

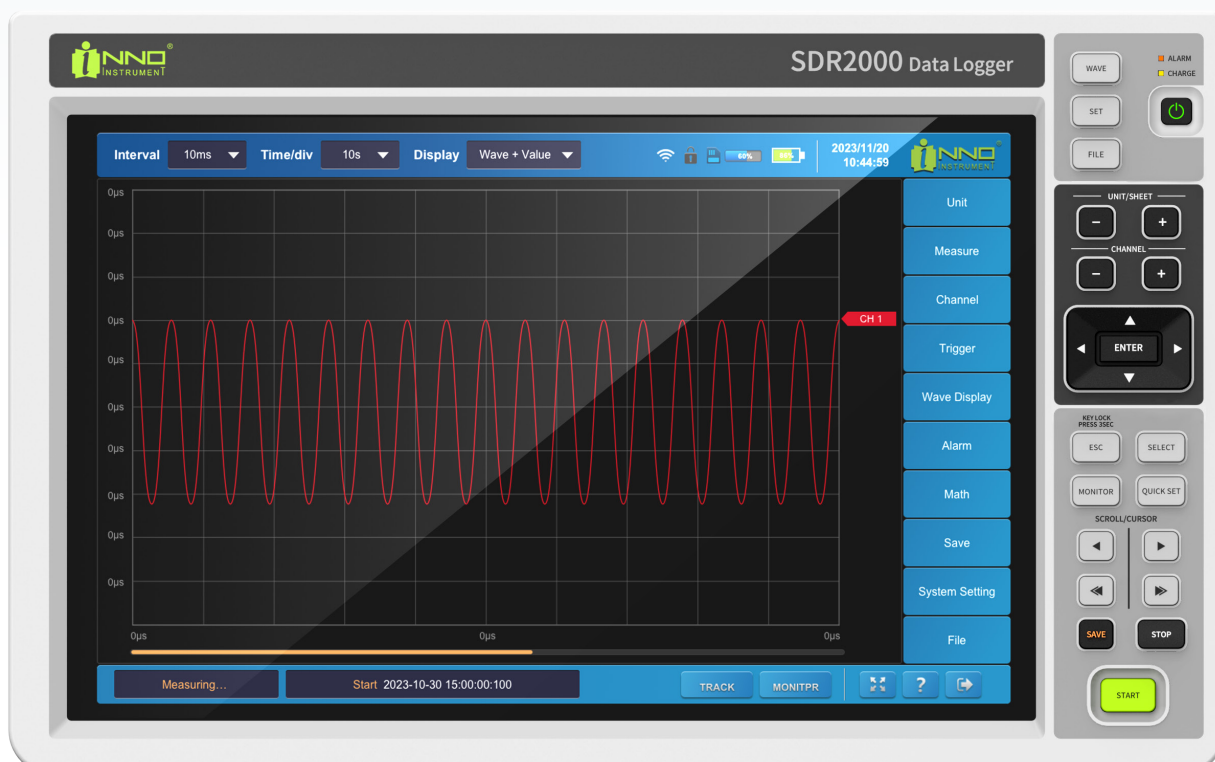
SDR2000

User Manual Data Logger

Please keep this manual with the equipment.

Please read this manual before starting to use the equipment.

Products models and specifications are subject to change without prior notice.



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The operational principles in this manual apply to any model in the following list. Hardware usage methods may vary for different models. Please pay attention to the hardware usage differences between different models.

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About Marking

To prevent personal injury and damage caused by incorrect operation of the instrument, INNO Company uses the following safety signs to indicate relevant safety information. Before using the instrument, make sure you clearly understand the meanings of these signs. It is possible that some or all of these signs are not used on this instrument. Additionally, in the illustrations of this manual, the safety signs of the equipment may not be shown.

Safety-related markings

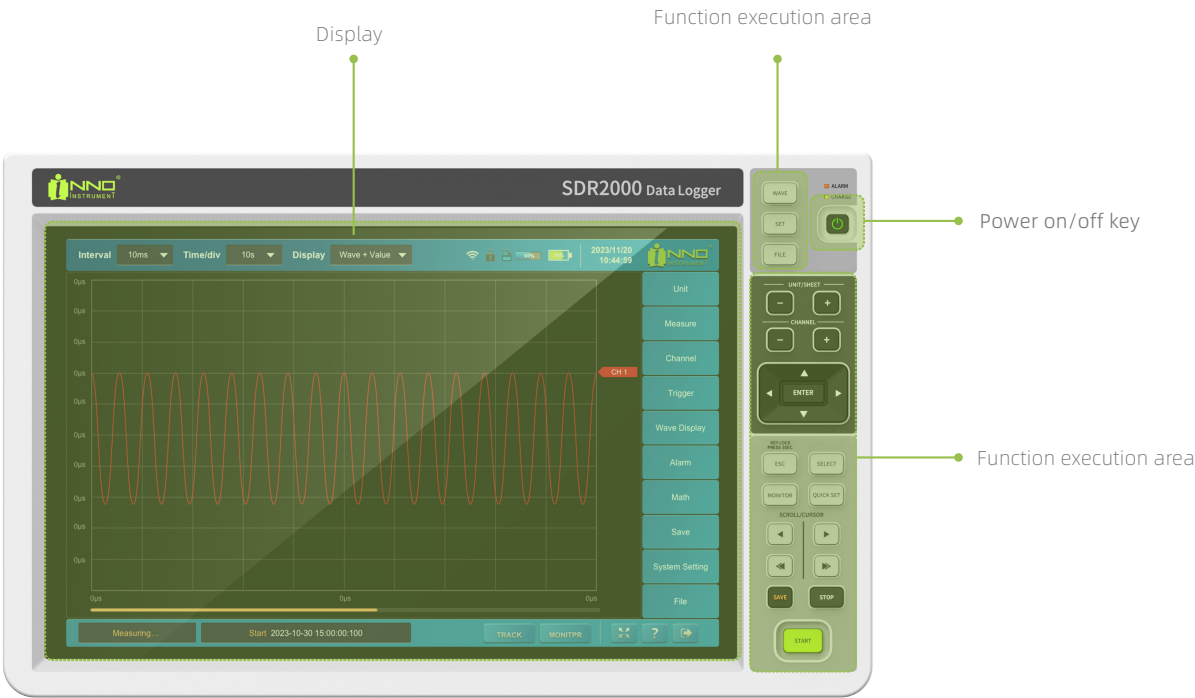
This manual classifies and marks the severity and hazard levels of risks as follows.

Item	Function Description
 Danger	This indicates a dangerous situation that, if not avoided, is highly likely to result in the death or serious injury of the workers.
 Warning	Indicates a situation where, if not avoided, it may result in the death or serious injury of the workers.
 Attention	This indicates a situation where, if not avoided, it may result in minor injuries to the workers.
Notes	Indicate situations that may cause damage to this instrument and others.
Important Matters	Describe the information or content regarding operation and maintenance tasks that must be understood in advance when it exists.
	Indicates the presence of high voltage danger. Warns of the risk of shock, burns or even death due to electric shock if safety checks are neglected or the item is used incorrectly.
	Indicate prohibited actions.
	Indicate mandatory "compulsory" items that must be carried out.
	Indicates attention or danger. Please refer to the "Precautions for Use" in the Quick Guide, the warning information marked at the beginning of each user manual, and the attached "Precautions for Use".
	An instrument that provides overall protection through double insulation or reinforced insulation.
	Indicate "on" and "off" for the power supply.
	Denote direct current (DC).
	Indicates alternating current (AC).
	The marking for the regulations on the disposal of waste electrical and electronic equipment (WEEE Directive) in EU countries.
	Indicates compliance with the safety limits as specified in the EU directive.

Names and functions of each component

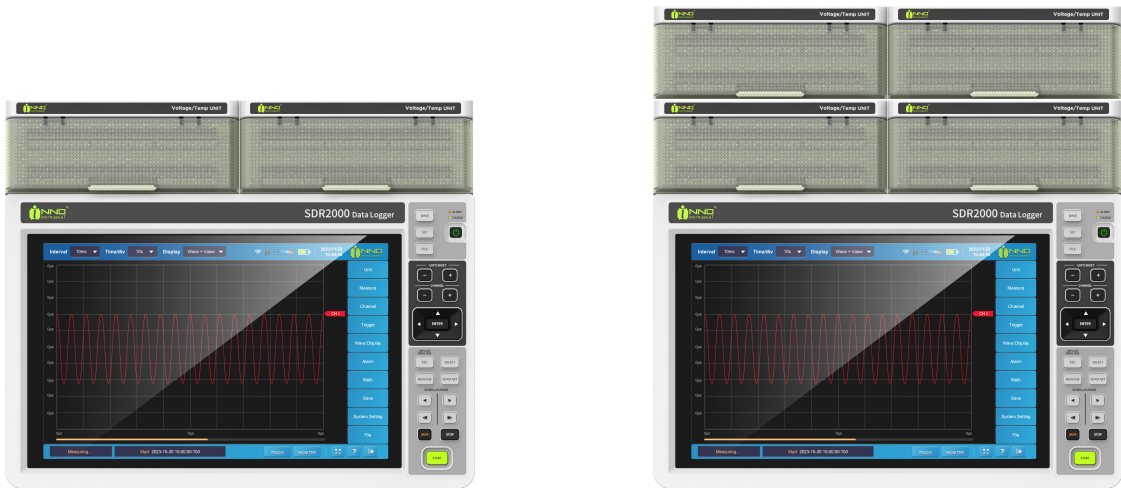
This section introduces the names and functions of each component of the instrument.

1.1 Panel introduction



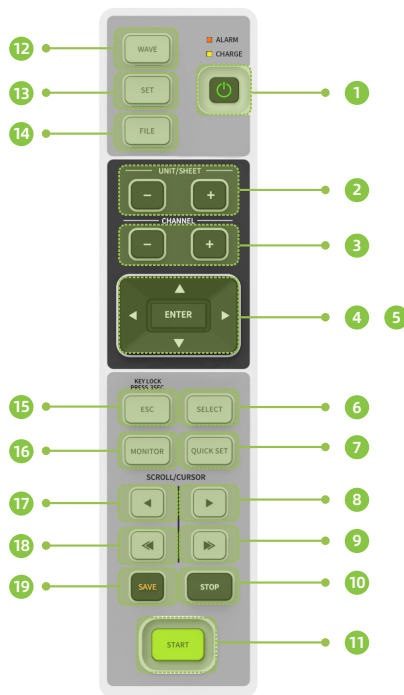
Install 2 units

Install 4 units



1.2 Brief Introduction to Button Functions

1.2.1 Key Button Diagrams



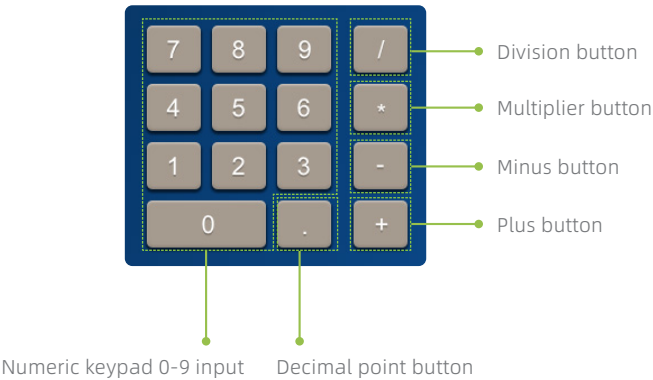
1.2 Key functions

Item	Button/Knob Nam	Function Description
1	POEWR	The power button is green during startup and turns off when the device is shut down.
2	UNIT/SHEET(+/-)	For selecting units/pages or switching sub-tabs
3	CHANNEL(+/-)	For channel switching
4	ENTER	For determining the settings content
5	Up, down, left and right keys	Used for moving the focus up, down, left and right on the screen.
6	SELECT	Press the function key to switch between selecting the waveform and the cursor item.
7	QUICK SET	For setting up the wizard
8	>	Move the cursor slightly to the right/up, and shift the waveform slightly to the right.
9	>>	Move the cursor significantly to the right/up, move the waveform significantly to the right.
10	STOP	End measurement
11	START	① Start measurement, the background light turns green. ② Stop measurement, the background light goes out.
12	WAVE	Used for displaying waveform/numeric screens. Can switch between waveform/numeric, waveform, numeric, and alarm interfaces in sequence.
13	SET	Used to sequentially open the setting function pages (unit/measurement/channel/trigger/waveform observation/alarm/calculation/save/system settings/file management), allowing for function settings.
14	FILE	It is used to display the file list screen and perform file operations.
15	ESC	If the cancel operation is held down for more than 3 seconds, the key can be locked.
16	MONITOR	The monitoring interface is used to display and confirm the current input signal.
17	<	Move the cursor slightly to the left/down, and shift the waveform slightly to the left.
18	<<	Move the cursor significantly to the left/down, move the waveform significantly to the left.
19	SAVE	When the save function is executed, the LED will light up green during the saving period.

1.3 Enter numbers and strings

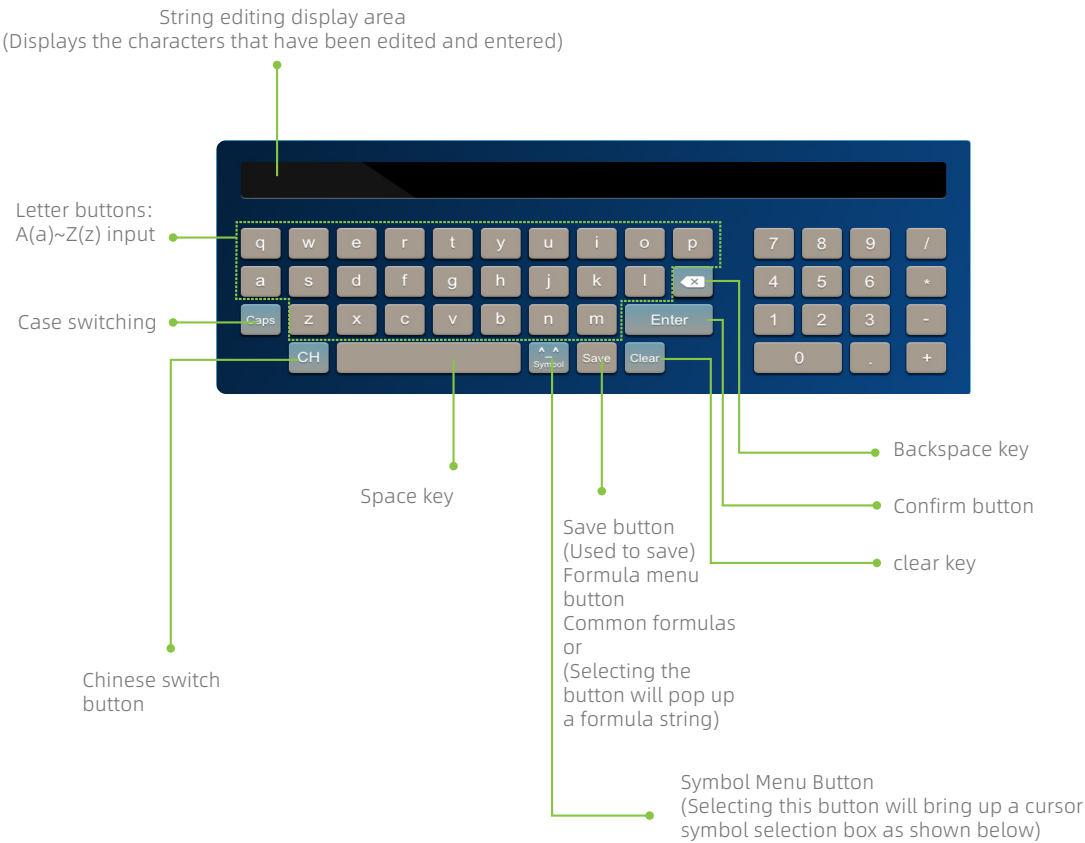
1.3.1 Input values

- All the numerical input methods required to be set in the instrument are as follows:
Move the cursor to the setting box, press the Enter key or click it with your touchscreen or mouse to make the system pop up the numeric soft keyboard. You can input values by clicking with the mouse or touching the screen. Schematic diagram of the numeric soft keyboard:



1.3.2 Input string

- All strings that need to be set in the instrument (such as names, expressions or comments, etc.) should be entered as follows:
By clicking the character editing box with a touchscreen or mouse, the system will pop up the soft keyboard as shown in the following figure. Select and input characters by clicking with the mouse or touching the screen. Schematic diagram of the string soft keyboard



1.4 Interpretation of instrument display information

When the instrument is turned on, under normal circumstances, the current status information and real-time measurement information of the instrument will be displayed on the screen. For detailed interpretation, please refer to the figure below:



⚠ NOTE

- Zone A** From left to right, the display shows the recording interval, timeline, display, Scr/Cur, remote control, Wi-Fi status, lock screen status, SD card status and capacity, battery symbol, time, and logo.
- Zone B** The display menu bar shows the following functions from top to bottom: Unit, Measurement, Channel, Trigger, Waveform Observation, Alarm Output, Calculation, Save, System Settings, and File Management.
- Zone C** From left to right, the display shows the measurement status, measurement start time, tracking button, monitoring button, full screen, and help.
- Zone D** The waveform display area shows the measured waveform and measurement data, along with a scroll bar.

Ready for Measurement

2.1 Instructions for Use

Safety Instructions

- To ensure your safe and correct use of this instrument, please read the following safety warnings carefully.
- If this instrument is not operated in the correct way, it may be damaged.
- The company shall not be held responsible for any damage caused by failure to operate the instrument in accordance with the following safety warnings.

Correct operation

- To prevent electric shock or fire, please use the power cord provided by our company. The power plug must be inserted into a power socket with protective grounding.
- Make sure that the voltage of the connected power supply is consistent with the rated voltage of the instrument. The power supply voltage must not exceed the maximum rated voltage of the power cord.

Check the grounding protection.

- Before connecting, check whether the protective grounding terminal and fuse inside and outside this instrument are intact. Do not use this instrument if any abnormalities are found, otherwise there will be a danger.
- Before starting up, check whether all protective grounds are properly connected. Only after triple confirmation can the machine be started and used normally.
- Do not touch the connected circuits directly with your hands. If necessary, cut off the power supply and wear safety gloves before operating.
- Non-maintenance personnel of this company are requested not to disassemble the machine casing to prevent the risk of high-voltage electric shock from the interior.

Confirmation of a safe environment

- To ensure the operator's personal safety, do not use this instrument in an environment containing flammable or explosive gases or liquids; otherwise, there will be a danger.
- To ensure accurate measurement, please use this instrument in a suitable working environment.

2.2 Connect power supply

Connection to the previous inspection

Before making a safe power connection, please carefully check the following:

Check that the exterior of the equipment is intact and free from assembly defects such as loose or missing screws.

2) Check whether the randomly provided power cord is intact and undamaged.

3) Check whether the types, models and quantities of random accessories are complete and intact.

If the above inspection does not match the description in the purchase contract, please contact our sales department directly.

Connect the power cord.

- 1) Make sure the power switch of this instrument is in the off position.
- 2) Determine the After the voltage is within the rated voltage range of this instrument, connect the power cord provided randomly to the power input port of the instrument.
- 3) The parameters of the instrument power interface are as follows:

Item	Specification
AC adapter	100V~240V 50hz/60hz
External power supply	DC 12V~28V
Typical power consumption	Maximum LCD brightness: 8.5VA (for the main unit only) When the LCD backlight is off: 7VA (for the main unit only)
Display	10 1-inch touch LCD screen, 1280*800 resolution
Temperature and humidity range for preservation	-20°C to 60°C, below 80% RH (no condensation)

2.3 Turn on/off power

Power switch status

- As shown in the schematic diagram of the front panel in Section 1.1, the power switch button on the front and the toggle switch on the back of the instrument jointly form a dual power switch design.
- When the boat-shaped switch on the back is not closed, the indicator light of the power button does not light up and the instrument is not powered.
- When the boat-shaped switch on the back is closed, the instrument is powered on, and the power button indicator light shows red, indicating that the instrument is in standby mode. At this time, if the power button is pressed, the instrument starts up, the power button indicator light turns green, and the instrument enters the operating state.
- When the instrument is running, press and hold the power key for 4 seconds. The instrument will stop running and enter standby mode. At this time, the power key indicator light will be red.

Precautions for precise measurement

- Turn on the power switch and let the instrument warm up for more than 30 minutes.
- After the preheating is completed, please perform zero adjustment.

Operations when turning off the power supply

- When the instrument is no longer in use and needs to be turned off, please first press the power button, then turn off the toggle switch. The instrument is considered to be properly shut down only when it is completely de-energized.

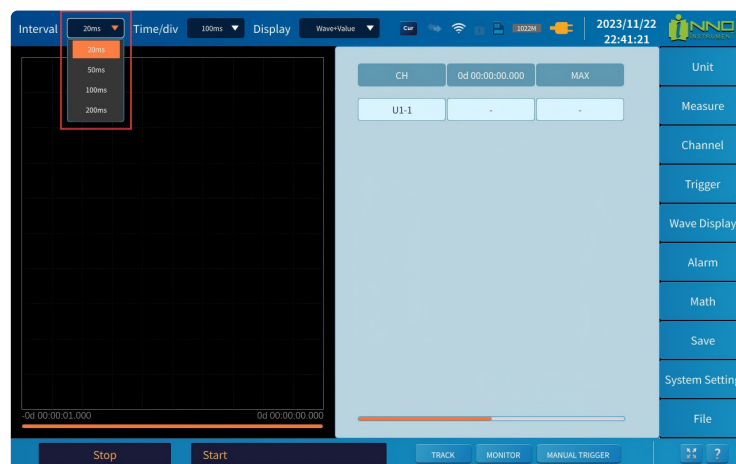
After the power is turned off, the instrument will store the setting information at the moment before shutdown. The same applies when the power cord is unplugged from the socket. The next time the instrument is turned on, it will start up with the setting information stored before the previous shutdown.

