File Name**, enter the file name, and then press **Done**. 3. Press the **State/Reference** soft key to choose between saving the current instrument state (State) or user preferences (Preference). 4. Press the **Save State/Save Prf** soft key to save the current instrument status or user preferences to a

Soft Key		Description
		specified location in the file directory. **Note:** State: Saves measurement configurations, including channel configurations and scan settings. Preference: Saves non-volatile settings related to the instrument, including user preferences and I/O settings.
Action:	Readings	1. To save measurement readings, press **Readings ->Browse**, navigate the file directory to the location where you wish to save the file, then press **Select**. 2. Press **File Name**, enter the file name, then press **Done**. 3. Press the **Separator** soft key to specify the character used to separate information within each line (Comma, Tab, or Semicolon). 4. Press the **Save Reading** soft key to save the file to the specified location in the file directory.
	Capture	1. To save the displayed screenshot, press **Capture Display->Browse**, navigate the file directory to the location where you wish to save the file, then press **Select**. 2. Press **File Name**, enter the file name, then press **Done**. 3. Press the **Format** soft key to specify the image file format to save (.bmp or .png). 4. Press the **Save Screen** soft key to save the screenshot to the specified location in the file directory.
	Browse	Press the **Browse** soft key to open the file directory, where you can select the file or folder to perform an operation on. Use the front panel arrow keys to navigate the file directory. Use the left and right arrow keys to collapse or expand folders. After selecting the target folder, click **Select** to enter it; to exit the folder directory, click **Cancel**.
File Name		Press the **File Name** soft key to set the folder or file name for the selected operation. To specify the folder or file name, use the knob or front panel arrow keys to select the desired character, then press **[OK]** to enter the selected character and move to the next character. After completing the desired file name, press **Done**.

Table 6-44 Save menu

Recall

You can use the Recall softkey to load previously saved status files (with the .sta extension) or preference files (with the .prf extension). Use the front panel arrow keys to browse for files stored in the internal flash memory (Internal) or on a USB drive (External). Press **Select** to load the chosen file.

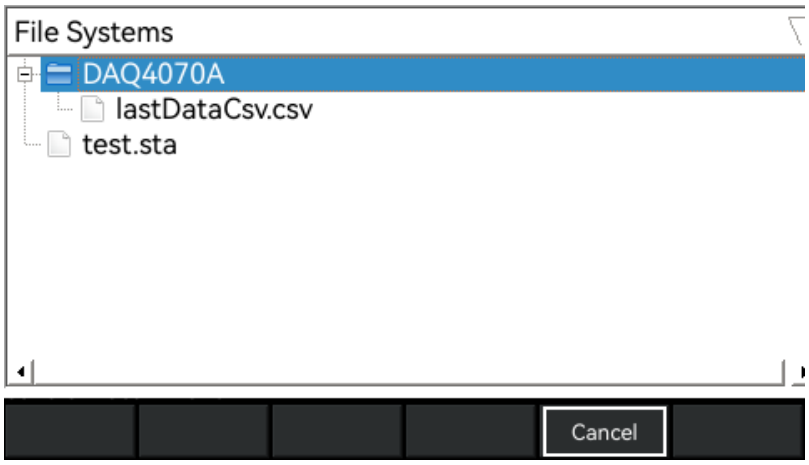


Figure 6-60 File systems interface

Set as default

You can restore the selected settings to their factory default settings and preset values using the Set to Defaults soft key. After pressing the **Set to Defaults** soft key, the following options will be displayed:

Figure 6-61 Set to defaults menu

Soft Key	Description
Factory Reset	Reset the instrument to factory settings. This soft key does not affect any previously saved instrument states or I/O settings, such as IP addresses.
Default Pref	Reset all preferences to their default values, including user preferences and I/O settings stored in non-volatile memory.
Preset State	Reset the instrument. All readings will be cleared, and all channels will be open-circuited.

Table 6-45 Set to defaults menu

Log to USB

Note: This option is only available when Scan is selected as the data acquisition mode.

You can use the **Log to USB** softkey to record scanned memory readings to a USB drive connected to the front panel USB host port. A USB indicator will appear whenever a USB drive is connected. After pressing the **Log to USB** softkey, the following options will be displayed:

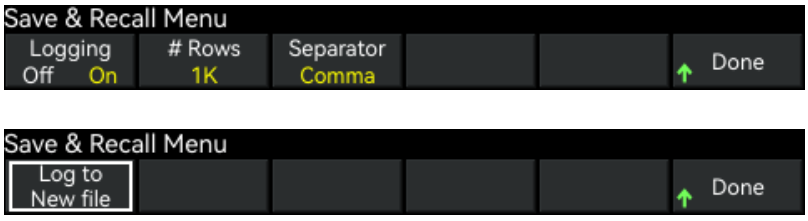


Figure 6-62 Log to USB menu

Soft Key	Description
Logging	Using the Logging softkey enables (On) or disables (Off) the recording of scanned memory readings to a USB drive connected to the front-panel USB host port. When USB data logging is enabled, readings are saved to a file on the USB drive. However, readings are not restored to the reading memory after a reboot.
# Rows	Press the **#Rows** soft key to specify the row limit (maximum number of rows scanned) to be written to each data record file. You can choose from six options: 1k (limit of 1,024 lines per data record file), 2k (limit of 2,048 lines per data record file), 3k (limit of 3,072 lines per data record file), 65k (limit of 65,536 lines per data record file), 1M (each data record file limited to 1,048,576 lines per file), or Infinite (limit is the number of bytes allowed by the file system (up to 4 GB) or available storage space).
Separator	Press the **Separator** soft key to specify the character used to separate information within each line (Comma, Tab, or Semicolon).
Log to New file	When recording data, the "Log to New File" soft key will appear. Each time you press the **Log to New File** soft key, it will record the data to a new file.

Table 6-46 Log to USB settings

Folder and File Structure

Folder Description

All saved scan data is stored in the top-level folder, which is named strictly according to the following format:
\DAQ40X0A\instrument_CN-yyyymmddhhmmssmmm

Note: instrument_CN: Represents the instrument's unique serial number, used to distinguish scan data generated by different devices.
yyyymmddhhmmssmmm: Indicates the approximate start time of the scan task as a timestamp.
The meaning of each character segment is as follows:
yyyy: 4-digit number representing the year
mm: 2-digit number representing the month
dd: 2-digit number representing the day
hh: 2-digit number representing the hour (24-hour format)
mm: 2-digit number representing the minute (distinguished from the month field)
ss: 2-digit number representing the second
mmm: 3-digit number representing the millisecond

Sample Interpretations (Sorted by Time)

Folder Path: \DAQ4070A\CN5526112000225-20251206105243483

Corresponding information: Generated by the instrument with serial number CN5526112000225. The scan task was initiated approximately at 10:52:43.483 on December 6, 2025.

Folder Path: \DAQ4070A\CN5526112000247-20250924111100745

Corresponding information: Generated by instrument serial number CN5526112000247. The scan task commenced approximately at 11:11:00.745 on September 24, 2025.

Document Description

The top-level folder contains one file type.
data#####.csv
Data generated during the scanning process is distributed across multiple files prefixed with "data" and sequentially numbered, such as data00001.csv, data00002.csv, data00003.csv, and so on.
This file format design facilitates direct import of data into spreadsheets or other data analysis software for subsequent processing tasks.
Note: If you change the default .csv file extension to .txt format, some spreadsheet or data analysis software may import the data more smoothly. Therefore, when encountering situations where software fails to import files properly, you can try adjusting the data file's extension to resolve import issues.

Content of the data file

This instrument supports recording data files only for channels in the scan list. The default field separator is a comma, but you can specify an alternative separator using the **Separator** soft key.

The table is as follows:

Sweep#	Time	Chan 101(DC Volts)	Chan 201(DC Volts)
1	24/09/2025 11:11:01.611	5.39467	100.39467
2	24/09/2025 11:11:02.273	5.39454	100.39454
3	24/09/2025 11:11:03.066	5.39491	100.39491
4	24/09/2025 11:11:03.804	5.39508	100.39508
5	24/09/2025 11:11:04.440	5.39546	100.39546

Table 6-47 Data file example

– The title line displays the number of scans, scan time, channel number, and measurement items.

– If the line restriction feature is enabled and data overflows into multiple files, the scan will continue numbering from the position where it stopped in the previous file. Therefore, if 65K is selected, the first scan in the second data file will start from number 65536, while the first scan in the third data file will start from number 131071, and so on.

7 Remote Interface Control

Warning: When any channel is connected to a hazardous voltage source, the instruments and equipment being tested should be supervised.
DAQ4000A supports remote interface communication through LAN, USB RS232/485, and GPIB (optional) interfaces.

- LAN interface: By default, DHCP (Dynamic Host Configuration Protocol, which is used to assign IP addresses to network devices) is turned on, enabling communication through LAN. With the help of dynamic addressing function, devices can have different IP addresses each time they connect to the network. For detailed information, please refer to LAN settings.
- USB Interface: Use the rear panel USB connector to communicate with the instrument via your PC. For details, refer to the USB Setup section.
- RS232/485 Interface: Set the instrument's RS232/485 address and connect it to a PC using an RS232/485 cable.
- GPIB Interface (Optional): Configures the instrument's GPIB address for networking with other devices, providing a standardized communication interface for multi-instrument coordination and high-speed data exchange.

7.1 LAN settings

The following sections describe the primary front-panel LAN configuration functions.

Figure 7-1 LAN settings

Enable or disable the LAN interface

Press **[Home]** -> **User Settings** -> **I/O** -> **LAN** to enable or disable the soft key.

View LAN status, MAC status, and current LAN configuration settings.

After enabling the LAN interface, the LAN status, MAC address, and current LAN configuration details can be viewed directly from the device's front panel. It should be noted that the LAN status may differ from the settings in the front panel configuration menu, depending on the actual network configuration. If the two settings differ, it essentially means the network has automatically assigned its own configuration parameters. Additionally, when the instrument switches to remote mode, all LAN modification operations will be disabled, and the display will switch to other display pages. With the LAN interface enabled, operators can directly access the device's front panel to view the LAN status, MAC address, and

detailed information about the current LAN configuration.
Additionally, when the instrument switches to remote control mode, all configuration changes targeting the LAN will be disabled by the system. Simultaneously, the device display will automatically switch to the corresponding remote mode display page and will no longer show LAN-related configuration information.

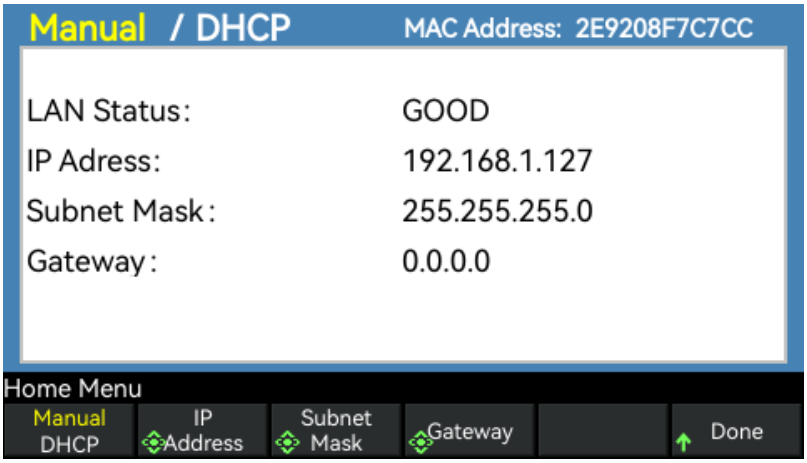


Figure 7-2 LAN state

LAN Settings

Front Panel
Press **[Home]->User Settings->I/O->LAN Settings**.

Modify Settings

Front Panel
Press **[Home]->User Settings->I/O->LAN Settings->Modify Settings**.

To manually configure network parameters, follow the instructions to modify the IP address, subnet mask, and default gateway. If a DHCP server is deployed within the local area network, enabling the instrument's DHCP function allows the device to automatically obtain IP and other network information without manual setup.

Manual/DHCP

DHCP can automatically assign dynamic IP addresses to LAN devices. Enabling DHCP will disable Manual settings, and vice versa.

To enable DHCP, perform the following steps:

Steps	Front Panel
1	Press **[Home]->User Settings->I/O->LAN Settings->Modify Settings**.Set the first soft key to DHCP.
2	If you change this parameter, you must press **Done** for the changes to take effect.

To disable DHCP, perform the following steps:

Steps	Front Panel
1	Press **[Home]->User Settings->I/O->LAN Settings->Modify Settings**.Set the first soft key to Manual.
2	If you change this parameter, you must press **Done** for the changes to take effect.

After disabling DHCP, you can use the following parameters for manual configuration:

IP Address

You can enter a static IP address for the instrument in the form of a four-byte integer represented by periods. Each byte is a decimal value without leading zeros (for example, 192.168.1.127).

Steps	Front Panel
1	Press **[Home]->User Settings->I/O->LAN Settings->Modify Settings**. Set the first soft key to **Manual**, then press IP Address to configure the desired IP address.
2	If you change this parameter, you must press **Done** for the changes to take effect.

– This is a non-volatile setting; it will not be altered by turning the instrument power off and on again, performing a factory reset (*RST command), or executing the instrument preset (SYSTem:PRESet command).

Subnet mask

Using the subnetting feature, LAN administrators can segment the network to simplify management and minimize network traffic. Subnet masks are used to indicate the host address portion of a subnet.

Steps	Front Panel
1	Press **[Home]->User Settings->I/O->LAN Settings->Modify Settings**. Set the first soft key to Manual, then press Subnet Mask to configure the desired subnet mask address.
2	If you change this parameter, you must press **Done** for the changes to take effect.

– This is a non-volatile setting; it will not change when the instrument power is turned off and back on, after a factory reset (*RST command), or following a system preset (SYSTem:PRESet command).

Gateway

A gateway is a network device used to connect networks. The default gateway setting is the instrument's IP address.

Steps	Front Panel
1	Press **[Home]->User Settings->I/O->LAN Settings->Modify Settings**. Set the first soft key to Manual, then press **Gateway** to configure the desired gateway address.
2	If you change this parameter, you must press **Done** for the changes to take effect.

– This is a non-volatile setting; it will not change when the instrument power is turned off and back on, after a factory reset (*RST command), or following a system preset (SYSTem:PRESet command).

Set to Defaults

Restore the LAN settings to their factory default settings.

Front Panel
Press **[Home]->User Settings->I/O->LAN Settings->Set to Defaults**. Click **Cancel Changes** to restore the LAN settings to their factory defaults. Click **Apply Changes** to restart the LAN.

LAN Reset

Front Panel
Press **[Home]->User Settings->I/O->LAN Reset**.

7.2 USB settings

Click **USB Settings** to view the USB address string used by the instrument.

Front Panel
Press **[Home]->User Settings->I/O->More->USB Settings->Show USB ID**, view the USB address string used by the instrument.

7.3 Baud settings

To ensure stable data exchange between serial communication devices, the instrument's baud rate must be configured according to the communication partner's parameters.

Front Panel
Press **[Home]->User Settings->I/O->More->Baud**, available baud rates include 9600, 19200, 38400, and 57600.

7.4 GPIB settings

To ensure stable data exchange between GPIB communication partners, GPIB addresses must be configured according to the parameters of the communication device.

Front Panel

Press **[Home]->User Settings->I/O->More->GPIB**, the GPIB address setting range is from 1 to 30.

8 Module Overview

This chapter provides a detailed explanation of each plug-in functional module, supplemented with intuitive and easy-to-understand diagrams to help you quickly grasp their working principles and structural characteristics.

8.1 DAQM4000A 20-channel FET multiplexer module

This functional module consists of two groups, each equipped with 10 dual-wire channels, totaling 20 channels. All channels support HI/LO input switching, enabling fully isolated signal access for either the internal digital multimeter (DMM) or external instruments. During four-wire resistance measurements, the system automatically pairs Group A channels (channel number n) with corresponding Group B channels (numbered n+10) to establish a complete excitation source-to-detection terminal connection system. Additionally, the module incorporates a built-in thermocouple reference connection device that effectively eliminates measurement deviations caused by temperature gradients, significantly enhancing data accuracy in thermocouple measurement scenarios.

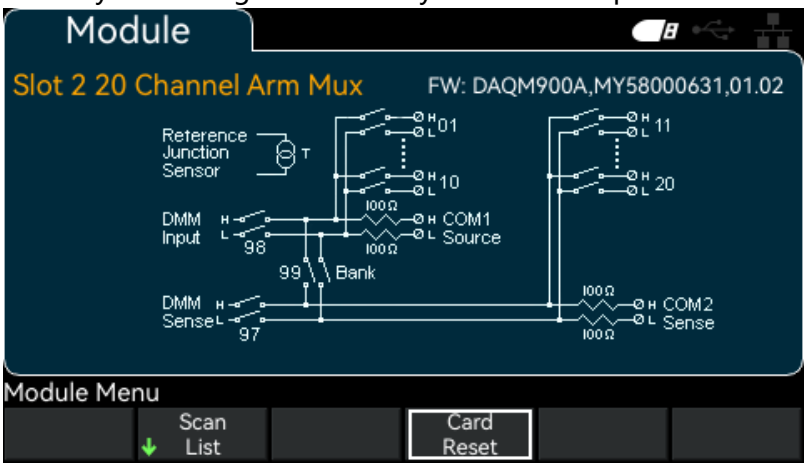


Figure 8-1 DAQM4000A multiplexing module

Warning:

1. Electrical Shock Protection Requirements

To effectively prevent electric shock hazards, only use wires certified to meet the highest voltage standards for all circuits. Before disassembling the module housing, all power sources must be disconnected prior to connecting external devices to the module. Working under power is strictly prohibited.

2. Precautions for Using Multiple Signals

To prevent unexpected connections between different signal sources from causing malfunctions, when multiplexing two or more signal sources, it is

recommended to connect each signal source to a separate module or to different signal groups within the same module. This ensures that signal transmission remains mutually interference-free.

3. Dangerous Voltage Protection Specification

When any channel of the module is connected to a hazardous voltage source, observe the following key points:

- All channels within the module shall be considered hazardous channels, and their associated cables must be certified to meet the requirements for the maximum voltage applied.
- Thermocouples connected to other channels of the module must incorporate or be fitted with insulation meeting the maximum voltage standard. Additionally, thermal paste or tape compatible with the maximum voltage should be used to ensure effective isolation from conductive components.
- Under no circumstances should any thermocouples be installed, moved, or removed while the device under test is energized to prevent electric shock or damage to the equipment.

4. Environmental Health and Safety (EHS) Management

If a module has channel connections to hazardous voltage sources, the instrument and equipment under test must be monitored throughout the entire process. Strict compliance with local environmental, health, and safety (EHS) regulations is required to restrict access by unauthorized personnel and ensure a safe operating environment.

8.2 DAQM4001A (20+2) channel armature-type multiplexer module

The overall architecture of this module is divided into two groups, each equipped with 10 dual-wire channels and two additional fuse channels, totaling 22 channels. Utilizing these channels enables direct calibration-accurate DC and AC current measurements via the internal DMM without requiring external shunt resistors. All 22 channels support flexible switching between HI and LO inputs, providing mutually isolated, pure signal input environments for both the internal DMM and external measurement instruments. For four-wire resistance measurements, the system automatically pairs Group A channels (channel n) with corresponding Group B channels (channel n+10), establishing a complete source-to-sensing connection. Furthermore, the module's integrated thermocouple reference connection mechanism significantly reduces measurement errors caused by temperature gradients, effectively enhancing the accuracy and reliability of thermocouple data acquisition.

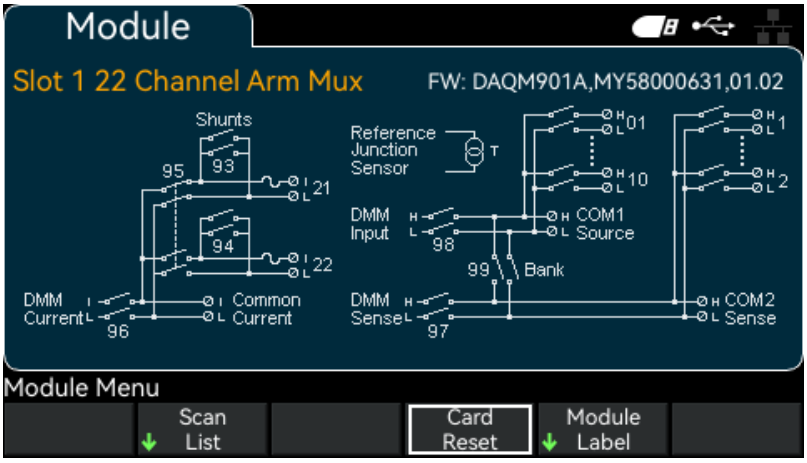


Figure 8-2 DAQM4001A multiplexing module

Warning:

1. Electrical Shock Protection Requirements

To effectively prevent electric shock hazards, only use wires certified to meet the highest voltage standards for all circuits. Before disassembling the module housing, all power sources must be disconnected prior to connecting external devices to the module. Working under power is strictly prohibited.

2. Precautions for Using Multiple Signals

To prevent unexpected connections between different signal sources from causing malfunctions, when multiplexing two or more signal sources, it is recommended to connect each signal source to a separate module or to different signal groups within the same module. This ensures that signal transmission remains mutually interference-free.

3. Dangerous Voltage Protection Specification

When any channel of the module is connected to a hazardous voltage source, observe the following key points:

- All channels within the module shall be considered hazardous channels, and their associated cables must be certified to meet the requirements for the maximum voltage applied.
- Thermocouples connected to other channels of the module must incorporate or be fitted with insulation meeting the maximum voltage standard. Additionally, thermal paste or tape compatible with the maximum voltage should be used to ensure effective isolation from conductive components.
- Under no circumstances should thermocouples be installed, moved, or removed while the device under test is energized to prevent electric shock or damage to the equipment.

4. Environmental Health and Safety (EHS) Management

If a module has channel connections to hazardous voltage sources, the instrument and equipment under test must be monitored throughout the entire process. Strict adherence to local environmental, health, and safety (EHS)

regulations is required to restrict access by unauthorized personnel and ensure a safe operating environment.

8.3 DAQM4003A 20 channel brake/general-purpose switch module

This module integrates 20 independent SPDT (Form C) latching relays internally, delivering exceptional performance. It can switch voltages up to 300V and currents up to 1A (maximum switching power of 50W) to test equipment or activate external devices, adapting to a wide range of complex application scenarios. The module's terminal block design allows convenient and flexible access to the "normally open" contacts, "normally closed" contacts, and "common" contacts for each of the 20 switches. Note that this module is not connected to an internal DMM. Featuring high-integrity contacts and superior connectivity, it is particularly suitable for applications demanding strict non-multiplexed signal integrity.

Near the terminal blocks, a dedicated analog board area has been provided to facilitate user-defined circuit implementation, such as building simple filters, buffers, or voltage dividers. This ample space allows users to insert their own components. However, this area does not include pre-installed PCB traces, so users must manually add required circuits and complete signal routing operations to meet their customized circuit assembly needs.

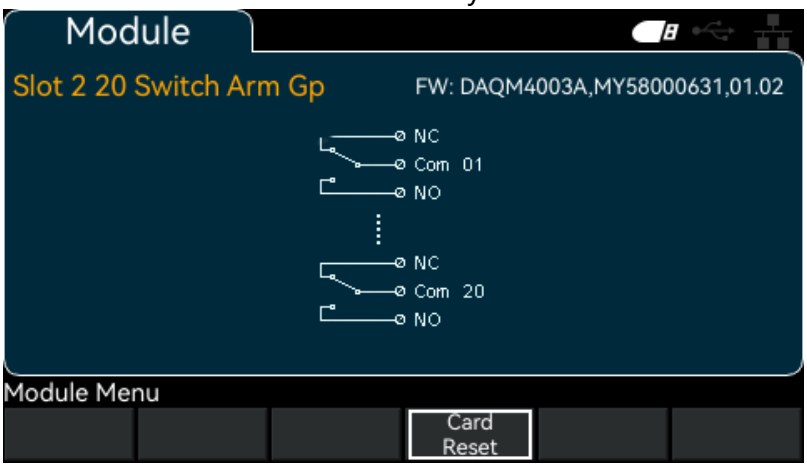


Figure 8-3 DAQM4003A switch module

Note: On this module, you can simultaneously disable multiple channels. CLOSE and OPEN commands control the connection status between the "Normally Open" (NO) contact and the COM contact in each channel. For example, CLOSE 201 connects the "Normally Open" contact to the COM contact on channel 01.

Warning:

1. Electrical Shock Protection Requirements
To effectively prevent electric shock hazards, only use wires certified to meet the highest voltage standards for all circuits. Before disassembling the module housing, all power sources must be disconnected prior to connecting external devices to the module. Working under power is strictly prohibited.
2. Precautions for Using Multiple Signals
To prevent unexpected connections between different signal sources from causing malfunctions, when multiplexing two or more signal sources, it is recommended to connect each signal source to a separate module or to different signal groups within the same module. This ensures that signal transmission remains mutually interference-free.
3. Dangerous Voltage Protection Specification
When any channel of the module is connected to a hazardous voltage source, observe the following key points:

- All channels within the module shall be considered hazardous channels, and their associated cables must be certified to meet the requirements for the maximum voltage applied.
- Thermocouples connected to other channels of the module must incorporate or be fitted with insulation that complies with the maximum voltage standard. Additionally, thermal paste or tape compatible with the maximum voltage should be used to ensure effective isolation from conductive components.
- Under no circumstances should thermocouples be installed, moved, or removed while the device under test is energized to prevent electric shock or damage to the equipment.

4. Environmental Health and Safety (EHS) Management
If the module has channel connections to hazardous voltage sources, the instrument and equipment under test must be monitored throughout the process. Strict adherence to local environmental, health, and safety (EHS) regulations is required to restrict unauthorized personnel from accessing the area and ensure a safe operating environment.

8.4 DAQM4004A 4x8 dual-wire matrix switch

This module features 32 dual-wire cross-connection points arranged in a 4-row × 8-column matrix layout. By expanding cross-module connections across rows and columns, larger matrix structures can be flexibly constructed, such as 8×8 or 4×16 configurations. In single-host applications, the maximum number of cross-points reaches 96. The design characteristics of this module make it highly suitable for synchronously connecting multiple measuring instruments to various test points on test equipment. It easily adapts to scenarios involving simple input signal transmission, output command control, or mixed input/output modes.
This module is not connected to the internal DMM. Each crosspoint relay has its

own unique channel label indicating the row and column. For example, channel 32 represents the connection at the intersection of row 3 and column 2, as shown below:

Note: On this module, you can simultaneously disable multiple channels.

Warning:

1. Electrical Shock Protection Requirements

To effectively prevent electric shock hazards, only use wires certified to meet the highest voltage standards for all circuits. Before disassembling the module housing, all power sources must be disconnected prior to connecting external devices to the module. Working under power is strictly prohibited.

2. Precautions for Using Multiple Signals

To prevent unexpected connections between different signal sources from causing malfunctions, when multiplexing two or more signal sources, it is recommended to connect each signal source to a separate module or to different signal groups within the same module. This ensures that signal transmission remains mutually interference-free.

3. Dangerous Voltage Protection Specification

When any channel of the module is connected to a hazardous voltage source, observe the following key points:

- All channels within the module shall be considered hazardous channels, and their associated cables must be certified to meet the requirements for the maximum voltage applied.
- Thermocouples connected to other channels of the module must incorporate or be fitted with insulation meeting the maximum voltage standard. Additionally, thermal paste or tape compatible with the maximum voltage should be used to ensure effective isolation from conductive components.
- Under no circumstances should thermocouples be installed, moved, or removed while the device under test is energized to prevent electric shock or damage to the equipment.

4. Environmental Health and Safety (EHS) Management

If a module has channel connections to hazardous voltage sources, the instrument and equipment under test must be monitored throughout the entire process. Strict adherence to local environmental, health, and safety (EHS) regulations is required to restrict access by unauthorized personnel and ensure a safe operating environment.