This section introduces the basic operation methods of the instrument.

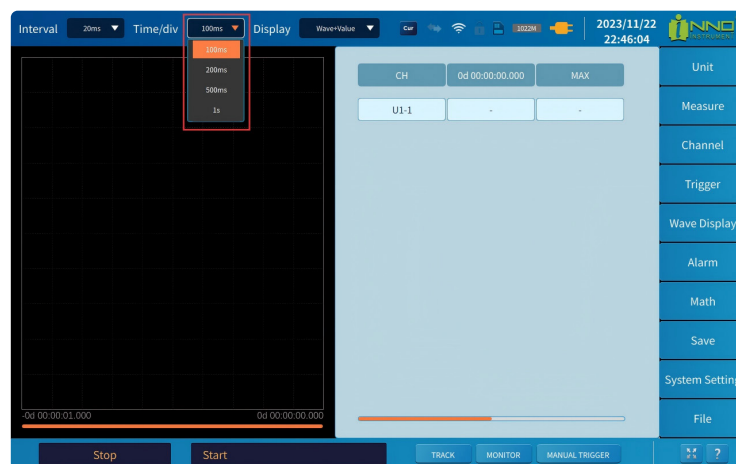
3.1 Main interface menu functions

3.1.1 Function introduction of the status bar above

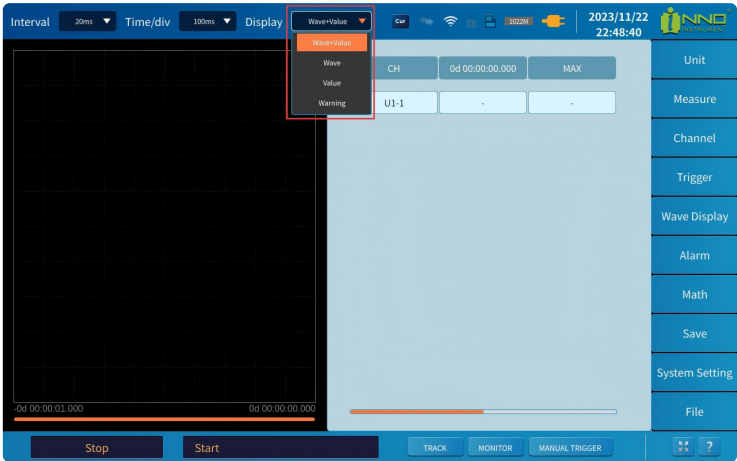
Recording interval: Set various functions such as recording interval or recording time. Parameters can be set through the drop-down menu. Settings cannot be made during the measurement. Please make the settings after the measurement has stopped.



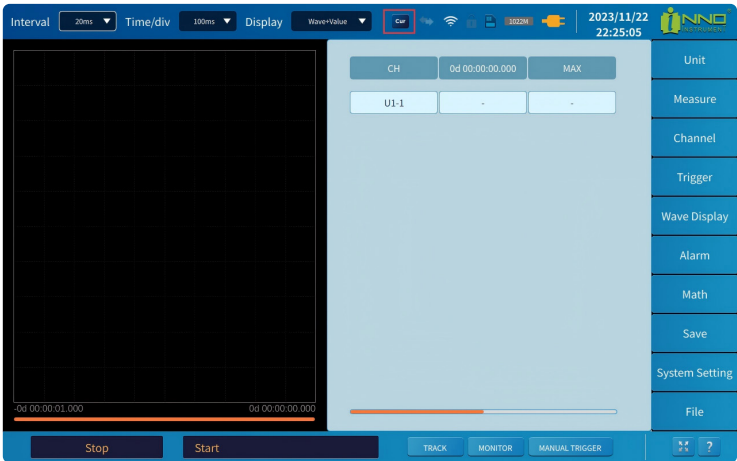
Time axis: Select the time of 1 scale on the horizontal axis. You can choose a time longer than the recording interval. Changes can be made during the measurement period, and parameter settings can be made through the drop-down menu.



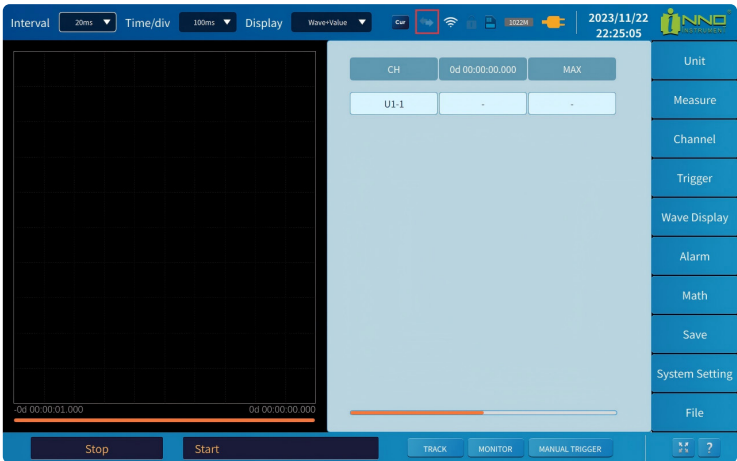
The display mode of the instrument includes four types: waveform + value, waveform, value, and alarm. The default display is waveform + value, and the parameters can be set through the drop-down menu.



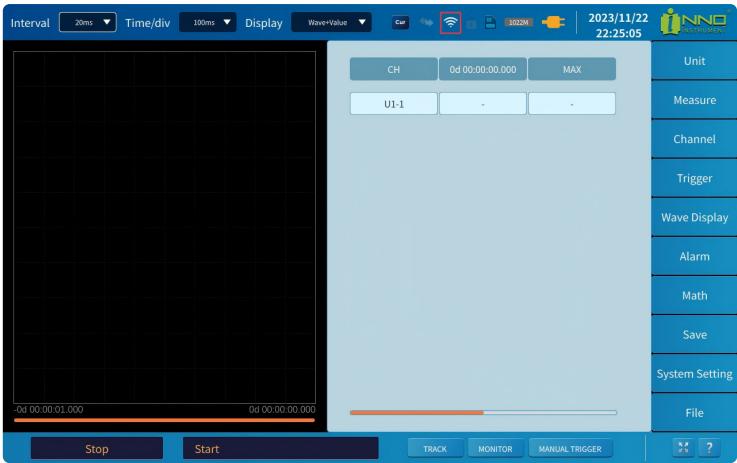
Scr/Cur: When the Select key is switched to move the waveform, the status bar at the top of the page changes to the Scr icon. At this time, the keys "<<", ">>", "<", and ">" can move the waveform left and right. When the Select key is switched to move the cursor, the status bar at the top of the page changes to the Cur icon. On the waveform observation page, turn on the cursor display switch. If the cursor type is vertical, the keys "<<", ">>", "<", and ">" can move the cursor left and right. If the cursor type is horizontal, the keys "<<", ">>", "<", and ">" can move the cursor up and down.



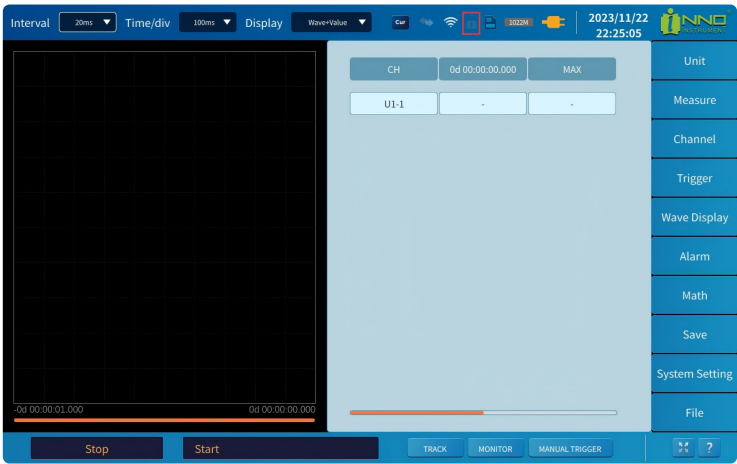
When the upper computer is connected to the lower computer, the remote control icon lights up. When the upper computer and the lower computer are disconnected, the remote control icon turns gray.



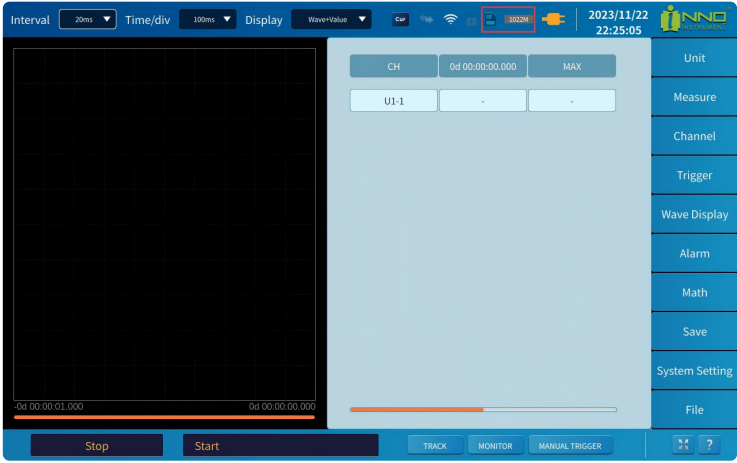
Wi-Fi status: The status indicator lights up and displays the wireless unit number when the wireless module is successfully connected; it turns gray when all wireless modules are not connected.



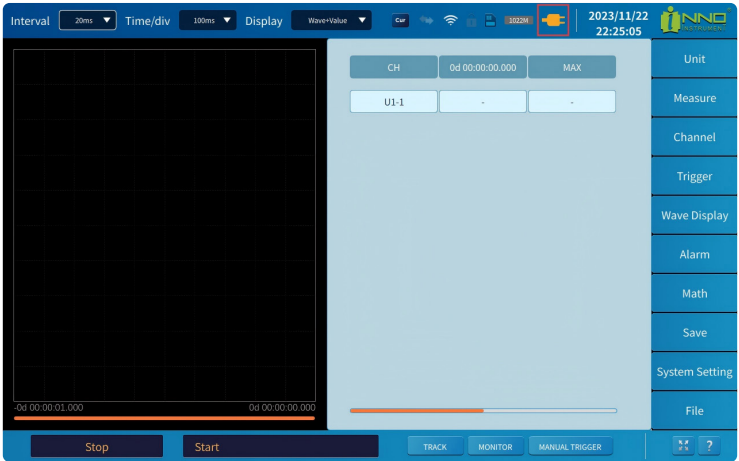
Lock screen status: Display "locked" after locking the screen, and "unlocked" when the screen is not locked.



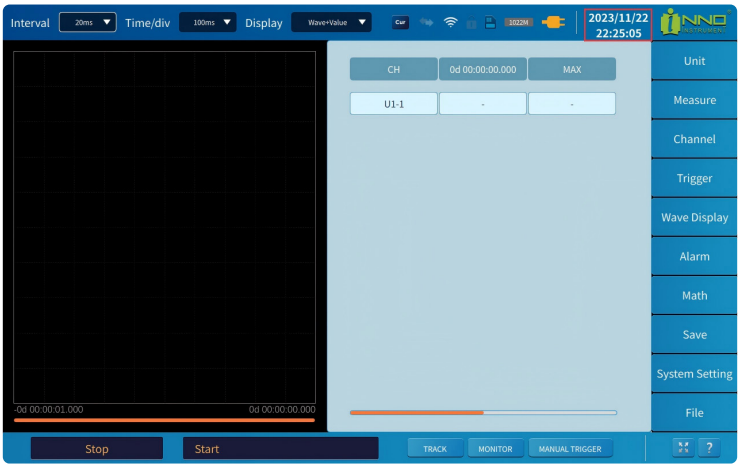
SD card status and capacity:
The SD card is not installed. The card symbol and capacity symbol are grayed out.
SD card installation: The card symbol lights up and shows the available capacity of the current SD card. Grayed ou



Battery symbol / Power supply: When the battery is not installed (connected to power), the power symbol is displayed; when the battery is installed and connected to power, the power symbol is displayed; when the battery is installed but not connected to power, the battery symbol is displayed, with the remaining battery power shown on the battery symbol.

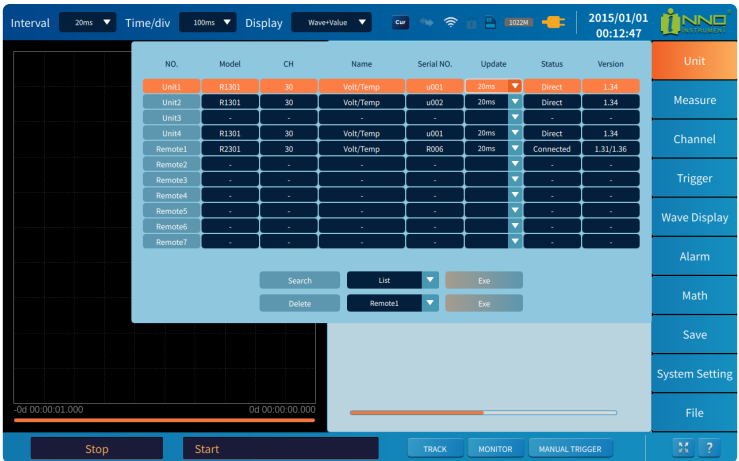


Time: Display the system time in the format of YYYY/MM/DD HH:mm:ss



3.1.2 Function introduction of the right status bar

The status bar on the right side is the entry point for the functions of this instrument, including ten major functions: Unit, Measurement, Channel, Trigger, Waveform Display, Alarm, Operation, Save, System Settings, and File Management. When a corresponding window module is clicked or opened, it will be highlighted in orange, allowing for detailed settings of that function. When not clicked, it will be displayed in blue.



3.1.3 Functions of the status bar below

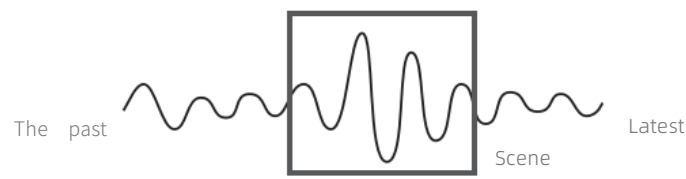
Measurement status: It includes four states: measuring, stopped, waiting for trigger, and waiting for pre-trigger. Each state corresponds to its own display status.



Start time: Displays the actual start time of data collection. It is not shown when in the waiting state.



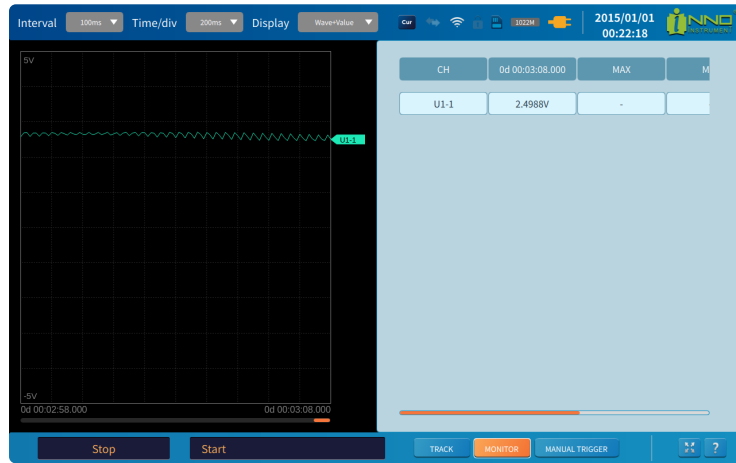
Tracking: Click the tracking button, and the scroll bar of the waveform interface will automatically jump to the latest waveform. When already at the latest waveform, clicking the button will have no jump effect, but the button can still be clicked.



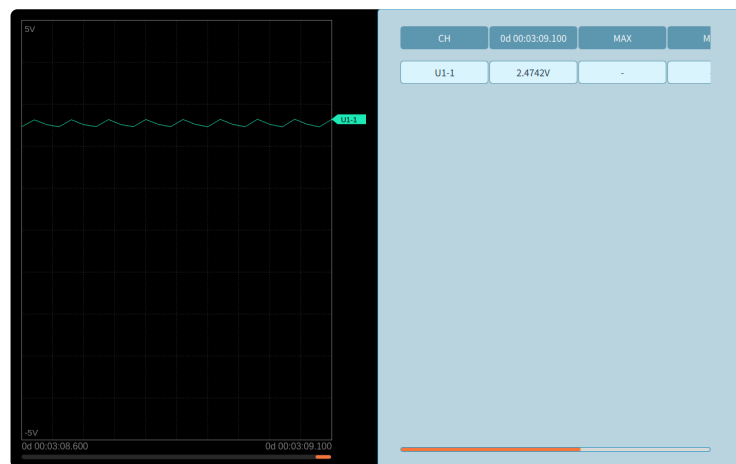
Monitoring: Click "Monitoring" to enter the monitoring interface. By default, the monitoring interface displays waveforms and instantaneous values. During the measurement period, it is not possible to enter the monitoring interface. Even if no measurement is in progress, the monitoring interface will still display the input signal status of the channels in real time.

Monitoring mode:

1. The fixed time display axis is set to 1S/div, and the recording interval is 100ms.
2. Only one screen of data (101 points) is displayed and no other data is saved.
3. The monitoring mode is fixed to display the waveform and instantaneous value.
4. The monitoring mode does not support parameter settings.
5. The monitoring mode displays the waveforms and instantaneous values of the channels that have been opened in the channel settings.



Full-screen display: Click to maximize the main display area, and double-click the interface to exit full-screen display.



Help documentation: Click to open the help documentation.

3.2 Display area

3.2.1 Waveform display + values

When displaying waveforms and values, the waveform is shown on the left and the values on the right:

The waveform area displays the waveform, the scale information of the horizontal and vertical axes, the scroll bar, the waveform label, and the cursor line. The scroll bar and the cursor line can be selected and dragged by touch screen. The waveform supports left and right dragging.



3.2.2 Waveform display

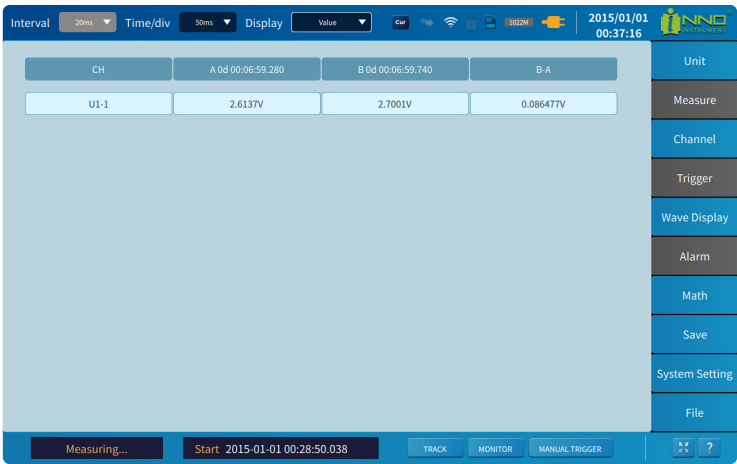
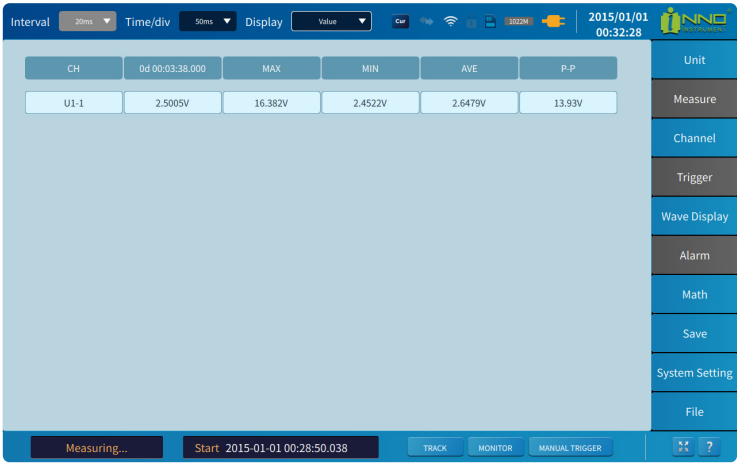
When the waveform is displayed, the entire display area shows only the waveform, and the display content is the same as that of the waveform plus numerical display.

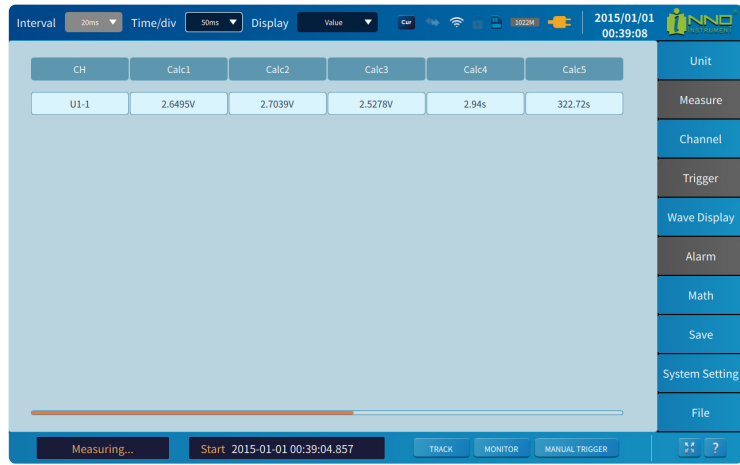


3.2.3 Numerical display

When displaying numerical values, the entire display area only shows numerical values. The displayed content varies depending on the settings and is divided into three types:

- Instantaneous values, cursors, and numerical operations.
- Instantaneous values: Fixedly display the instantaneous values, maximum values, minimum values, average values, and P-P values of all open channels.
- Cursor values: When the cursor is vertical, display the A, B, and B-A cursor values of all open measurement channels and the time (the time is continuously updated during the measurement period). When the cursor is horizontal, the cursor values of A, B, and B-A are displayed.
- Numerical operation values: Display the calculated values of all calc1 to calc10 and the corresponding channel numbers.