8.5 DAQM4005A 1:4 dual-frequency multiplexer (50 Ω) module

This module consists of two independently operating 4-to-1 multiplexers, specifically designed for high-frequency and pulsed signal transmission with broadband switching capability. Each channel group within the module employs a "tree-like" architecture layout. This design not only achieves high isolation between channels but also effectively reduces the voltage standing wave ratio (VSWR). The two multiplexers share the same grounding system, offering significant advantages of low crosstalk and minimal insertion loss. For larger RF multiplexing systems, expansion is achievable by cascading multiple module groups.

This module has no connection to an internal digital multimeter (DMM). Signal transmission can be accomplished in two ways: either by direct connection to the module's onboard SMB connectors, or by utilizing the included SMB-to-BNC adapter cable for flexible and convenient connectivity.

Note: Module Channel Operation Rules

1. Channel Switching Restrictions: On this module, only one channel within a group can be deactivated at a time. When a channel within a group is deactivated, any previously deactivated channel in that group will automatically reactivate. Furthermore, one channel within each group must always remain connected to the COM (common terminal).
2. Command Response Characteristics: This module responds only to CLOSE commands and does not respond to OPEN commands. To open a closed channel, send a CLOSE command to another channel within the same group. This achieves the desired channel opening by switching the group's closed channels.

Warning:

1. Electrical Shock Safety Requirements

To effectively prevent electric shock hazards, only use wires certified to meet the highest voltage standards for all circuits. Before disassembling the module housing, all power sources must be disconnected prior to connecting external devices to the module. Working under power is strictly prohibited.

2. Precautions for Multiple Signal Usage

To prevent unexpected connections between different signal sources from causing malfunctions, when multiplexing two or more signal sources, it is recommended to connect each signal source to a separate module or to different signal groups within the same module. This ensures that signal transmission remains mutually interference-free.

3. Protective Measures Against Hazardous Voltage

When any channel of the module is connected to a hazardous voltage source, observe the following key points:

- All channels within the module shall be considered hazardous channels, and their associated cables must be certified to meet the requirements for the maximum voltage applied.
- Thermocouples connected to other channels of the module must incorporate or be fitted with insulation meeting the maximum voltage standard. Additionally, thermal paste or tape compatible with the maximum voltage should be used to ensure effective isolation from conductive components.
- Under no circumstances should thermocouples be installed, moved, or removed while the device under test is energized to prevent electric shock or damage to the equipment.

4. (EHS) Environmental Health and Safety (EHS) Management

If a module has channel connections to hazardous voltage sources, the instrument and equipment under test must be monitored throughout the entire process. Strict adherence to local environmental, health, and safety (EHS) regulations is required to restrict access by unauthorized personnel and ensure a safe operating environment.

8.6 DAQM4008A 40 channel single-ended multiplexer

This module consists of two channel groups, each equipped with 20 channels, totaling 40 channels. All channels support only HI-side switching and share a common LO-side. This design feature makes it particularly suitable for applications requiring single-wire input and shared LO, while pursuing high-density signal switching.

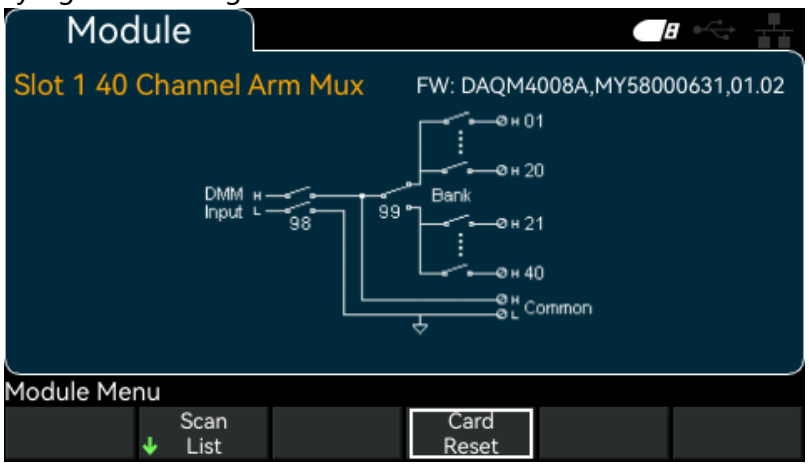


Figure 8-4 DAQM4008A multiplexer

Note: Only one channel per group can be turned off at a time on these modules.

This module cannot be used for direct current measurement or any 4-wire measurements.

Warning:

1. Electrical Shock Safety Requirements

To effectively prevent electric shock hazards, only use wires certified to meet the highest voltage standards for all circuits. Before disassembling the module housing, all power sources must be disconnected prior to connecting external devices to the module. Working under power is strictly prohibited.

2. Precautions for Using Multiple Signals

To prevent unexpected connections between different signal sources from causing malfunctions, when multiplexing two or more signal sources, it is recommended to connect each signal source to a separate module or to different signal groups within the same module. This ensures that signal transmission remains mutually interference-free.

3. Protective Measures Against Hazardous Voltage

When any channel of the module is connected to a hazardous voltage source, observe the following key points:

- All channels within the module shall be considered hazardous channels, and their associated cables must be certified to meet the requirements for the maximum voltage applied.
- Thermocouples connected to other channels of the module must incorporate or be fitted with insulation meeting the maximum voltage standard. Additionally, thermal paste or tape compatible with the maximum voltage should be used to ensure effective isolation from conductive components.

4. Environmental Health and Safety (EHS) Management

If a module has channel connections to hazardous voltage sources, the instrument and equipment under test must be monitored throughout the entire process. Strict adherence to local environmental, health, and safety (EHS) regulations is required to restrict access by unauthorized personnel and ensure a safe operating environment.

8.7 DAQM4009A 4-channel 24 bit digital-to-analog converter module

This module is a four-channel digital converter capable of providing four simultaneously sampled channels with a sampling rate up to 800,000 samples per second and a maximum resolution of 24 bits. The input channels of the DAQM4009A can be configured as differential or single-ended inputs, with each channel capable of supplying a constant current of up to 4mA to power external IEPE transducers.

Warning:

1. The measured voltage must not exceed the rated voltage.
For the HI and LO pins, the maximum input voltage measured is +/-18Vpk (single-ended).
2. Prevent electric shock
To prevent electric shock, use only wires rated for the highest voltage in any channel. Before removing the module housing, turn off all power sources to connect external devices to the module.
3. Precautions for Using Multiple Signals
To prevent unexpected connections between different signal sources from causing malfunctions, when multiplexing two or more signal sources, it is recommended to connect each signal source to a separate module or to different signal groups within the same module. This ensures that signal transmission remains mutually interference-free.
4. Dangerous Voltage Protection Specification
When any channel of the module is connected to a hazardous voltage source, observe the following key points:

- All channels within the module shall be considered hazardous channels, and their associated cables must be certified to meet the requirements for the maximum voltage applied.
- Thermocouples connected to other channels of the module must incorporate or be fitted with insulation meeting the maximum voltage standard. Additionally, thermal paste or tape compatible with the maximum voltage should be used to ensure effective isolation from conductive components.
- Under no circumstances should thermocouples be installed, moved, or removed while the device under test is energized to prevent electric shock or damage to the equipment.

5. Environmental Health and Safety (EHS) Management
If a module has channel connections to hazardous voltage sources, the instrument and equipment under test must be monitored throughout the entire process. Strict adherence to local environmental, health, and safety (EHS) regulations is required to restrict access by unauthorized personnel and ensure a safe operating environment.

8.8 DAQM4014A 8 channel current measurement module

As a specialized module dedicated to current measurement, it supports 8-channel parallel current measurement with a scanning rate of up to 20 channels per

second, enabling efficient continuous data acquisition across multiple measurement points to meet batch testing requirements. Maximum input (DC) current is 2A, suitable for medium-to-low current measurement scenarios. It also possesses stable current carrying capacity, ensuring long-term operational reliability. Core Performance Parameters: The module employs continuous current measurement design, with extremely brief interruptions in the current path during measurement. This minimizes interference with the normal operation of the circuit under test, ensuring measurement accuracy while protecting circuit stability. It prevents testing errors or circuit abnormalities caused by measurement interruptions.

Warning:

1. Electrical Shock Protection Requirements

To effectively prevent electric shock hazards, only use wires certified to meet the highest voltage standards for all circuits. Before disassembling the module housing, all power sources must be disconnected prior to connecting external devices to the module. Working under power is strictly prohibited.

2. Precautions for Using Multiple Signals

To prevent unexpected connections between different signal sources from causing malfunctions, when multiplexing two or more signal sources, it is recommended to connect each signal source to a separate module or to different signal groups within the same module. This ensures that signal transmission remains mutually interference-free.

3. Dangerous Voltage Protection Specifications

When any channel of the module is connected to a hazardous voltage source, observe the following key points:

- All channels within the module shall be considered hazardous channels, and their associated cables must be certified to meet the requirements for the maximum voltage applied.
- Thermocouples connected to other channels of the module must incorporate or be fitted with insulation meeting the maximum voltage standard. Additionally, thermal paste or tape compatible with the maximum voltage should be used to ensure effective isolation from conductive components.
- Under no circumstances should thermocouples be installed, moved, or removed while the device under test is energized to prevent electric shock or damage to the equipment.

4. Environmental Health and Safety (EHS) Management

If a module has channel connections to hazardous voltage sources, the instrument and equipment under test must be monitored throughout the entire process. Strict adherence to local environmental, health, and safety (EHS) regulations is required to restrict access by unauthorized personnel and ensure a safe operating environment.

8.9 DAQM4015A 8 channel high-voltage measurement module

As a professional module dedicated to high-voltage measurement, the DAQM4015A supports 8-channel parallel high-voltage measurement with a scan rate of up to 15 channels per second. It efficiently handles continuous data acquisition across multiple measurement points, meeting the rapid testing demands of high-volume high-voltage equipment. As a 1500V high-voltage measurement card, its maximum measurable input voltage spans both AC and DC scenarios—AC 1100V/DC 1500V—with a current limit of 10mA (at 1500V). This design accommodates high-voltage measurement requirements while ensuring safety for both the module and the device under test through current limiting. As a 1500V high-voltage measurement card, its maximum measurable input voltage spans both AC and DC scenarios—AC 1100V/DC 1500V—with a current limit of 10mA (1500V). This design accommodates high-voltage measurement requirements while ensuring safety for both the module and the device under test through current limiting.

Warning:

1. Electrical Shock Protection Requirements

To effectively prevent electric shock hazards, only use wires certified to meet the highest voltage standards for all circuits. Before disassembling the module housing, all power sources must be disconnected prior to connecting external devices to the module. Working under power is strictly prohibited.

2. Precautions for Using Multiple Signals

To prevent unexpected connections between different signal sources from causing malfunctions, when multiplexing two or more signal sources, it is recommended to connect each signal source to a separate module or to different signal groups within the same module. This ensures that signal transmission remains mutually interference-free.

3. Dangerous Voltage Protection Specifications

When any channel of the module is connected to a hazardous voltage source, observe the following key points:

- All channels within the module shall be considered hazardous channels, and their associated cables must be certified to meet the requirements for the maximum voltage applied.
- Thermocouples connected to other channels of the module must incorporate or be fitted with insulation meeting the maximum voltage standard. Additionally, thermal paste or tape compatible with the maximum voltage

should be used to ensure effective isolation from conductive components.

- Under no circumstances should thermocouples be installed, moved, or removed while the device under test is energized to prevent electric shock or damage to the equipment.

4. Environmental Health and Safety (EHS) Management

If a module has channel connections to hazardous voltage sources, the instrument and equipment under test must be monitored throughout the entire process. Strict adherence to local environmental, health, and safety (EHS) regulations is required to restrict access by unauthorized personnel and ensure a safe operating environment.

8.10 DAQM4016A 8 channel high-voltage measurement module

As an upgraded high-voltage measurement module, the DAQM4016A supports 8-channel parallel high-voltage measurement with a scan rate of up to 15 channels per second. It efficiently handles continuous data acquisition across multiple test points, ensuring testing efficiency and data consistency even during batch inspections of ultra-high-voltage equipment. As a 2000V high-voltage measurement card, its maximum measurable input voltage has been further enhanced, covering both AC and DC scenarios—AC 1500V/DC 2000V. Simultaneously, current limiting is strictly controlled at 1mA (2000V). While accommodating higher voltage measurement requirements, this precise current limitation maximizes operational safety for both the module and the device under test. As a 2000V high-voltage measurement card, its maximum measurable input voltage has been further increased, covering both AC and DC scenarios — AC 1500V/DC 2000V. Simultaneously, current is strictly limited to 1mA (2000V). This design not only accommodates higher voltage measurement requirements but also maximizes operational safety for both the module and the device under test through precise current limiting.

Warning:

1. Electrical Shock Protection Requirements

To effectively prevent electric shock hazards, only use wires certified to meet the highest voltage standards for all circuits. Before disassembling the module housing, all power sources must be disconnected prior to connecting external devices to the module. Working under power is strictly prohibited.

2. Precautions for Using Multiple Signals

To prevent unexpected connections between different signal sources from causing malfunctions, when multiplexing two or more signal sources, it is recommended to connect each signal source to a separate module or to different

signal groups within the same module. This ensures that signal transmission remains mutually interference-free.

3. Hazardous Voltage Protection Specifications

When any channel of the module is connected to a hazardous voltage source, observe the following key points:

- All channels within the module shall be considered hazardous channels, and their associated cables must be certified to meet the requirements for the maximum voltage applied.
- Thermocouples connected to other channels of the module must incorporate or be fitted with insulation meeting the maximum voltage standard. Additionally, thermal paste or tape compatible with the maximum voltage should be used to ensure effective isolation from conductive components.
- Under no circumstances should thermocouples be installed, moved, or removed while the device under test is energized to prevent electric shock or damage to the equipment.

4. Environmental Health and Safety (EHS) Management

If a module has channel connections to hazardous voltage sources, the instrument and equipment under test must be monitored throughout the entire process. Strict adherence to local environmental, health, and safety (EHS) regulations is required to restrict access by unauthorized personnel and ensure a safe operating environment.

9 Multimeter System

Push the white button on the front panel to switch the instrument from the data acquisition system to the multimeter system.

9.1 Front panel overview

Figure 9-1 Introduction to front panel(DMM)

1 Power button

2 USB HOST ports

External storage devices (USB drives) can be connected for saving or loading configuration files, storing data records, capturing screenshots, and more.

3 Help

To access context-sensitive help for any front panel button or menu soft key, press the button followed by the key for which you need help.

4 Restore default settings

Used to restore the instrument to its factory default settings.

5 LCD display

4.3-inch color TFT LCD display shows the menu and parameter settings for the current function, system status, and prompt messages.

6 Measurement configuration and instrument operation keys

Used for configuring instrument measurement items and basic instrument operations.

7 Connection terminal

8 **DMM/DAQ switch**

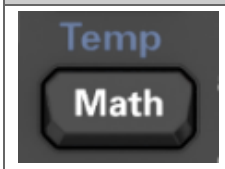
9 **Menu soft key**

Each soft key corresponds to an item in the menu above it. Pressing any soft key activates the corresponding menu item.

9.2 Front panel button guide

On the multimeter system, the button functions correspond to the blue text above each button.

Button	Description
	Configure DC/AC voltage measurement. Measure: Select DCV to configure DC voltage measurement. Range: Auto (automatically adjusts range, default), 100 mV, 1 V, 10 V, 100 V, or 1000 V. Aperture: 0.002, 0.02, 0.2, 1, 10, 100. Default: 10. Auto Zero: Off or On (default). Input Z: 10 MΩ (default) or Auto (> 1 GΩ). Delay: Set delay to Auto (default) or Manual. Measure: Select ACV to configure DC voltage measurement. Range: Auto (auto-ranging, default), 100 mA, 1 V, 10 V, 100 V, and 750 V. AC Filter: >3 Hz, >20 Hz (default), >200 Hz. Delay: Set delay to Auto (default) or Manual.
	Configure DC/AC current measurement. Measure: Select DCI to configure DC current measurement. Terminals: 3 A (default) or 10 A range. Range: Auto (automatic range adjustment, default), 100 μA, 1 mA, 10 mA, 100 mA, 1 A, 3 A, or 10 A (terminals set to 10 A). Aperture: 0.002, 0.02, 0.2, 1, 10, 100. Default: 10. Auto Zero: Off or On (default). Delay: Set delay to Auto (default) or Manual. Measure: Select ACI to configure AC current measurement. Terminals: 3 A (default) or 10 A range. Range: Auto (automatic range adjustment, default), 100 μA, 1 mA, 10 mA, 100 mA, 1 A, 3 A, or 10 A (terminal set to 10 A). AC Filter: >3 Hz, >20 Hz (default), >200 Hz. Delay: Set delay to Auto (default) or Manual.

	Configure 2Ω/4Ω resistance measurement. Range: Auto (automatic range adjustment, default), 100 Ω, 1 kΩ, 10 kΩ, 100 kΩ, 1 MΩ, 10 MΩ, 100 MΩ. Aperture: 0.002, 0.02, 0.2, 1, 10, 100. Default: 10. Auto Zero: Off or On (default). Delay: Set delay to Auto or Manual.
	Start and stop measurement.
	Perform a single measurement.
	Display Format for Configuration Data Select Number to display readings as numeric values. Select Bar Meter to add a moving bar below the standard numeric display. Select Trend Chart to collect and display data in a pixel column. Select Histogram to graphically represent the distribution of measurement data. Data is grouped into individual bars represented by vertical bars in the histogram display.
	Allow/disallow invalid values and specify the use of invalid values.
	Configure 2-wire and 4-wire temperature measurement. Sensor: RTD 2w (default), RTD 4w, Thermis2w, Thermis4w. Additional settings for RTD 2w or RTD 4w: Set to PT100 (default) or PT1000. Additional settings for Thermis2w or Thermis4w: Set to 2.2K, 5K (default), or 10K. Auto Zero: Off or On (default). Aperture: 0.002, 0.02, 0.2, 1, 10, 100. Default: 10. Unit: °C (default), °F, or K. Delay: Set delay to Auto (default) or Manual.
	Capacitance Measurement Configuration: Range: 1 nF, 10 nF, 100 nF, 1 µF, 10 µF, 100 µF, or Auto (default). Delay: Set delay to Auto (default) or Manual.

	Configure diode measurement and continuity measurement: Beeper: Off or On (default). Delay: Set delay to Auto (default) or Manual.
	Configure frequency and period measurements. Parameters include range, AC filter, gate time, timeout, and delay. Measure: Select Freq/Period to configure frequency or period measurement. Range: Auto (automatically adjusts range, default), 100 mA, 1 V, 10 V, 100 V, and 750 V. AC Filter: >3 Hz, >20 Hz (default), >200 Hz. Gate Time: 10 ms, 100 ms, 1 s (default). Delay: Set delay to Auto (default) or Manual.

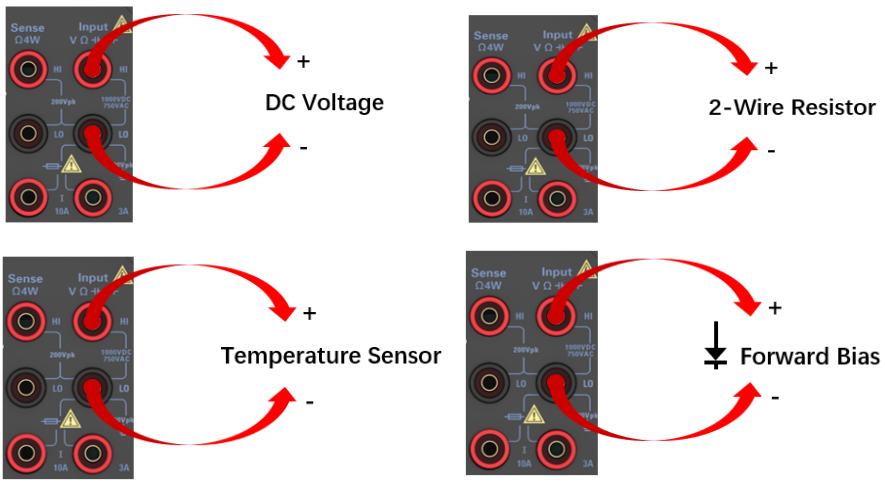
Table 9-1 Introduction to front panel buttons

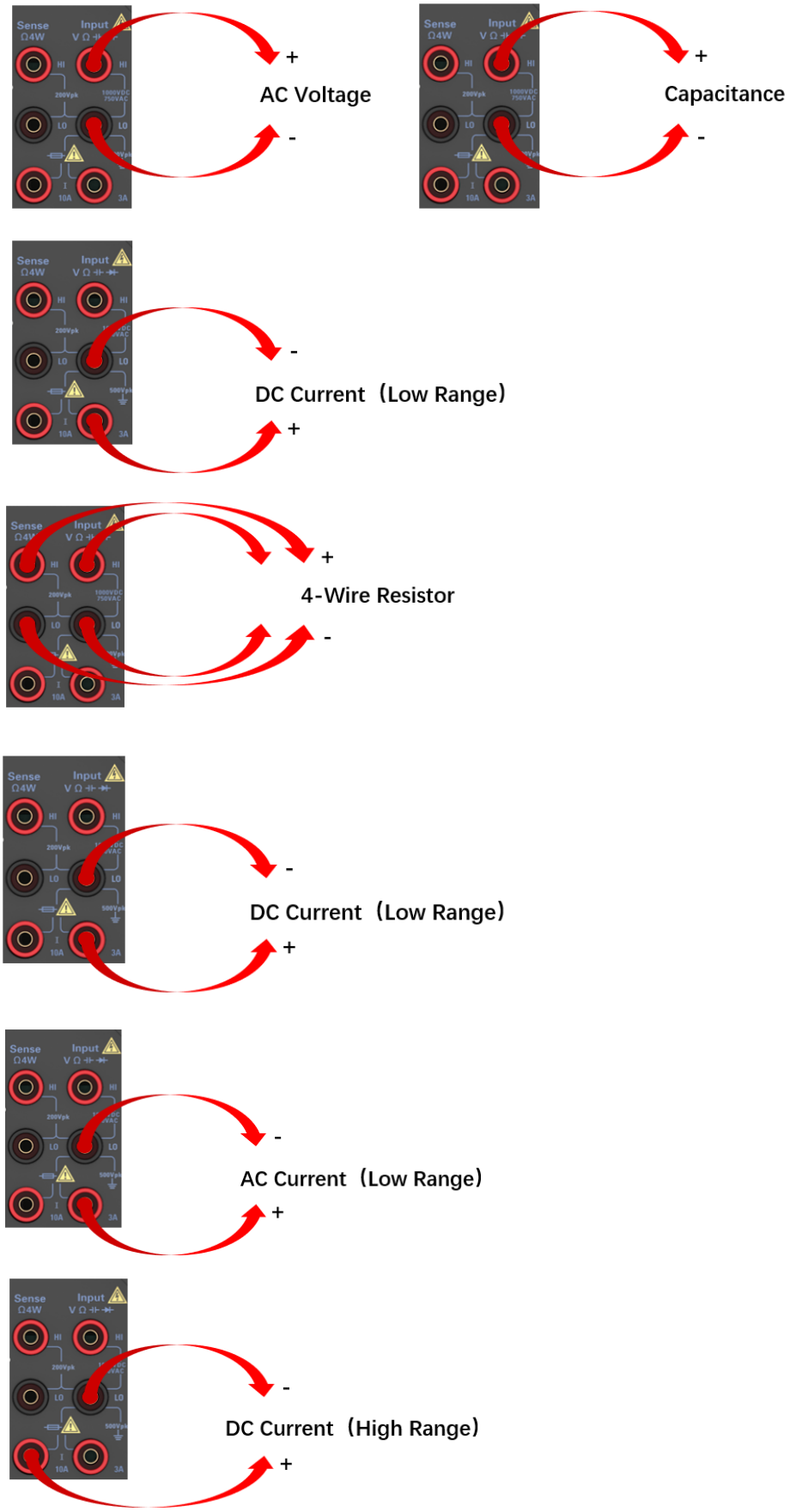
9.3 Measurement connection

This multimeter provides multiple measurement functions. After selecting the required measurement function, please connect the measured signal (device) to the multimeter according to the method shown in the following figure. During the measurement process, please do not switch the measurement function arbitrarily, otherwise it may damage the multimeter.

For example, when the measuring lead is connected to the current socket, do not use it to measure AC voltage.

Connection diagram





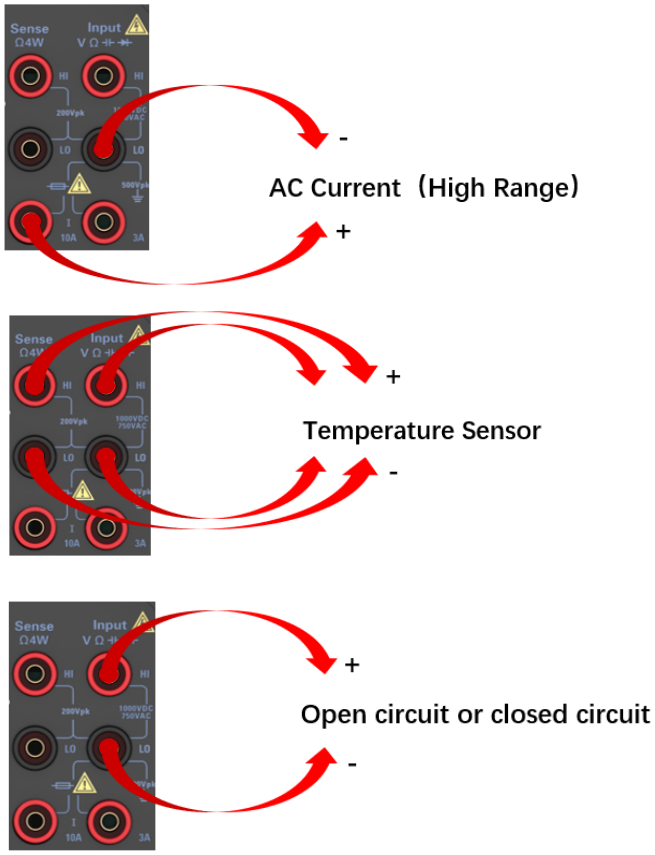


Figure 9-2 Measurement connection diagram

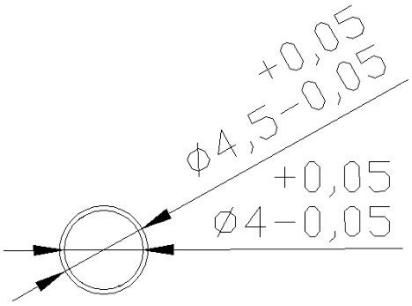


Figure 9-3 Input terminal size

Note: To avoid damaging the multimeter, be sure to follow these guidelines when taking measurements.

1. When measuring current, be sure to select the correct current input terminals based on the expected current magnitude before turning on the multimeter's power supply.

2. The input terminal of the multimeter has an outer diameter of 4.5mm and an inner diameter of 4mm, with a tolerance of ±0.05mm (as shown below). The minimum inner diameter is 3.95mm. Special Note: Please use genuine Hantai test leads or purchase compatible leads for testing. Damage to the multimeter's input

terminals caused by improperly sized leads selected by the customer, forced insertion/removal, or other human factors is not covered under warranty.

9.4 Features and functions

The multimeter section supports numerous common measurements, including DC voltage, AC voltage, DC current, AC current, resistance, temperature, capacitance, diode testing, frequency and period measurement, as well as continuity testing.

9.4.1 Configure DC voltage measurement

This section describes how to configure DC voltage measurements from the front panel.

Step 1: Configure the test leads as shown below.

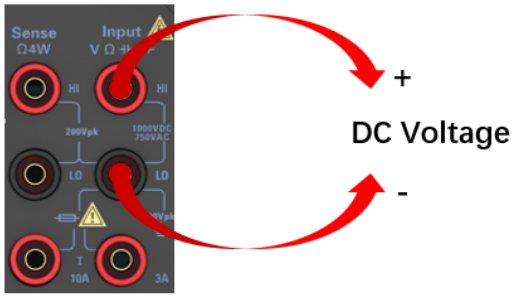


Figure 9-4 DC voltage connection diagram

Step 2: Press **[V]** on the front panel.