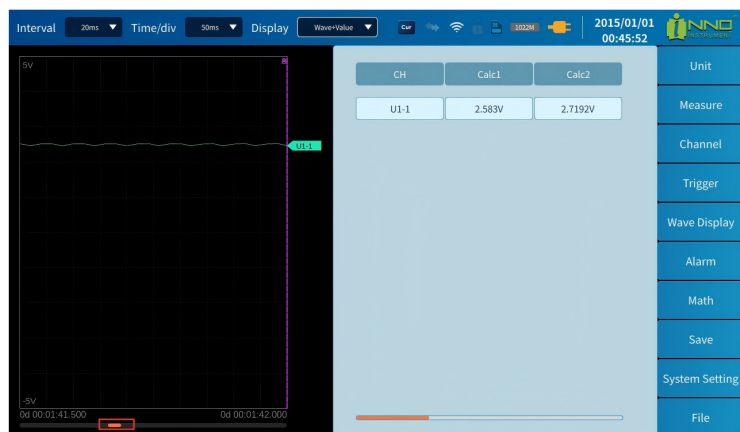
3.2.4 Alarm display

Display the current alarm status of ALAM1 to 8 (red indicates an alarm is occurring, green indicates no alarm at present) and the alarm event log.



3.2.5 Scroll bar

A scroll bar will be displayed at the bottom of the screen. You can use the scroll bar to confirm the specific part of the waveform within the entire display range. The width of the waveform displayed by the scroll bar varies depending on the recording time or the setting of the horizontal axis display.

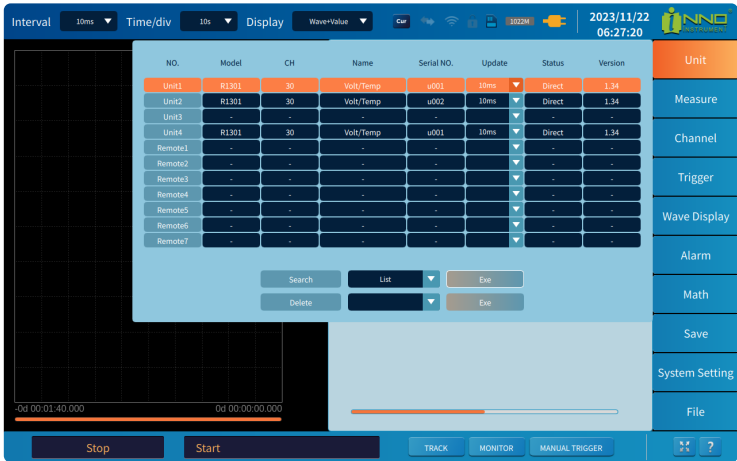


This chapter introduces the registration methods of wireless units, including list-based registration, automatic connection-based registration, wireless unit deletion, unit information display and settings, etc.

4.1 Wireless unit registration methods

The SDR2000 can not only use direct connection units but also wireless units. When using wireless units, they need to be registered in the SDR2000, with a maximum of 7 wireless units allowed to be registered.

On the right navigation bar menu, tap "Unit" to enter the unit settings page. The wireless unit registration methods are divided into list and automatic connection. You can view them in the drop-down options of the search method parameter.



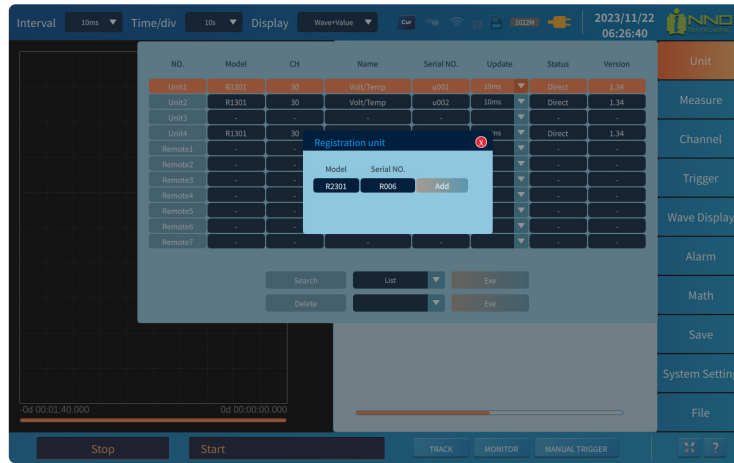
Please make sure the wireless function is turned on before registration.

The differences among different registration methods are as follows:

Item	Specification
List format	The list shows the available wireless units. Select the unit you want to register.
Automatic connection mode	Registration can be performed by pressing the Auto button on the wireless unit.

4.1.1 List-based registration

- The operation steps for registration by list are as follows:
- Turn on the Wi-Fi function in the system settings;
 - Select the search method as list; Click the "Execute" button;
 - The pop-up list of registrable items shows all the available wireless units that can be connected.
 - Select the unit you want to register and click the Add button;
 - Registration completed, and the added unit is displayed in the unit list.



4.1.2 Automatic connection mode registration

The operation steps for registration via automatic connection mode are as follows:

- Turn on the Wi-Fi function in the system settings;
- Select the search method as automatic connection;

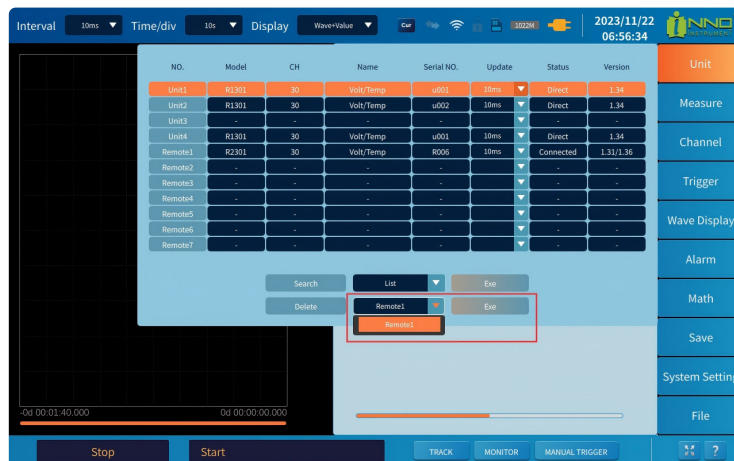
Click the "Execute" button, and "Executing" will be displayed.

Press and hold the Auto key of the wireless unit to be registered for more than 3 seconds;

After successful registration, the CONNECT LED will be lit up and the wireless unit will be displayed in the unit list.

4.2 Wireless unit deletion

Registered wireless units can be deleted. Depending on the situation, unnecessary wireless units can be removed from the registration list. Select the wireless unit to be deleted from the drop-down list of deletions, and click the execute button to complete the deletion successfully. The wireless unit will be removed from the list of units. Delete wireless unit:



⚠ De-registration can be performed on the wireless unit side.

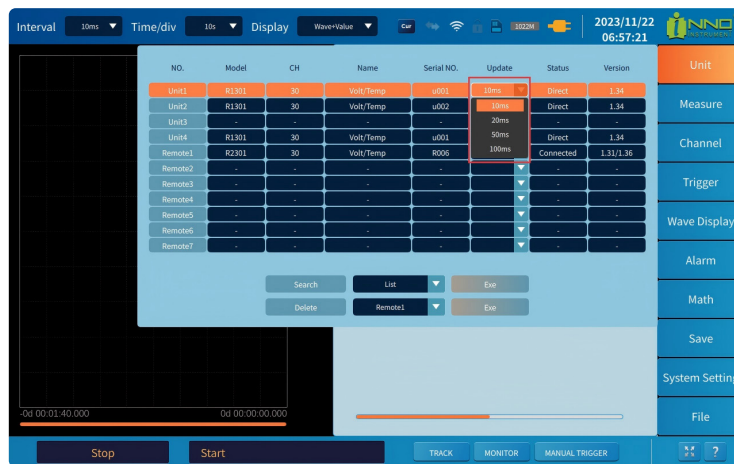
Method: Press and hold the RESET button for more than 5 seconds to delete the wireless unit registration.

4.3 Unit information display

- **Module number:** Fixedly displayed as Unit1 to Unit4 and Remote1 to Remote7. Among them, Unit1 to Unit4 are direct connection units. When not installed, they are blank. Remote1 to Remote7 are wireless units. When not registered, they are also blank.
- **Module model:** Displays the sales model of each module;
- **Number of channels:** The corresponding number of channels is displayed based on the installed module, such as 30, 15, etc.
- **Module Name:** Display the names of voltage, temperature, general and other modules based on the installed modules;
- **Serial Number:** Display the corresponding serial numbers of each module;
- **Update interval:** The time interval at which the measurement unit updates the measurement data;
- **Attributes:** Divided into direct connection units and wireless units;
- **Version:** The version number of the daughter board card.

4.4 Data interval setting

The data update interval is the time interval at which the measurement unit updates the measurement data, which can be set in the "Update Interval" of the unit list.



The update interval setting parameters are respectively: 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, and Auto. The minimum measurement interval is determined by the module's own parameters, as follows:

The minimum measurement interval of the voltage and temperature module (30 channels) is 20 ms. When the number of channels used is less than 15, the minimum measurement interval is 10 ms.

Usually, "Automatic" is selected. If "Automatic" is chosen, the shortest data update interval will be set according to the recording interval, by unit.

The value above the recording interval can be set. When the recording interval is 10 seconds or more, the update interval is fixed at 10 seconds.

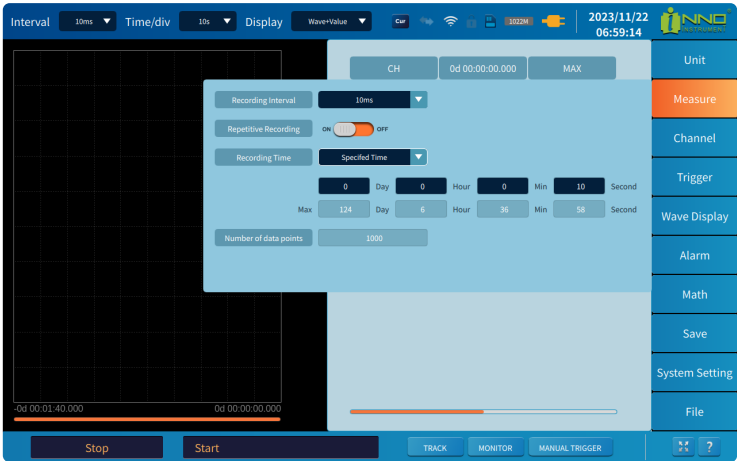
The update interval is greater than or equal to the record interval.

When the update intervals of different units are set differently, the maximum value that the recording interval can be set to is the smaller update interval.

Chapter 5

Measure

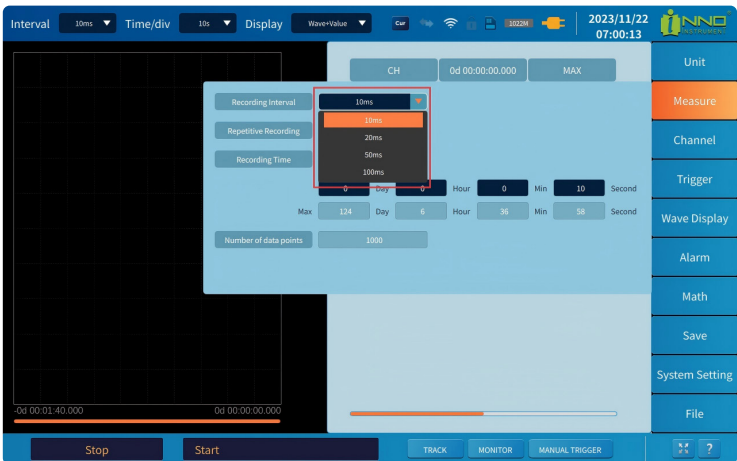
This chapter introduces various functions such as setting the recording interval and recording time. For the definition of measurement-related parameters, they cannot be set during the measurement. Please make the settings after stopping the measurement. To enter the measurement settings page, simply tap "Measurement" on the right navigation bar menu.



5.1 Function parameter settings

5.1.1 Recording interval

The recording interval is the time interval at which the instrument reads data from the measurement unit. Its parameter values are: 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, 1 min, 2 min, 5 min, 10 min, 20 min, 30 min, and 1 h. You can select the data reading interval in the "Recording Interval" option. For example, if you choose "10 ms", the data will be read at an interval of 10 ms (100 times per second). The recording intervals on the measurement page and the main interface are synchronized and refreshed.



5.1.2 Duplicate records

In the "Repeat Record" option, you can choose whether to repeat the recording action.

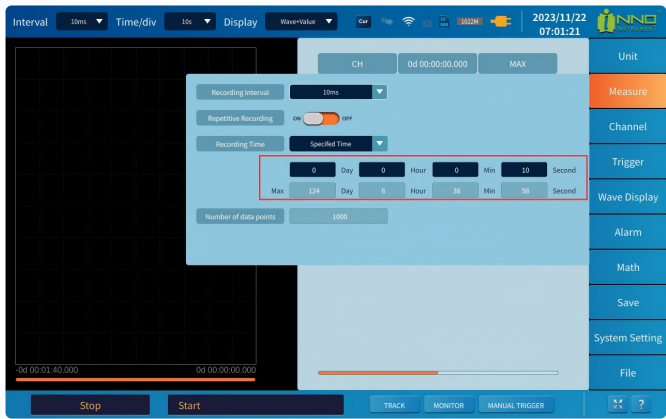
Item	Specification
OFF	The measurement is completed after one recording.
ON	Repeat the recording. If the STOP key is pressed, the measurement will end.

5.1.3 Record time

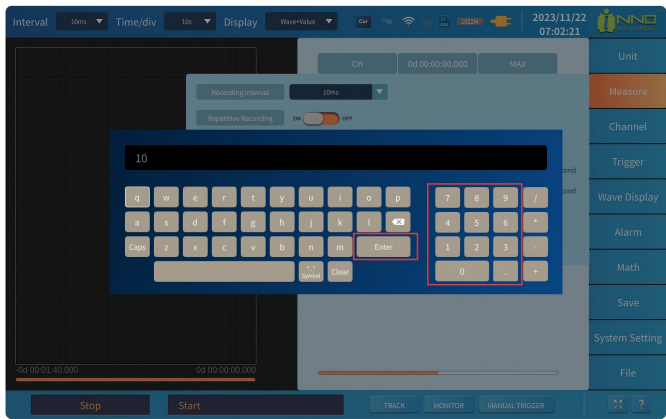
In the "Record Time" setting, you can choose the length of the recording, which is divided into two types: specified time and continuous recording. The specific differences are as follows:

Item	Specification
Designated time	Set the time to be recorded. The set parameters cannot exceed the maximum recording time. The parameter format is: days, hours, minutes, and seconds.
Continuous record	Measurement continues until the STOP key is pressed or until measurement is triggered to stop.

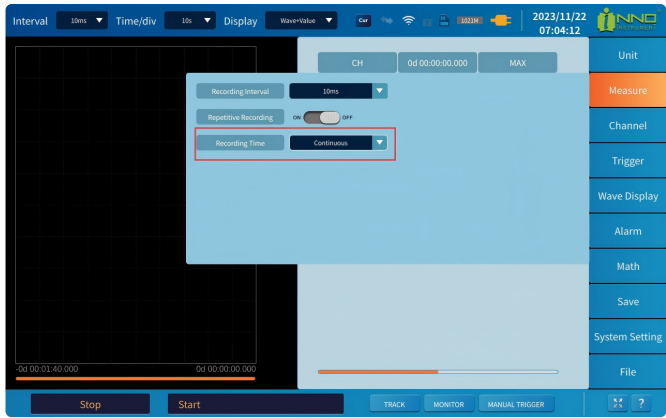
When "Specified Time" is selected, the estimated maximum recordable time and the actual number of sampling points will be displayed.



Click the input boxes in front of "day", "hour", "minute" and "second" respectively, and a numeric keypad will pop up. You can enter numbers and click Enter to complete the setting.



When "Continuous Recording" is selected, no parameters can be set below.

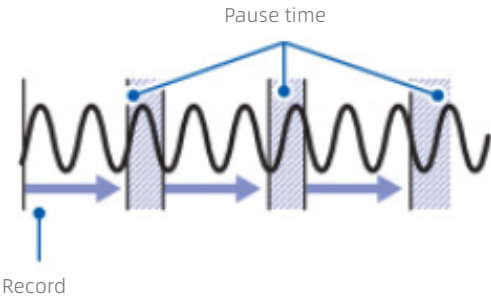


5.2 Recording methods

Continuous recording, recording at specified times, and repetitive recording methods.

Item	Specification
Continuous record	Set the record time to continuous recording. Keep recording until the STOP button is pressed. Recording can also be stopped by triggering.
Designated time record	Set the time for recording to the specified time. Specify the time to be recorded (record- ing length). If recording for a specified time, then Recording will stop. It can be stopped by pressing the STOP key or by triggering an intermediate stop.
Duplicate records	Set the repeat recording setting to ON. Recording will resume after the specified time interval has ended. Recording will repeat until the STOP button is pressed. When repeat recording is set to OFF, recording will end after one iteration.

When the recording time is set to "specified time" and the repeat recording is set to "ON", after the recording for the specified time is completed, there is a certain internal processing time (pause time) before the next recording starts. During this period, no recording is made. Please refer to the following figure.。



If the recording time is set to "Continuous Recording" and automatic saving is enabled with file splitting, the recording can be done without interruption, and the data files to be saved can be split at any time. If the internal cache exceeds its maximum capacity, the measurement will continue after deleting the past data in the internal cache, and the deleted data will not be retained.

Channel

This chapter introduces the parameter settings for input channels, including different input contents such as voltage, temperature, and pulse. Parameters for all valid channels can be set in a single setting window or in the list setting screen. On the right navigation bar menu, simply tap "Channel" to enter the channel settings page.



6.1 Single setting

Each individual setting page is designed to configure the display according to the channel. The settings available include board channel selection, measurement switch, waveform color, input parameters, and display settings, etc.

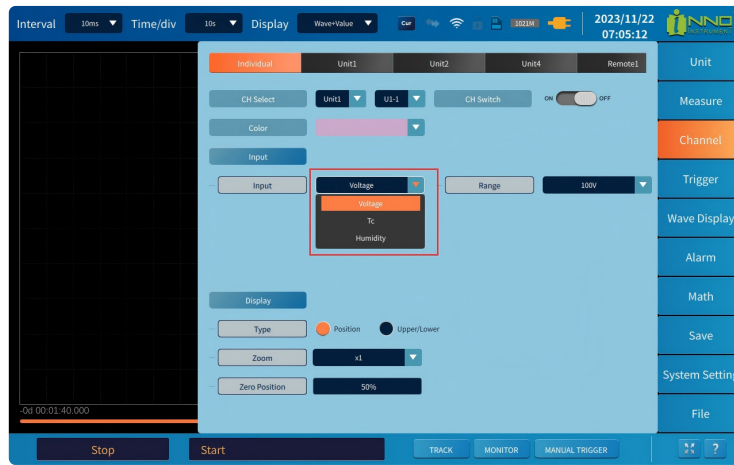
6.1.1 Voltage measurement channel settings

The method for setting up voltage measurement in a single settings window is as follows:

- Click the dropdown arrow on the right side of the channel selection.
- Click the box to select the specific unit and channel (Unit, Remote) you need to set. The available channels are all valid channels.



- Click to set the channel switch to ON. If it is set to OFF, the channel will not be measured.
- Click the drop-down box to the right of the color and select the waveform display color you need to set.
- Click the drop-down box on the right side of the input field and select "Voltage" as the input type.



- Click the drop-down box on the right side of the range, and select the range you need to set. Depending on the module, the parameters that can be set for the range may vary; the corresponding diagram for the selectable parameters of the voltage range is as follows:



- The selectable voltage range values are: 10mv, 20mv, 100mv, 200mv, 1v, 2v, 10v, 20v, 100v, 1-5v. The voltage parameters can also be set in the analog channel list setting screen.

6.1.2 Thermocouple measurement channel settings

The method for setting up the measurement of temperature using thermocouples in a single setup window:

- Click the drop-down box on the right side of the channel selection, and choose the specific unit and channel (Unit, Remote) you need to set. All valid channels are available for selection.
- Click to set the channel switch to ON. If it is set to OFF, the channel will not be measured.
- Click the drop-down box to the right of the color and select the waveform display color you need to set.
- Click the drop-down box on the right side of the input field and select "Tc" as the input type.



- Click the drop-down box on the right side of "Type" and select the required thermocouple type. The thermocouple types are: K, J, E, T.



- Click the drop-down box on the right side of the range to set the required thermocouple range.



- Click the disconnection detection switch to set it. The specific instructions for setting it to ON/OFF are as follows:

Item	Specification
OFF	The disconnection of the thermocouple is not detected. When the thermocouple is disconnected, the value will deviate.
ON	During thermocouple temperature measurement, a thermocouple breakage is detected. When a breakage occurs, the numerical display and cursor value will show "[BURN-OUT]". Calculated values and saved data are processed in ranges of 327.66°C (100°C f.s. range), 1638.3°C (500°C f.s. range), and 3276.6°C (2000°C f.s. range). There are limitations on the configurable data update interval.

· Click to select the contact compensation mode, which has two types: INT and EXT. The differences between different reference contact compensation modes are as follows:

Item	Specification
INT	Reference contact compensation is performed within the measurement unit. This setting is used when directly connecting the thermocouple (or compensating wire) to the instrument. The test accuracy is the sum of the temperature measurement accuracy and the reference contact compensation accuracy.
EXT	Reference contact compensation is not performed internally within the measurement unit. It is set when an external zero-contact compensator (such as ice water at 0°C) is connected. The test accuracy is specified only for temperature measurement accuracy.

The parameters of the thermocouple can also be set in the analog channel list setting screen.

Parameter Description

The temperature measurement range varies depending on the type of thermocouple. The corresponding temperature measurement ranges for different types are as follows:

Item	Specification
K	-200°C~1350°C
J	-200°C~1200°C
E	-200°C~1000°C
T	-200°C~400°C

6.1.3 Humidity measurement channel settings

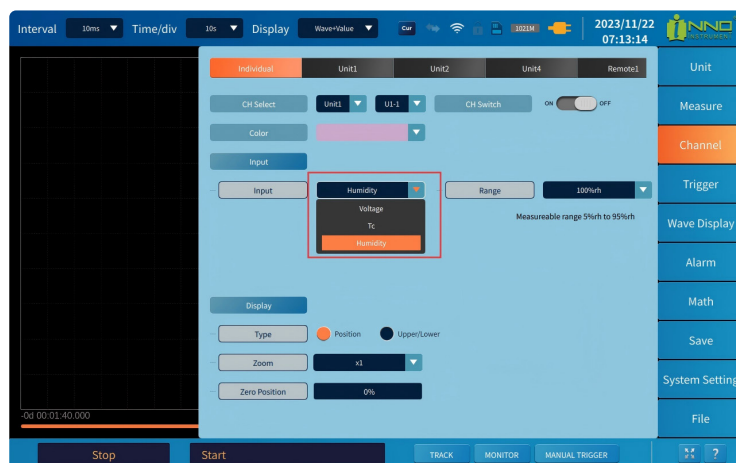
The method for setting the humidity sensor to measure humidity in a single setup window is as follows:

Click the drop-down box on the right side of the channel selection, and choose the specific unit and channel (Unit, Remote) you need to set.

All valid channels are available for selection. Click to set the channel switch to ON. If it is set to OFF, the channel will not be measured.

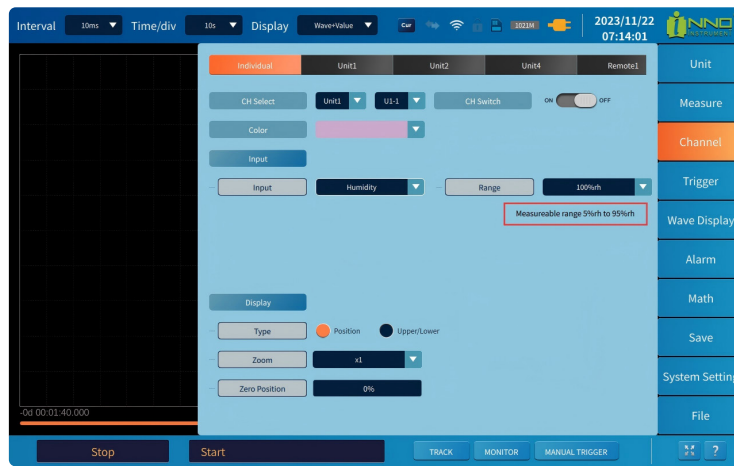
Click the drop-down box to the right of the color and select the waveform display color you need to set.

Click the dropdown box on the right side of the input field and select "Humidity" as the input type.



The range is fixedly displayed as 100% RH;

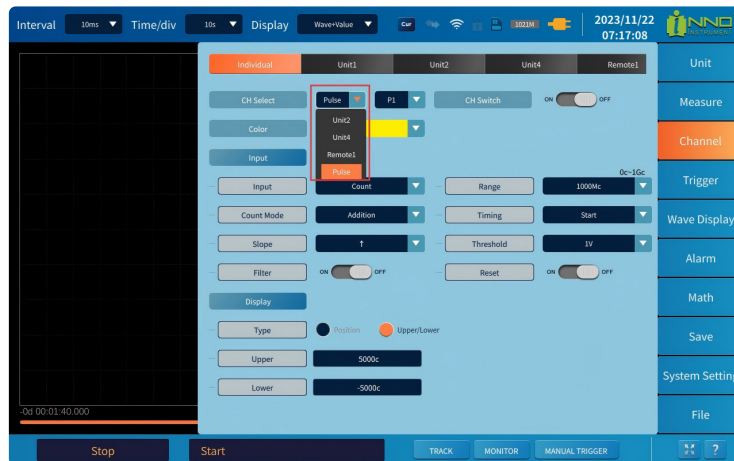
The measurable range is fixedly displayed as 5% RH to 95% RH.



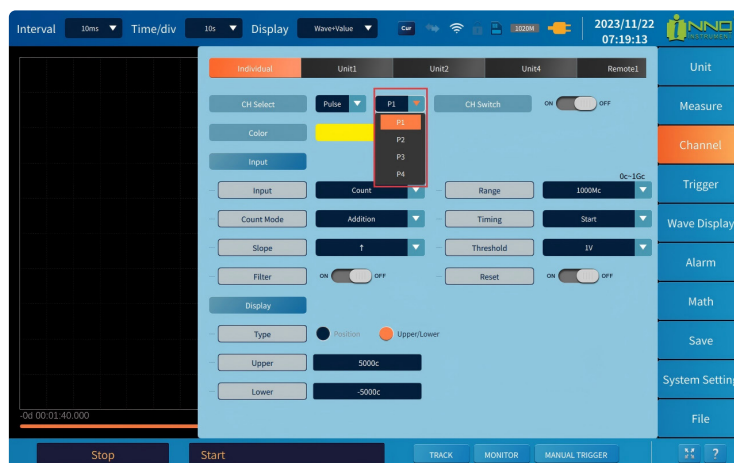
The humidity can also be set in the analog channel list setting screen.

6.1.4 Pulse cumulative measurement channel settings

The method for setting up pulse accumulation measurement in a single setup window is as follows:
Click the drop-down box on the right side of the channel and select Pulse.



Select the required pulse input terminals, which are P1 to P8 respectively.



Click the drop-down box to the right of the color and select the waveform display color you need to set. Click the drop-down box on the right side of the input field and select "Count" as the input type.



Introduction to Cumulative Mode:

Item	Specification
Addition	Count the total number of pulses input since the start of measurement.
Instantaneous value	The cumulative number of pulses input to this instrument within the recording interval. The pulse count is reset at the end of each recording interval.

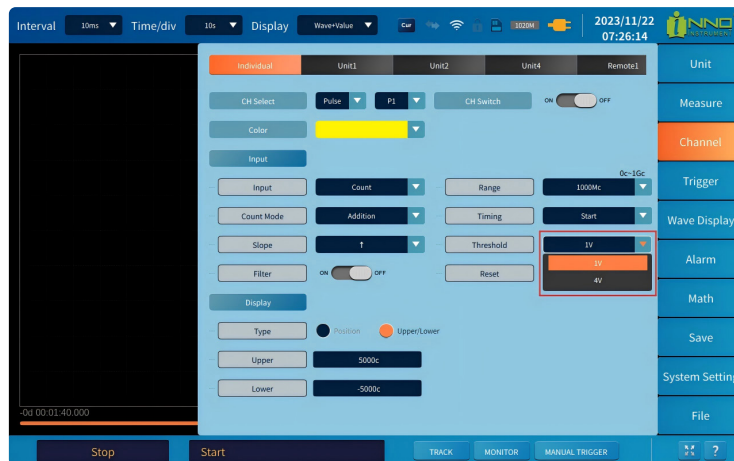
Click the dropdown box to the right of the slope, select the slope for which you need to count, and the slope parameters are $\uparrow$ and $\downarrow$. The default is $\uparrow$.



Counting methods corresponding to different slopes:

Item	Specification
$\uparrow$	The cumulative number of times the pulse changes from the Low level to the High level (rising edge).
$\downarrow$	The cumulative number of times the pulse changes from the High level to the Low level (falling edge).

Click the drop-down box on the right side of the threshold to select the level for counting, which is divided into 1V and 4V, with 1V as the default.



Counting levels corresponding to different thresholds:

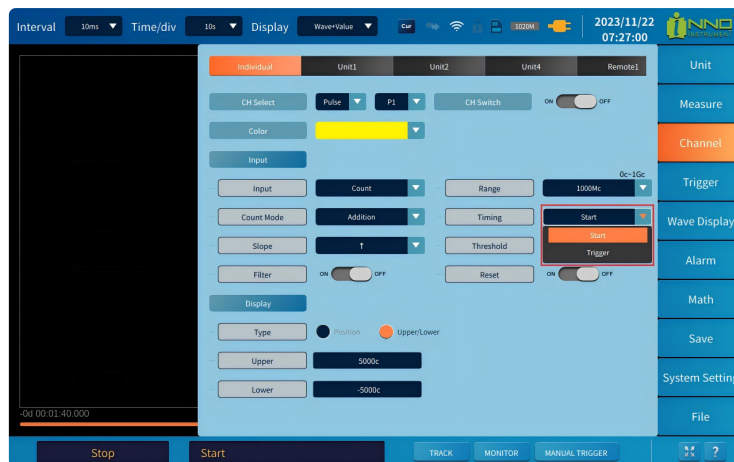
Item	Specification
1 V	A voltage greater than 1.0 V is judged as a High level, and a voltage ranging from 0 V to 0.5 V is judged as a Low level.
4 V	A voltage greater than 4.0V is judged as a High level, and a voltage ranging from 0V to 1.5V is judged as a Low level.

Click to turn on or off the filter switch. If set to ON, it can be used for mechanical contact (relay) output to prevent incorrect counting due to chattering (intermittent electrical shock).

Click the drop-down box on the right side of the timing and select the timing for resetting the count.

Reset count timing corresponding to different timings:

Item	Specification
Start	Set the count to 0 when starting the measurement.
Trigger	Set the count to 0 when starting the measurement and when the trigger is established. The value before the reset will be recorded in the trigger point.



Click to open or close the reset switch. If it is set to OFF, the counting will stop when the accumulated value overflows. If it is set to ON, the count value will be reset to 0 and start counting again when the accumulated value overflows.

Pulse accumulation can also be set in the pulse list setting screen.

6.1.5 Rotation speed measurement channel settings

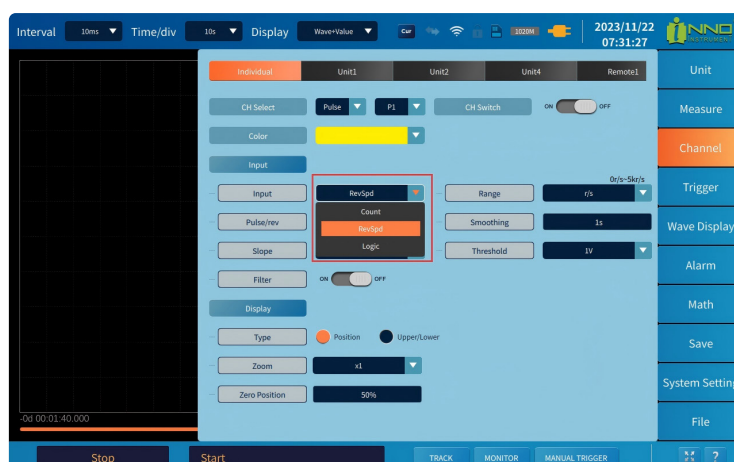
The method of setting the measurement of rotational speed in a single setup window Click the drop-down box on the right side of the channel and select Pulse.

Select the required pulse input terminals, which are P1 to P8 respectively.

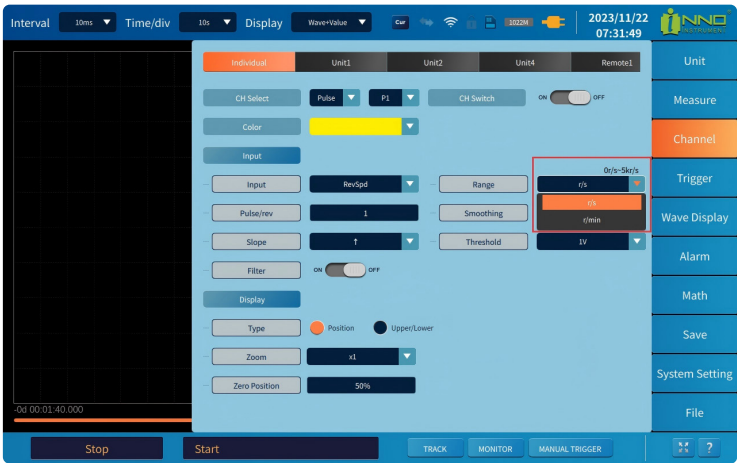
Click to set the channel switch to ON. If it is set to OFF, the terminal will not be measured.

Click the drop-down box to the right of the color and select the waveform display color you need to set.

Click the dropdown box on the right side of the input field and select "Revspd" as the input type.



Click the drop-down box on the right side of the range to select the reference time for counting. The ranges are respectively r/s and r/min. When the range is r/s, the upper display shows the measurement range of 0r/s to 5kr/s.



When the range is set to r/min, the upper display shows the measurement range of 0 r/min to 300,000 r/min.



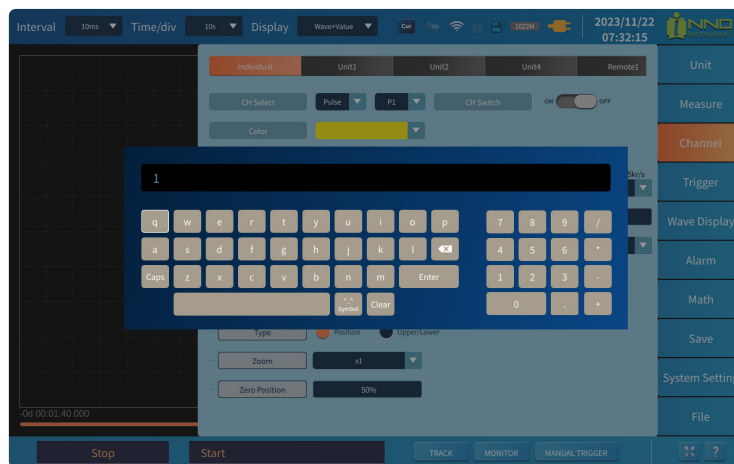
Range Introduction:

Item	Specification
r/s	Count the number of pulses within one second and calculate the(reotliuotoas peds.econd)
r/min	Count the number of pulses within the smoothing time setting and calculate the rotational speed (revolutions per minute).

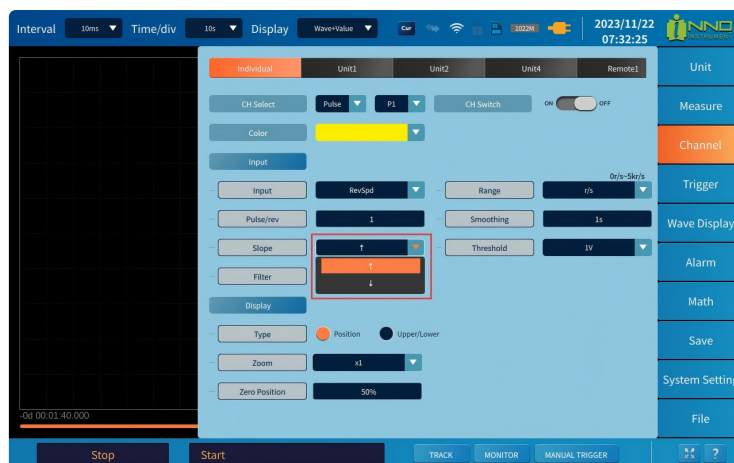
Click the input box on the right side of the "Pulse Count" label to pop up the numeric keypad, where you can enter the pulse count.
Pulse count input box:



Pop up the numeric keypad:



The default value of the pulse count is 1, with a range of 1 to 1000. When the input pulse count does not fall within this range, it will display the maximum or minimum value. Click the dropdown box to the right of the slope to select the slope for counting. The slope parameters are $\uparrow$ and $\downarrow$, with the default being $\uparrow$.



Counting methods corresponding to different slopes:

Item	Specification
↑	The cumulative number of times the pulse changes from the Low level to the High level (rising edge).
↓	The cumulative number of times the pulse changes from the High level to the Low level (falling edge).

Click the drop-down box on the right side of the threshold, and select the level to be counted. The threshold parameters are divided into 1V and 4V, with 1V as the default.

Counting levels corresponding to different thresholds:

Item	Specification
1 V	A voltage greater than 1.0 V is judged as a High level, and a voltage ranging from 0 V to 0.5 V is judged as a Low level.
4 V	A voltage greater than 4.0V is judged as a High level, and a voltage ranging from 0V to 1.5V is judged as a Low level.

Click to open or close the filter switch. If set to ON, it can prevent incorrect counting caused by chattering (intermittent electrical shock) for mechanical contact (relay) output.

Click the input box to the right of the "Smoothing Processing" tab to pop up the numeric keypad, allowing you to set the smoothing processing time. The range for smoothing processing is 1 second to 60 seconds, with the default value being 1 second. When the set smoothing processing value exceeds the range, it will be displayed as the maximum or minimum value.

The rotation speed can also be set in the pulse list setting screen.

The measurement principle of rotational speed

When the cumulative pulse count inside the instrument is updated at an interval of 10 ms, the rotational speed r at time t [s] is calculated by dividing the number of pulses between $(t - 1)$ and t [s] by the number of pulses per revolution.

When the range is r/s :

$$r (r/s) = \frac{\text{The cumulative pulse count of } t \text{ [S] minus the cumulative pulse count of } (t - 1) \text{ [S]}}{\text{The number of pulses per revolution}}$$

r/s : revolutions per second

When the range is r/min and the smoothing processing setting force is 1s:

$$r (r/min) = \frac{\text{The cumulative pulse count of } t \text{ [S] minus the cumulative pulse count of } (t - 1) \text{ [S]}}{\text{The number of pulses per revolution}} \times 60$$

r/min : Rotational speed per 60 seconds (when the smoothing setting is [1 second])

When the range is set to t/in and the smoothing setting is t_0 [s], the cumulative pulse count is updated internally at a data update interval of 50 ms in this instrument.

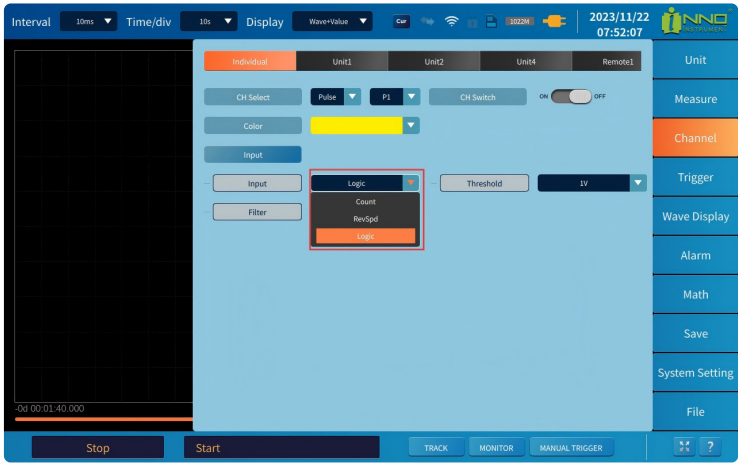
The rotational speed r at time t [S] is calculated by dividing the number of pulses between $(t - t_0)$ and t [S] by the number of pulses per revolution and the smoothing processing time, and then multiplying by 60.

$$r (r/min) = \frac{\text{The cumulative pulse count of } t \text{ [S] minus the cumulative pulse count of } (t - t_0) \text{ [S]}}{\text{The number of pulses per revolution}} \times \frac{60}{t_0}$$

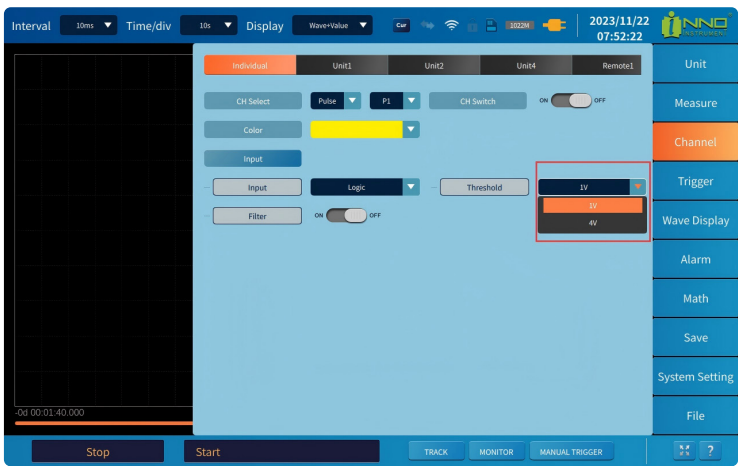
When the range is $[r/min]$, and the time t [s] is $t < t_0$ (t_0 : the time set in the smoothing processing), due to the smoothing processing, the displayed rotational speed will be less than the actual rotational speed (where $t_0 \geq 2s$). In case of unexpected triggering, please set the smoothing processing time to 1s.

6.1.6 Logical signal measurement channel settings

The method for setting up logical signal measurement in a single setup window is as follows:
Click the dropdown box on the right side of the channel and select Pulse.
Select the required pulse input terminals, which are P1 to P8 respectively.
Click to set the channel switch to ON. If it is set to OFF, the terminal will not be measured.
Click the drop-down box to the right of the color and select the waveform display color you need to set.
Click the dropdown box on the right side of the input field and select "Logic" as the input type.



Click the drop-down box on the right side of the threshold, and select the level to be counted, with the parameters being 1V and 4V, and the default is 1V.