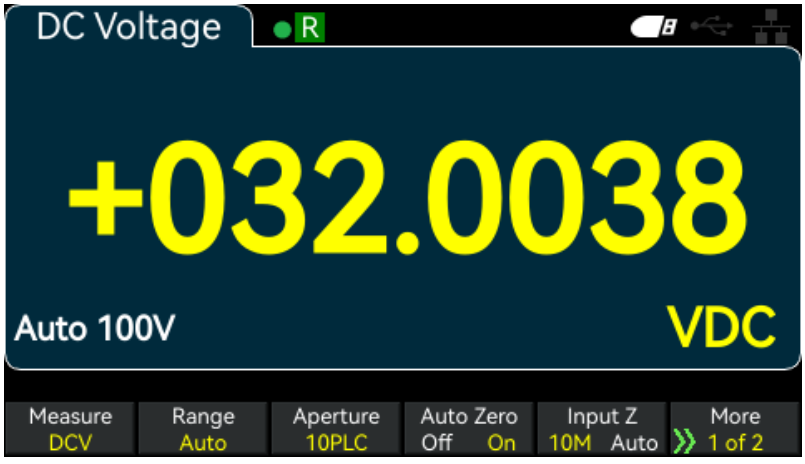


Figure 9-5 DCV interface

Step 3: Press **Measure** and select **DCV**.

Step 4: Press **Aperture** and select the power line cycle count (PLC) for measurement. Only 1, 10, and 100 PLC provide normal mode (line frequency noise) suppression. Selecting 100 PLC offers the best noise suppression but results in the slowest measurement speed.

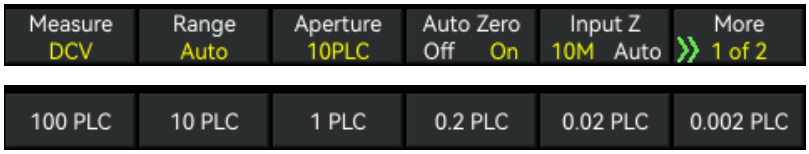


Figure 9-6 PLC settings

Step 5: Press **Range** to select a measurement range. Auto (automatic range adjustment) automatically selects the measurement range based on the input. Compared to manual ranging, automatic range adjustment is more convenient but may result in slower measurements. Automatic range adjustment can increase up to 120% of the current range and decrease to below 10% of the current range.

Figure 9-7 DCV-Range

Step 6: **Auto Zero**: Auto zero provides the most accurate measurement values but requires additional time to perform the zeroing measurement. When auto zero is enabled (On), the DMM internally measures the offset after each measurement. This value is then subtracted from the previous reading.

This prevents offset voltage on the DMM input circuit from affecting measurement accuracy. When Auto Zero is disabled (Off), the DMM takes a single offset measurement and subtracts this offset value from all subsequent measured parameters. Each time you change a function, range, or integration time, the DMM performs a new offset measurement. (4-wire measurements do not have an Auto Zero setting.)

Step 7: **Input Z** specifies the input impedance (Input Z) of the test leads. This sets the measurement terminal input impedance, which can be Auto or 10 MΩ. Auto mode selects HighZ, suitable for 100 mV, 1 V, and 10 V ranges, while 10 MΩ is used for 100 V and 1000 V ranges. In most cases, 10 MΩ is sufficiently high to avoid loading most circuits, yet low enough to stabilize readings on high-impedance circuits. It also introduces less noise into the reading than the HighZ option, which is suitable for situations where the 10 MΩ load is significant.

Step 8: **Delay** specifies whether the delay is set to automatic or manual, used to adjust the multimeter's response time to the measured signal.

9.4.2 Configure AC voltage measurement

This section describes how to configure AC voltage measurement from the front panel.

Step 1: Configure the test leads as shown below.

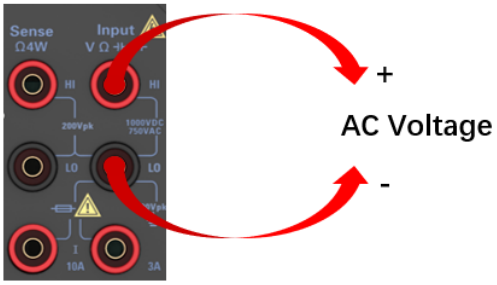


Figure 9-8 AC voltage connection diagram

Step 2: Press **[V]** on the front panel.

Step 3: Press **Measure** and select **ACV**.

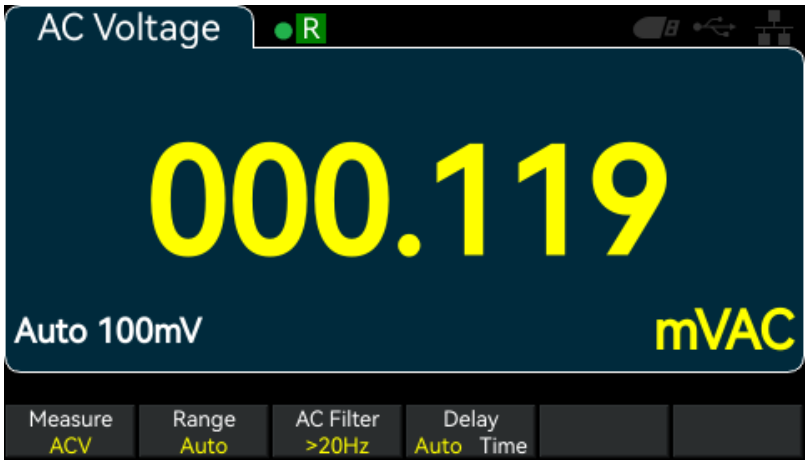


Figure 9-9 ACV interface

Step 4: Press **Range** to select a measurement range. Auto (automatic range adjustment) automatically selects the range based on the input. Compared to manual ranging, automatic adjustment is more convenient but may result in slower measurements. Auto ranging can adjust upward to 120% of the current range and downward to below 10% of the current range.

Figure 9-10 ACV-Range

Step 5: Press **AC Filter** and select a filter for measurement. This instrument employs three distinct AC filters, enabling you to optimize low-frequency accuracy. These filters are 3 Hz, 20 Hz, and 200 Hz. Typically, you should select the highest-frequency filter whose frequency is lower than that of the signal being measured, as higher-frequency filters yield faster measurements. For example, use the 20 Hz filter when measuring signals in the 20 to 200 Hz range. If measurement speed is not a concern, selecting a lower frequency filter may yield quieter measurements, depending on the signal being measured.

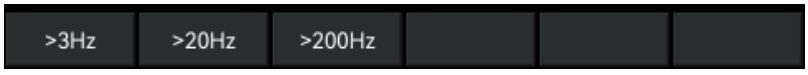


Figure 9-11 AC Filter settings

Step 6: **Delay** specifies whether the delay is set to automatic or manual, used to

adjust the multimeter's response time to the measured signal.

Note: Selecting the default delay provides the correct first reading for most measurements. For the most precise measurements, the input blocking RC time constant must stabilize to 1/50th of the AC signal level.

Signals exceeding 300 V (rms) may cause self-heating of the signal conditioning elements. These errors are included in the instrument's technical specifications. Internal temperature changes due to self-heating may introduce additional errors in other functions or ranges. Such additional errors typically dissipate within minutes.

9.4.3 Configure DC current measurement

This section describes how to configure DC current measurement from the front panel.

Step 1: Configure the test leads as shown below.

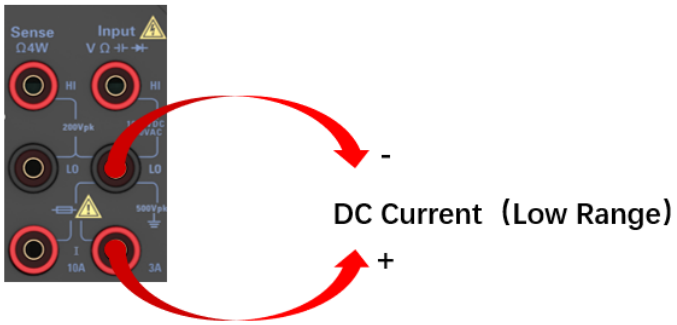


Figure 9-12 DC current (small range) connection diagram

On the multimeter system, you can also configure the measurement process using the 10 A terminals. When measuring currents exceeding 3 A, it is recommended to use these terminals:

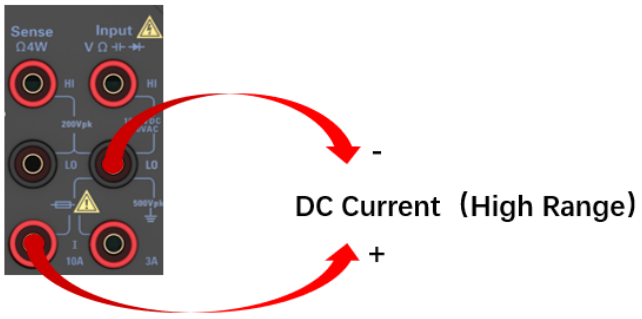


Figure 9-13 DC current (large range) connection diagram

Step 2: Press **[I]** on the front panel.

Step 3: Press **Measure** and select **DCI**.

Figure 9-14 DCI interface

Step 4: For the multimeter system, the default Aperture NPLC is set to 100PLC. Use the soft keys in the menu at the bottom of the screen to specify the integration time in Power Line Cycle (PLC) for measurement. 1, 10, and 100 PLC provide normal mode (line frequency noise) suppression.

Step 5: By default, the 3A terminal is selected. Use the Terminals softkey to switch between the 3A terminal and the 10A input terminal. When changed to 10A, the measurement range automatically adjusts to 10A.

Step 6: Press **Range** to select a measurement range. Auto (Auto Range) automatically selects the range based on the input. Compared to manual ranging, Auto Range is more convenient but may result in slower measurements. Auto Range can adjust upward to 120% of the current range and downward to below 10% of the current range. Press More to switch between the two pages of settings.

Figure 9-15 DCI-Range

Step 7: Auto Zero: Auto Zero provides the most accurate measurement values but requires additional time to perform the zeroing measurement. When Auto Zero is enabled (On), the DMM will internally measure the offset after each measurement. This value is then subtracted from the previous reading.

This prevents offset voltage on the DMM input circuit from affecting measurement accuracy. When auto-zeroing is disabled (Off), the DMM measures the offset once and subtracts this offset value from all subsequent measured parameters.

Step 8: **Delay** specifies whether the delay is set to automatic or manual, used to adjust the multimeter's response time to the measured signal.

9.4.4 Configure AC current measurement

This section describes how to configure AC current measurement from the front panel.

Step 1: Configure the test leads as shown below.

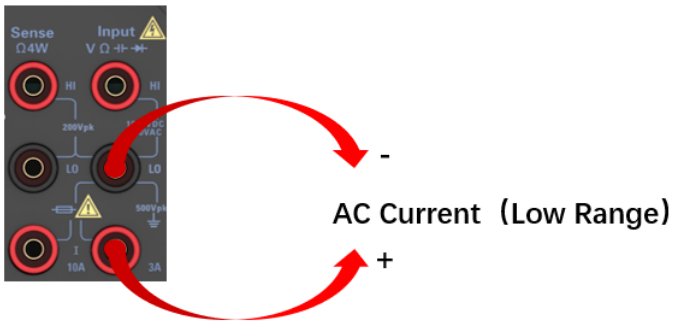


Figure 9-16 AC current (small range) connection diagram

On the multimeter system, you can also configure the measurement process using the 10 A terminals. When measuring currents exceeding 3.0 A, it is recommended to use these terminals:

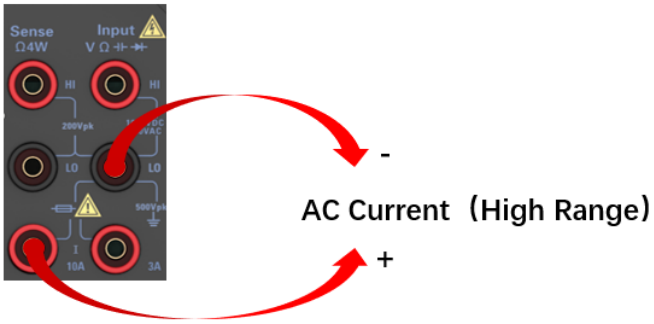


Figure 9-17 AC current (large range) connection diagram

Step 2: Press **[I]** on the front panel.

Step 3: Press **Measure** and select **ACI**.

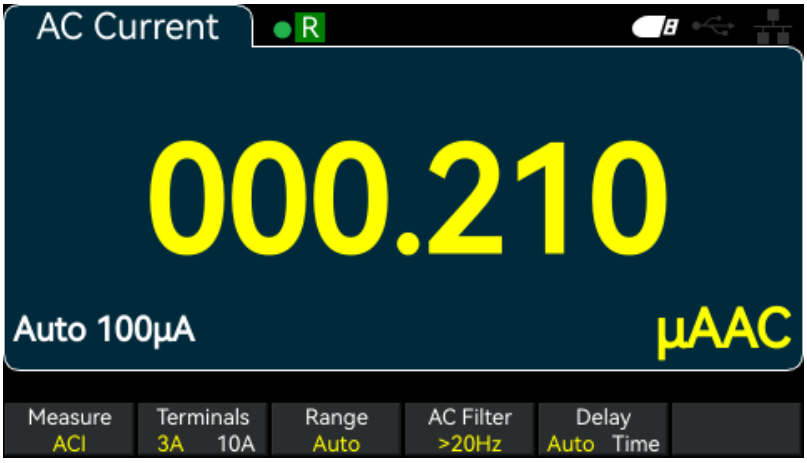


Figure 9-18 ACI interface

Step 4: By default, the 3A terminal is selected. Use the Terminals softkey to switch

between the 3A terminal and the 10A input terminal. When changed to 10A, the measurement range automatically adjusts to 10A.

Step 5: Press **Range** to select a measurement range. You can also use the menu soft keys at the bottom of the screen to select the range. Auto (Auto Range) automatically selects the measurement range based on the input. Compared to manual ranging, auto ranging is more convenient but results in slower measurements. Auto ranging can adjust upward to 120% of the current range and downward to below 10% of the current range. Press More to switch between the two pages of settings.

Figure 9-19 ACI-Range

Step 6: Press **AC Filter** and select a filter for measurement. This instrument employs three distinct AC filters, allowing you to optimize low-frequency accuracy or reduce AC settling time after changes in input signal amplitude.