Counting levels corresponding to different thresholds:

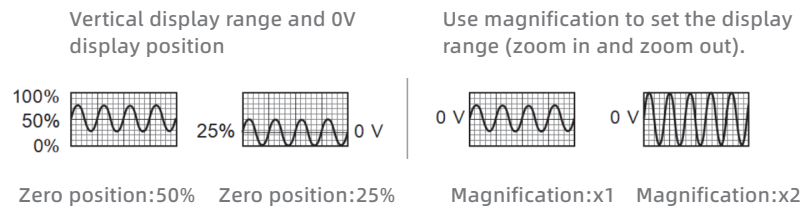
Item	Specification
1 V	A voltage greater than 1.0 V is judged as a High level, and a voltage ranging from 0 V to 0.5 V is judged as a Low level.
4 V	A voltage greater than 4.0V is judged as a High level, and a voltage ranging from 0V to 1.5V is judged as a Low level.

Click to turn on or off the filter switch. If set to ON, it can prevent incorrect counting due to chattering (intermittent electrical shock) for mechanical contacts (relays).
The logic signal can also be set in the pulse list setting screen.

6.1.7 Channel display settings

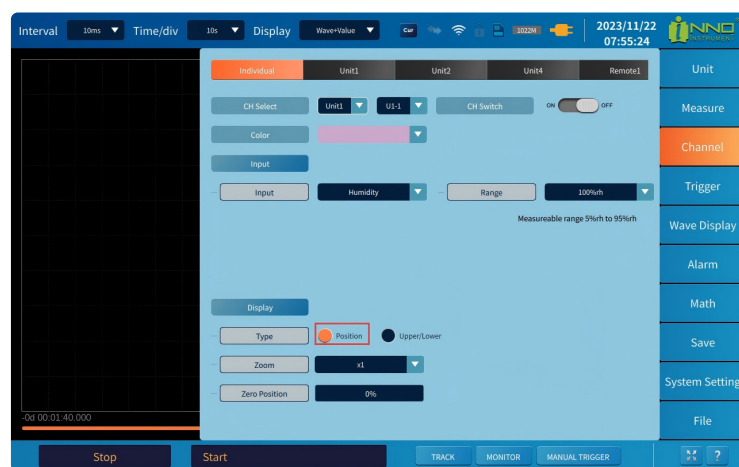
The channel can be set for the display position or magnification of the waveform in a single setting window, or in the "Display" section of the list setting screen. There are two methods for setting the display: one is by using the magnification and zero position, and the other is by using the upper and lower limit values.

The setting is done by using the magnification and zero position. The zero position serves as the reference 0 point. When setting the waveform display position with the magnification, the amplification or reduction is based on the zero position.

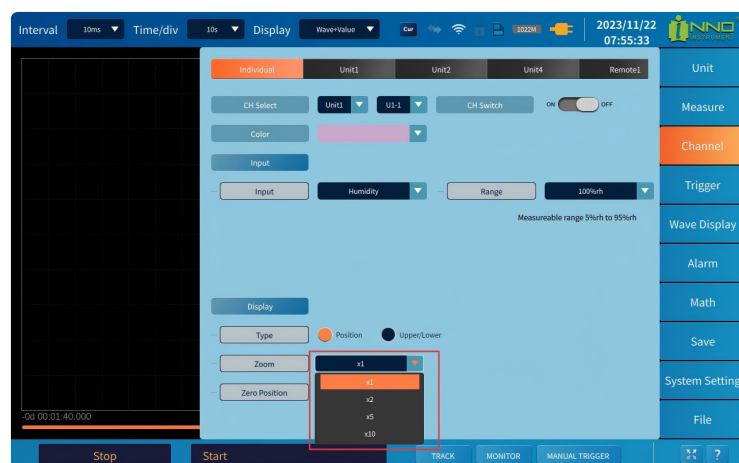


The setup method is as follows:

Click "Settings" and set the display type to "Location";



Click the dropdown box to the right of the magnification to select the display magnification of the waveform. The parameters are: $\times 1/2$, $\times 1$, $\times 2$, $\times 5$, $\times 10$, $\times 20$, $\times 50$, $\times 100$. The default is $\times 1$. You can slide up and down to select different magnifications.



Item	Specification
Magnification[*1]	The display range of the vertical axis of the picture is the same as the full-scale range.
Magnification[*1/2]	The display range of the vertical axis of the picture is twice the full-scale range.
Magnification[*2]	The display range of the vertical axis of the picture is 1/2 of the full-scale range.
Magnification[*5]	The display range of the vertical axis of the picture is 1/5 of the full-scale range.
Magnification[*10]	The display range of the vertical axis of the picture is 1/10 of the full-scale range.
Magnification[*20]	The display range of the vertical axis of the picture is 1/20 of the full-scale range.
Magnification[*50]	The display range of the vertical axis of the picture is 1/50 of the full-scale range.
Magnification[*100]	The display range of the vertical axis of the picture is 1/100 of the full-scale range.

Click the input box to the right of the zero position, and a numeric keypad will pop up. Enter the specific position of the waveform's zero (0V, 0°C, etc.) on the screen. When entering, only input the number; there is no need to input "%". The percentage is provided by the software itself. The range of the zero position is -50% to 150%, with a default of 50%. If the entered number exceeds the range, it will be displayed as the maximum or minimum value.

Set the magnification to x2 and the zero position to 0%.

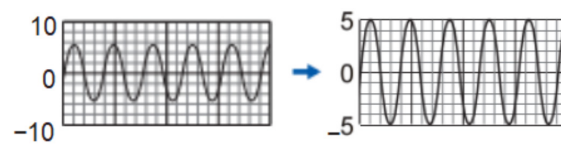


Set the magnification to x1/2 and the zero position to 50%.



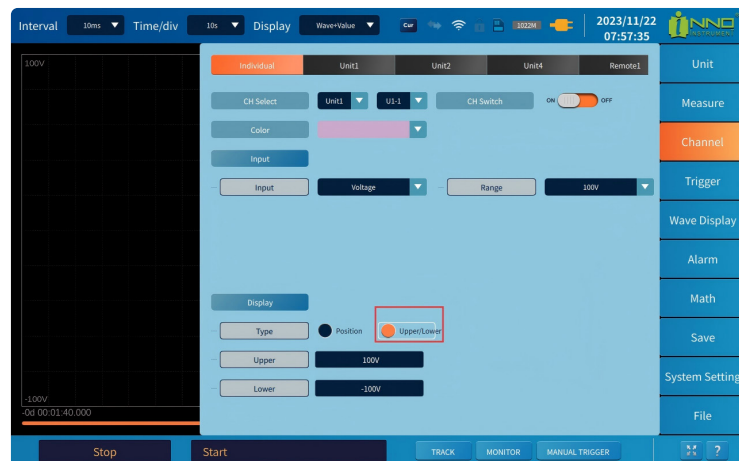
Set using upper and lower limit values

The upper and lower limits of the display can be specified to set the display range of the waveform. Any range can be displayed, so only the required part of the waveform can be magnified and shown.



The setting method is as follows:

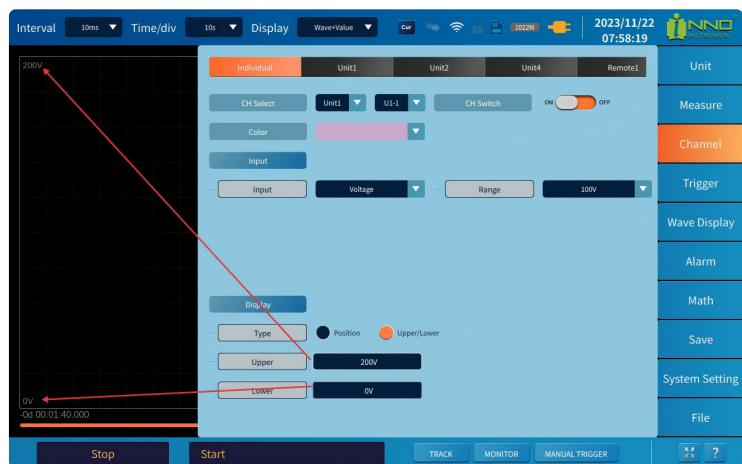
Click to set the display type as upper and lower limits.



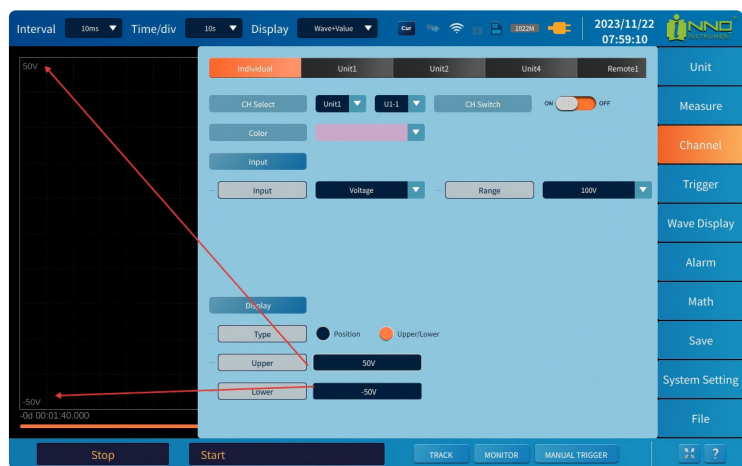
Click the input box on the right side of the upper limit, a numeric keypad will pop up, allowing you to enter the upper limit value. The maximum upper limit value is $9.9999\text{E}+29$. The default value is the upper limit of the range. If the entered value exceeds the maximum, it will be displayed as the maximum value.

Click the input box on the right side of the lower limit to pop up the numeric keypad. You can enter the lower limit value. The minimum lower limit value is $-9.9999\text{E}+29$, and the default value is the lower limit of the range. The lower limit value must be less than the upper limit value; otherwise, the setting will fail and a prompt will be displayed that the upper limit must be greater than the lower limit.

Set the upper limit to 200 and the lower limit to 0.



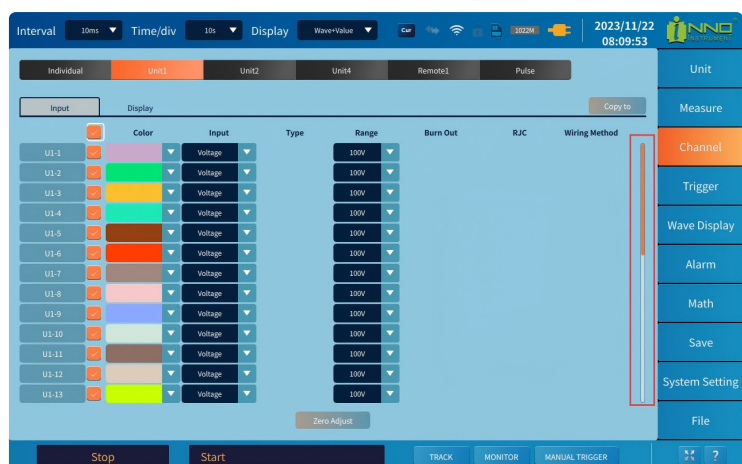
Set the upper limit to 50 and the lower limit to -50.



6.2 Simulation channel list settings

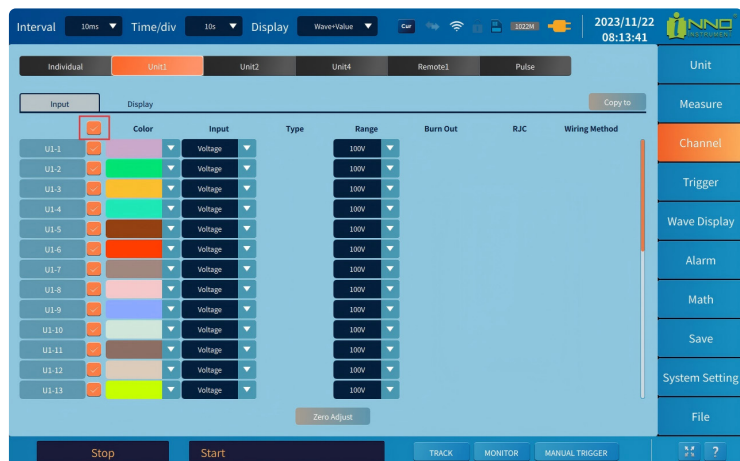
6.2.1 Simulation channel input settings

The list setting is formed with each module as a page, and the items that can be set are the same as those for the individual analog channel settings. Click on the sub-labels at the top of the channel page to select the unit to be set, and enter the analog channel list setting page, which displays information for 30 channels. You can use the scroll bar on the right to view all channel information.

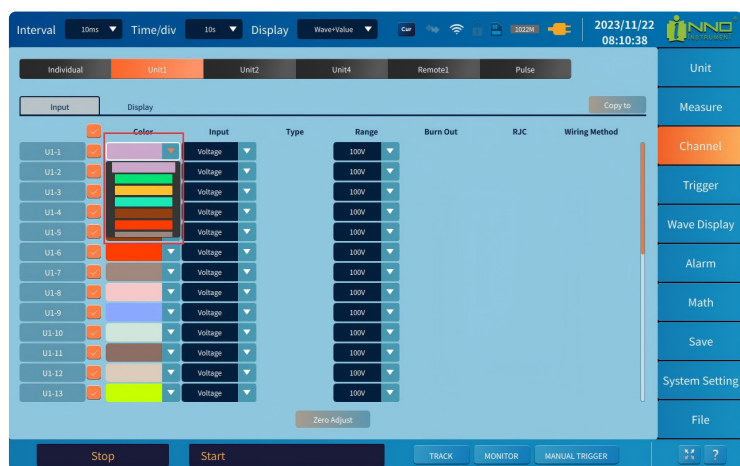


Voltage measurement list setup

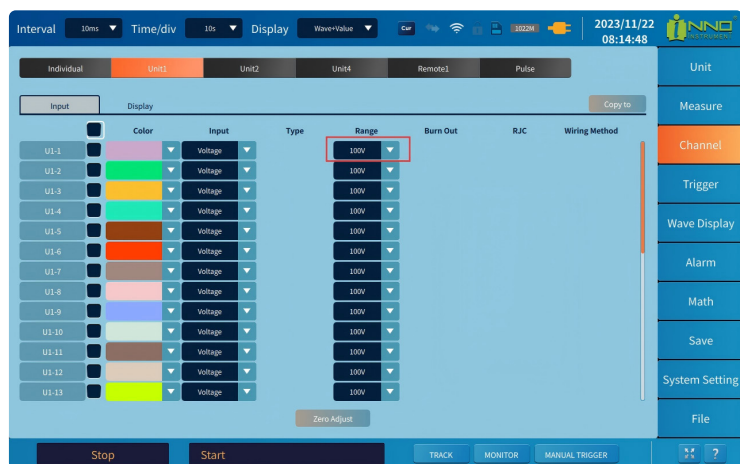
Check the checkbox corresponding to the channel to turn on the channel switch. If you need to turn on all channel switches at the same time, check the checkbox at the top.



To set the channel color, you can click the dropdown box corresponding to the color and select the color you need to set for the channel.

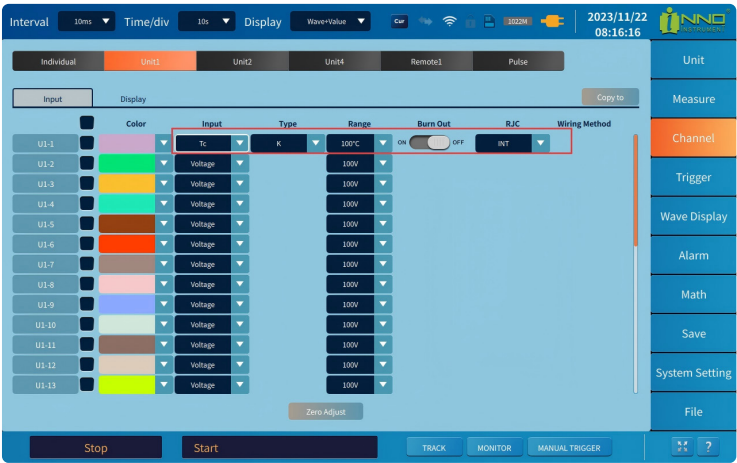


Set the input type. Click the drop-down box of the input, select Voltage as the input type. The corresponding type, open-circuit detection, contact compensation, and wiring method on the right will not display any content and cannot be set. Only the range can be set.



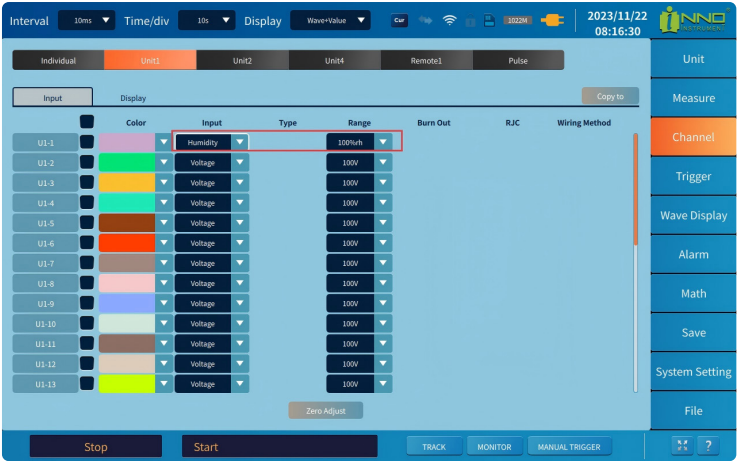
Thermocouple measurement list setup

Check the corresponding channel's checkbox to turn on the channel switch. If you need to turn on all channel switches at the same time, check the checkbox at the top. Set channel color;
Click the input drop-down box, select the input type as TC. The wiring method on the right cannot be set and no content is displayed. Other parameters can be set.
Set the thermocouple type, range, open circuit detection switch, and contact compensation.



Humidity measurement list settings

Select the channel checkbox and turn on the corresponding channel switch.
Set the channel color;
Click the input drop-down box and select the input type as Humidity. On the right side, except for the range display, no other parameters are shown.



6.2.2 Simulation channel display settings

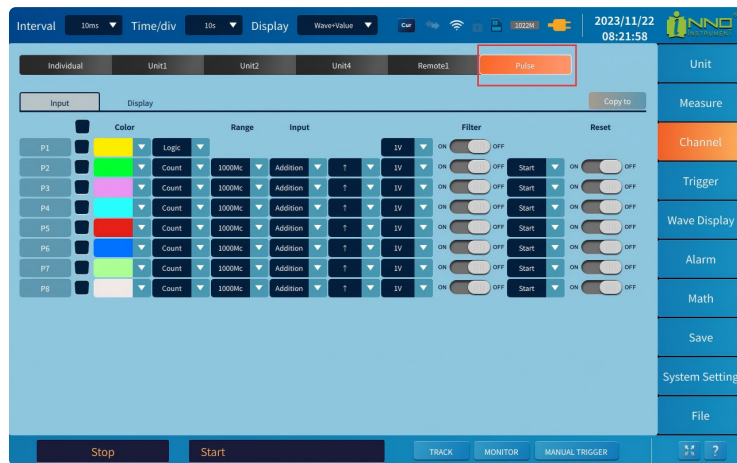
Tap the display button in the top tab bar to open the analog channel list display settings page, which displays information for 30 channels. You can drag the scroll bar on the right to view all channel information.



To open/close the channel switch, set the waveform display color, and set the input content, refer to Section 6.2.1. For setting the display type, amplification factor, zero position, upper limit, and lower limit parameters, refer to Section 6.1.8.

6.3 Pulse list settings

Tap the Pulse button on the upper tab bar to enter the pulse list settings page, which contains information on the pulse input terminals P1 to P8.



6.3.1 Pulse list input settings

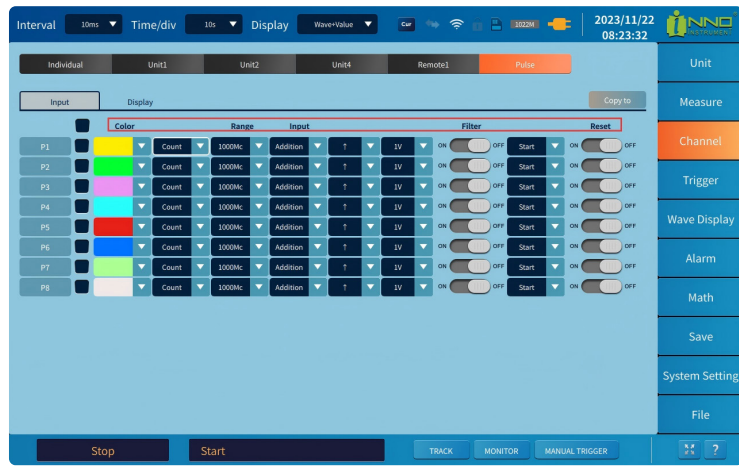
The list setting of pulse accumulation measurement channels is as follows:

Check the checkbox of the external terminal to turn on the channel switch.

Set the waveform display color;

Set the input as pulse accumulation;

The settings of parameters such as cumulative mode, slope, and threshold can be referred to in Section 6.1.4.



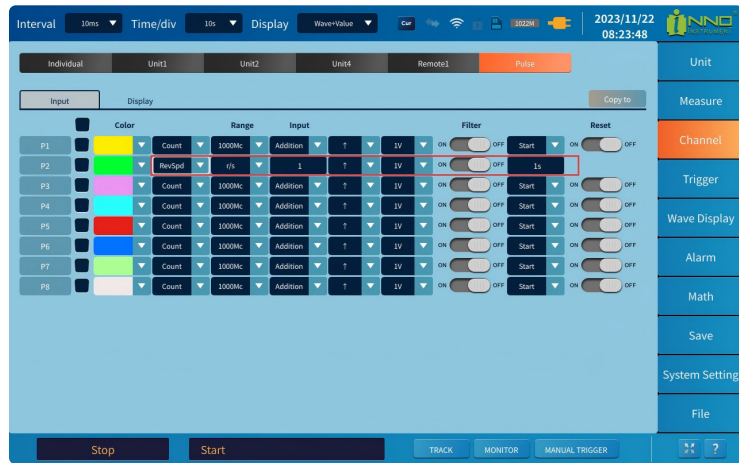
Rotary Express Measurement Channel List Settings:

Check the checkbox of the external terminal to turn on the channel switch.

Set the waveform display color;

Set the input as the rotational speed;

The settings of parameters such as pulse count, slope, and threshold can be referred to Section 6.1.5.



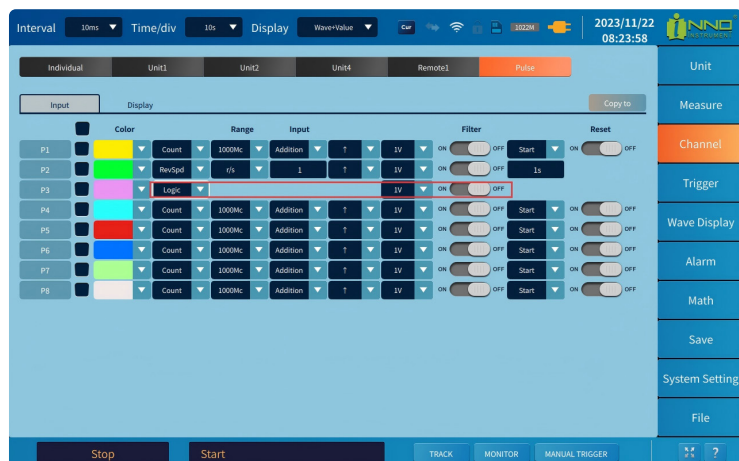
List of logical signal measurement channel settings:

Check the checkbox of the external terminal to turn on the switch of this channel.

Set the waveform display color;

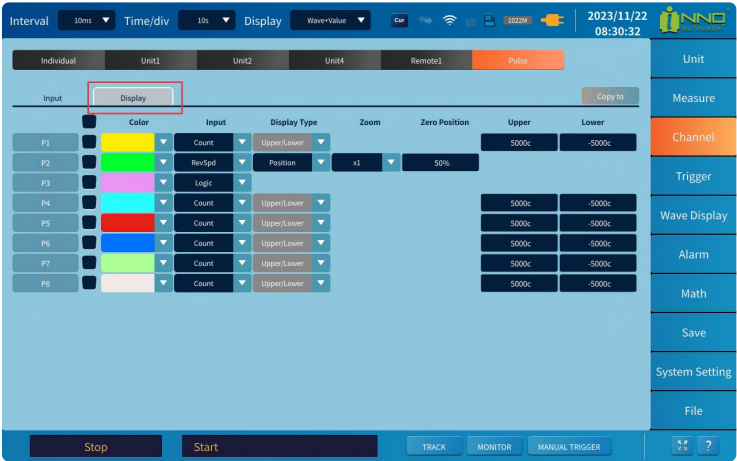
Set the input as a logic signal;

The threshold and filter parameters can be set with reference to Section 6.1.6.

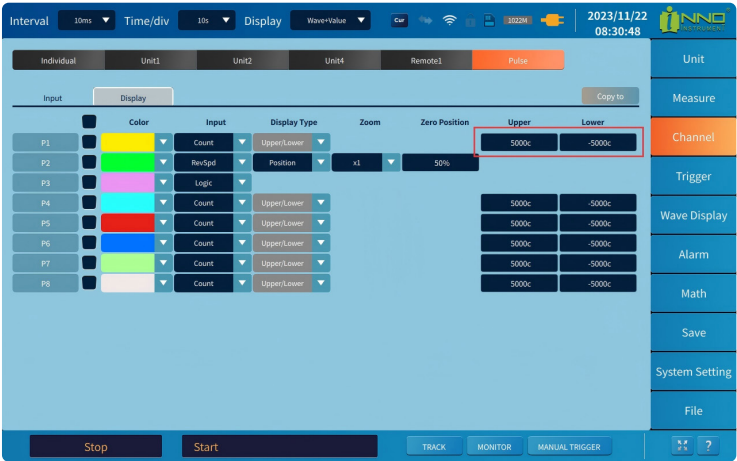


6.3.2 Pulse list display settings

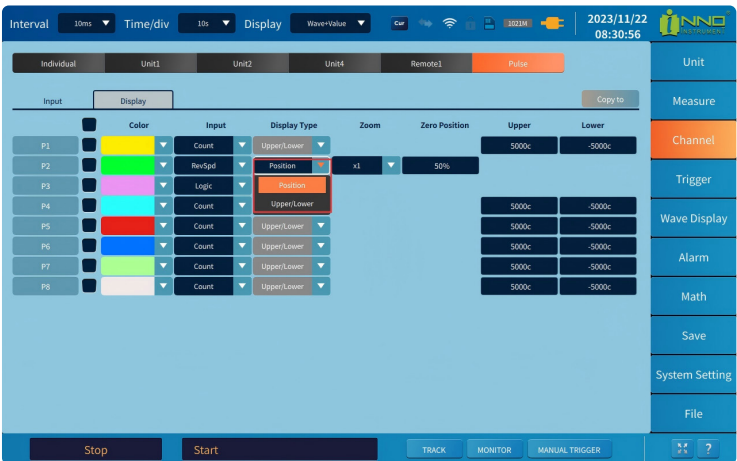
Tap the display button on the pulse list page to enter the pulse list display settings page, where the display settings for P1 to P8 are shown.



- Pulse accumulation list display settings:
- Check the checkbox of the input terminal to enable the channel.
 - Set the waveform display color;
 - Set the input as pulse accumulation;
 - The display type is fixed as upper and lower limits, with the upper limit defaulting to 5K and the lower limit defaulting to -5K.



- Rotational speed list display settings:
- Check the checkbox of the input terminal to enable the channel.
 - Set the waveform display color;
 - Set the input as the rotational speed;
 - Set the display type, which can be either position or upper and lower limits, along with the corresponding magnification and zero position.



Set the input as a logic signal. All display settings parameters will not show any content and cannot be set.



Chapter 7

Trigger

This chapter introduces the settings of trigger-related parameters, including basic trigger settings, analog trigger settings, waveform arithmetic trigger settings, and other contents.

7.1 Trigger Function Introduction

On the navigation bar on the right, simply tap "Trigger" to enter the trigger settings page.



Triggering is a function that determines the start and stop timing of recording through specific conditions or signals. The establishment of a specific condition (trigger condition) is called "triggering". The location where triggering occurs (the time when the trigger condition is met) is called the "trigger point". When triggering occurs, recording can start or stop.

- Trigger source type:
 - Simulation trigger (level, window)
- Waveform operations (level, window) External trigger

- Trigger specific conditions that can be set:

Specific conditions	
Start triggering	Recording begins the moment the trigger condition is met. Example: Recording begins when the temperature is greater than or equal to 50°C.
Stop triggering.	Recording stops the moment the trigger condition is met. Example: Recording ends when the signal drops below 1 V.
Stop triggering.	Triggered by an external signal. (I/O 3) Example: Recording data in conjunction with the operation of other instruments.
Pre-triggering	It also records data prior to the trigger point. Example: It also records the phenomena prior to the occurrence of the exception.
Trigger the establishment conditions	You can set the conditions for the trigger to be true. Select the AND/OR between triggers.

⚠️ Explanation:

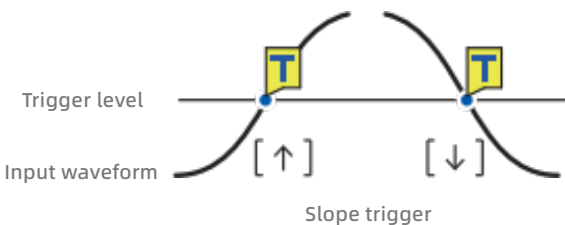
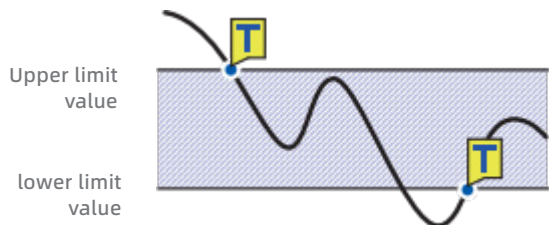
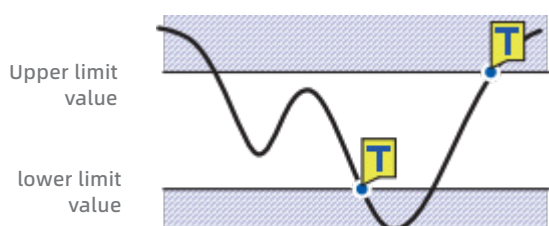
When the trigger function is set to OFF, pressing the START button will start the recording. (Free measurement)

When the trigger function is set to ON, it will remain in a "waiting for trigger" state until the trigger condition is met.

Once the trigger condition is satisfied, it will start recording.

During the processing of a trigger, the next trigger will not be accepted. During the processing of a trigger, the trigger output will become active.

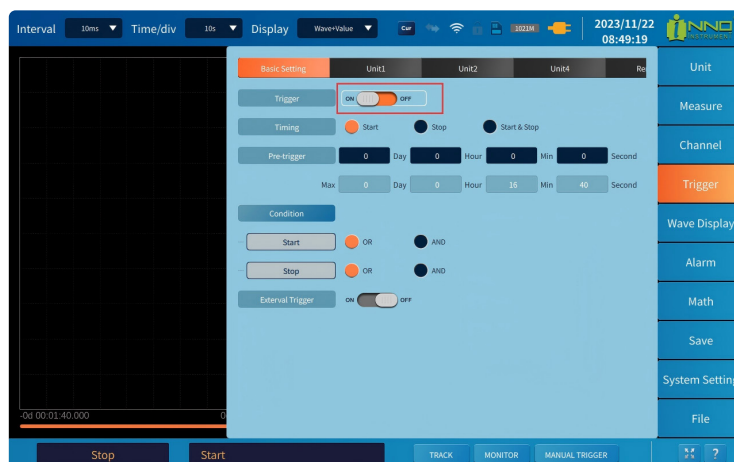
Introduction to Trigger Types

Specific conditions		Content	Explanation
Level-triggered	↑		If the waveform crosses the level upwards, a trigger will occur. This includes both the level and the same value.
	↓		A trigger will occur if the waveform crosses the level downwards. This excludes levels and values of the same magnitude.
Window trigger	IN		If the waveform enters the upper or lower limit range, it will be triggered. This includes both the upper and lower limits and the same value.
	OUT		If the waveform deviates from the upper or lower limit range, it will be triggered. This excludes the upper and lower limits and values that are the same.

7.2 Basic Settings

7.2.1 Trigger function switch settings

The trigger function can be turned on or off by clicking the setting. When it is set to ON, other trigger setting items will take effect.



7.2.2 Trigger timing settings

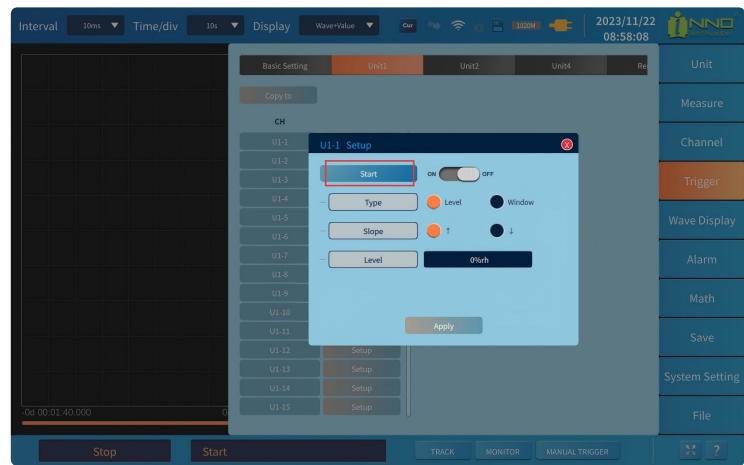
In the trigger timing, select the action to be taken when the trigger is established. There are three options: start, stop, and start & stop. The default is start.

The start/stop recording relationships corresponding to different trigger timings are as follows:

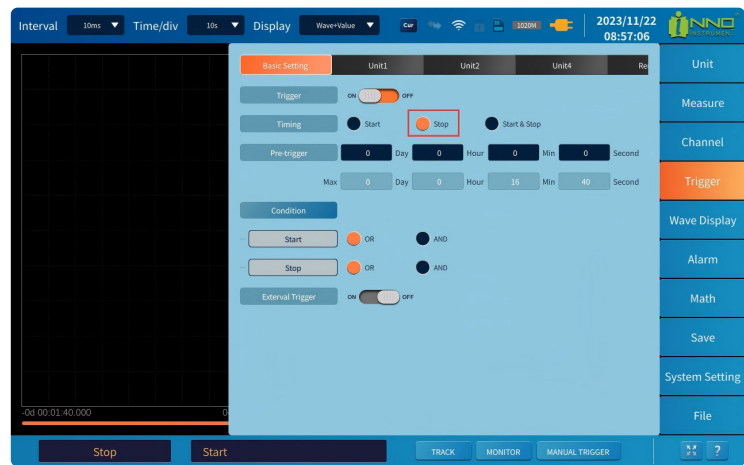
Item	Specification
Start	If the trigger condition is met, recording will begin (triggering begins). Example: Recording begins when the temperature is above 50°C.
Stop	If the trigger condition is met, recording will stop (triggering will stop). Example: Recording ends when the voltage drops below 1 V.
Start & Stop	Recording will begin if the trigger condition is met; recording will stop if the trigger condition is met again during recording. Example: Recording begins when the temperature exceeds 50°C; recording ends when the temperature exceeds 100°C.

If the trigger timing is set to "Start", only the parameters related to the start trigger will be available in the trigger settings menu for simulation trigger and waveform operation trigger.

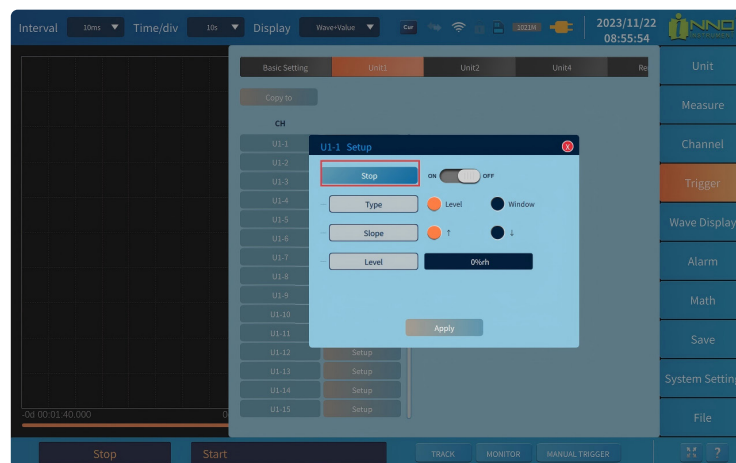
Set the trigger timing to Start:



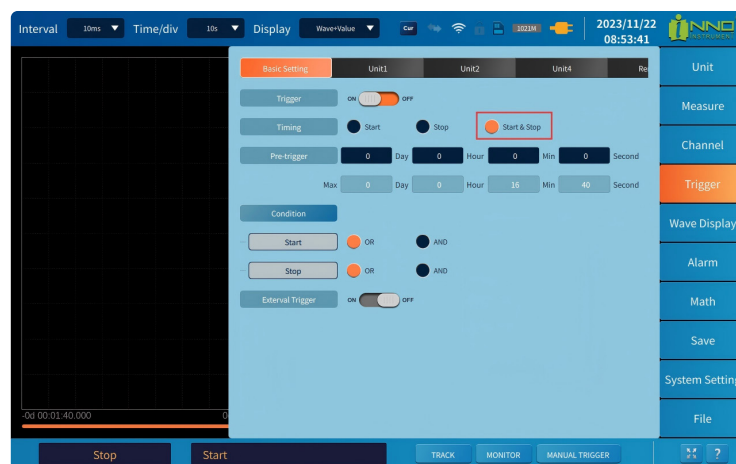
Settings menu for simulated triggering::



Waveform operation trigger settings menu:



If the trigger timing is set to "Stop", only the parameters related to the stop trigger will be available in the trigger settings menu for simulation trigger and waveform operation trigger. Set the trigger timing to "Stop":



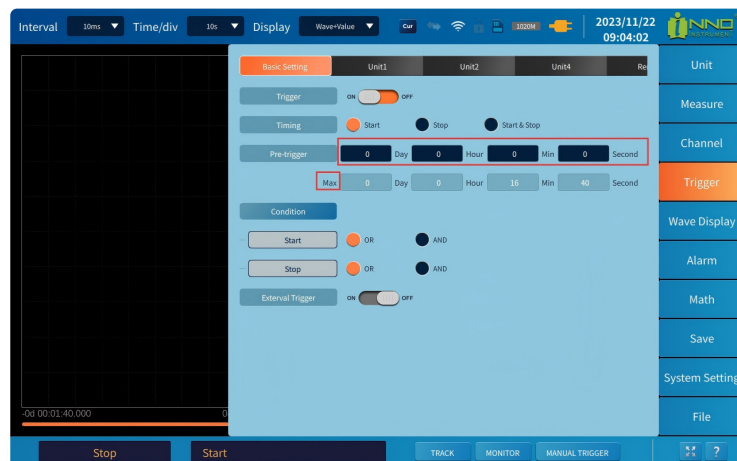
Waveform operation trigger setup menu:



7.2.3 Pre-trigger settings

Set the time or number of days to record before the trigger in the pre-trigger. Pre-trigger can record data before the trigger point (the time when the trigger occurs). Since it records data before abnormal phenomena occur, it is helpful for fault analysis.

- Pre-trigger format: days, hours, minutes, seconds. The default value is 0 days 0 hours 0 minutes 0 seconds. The maximum value is shown below. If the set pre-trigger value exceeds the maximum value, it will be displayed as the maximum value.
- Click the input boxes in front of "Day", "Hour", "Minute" and "Second", and a numeric keypad will pop up, allowing you to enter the time you need to set.

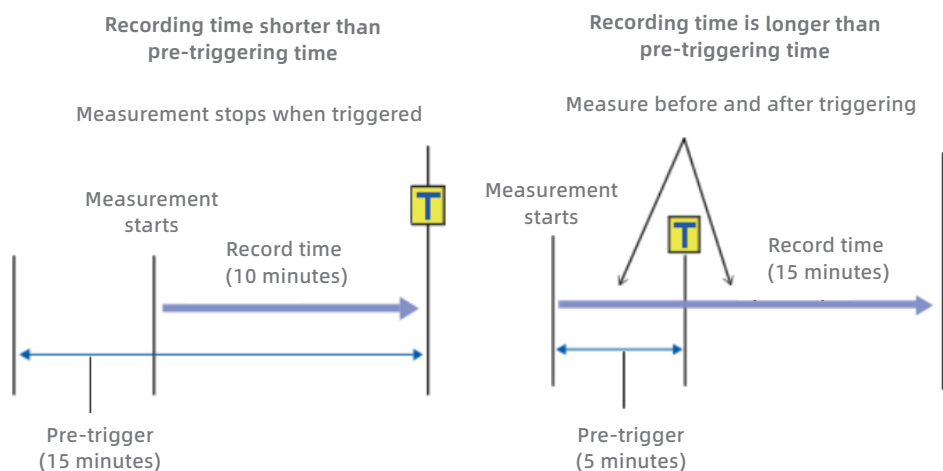


⚠ The difference between waiting for pre-trigger and waiting for trigger:

If the measurement starts, the trigger will be disabled for the duration of the pre-trigger setting. During this period, "Waiting for pre-trigger" will be displayed on the screen.

After the pre-trigger period has elapsed, it will wait for the trigger to be established. During this time, "Waiting for Trigger" will be displayed on the screen. During the pre-trigger waiting period, even if the trigger conditions are met, triggering will not occur.

·The relationship between pre-trigger and record time:



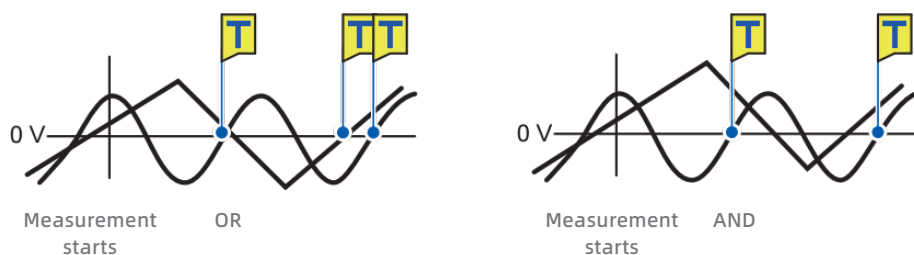
When recording the waveform after triggering, please set a longer recording time than the pre-trigger time.

7.2.4 Trigger conditions

Select the conditions for trigger establishment in the trigger conditions, and use logical product (AND) or logical sum (OR) to set the establishment conditions among various triggers (analog, waveform operation, external). When all trigger sources are OFF (when no trigger settings have been made), recording will start immediately (free measurement).

Item	Specification
OR	Trigger when a certain condition is met. Determine the trigger condition through edge detection.
AND	Trigger when all trigger conditions are met. Determine the trigger conditions through level judgment.

If the trigger condition is met at the start of the measurement, no triggering will occur. If the trigger condition changes from not being met to being met, triggering will occur. Example: Trigger when the waveform crosses 0 V from bottom to top. Trigger type: Level trigger, Level: 0 V, Slope: ↑



7.2.5 External triggers

In external triggering, set the external trigger function to ON. At this time, triggering can be performed through the input signal of terminal I/O 3 of the external control terminal.

OFF、ON

The external trigger slope can be set; the default value is ↑.

Item	Specification
↑	Triggered by the rising edge from Low level to High level.
↓	Triggered by the falling edge from High level to Low level.