These filters are 3 Hz, 20 Hz, and 200 Hz. Typically, you should select the highest frequency filter whose frequency is lower than the signal you are measuring, as higher frequency filters result in faster measurements. For example, use the 20 Hz filter when measuring signals in the 20 to 200 Hz range.

If measurement speed is not a concern, selecting a lower-frequency filter may yield quieter measurements, depending on the signal being measured.

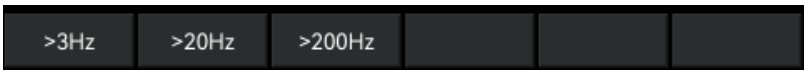


Figure 9-20 AC Filter settings

Step 7: **Delay** specifies whether the delay is set to automatic or manual, used to adjust the multimeter's response time to the measured signal.

9.4.5 Configure resistance measurement

This section describes how to configure 2-wire and 4-wire resistance measurements from the front panel.

Step 1: Configure the test leads as shown below.

2-wire resistance:

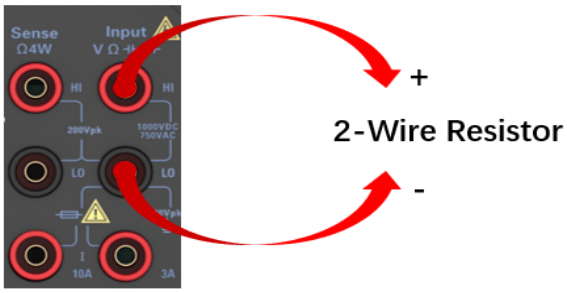


Figure 9-21 2-wire resistance connection diagram

4-wire resistance:

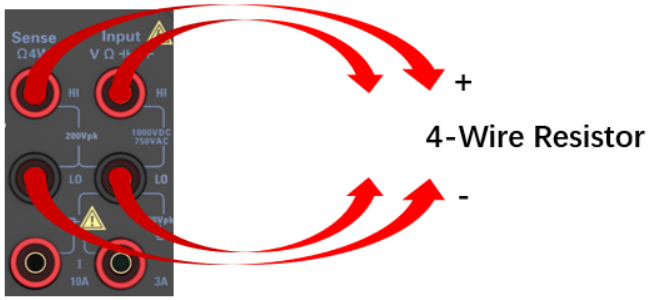


Figure 9-22 4-wire resistance connection diagram

Step 2: Press **[Ω]** on the front panel.

Step 3: Press **Measure** and select **2W Ohms** or **4W Ohms**. (The 4W Ohms menu does not include Auto Zero.)

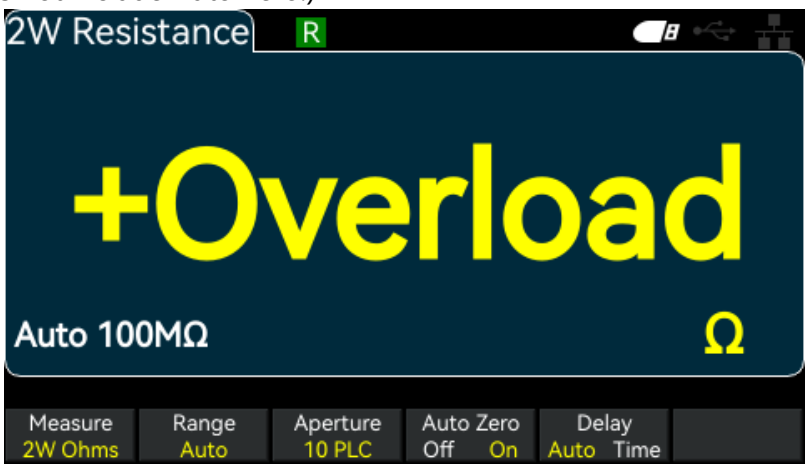


Figure 9-23 Resistance interface

Step 4: For the Multimeter System, the default Aperture NPLC=10PLC. Use the front panel menu soft keys to specify the integration time for measurement in Power Line Cycle Count (PLC). 1, 10, and 100 PLC provide normal mode (line frequency noise) suppression.

Selecting 100 PLC provides the best noise suppression but offers the slowest measurement speed.

Step 5: Press **Range** to select a measurement range. Auto (automatic range

adjustment) automatically selects the range based on the input. Compared to manual ranging, auto ranging is more convenient but may result in slower measurements. Auto ranging can adjust upward to 120% of the current range and downward to below 10% of the current range. Press **More** to switch between the two pages of settings.

Figure 9-24 Resistance-Range

Please note that the test current provided by each range will be displayed. After selecting a range, the main resistance menu will appear.

Step 6: Auto Zero: Auto zero provides the most accurate measurement values but requires additional time to perform the zeroing measurement. When auto zero is enabled (On), the DMM internally measures the offset after each measurement. This value is then subtracted from the previous reading.

This prevents offset voltage on the DMM input circuit from affecting measurement accuracy. When Auto Zero is disabled (Off), the DMM takes a single offset measurement and subtracts this offset value from all subsequent measured parameters. The DMM performs a new offset measurement each time you change the function, range, or integration time. (Auto Zero is not available for 4-wire measurements.)

Step 7: **Delay** specifies whether the delay is set to automatic or manual, used to adjust the multimeter's response time to the measured signal.

9.4.6 Configure temperature measurement

This section describes how to configure 2-wire and 4-wire temperature measurements from the front panel.

Step 1: Configure the test leads as shown below.

2-wire temperature

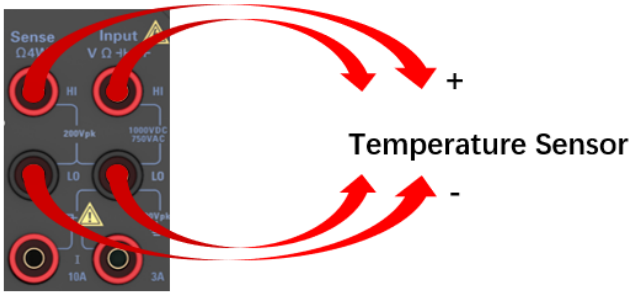


Figure 9-25 2-wire temperature connection diagram

4-wire temperature

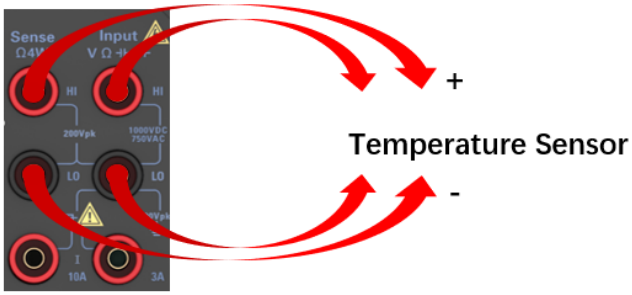


Figure 9-26 4-wire temperature connection diagram

Step 2: Press **[Temp]** on the front panel.

Figure 9-27 Temperature interface

Step 3: Press **Sensor** to select the probe type. If you choose to use an RTD, this menu will feature a soft key for specifying the RTD's resistance at 0°C. If you choose to use Thermis, this menu will feature a soft key for specifying the Thermis' resistance at 0°C.

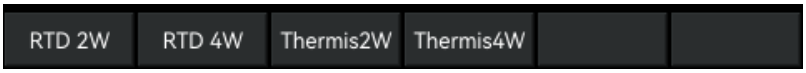


Figure 9-28 Temperature probe type

Step 4: For 2-wire measurements, the **Auto Zero** soft key is enabled.

Auto Zero: Auto zero provides the most accurate measurement values but requires additional time to perform the zeroing measurement. When Auto Zero is enabled (On), the DMM performs an internal offset measurement after each measurement. This value is then subtracted from the previous reading. This prevents offset voltage on the DMM input circuit from affecting measurement accuracy. When Auto Zero is disabled (Off), the DMM performs a single offset measurement and subtracts this offset value from all subsequent measurements.

Step 5: Press **Aperture** and select the power line cycle count (PLC) for measurement. Only 1, 10, and 100 PLC provide normal mode (line frequency noise) suppression. Selecting 100 PLC delivers optimal noise suppression and resolution, but offers the slowest measurement speed.

Figure 9-29 PLC settings

Step 6: Use the **Units** soft key to display temperatures in Celsius, Fahrenheit, or Kelvin.

A temperature sensor probe is required for temperature measurement. Supported probes include 2-wire and 4-wire RTDs, as well as 2-wire and 4-wire thermistors (5k 44007 type).

Probe type selection:

RTD can provide a highly accurate linear relationship between resistance and temperature, with a temperature range of approximately -200 to 500 ℃. Due to its inherent linearity, the conversion complexity for RTD is very low.

Thermistors contain semiconductor materials, and their sensitivity is approximately 10 times that of RTDs. Due to being a semiconductor material, its temperature range is more limited, usually between -80 ℃ and 150 ℃. Thermistors have a strong nonlinear temperature resistance relationship; Therefore, its conversion algorithm is more complex.

Step 7: **Delay** specifies whether to set the delay to automatic or manual, used to adjust the response time of the multimeter to the measured signal.

9.4.7 Configure capacitance measurement

Step 1: Configure the test leads as shown below.

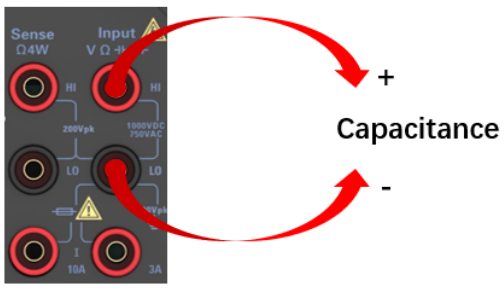


Figure 9-30 Capacitor connection diagram

Step 2: Press the **[Module]** button on the front panel( ).

Figure 9-31 Capacitance interface

Step 3: To remove the test lead capacitance, perform the following actions:

- Disconnect the probe ends of the positive and negative test leads from the test circuit, then keep them open.
- Press Null; the DMM will subtract this zero value from the capacitance measurement result.

Step 4: Press **Range** to select a measurement range. You can also use the menu soft keys at the bottom of the screen to select the range.

Auto (Auto Range) automatically selects the measurement range based on the input. Compared to manual ranging, auto ranging is more convenient but results in slower measurements. Auto ranging can adjust downward to below 10% of the range and upward to over 120% of the range. When Auto Range is disabled, the instrument will not report "Overload" for readings exceeding 120% of the range (capacitance measurement only). Overload occurs only when the applied capacitance is too large, causing the algorithm to time out and fail to complete the measurement. In capacitance measurement mode, applying DC voltage or shorting the input terminals will cause the instrument to report "Overload".

Figure 9-32 Capacitance-Range

Step 5: **Delay** specifies whether the delay is set to automatic or manual, used to adjust the multimeter's response time to the measured signal.

9.4.8 Configure diode measurement

This section describes how to configure the diode test from the front panel.

Step 1: Configure the test leads as shown below.

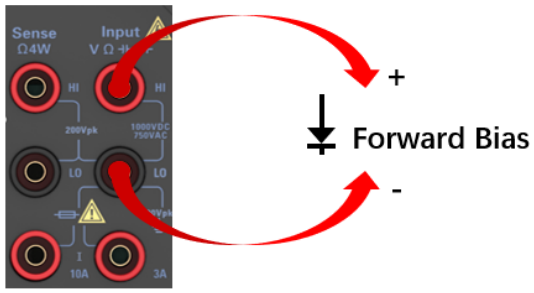


Figure 9-33 Diode connection diagram

Step 2: Press **[Copy]** on the front panel( ).

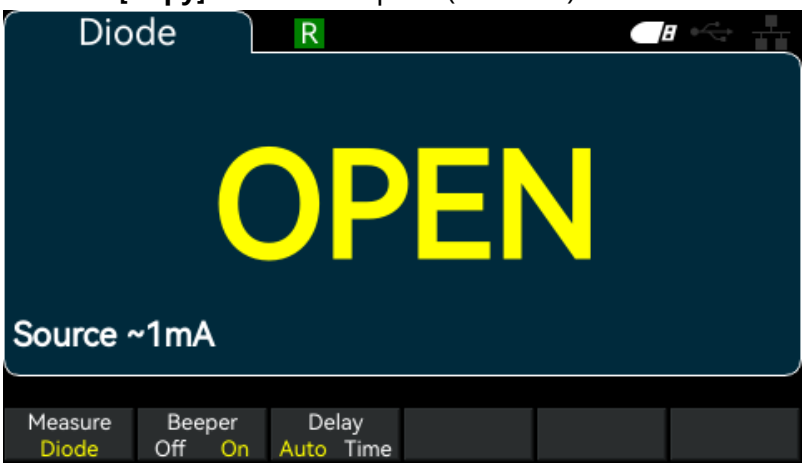


Figure 9-34 Diode interface

Step 3: Press **Measure** and select **Diode**. This menu specifies whether the DMM will beep to indicate a successful diode test.

Step 4: **Delay** specifies whether the delay is set to automatic or manual, used to adjust the multimeter's response time to the measured signal.

The diode measurement method is as follows:

0 to 4.9V	The voltage display is on the front panel, and when the signal is converted to a threshold of 0.3 to 0.8V, the instrument emits a buzzing sound (if the buzzing is enabled).
>5V	The front panel displays OPEN.

9.4.9 Continuity testing

This section describes how to configure continuity measurement from the front panel.

Step 1: Configure the test leads as shown below.

2-wire resistance:

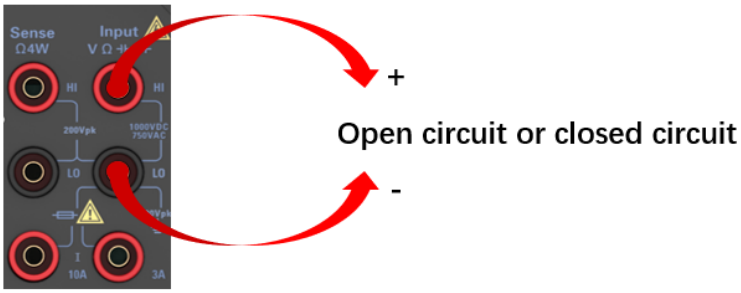


Figure 9-35 Continuity testing connection

Step 2: Press **[Copy]** on the front panel( ).