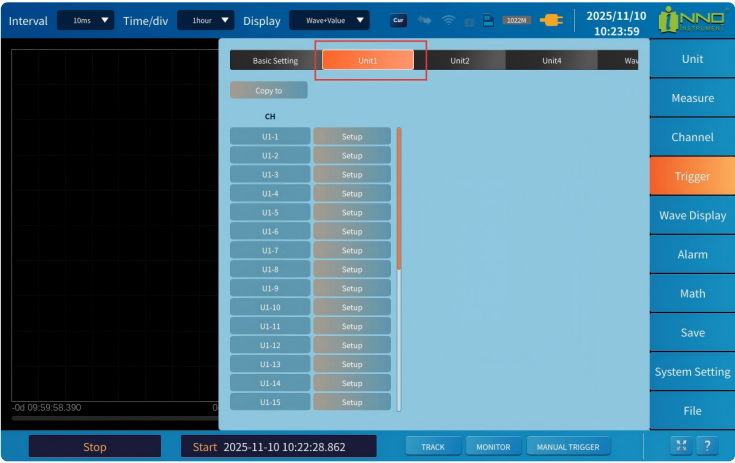
7.2.6 Manual trigger

Triggering is achieved by pressing the manual trigger button. Forced triggering is independent of the trigger source settings and can be performed while waiting for a trigger.

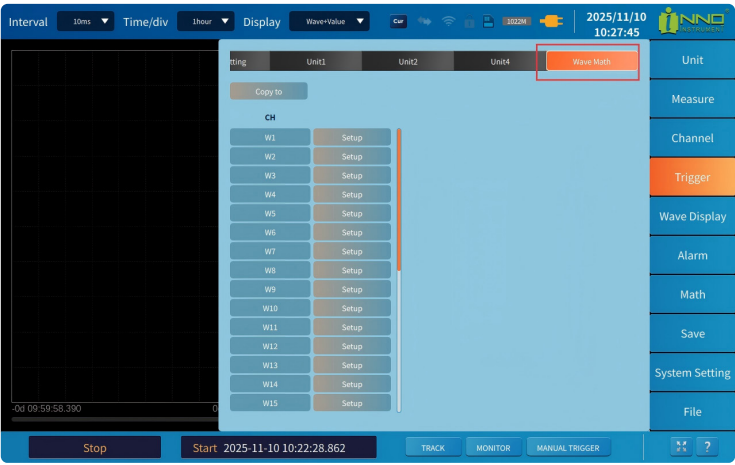


7.3 Simulation trigger, waveform operation trigger

Triggering can be set according to the analog channel or waveform arithmetic channel.
The settable triggers include: level trigger and window trigger.
When simulating the trigger, select the channel to be set in Un-m.
When the waveform operation is triggered, select the channel to be set in [Wm] (m = 1, 2, ...).
At this point, the trigger setting windows for each channel will open.
Simulation Trigger:



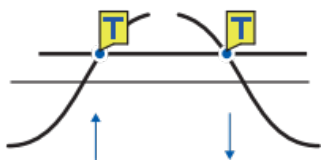
Waveform operation trigger:



Set trigger functions in each project. If the trigger timing is at the start, set a start trigger. If the trigger timing is at the stop, set a stop trigger. If the trigger timing is at both the start and stop, set two triggers, one for the start and one for the stop.

Level-triggered:

If the specified level (trigger level) is crossed, a trigger will occur. The crossing direction (slope) can be set.



Set the trigger type to level, and in this case, level triggering will be used.

When the slope is selected and crossed in the set direction, the trigger will be activated.

When the trigger condition is set to AND, determine whether the waveform exceeds the specified level.

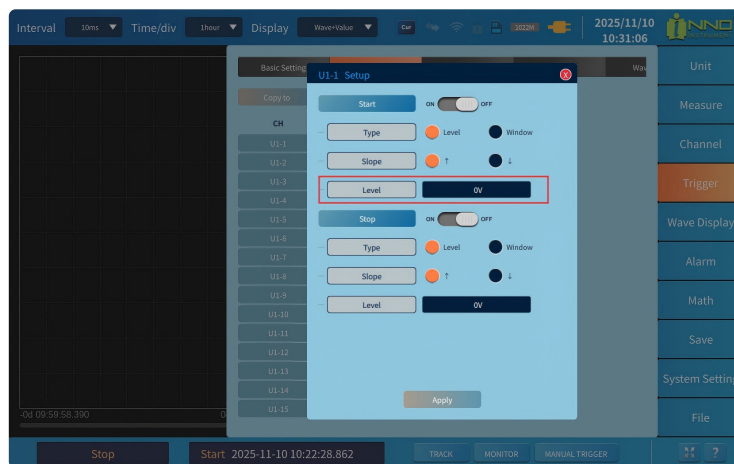
Item	Specification
↑	Pass from bottom to top through tiesnpgedfed level.
↓	Pass through the specified level framllitnoggpgbeottom.

The trigger level setting range is: -1.5 times the full scale value to 1.5 times the full scale value, with a default of 0.

When the measurement range only includes positive values, the range is 0 to three times the maximum measurement range, with the default being 0.

A trigger will be activated when the set level (such as temperature or voltage) is crossed.

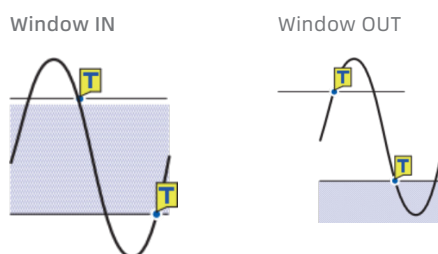
The resolution of the trigger level varies with the range.



Window trigger

The range (window) can be specified by the upper limit and lower limit values, and triggering can be performed when the waveform enters or exits this range.

It can be triggered either when entering the range (window IN) or when deviating from the range (window OUT).



When the trigger type is set to window, window triggering will be used at this time.

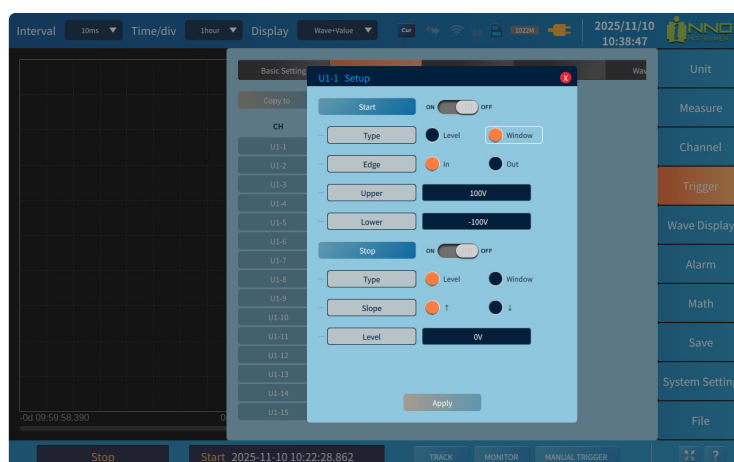
Select the IN/OUT of the waveform

When the trigger condition is set to AND, determine whether the waveform is within the specified range.

Set the upper limit value and the lower limit value within the upper and lower limits. The range sandwiched between the upper limit value and the lower limit value is regarded as the window. Upper limit: -1.5 times the range value to 1.5 times the range value, default range value;

Lower limit: -1.5 times the range value to 1.5 times the range value, default -range value. The upper limit must be greater than the lower limit.

Item	Specification
IN	Triggering occurs when the waveform enters the specified range.
OUT	Trigger when the waveform deviates from the specified range.



Chapter 8

Wave Display

This chapter introduces the display of waveforms and numerical values.

8.1 Display settings

8.1.1 Timeline

Time axis: Select the time of 1 scale in the horizontal axis, which can be longer than the recording interval. Changes can be made during the measurement period. Parameter settings can be made through the drop-down menu. The parameter options include:
20 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, 1 min, 2 min, 5 min, 10 min, 20 min, 30 min
1 h, 2 h, 5 h, 10 h, 12 h, 1 day
Default value of the timeline:
After the system initialization is executed, the default value is 10 seconds.
After restarting the machine, the time axis will default to the value set before the last shutdown.



If a shorter time is set, the waveform will be magnified.
If a longer time is set, the waveform will be compressed.
Each scale represents the time setting on the display and does not affect the recording interval or the data update interval.。

8.1.2 Show the horizontal axis

Select the display format of the time value (horizontal axis) to be shown in the picture from the horizontal axis display options:
There is an upper limit to the 1-scale time that can be set according to the recording interval during the measurement period.
Recording interval: 10ms to 50ms; the maximum setting can be 1 hour.
If it is set to be equal to or longer than 2 hours and the measurement starts, it will be changed to 1 hour.
Recording interval: 100ms to 500ms; the maximum setting time is 10 hours.
If it is set to be equal to or longer than 12 hours and the measurement begins, it will be changed to 10 hours.

Item	Specification
Time	Display the time starting from the beginning of the measurement. When using a trigger, display the time starting from when the trigger is established.
Date	The actual time (date and time) is displayed every 10 degrees.
Data volume	Display the number of data points from the start of the measurement. When using a trigger, display the number of data points starting from the moment the trigger is established.

Time display:



Date display:



Data shows:



8.1.3 Vertical axis scale

The display of the vertical axis scale includes two states: on or off.

Item	Specification
Open state	Scale divisions of the display: 10 divisions, upper and lower limits determined by the selected channel or option.
Off state	纵The vertical axis scale is not displayed and is set to be off by default.

Off state:



Open status:



8.1.4 Channel labels

The display of channel labels includes two states: open or closed.

Item	Specification
Open state	Show channel labels, default display is on.
Off stat	Hidden channel label

Open state:



Off state:



8.1.5 Numeric display types

The numerical display types include: instantaneous value, cursor value, and numerical operation. The default display type is the instantaneous value.

Item	Specification	
Instantaneous value	The numerical display interface displays instantaneous values.	Instantaneous value (the numerical page displays the measurement time), maximum value, minimum value, average value, P-P value
Cursor value	The numerical display interface shows the cursor value item.	Display cursor A, cursor B, cursor B-A
Numerical operations	The numerical display interface displays numerical calculation items.	Display calc1~calc10

Instantaneous value



Cursor value



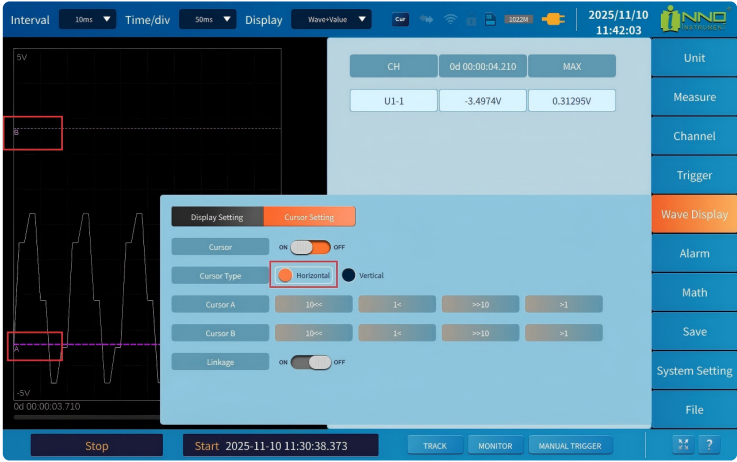


8.2 Cursor settings

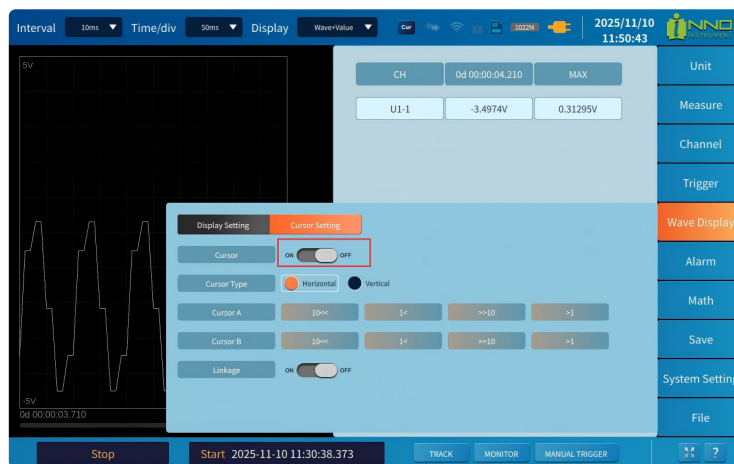
8.2.1 Cursor switch

Item		Specification
Open state		Show cursor line
Off state		Hide cursor line. The default is off.

Open state



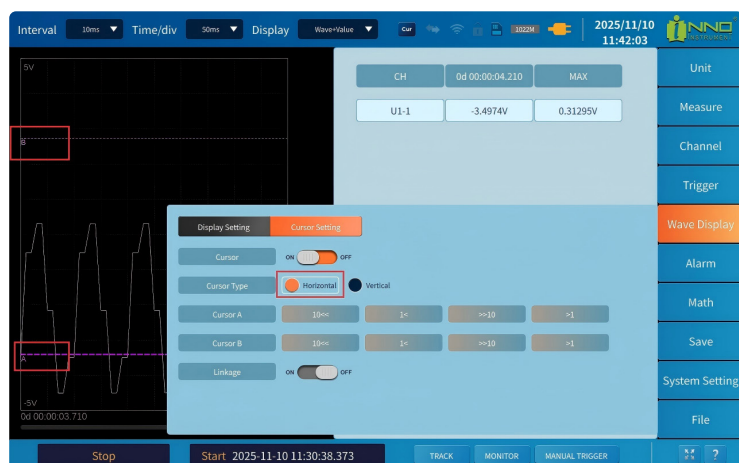
Off state



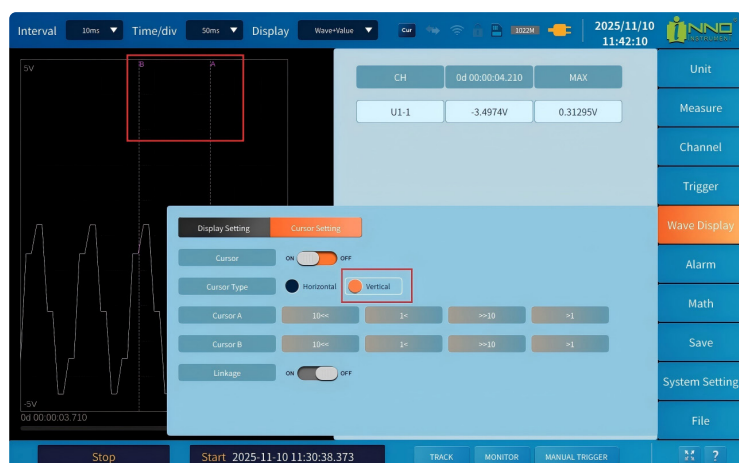
8.2.2 Cursor type

Item	Specification
Horizontal cursor	Cursor lines A and B are used to measure the vertical (Y-axis) values.
Vertical cursor	The vertical A and vertical B cursor lines are used to measure the horizontal (X-axis) values. By default, they are vertical cursors.

Horizontal cursor

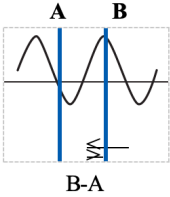
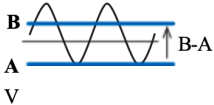


Vertical cursor



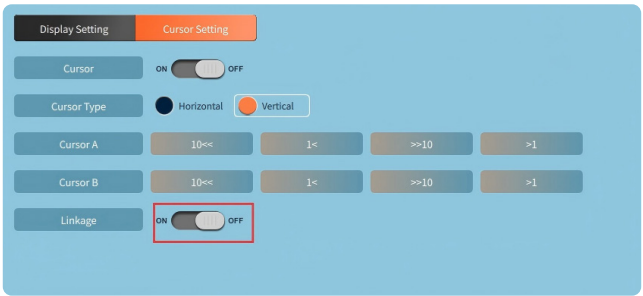
8.2.3 Set cursor A and cursor B

Values can be read from the measured waveform using the A/B cursors. Additionally, the range for data saving or numerical operations can be specified.

Item	Specification	
Vertical axis	Vertical cursor - Time value at the A/B cursor position * - Measurement value at the intersection of the A/B cursor and the waveform - Difference in measurement values between the B cursor and the A cursor (B - A)	
Horizontal axis	Horizontal axis cursor - Measurement value at the A/B cursor position - Difference between the measurement values of the B cursor and the A cursor (B - A)	
Cursor A/B	<<	Horizontal cursor: Move the waveform down significantly (by 1 grid) Vertical cursor: Move the waveform significantly to the left (by 10 points each time)
Cursor A/B	>>	Horizontal cursor: Move the waveform up significantly (by 1 grid) Vertical cursor: Move the waveform significantly to the right (by 10 points each time)
Cursor A/B	<	Horizontal cursor: Move the waveform slightly downward (by 1/10 of a grid) Vertical cursor: Move the waveform slightly to the left (by 1 point)
Cursor A/B	>	Horizontal cursor: Move the waveform slightly upward (by 1/10 of a division) Shift the waveform slightly to the right (by 1 point)

8.2.4 Cursor linkage

Cursor A and Cursor B move simultaneously towards the set direction while maintaining the current distance. By default, the cursor linkage is in the off state.



Chapter 9

Alarm Output

Alarm conditions can be set for each measurement channel. When the measured data meets the set conditions, the buzzer can sound or an alarm signal can be output to the outside. For example, an alarm can be output when the recorded temperature is too high. If the alarm condition is met at the start of the measurement, an alarm will be output immediately.

9.1 Basic Settings

9.1.1 Alarm switch

Alarm switch: ON/OFF, default is OFF.
Only alarm judgment is made during the data collection period; no judgment is made after the data collection stops.
If the alarm condition is met at the start of the measurement, an alarm will be output immediately.



9.1.2 Alarm retention

Select the alarm output hold in the alarm hold.

Item	Specification
OFF	f the alarm conditions are not met, the alarm output will be stopped. Settings should only be made when an alarm is to be output under the condition that the alarm criteria are met.
ON	After an alarm is output, manually deactivate it; or maintain the alarm output until mea- surement stops. This setting should be configured to maintain the alarm output even if the alarm conditions are not met (even if normal operation resumes).



9.1.3 Alarm sound

When the alarm sound switch is turned on, the buzzer will sound during alarm output. When the alarm sound switch is turned off, the buzzer will not sound during alarm output.



9.1.4 Alarm history

When reporting an alarm, select whether to attach an event tag when the alarm occurs in the event tag option:
The selectable parameters for the alarm history include: from the beginning to the 100th occurrence, the most recent 100 occurrences, with the default being the most recent 100 occurrences.
From the start to the 100th time: Keep alarm numbers 0 to 99 in the history (do not keep numbers 100 and above in the history).
Recent 100 times: Keep the most recent 100 alarms in the history (do not keep alarms older than the most recent 100 in the history). The maximum alarm number retained in the history is 999999.
Save the alarm history that occurs during the measurement period when the START key is pressed.



9.1.5 Alarm conditions

For each alarm output (ALM1 to ALM8), select the condition for the alarm to be triggered in the alarm conditions.

Item	Specification
OR	An alarm will be output as long as the alarm condition set for any channel is met.
AND	An alarm is output when all the alarm conditions set for each channel are met.

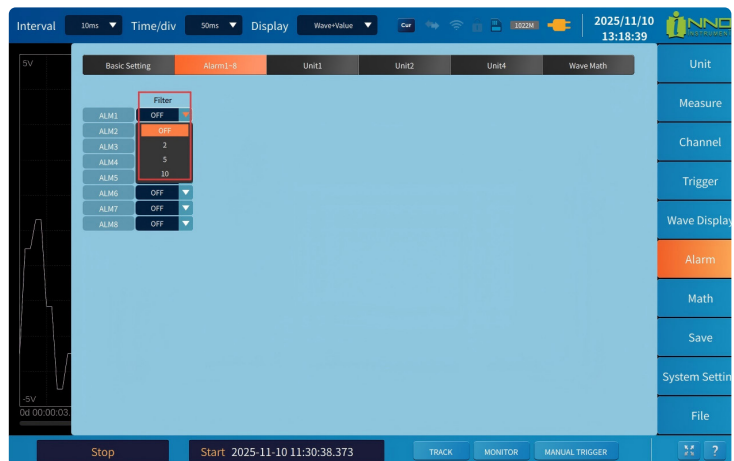


All alarms are determined after the measurement starts; no determination is made during the stop state.

9.2 Alarm1~Alarm8

Set the alarm channels ALM1 to ALM8 respectively.

When selecting the number of data points for filtering, an alarm is output when the alarm state persists between the set number of data points. The filtering parameters include: OFF, 2, 5, 10, 20, 50, 100, 200, 500, 1000, with the default being OFF.

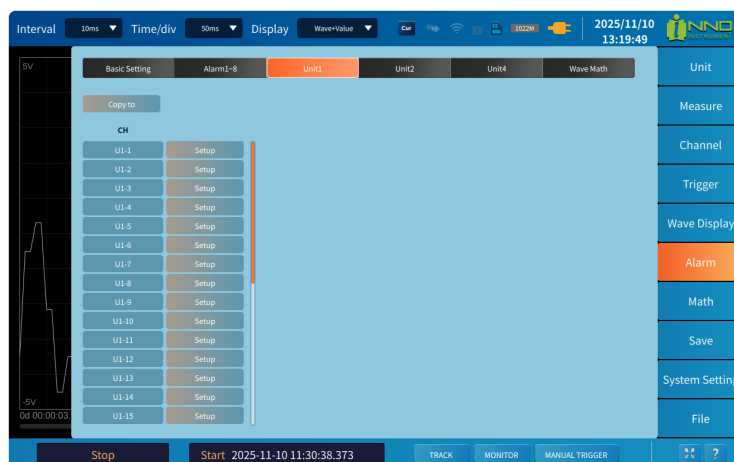


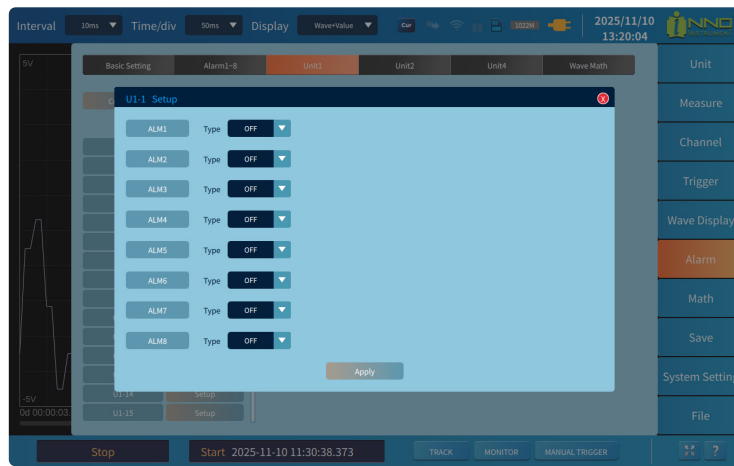
9.3 Individual channel alarm settings

The alarm settings for individual channels mainly refer to: analog channels and calculation channels.