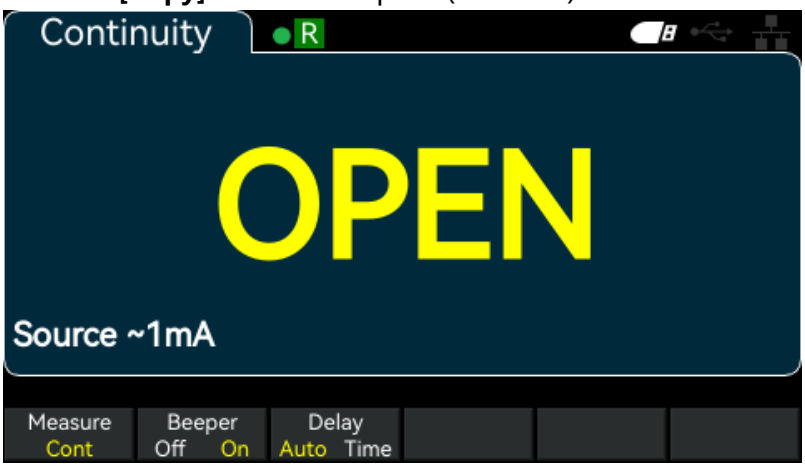


Figure 9-36 Continuity interface

Step 3: Press **Measure** and select **Cont**. You can use this menu to choose whether to use the buzzer or disable it.

The continuity measurement method is as follows:

≤ 10 Ω	Display the measured resistance and beep (if the buzzer is enabled).
10 Ω to 1.2 kΩ	Display measured resistance, no beep.
> 1.2 kΩ	Display OPEN, no beep.

9.4.10 Configure frequency and period measurements

This section describes how to configure frequency and period measurements from the front panel.

Step 1: Configure the test leads as shown below.

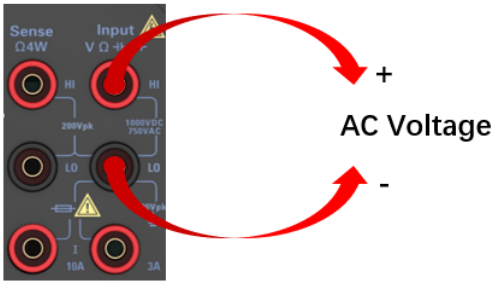


Figure 9-37 Frequency/Cycle connection diagram

Step 2: Press **[Freq]** on the front panel, then use the first soft key to select frequency or period measurement.

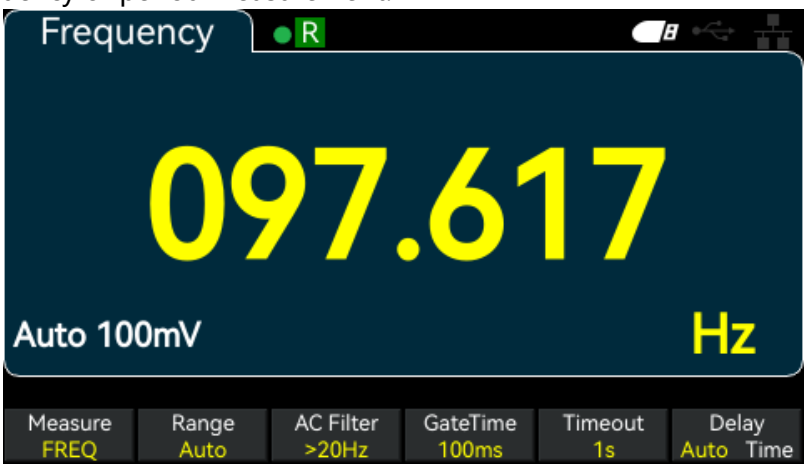


Figure 9-38 Capacitance interface

Step 3: Press **Range** to select a measurement range. Auto (automatic range adjustment) automatically selects the range based on the input. Compared to manual ranging, auto ranging is more convenient but may result in slower measurements. Auto ranging can adjust upward to 120% of the current range and downward to below 10% of the current range.

Figure 9-39 Capacitance-Range

Step 4: Press **AC Filter** and select a filter for measurement. This instrument employs three distinct AC filters, allowing you to optimize low-frequency accuracy or reduce AC settling time after changes in input signal amplitude.

These filters are 3 Hz, 20 Hz, and 200 Hz. Typically, you should select the highest frequency filter whose frequency is lower than the signal you are measuring, as higher frequency filters result in faster measurements. For example, use the 20 Hz filter when measuring signals in the 20 to 200 Hz range.

If measurement speed is not a concern, selecting a lower-frequency filter will yield quieter measurements, depending on the signal being measured.

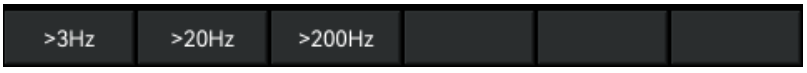


Figure 9-40 AC Filter settings

Step 5: Press **Gate Time** and select a measurement interval (integration time) of 10 ms, 100 ms (default), or 1 s.

Figure 9-41Gate Time settings

Step 6: Press **Timeout** to set the duration the instrument waits before timing out frequency or period measurements in the absence of any signal. If set to 1s, the instrument will wait one second before timing out. When set to Auto, the wait time varies with the AC filter bandwidth; a faster bandwidth results in shorter wait times before timeout and return. This facilitates test systems where DUT faults may cause signal loss; in such cases, faults can be identified more rapidly, enhancing overall test speed.

Step 7: **Delay** specifies whether the delay is set to automatic or manual, used to adjust the multimeter's response time to the measured signal.

9.5 [View] menu

By default, the instrument displays readings in digital format. Additionally, you may select bar gauge, trend graph, or histogram displays.

Press the **[View]** key, then press the **Display** soft key to select the display type:

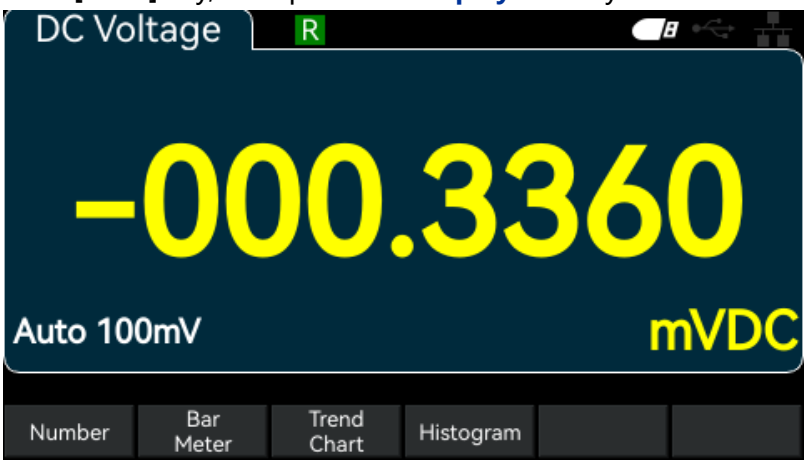


Figure 9-42 View menu

9.5.1 Number

Click on **Number**, and the instrument will display the reading in numerical form.

Figure 9-43 View-Number

9.5.2 Bar meter

Click on the **Bar Meter**, and a moving bar has been added below the standard numerical display for the bar gauge.

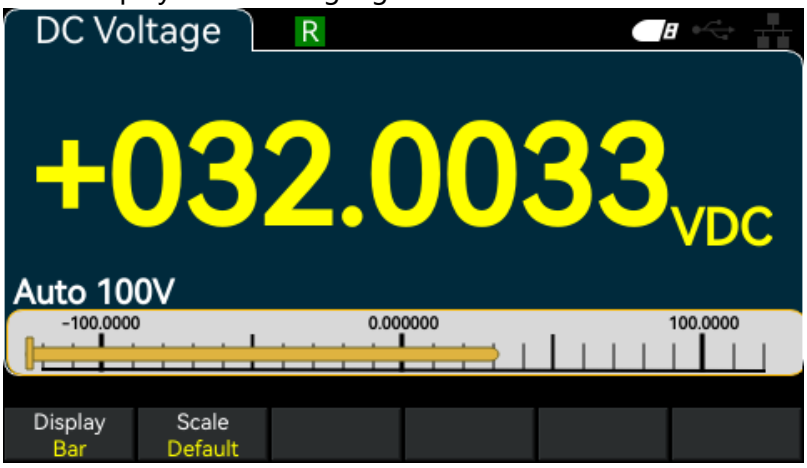


Figure 9-44View-Bar

Click on **Scale** to set the horizontal scale.

- The default setting for the scale equals the measurement range.
- Manual allows you to configure calibrations either as High and Low values or as Span values centered around a Center value. For example, a scale ranging from a Low value of -500 Ω to a High value of 1000 Ω can also be specified as having a 250 Ω Center value with a 1500 Ω Span.

9.5.3 Trend chart

To select the trend chart, press **[Display]**, then press the **Trend Chart** soft key:

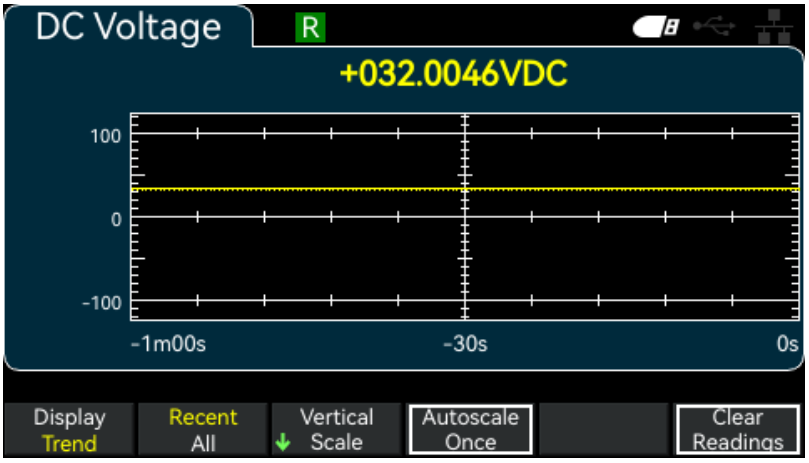


Figure 9-45 View-Trend chart

In continuous measurement mode, the trend graph displays data trends over a period of time:

The system will collect data and display it in a pixel column.

- The Recent/All soft key can display all data in the trend graph (All) or only recent data (Recent). Neither option clears the reading memory.

In All mode, the trend graph displays all acquired readings, arranged from left to right. After filling the display, data on the left side compresses as new data is added to the right side of the display.

In Recent mode, the trend graph displays readings acquired within a specified time period.

Press the **Vertical Scale** soft key to specify how the current vertical scaling is determined.

Figure 9-46 Vertical scale menu

- Default: The default setting for the scale equals the measurement range.
- Auto:It can automatically adjust the scaling ratio to best fit the straight line currently displayed on the screen.
- Manual: Allows you to configure calibration either as High and Low values or as Span values centered around a Center value. For example, scaling from a 0 V Low value to a 5 V High value corresponds to a 2.5 V Span and a 5 V Center.

Press the **Clear Readings** soft key to clear the current reading.

9.5.4 Histogram

Select **Histogram** display mode to graphically represent the distribution of measurement data. Data is grouped into individual bars represented by vertical bars in the histogram display.

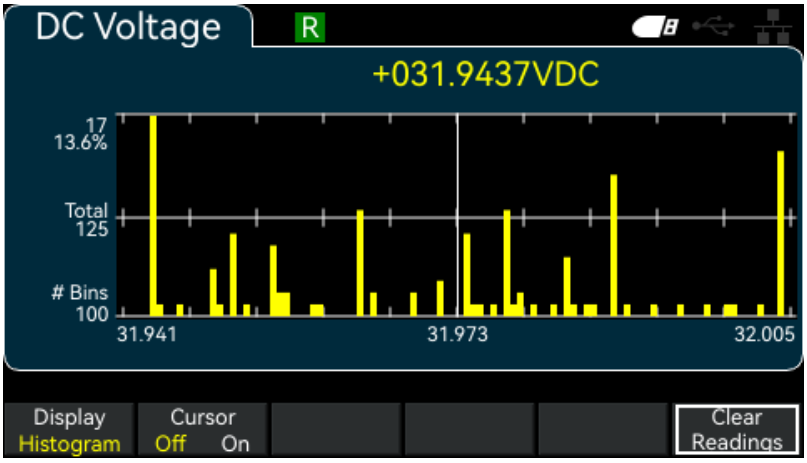


Figure 9-47 View-Histogram

Note: When measuring repetitive signals spanning multiple ranges, automatic range adjustment may adversely affect the histogram display. To avoid this, select a fixed range when using the histogram display.

Press the **Cursors** softkey and select **On** to enable the cursor menu.

B1: Use the arrow keys to adjust the position of cursor B1 (purple vertical dashed line).

B2: Use the arrow keys to adjust the position of cursor B2 (green vertical dashed line).

Press the **Clear Readings** softkey to recalculate the histogram, including new readings.

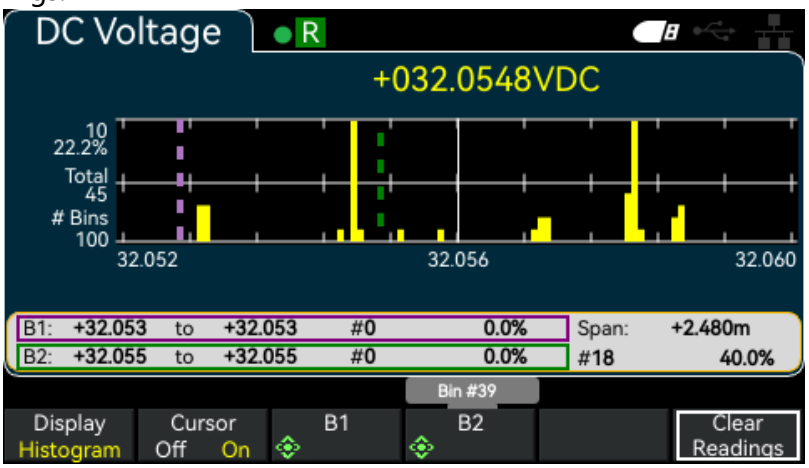


Figure 9-48 Cursors menu

9.5.5 Run/Stop menu

If the reading is currently in progress, pressing the **[Run/Stop]** key will terminate the reading. If the reading has already stopped, pressing this key will switch to reading mode.

Reading Mode: The letter R appears in the upper left corner of the screen.

End Reading: The letter S appears in the upper left corner of the screen.

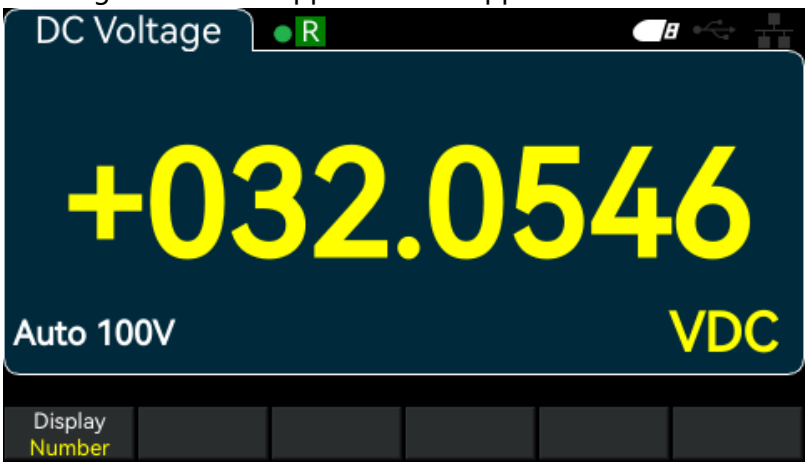


Figure 9-49 Reading modes

Figure 9-50 Terminate reading

9.5.6 Single menu

Press the **[Single]** key, and the instrument will perform a single trigger, completing one reading before entering the reading termination state.

9.5.7 Null menu

Null refers to a menu function. Press **[Null]** to execute a null operation. Press **[Null]** again to exit the null operation.

10 Indicator

Range (2)		24 hours (3) TCAL ± 1℃	90 Day TCAL±5℃	1 Year TCAL±5℃	2 Year TCAL±5℃	Temperature Coefficient (4)
DC voltage						
100mV		0.0030+0.0030	0.0040+0.0035	0.0050+0.0035	0.0065+0.0035	0.0005+0.0005
1V		0.0020+0.0006	0.0030+0.0007	0.0040+0.0007	0.0055+0.0007	0.0005+0.0001
10V		0.0015+0.0004	0.0020+0.0005	0.0035+0.0005	0.0050+0.0005	0.0005+0.0001
100V		0.0020+0.0006	0.0035+0.0006	0.0045+0.0006	0.0060+0.0006	0.0005+0.0001
1000V		0.0020+0.0006	0.0035+0.0010	0.0045+0.0010	0.0060+0.0010	0.0005+0.0001
True RMS AC Voltage (2, 5, 6) 100 mV, 1 V, 10 V, 100 V, and 750 V ranges						
5Hz-10Hz		0.35+0.02	0.35+0.03	0.35+0.03	0.35+0.03	0.035+0.003
10Hz-20KHz		0.04+0.02	0.05+0.03	0.06+0.03	0.07+0.03	0.005+0.003
20KHz-50KHz		0.10+0.04	0.11+0.05	0.12+0.05	0.13+0.05	0.011+0.005
50KHz-100KHz		0.55+0.08	0.60+0.08	0.60+0.08	0.60+0.08	0.060+0.008
100KHz-300KHz		4.00+0.50	4.00+0.50	4.00+0.50	4.00+0.50	0.200+0.020
DC current	Internal resistance voltage drop					
100μA	<0.03V	0.010+0.020	0.040+0.025	0.050+0.025	0.060+0.025	0.0020+0.0030
1mA	<0.3V	0.007+0.006	0.030+0.006	0.050+0.006	0.060+0.006	0.0020+0.0005
10mA	<0.05V	0.007+0.020	0.030+0.020	0.050+0.020	0.060+0.020	0.0020+0.0020
100mA	<0.5V	0.010+0.004	0.030+0.005	0.050+0.005	0.060+0.005	0.0020+0.0005
1A	<0.7V	0.050+0.006	0.080+0.010	0.100+0.010	0.120+0.010	0.0050+0.0010
3A	<2.0V	0.180+0.020	0.200+0.020	0.200+0.020	0.230+0.020	0.0050+0.0020

10A (8)	<0.5V	0.050+0.010	0.120+0.010	0.120+0.010	0.150+0.010	0.0050+0.0010	
True RMS AC Current (2, 6, 9)							
100μA	<0.011v	3Hz-5KHz	0.10+0.04	0.10+0.04	0.10+0.04	0.10+0.04	0.015+0.006
		5KHz-10KHz	0.10+0.04	0.10+0.04	0.10+0.04	0.10+0.04	0.030+0.006
1mA	<0.11V	3Hz-5KHz	0.10+0.04	0.10+0.04	0.10+0.04	0.10+0.04	0.015+0.006
		5KHz-10KHz	0.10+0.04	0.10+0.04	0.10+0.04	0.10+0.04	0.030+0.006
10mA	<0.05V	3Hz-5KHz	0.10+0.04	0.10+0.04	0.10+0.04	0.10+0.04	0.015+0.006
		5KHz-10KHz	0.10+0.04	0.10+0.04	0.10+0.04	0.10+0.04	0.030+0.006
100mA	<0.5V	3Hz-5KHz	0.10+0.04	0.10+0.04	0.10+0.04	0.10+0.04	0.015+0.006
		5KHz-10KHz	0.10+0.04	0.10+0.04	0.10+0.04	0.10+0.04	0.030+0.006
1A	<0.7V	3Hz-5KHz	0.10+0.04	0.10+0.04	0.10+0.04	0.10+0.04	0.015+0.006
		5KHz-10KHz	0.10+0.04	0.10+0.04	0.10+0.04	0.10+0.04	0.030+0.006
3A	<2.0V	3Hz-5KHz	0.23+0.04	0.23+0.04	0.23+0.04	0.23+0.04	0.015+0.006
		5KHz-10KHz	0.23+0.04	0.23+0.04	0.23+0.04	0.23+0.04	0.030+0.006
10A (8)	<0.5V	3Hz-5KHz	0.15+0.04	0.15+0.04	0.15+0.04	0.15+0.04	0.015+0.006
		5KHz-10KHz	0.15+0.04	0.15+0.04	0.15+0.04	0.15+0.04	0.030+0.006
Resistor (7)	Test current						
100Ω	1mA	0.003+0.0030	0.008+0.004	0.010+0.004	0.012+0.004	0.0006+0.0005	
1KΩ	1mA	0.002+0.0005	0.008+0.001	0.010+0.001	0.012+0.001	0.0006+0.0001	
10KΩ	100uA	0.002+0.0005	0.008+0.001	0.010+0.001	0.012+0.001	0.0006+0.0001	
100KΩ	10uA	0.002+0.0005	0.008+0.001	0.010+0.001	0.012+0.001	0.0006+0.0001	

1MΩ	5uA	0.002+0.0010	0.008+0.001	0.010+0.001	0.012+0.001	0.0010+0.0002
10MΩ	500nA	0.015+0.0010	0.020+0.001	0.040+0.001	0.060+0.001	0.0030+0.0004
100MΩ	500nA	0.300+0.0100	0.800+0.010	0.800+0.010	0.800+0.010	0.1500+0.0002
Frequency and Period Characteristics Accuracy:±(%ofreading) (12,13) 100 mV, 1 V, 10 V, 100 V, and 750 V (14)						
10Hz-100Hz		0.03	0.03	0.03	0.03	0.035
100Hz-1KHz		0.003	0.008	0.01	0.01	0.015
1KHz -300KHz		0.002	0.006	0.01	0.01	0.015
Square Wave (15)		0.001	0.006	0.01	0.01	0.015
Additional gate time error ± (% of reading) (13)		1second	0.1second	0.01second		
3Hz-40Hz		0	0.2	0.2		
40Hz-100Hz		0	0.06	0.2		
100Hz-1KHz		0	0.02	0.2		
1KHz-300KHz		0	0.004	0.03		
Square Wave (15)		0	0	0		
Conduction						
1KΩ		0.002+0.030	0.008+0.030	0.010+0.030	0.012+0.030	0.001+0.002
Diode Testing						
5V		0.002+0.030	0.008+0.030	0.010+0.030	0.012+0.030	0.001+0.002
Temperature Characteristics (11)						
PT100(DIN/IEC751)	Probe accuracy: ±0.05°C					
5 KΩ Thermistor	Probe accuracy: ±0.1°C					
Capacitor (15)						
1.000 nF		0.50+0.50	0.50+0.50	0.50+0.50	0.50+0.50	0.05+0.05
10.00 nF		0.40+0.10	0.40+0.10	0.40+0.10	0.40+0.10	0.05+0.01
100.0 nF		0.40+0.10	0.40+0.10	0.40+0.10	0.40+0.10	0.05+0.01

1.000 uF	0.40+0.10	0.40+0.10	0.40+0.10	0.40+0.10	0.05+0.01
10.00 μF	0.40+0.10	0.40+0.10	0.40+0.10	0.40+0.10	0.05+0.01
100.0 uF	0.40+0.10	0.40+0.10	0.40+0.10	0.40+0.10	0.05+0.01

Range (2)	24 hours (3) TCAL ± 1℃	90 Day TCAL±5℃	1 Year TCAL±5℃	2 Year TCAL±5℃	Temperature Coefficient (4)
Frequency and Period Characteristics Accuracy:±(%ofreading) (12、13) 100 mV, 1 V, 10 V, 100 V, and 750 V (14)					
10Hz-100Hz	0.03	0.03	0.03	0.03	0.035
100Hz-1KHz	0.003	0.008	0.01	0.01	0.015
1KHz -300KHz	0.002	0.006	0.01	0.01	0.015
Square Wave (15)	0.001	0.006	0.01	0.01	0.015
Additional gate time error ± (% of reading) (13)	1second	0.1second	0.01second		
3Hz-40Hz	0	0.2	0.2		
40Hz-100Hz	0	0.06	0.2		
100Hz-1KHz	0	0.02	0.2		
1KHz-300KHz	0	0.004	0.03		
Square Wave (15)	0	0	0		
Conduction					
1KΩ	0.002+0.030	0.008+0.030	0.010+0.030	0.012+0.030	0.001+0.002
Diode Testing					
5V	0.002+0.030	0.008+0.030	0.010+0.030	0.012+0.030	0.001+0.002
Temperature Characteristics (11)					
PT100(DIN/IEC751)	Probe accuracy: ±0.05°C				
5 KΩ thermistor	Probe accuracy: ±0.1°C				
Capacitor (15)					
1.000 nF	0.50+0.50	0.50+0.50	0.50+0.50	0.50+0.50	0.05+0.05
10.00 nF	0.40+0.10	0.40+0.10	0.40+0.10	0.40+0.10	0.05+0.01
100.0 nF	0.40+0.10	0.40+0.10	0.40+0.10	0.40+0.10	0.05+0.01
1.000 uF	0.40+0.10	0.40+0.10	0.40+0.10	0.40+0.10	0.05+0.01
10.00 μF	0.40+0.10	0.40+0.10	0.40+0.10	0.40+0.10	0.05+0.01
100.0 uF	0.40+0.10	0.40+0.10	0.40+0.10	0.40+0.10	0.05+0.01

Indicator Explanation

1. For DC: Technical specifications apply after 60 minutes of warm-up, with the integration period set to 10 or 100 PLC, and auto-zero enabled. For AC: Technical specifications apply after 60 minutes of warm-up, using slow AC filtering and a sine wave.

2. All ranges have 20% overrange capability except for 1,000 DCV, 750 ACV, 10 ADC, 3 AAC, 10 AAC, and diode test.

3. Relative to calibration standards.

4. Outside the TCAL ±5°C range, add one coefficient per degree Celsius (°C).

5. Technical specifications apply when sine wave input exceeds 5% of full scale and exceeds 1mVrms. The 750ACV range is limited to the 8×10^7 V-Hz range. If the input signal frequency is <50kHz and the sine wave input is between 1% and 5% of full scale, an additional 0.1% error is added to the specification. For frequencies between 50kHz and 100kHz, an additional 0.13% error is added to the specification.

6. Low-frequency performance: Three filter settings are provided: 3Hz, 20Hz, and 200Hz. Frequencies exceeding the filter settings are specified and incur no additional error.

7. Technical specifications apply to 4-wire or 2-wire resistance measurements (with NULL adjustment). Without NULL adjustment, 2-wire resistance measurements incur an additional 0.2Ω error.

8. The 10A range is available only on the front-end connector. Each amplifier adds 2mA of base current or requires an input current >5Arms.

9. Specifications apply to sine wave inputs >1.5% of span and >10μAAC.

10. Specifications apply to voltages measured at the input terminals. 1mA test current is typical. Variations in the current source will cause changes in the diode junction voltage drop.

11. The selected probe limits the actual measurement range and measurement error. Probe accuracy includes all measurement and ITS-90 temperature conversion errors. PT100Ro can be set to 100Ω ±5Ω to eliminate inherent probe error.

12. Unless otherwise specified, specifications apply after 60 minutes of warm-up with sine wave input. Specifications apply to a 1-second sampling time (7 bits).

13. Applicable for sine wave and square wave inputs ≥100mV. For input signals between 10mV and 100mV, multiply specifications by 10 (i.e., reading specifications are 10 times larger).

14. Amplitude range is 10% to 120% below 750ACV.

15. Square wave input is specified as 10Hz-300kHz.

11 Appendix

11.1 Appendix A: models and accessories

Ordering Information	Order Number
Host Model	
120CH, LAN, USB, RS232/485, and GPIB (optional)	DAQ4070A /DAQ4070B
360CH, LAN, USB, RS232/485, and GPIB (optional)	DAQ4080A
600CH, LAN, USB, RS232/485, and GPIB (optional)	DAQ4090A

Table 11-1 Model

Ordering Information	Order Number
Standard Accessories	
Power cord compliant with the standards of the country of use	——
Packing list	——
Data cable	——
Network cable	——
Multimeter probes	——
RS232 Adapter	——

Table 11-2 Attachment

Address: Building 35, LianDong U Valley, No. 780 Baoyuan Road, High-Tech Zone, Qingdao City, Shandong Province

Main Switchboard: 400-036-7077

Email: service@hantek.com

Tel: 0532-55678770, 55678772, 55678773

Postal Code: 266000

Official Website: www.hantek.com

Qingdao Hantek Electronics Co., Ltd.