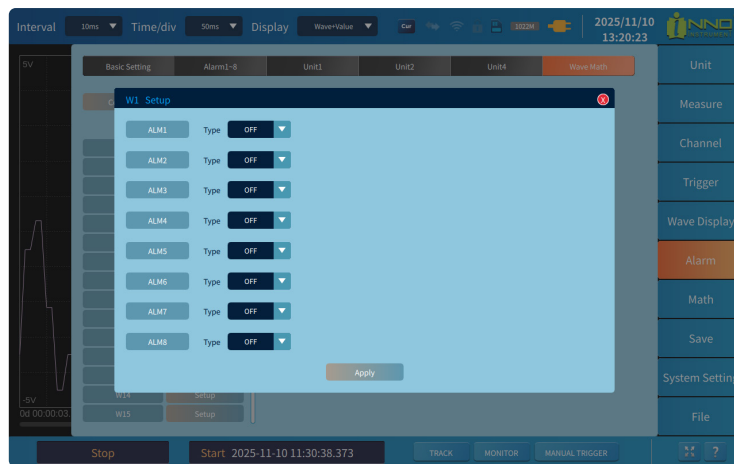
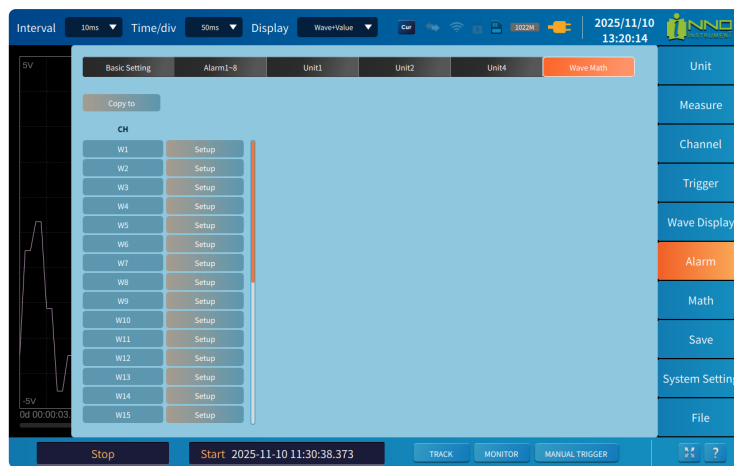
Select the channels to be monitored: analog channels or operation channels. Open the alarm settings window.

Analog channel:

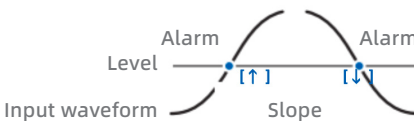
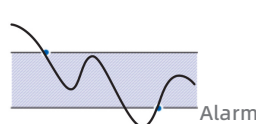
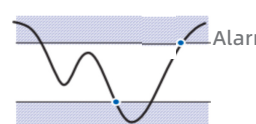
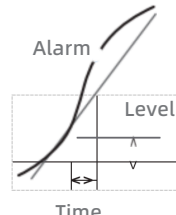




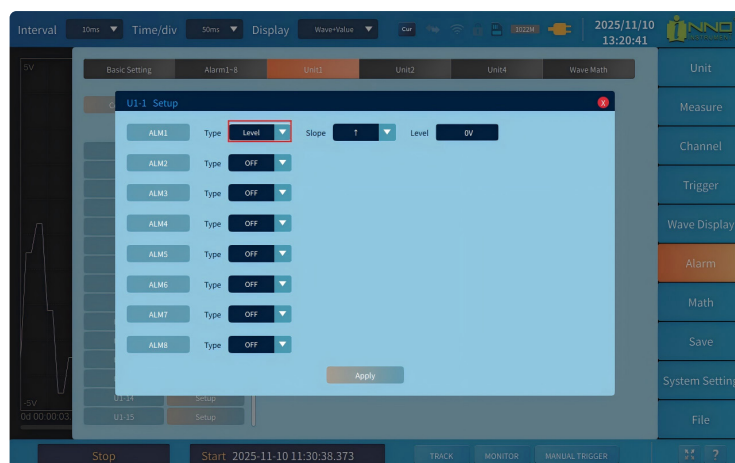
Operation channel:



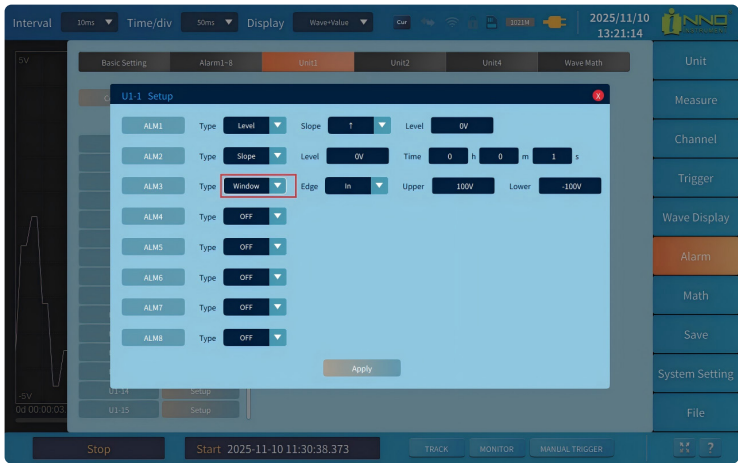
Set alarms for ALM1 to ALM8 respectively for each channel to be monitored.
Alarm type: OFF, level, window, slope. Default is OFF (alarm function not in use).

Alarm type	Alarm type		Operate	Illustrate
Open state	-		-	Do not use the alarm function.
Level	Slope	↑、↓		An alarm will be triggered when the measured data exceeds a specified level. This includes both level and value values.
	Level (-range value * 1.5 ~ range value * 1.5, default 0)	Enter value		An alarm will be triggered when the measured data is below a specified level. This does not include data at the same level.
Window	Direction	IN, OUT	[IN] 	An alarm will be triggered when the measured data is within the specified range. This includes upper and lower limits as well as the same value.
	Upper and lower limits Upper limit: -range value * 1.5 ~ range value * 1.5, default range value Lower limit: -range value * 1.5 ~ range value * 1.5, default -range value	Enter value	[OUT] 	An alarm will be triggered when the measured data falls outside the specified range. This excludes upper and lower limits, as well as values that are the same. The upper limit must be greater than the lower limit
Slope	Level (-range value * 1.5 ~ range value * 1.5, default 0)	Enter value		The settable time value is an integer multiple of the unit data update interval. If the rate of change of the measured data exceeds the rate of change (level/time) per unit time within the set time, an alarm will be output.
	Time	Set time		

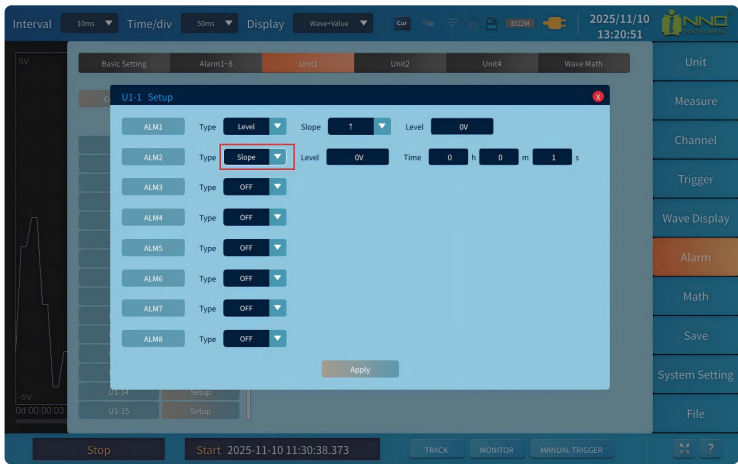
Alarm level:



Alarm window:



Alarm slope:



9.4 Confirm the alarm

The occurrence status of the alarm can be confirmed on the alarm screen.
When the drop-down box in the upper status bar is selected as "Alarm", the alarm screen will be displayed.



Item		Specification
1	ALM1~ALM8	Red: There is an alarm output; Green: There is no alarm output.
2	Number	Alarm storage number (allocated in sequence starting from 0 according to the order in which the alarms occur)
3	ALM	Alarm numbers (ALM1 to ALM8) COMM
4	UNIT-CH	Unit and channel numbers
5	Error	Error type
6	Occurrence time	The time when the alarm occurred
7	Release time	The time to clear the alarm

In the displayed alarms, select the alarm number for which you want to view the alarm history.
 Display the history of the selected alarm number (ALM1 to ALM8).
 ALL, ALM1, ALM2, ALM3, ALM4, ALM5, ALM6, ALM7, ALM8
 To display all alarms, please select [ALL]. Use the slider to scroll through the alarm history for selection.



Alarm Clear: This function is used to clear the alarm status. Pressing it will remove the current alarm status.



Math

This instrument can be used to perform numerical operations and waveform operations. Numerical operations are used to calculate the maximum and minimum values of the measured waveforms, etc. Waveform operations use waveforms to perform addition/multiplication and other operations between channels.

10.1 Numerical Operations

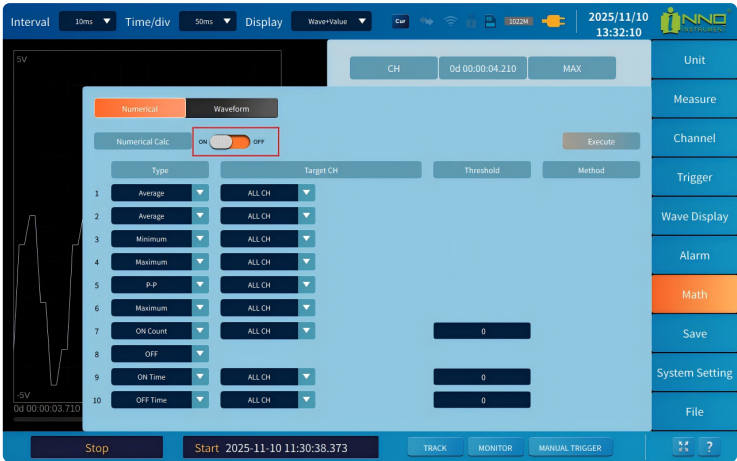
Numerical operations include the following two methods.
During the measurement period, perform calculations (real-time automatic calculation): After setting the numerical operation, start the measurement. The calculation is carried out in real time during the measurement. The latest result of the numerical operation can be confirmed in the waveform + value of the waveform display.
After measurement, perform calculation (manual calculation): After the measurement is completed, start the numerical calculation by pressing the keys.

Perform calculations during the measurement period (real-time automatic calculation)	Perform calculations (manual calculations) after measurement.
Before starting the measurement, set up the numerical calculations. The calculations are performed in real time during the measurement. · The latest calculated values can be viewed in the waveform display (waveform + numerical display). · Alculated values can also be saved as text at regular intervals.	After measurement, numerical calculation settings are configured and the calculation is executed.

10.1.1 Numerical Operation Switch

Numeric operation switch: Tap to select whether to enable or disable numeric operations.

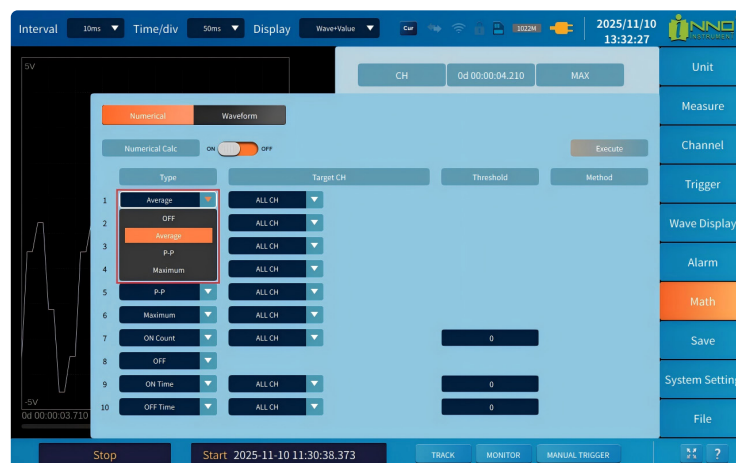
Item	Specification
Open state	Start numerical operation
Off stat	Disable numerical operations



10.1.2 Types of Operations

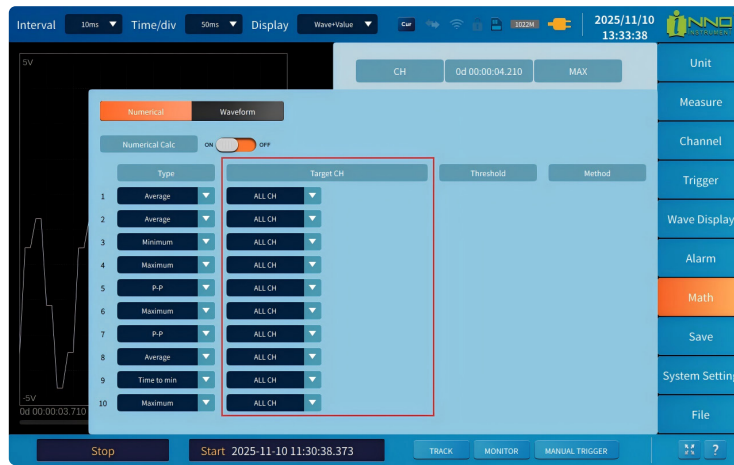
Up to 10 numerical operations can be performed simultaneously.

Item	Specification
Average	Used to calculate the average value.
P-P Value	Used to calculate the difference between the maximum and minimum values (Peak-to-Peak).
Maximum	Used to calculate the maximum value.
Minimum	Used to calculate the minimum value.
Time to Maximum	Used to calculate the time from the start of recording until the maximum value is reached.
Time to Minimum	Used to calculate the time from the start of recording until the minimum value is reached.
Total	Used to calculate the cumulative value.
Integration	Used to calculate the integrated value.
Duty Ratio	Used to calculate the proportion of measured values that exceed the threshold.
ON Time	Used to calculate the total time during which the measured value exceeds the threshold.
OFF Time	Used to calculate the total time during which the measured value is below the threshold.
ON Count	Used to calculate the number of times the measured value exceeds the threshold.
OFF Count	Used to calculate the number of times the measured value falls below the threshold.



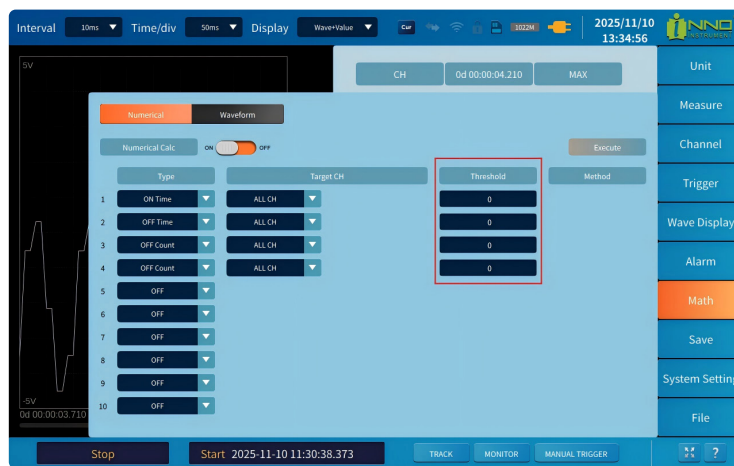
Select the object channel for numerical operations in the target channel.

Item	Specification
All CH	Perform numerical operations using the waveforms of all channels. Please set the threshold in the channel display.
Unit n	Perform numerical operations using only the waveforms of the specified channels (n = 1, 2,)
Pulse	Used for numerical operations on pulse waveforms. (P1 ~ P8)
Waveform operation	Used for numerical operations on pulses for which waveform operations have been performed. (W1 ~ W30)



10.1.3 Threshold

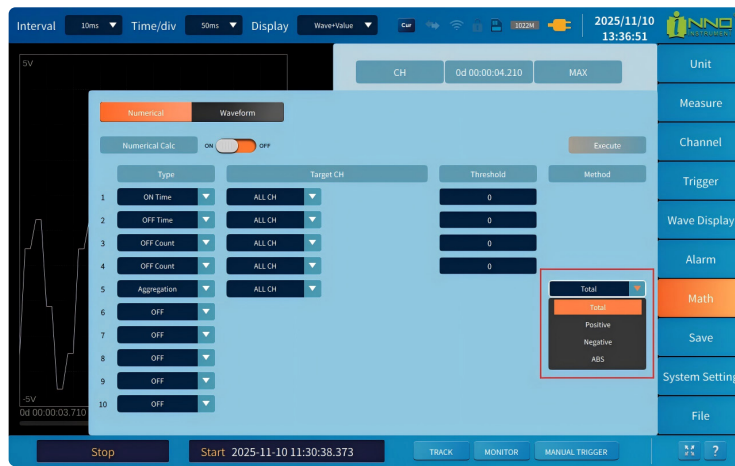
When selecting the operation type as running rate, ON time, OFF time, ON count or OFF count, set the reference value in the threshold. The setting range is $-9.9999\text{E}+29$ to $9.9999\text{E}+29$, with a default value of 0.



10.1.4 Types of Operation

When choosing the operation type as cumulative or integral, select the calculation method.

Item	Specification
Total	Calculate the difference between the cumulative value/area of the amplitude of the zero position and the signal waveform enclosed by the positive part and the cumulative value/area of the amplitude of the zero position and the signal waveform enclosed by the negative part.
Correct	Calculate the cumulative value/area enclosed by the positive part of the signal waveform and the zero position.
Negative	Calculate the cumulative value/area enclosed by the negative part of the amplitude of the signal waveform and the zero position.
Absolute value	Calculate the cumulative value/area enclosed by the zero position and the signal waveform.



Note: When the numerical operation type is operation rate, ON time, OFF time, ON count, or OFF count, the "Execute" button is available.

10.1.5 Real-time numerical operations (automatic calculation)

Perform numerical operations while measuring. The operation results at that time can be confirmed in the current measurement waveform + numerical value screen.

Set up numerical operation parameters

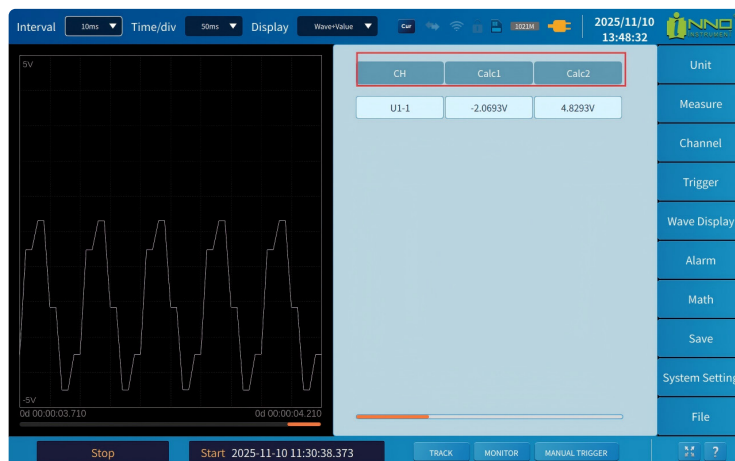
Press the START button to begin the measurement. During the measurement, real-time numerical operations will be performed.

Display the selected waveform + numerical value screen

In waveform observation, when the numerical display type is set to numerical operation, the result of the numerical operation will be displayed at that time, allowing you to confirm the operation result at that moment.



Display the result of numerical operations



10.1.6 Real-time numerical operation (manual operation)

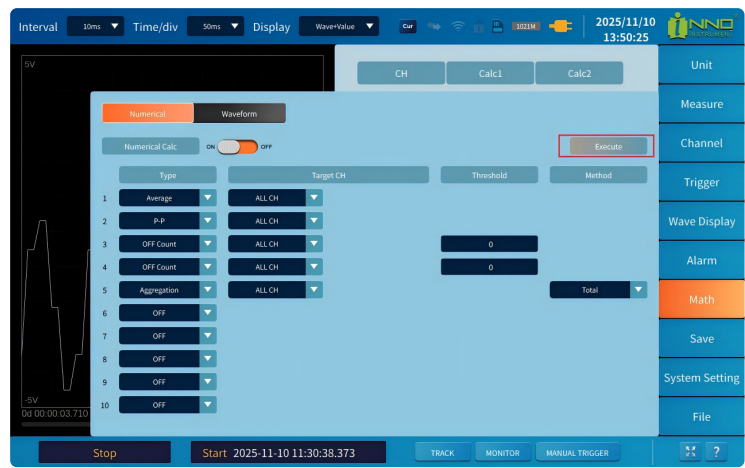
After measurement, perform numerical operations by pressing the keys. If the waveform + numerical display screen is shown and the numerical display on the right side of the screen is set to numerical operation, the operation result can be confirmed.

Press the START button to begin the measurement.

After the measurement is completed, click the "Execute" button on the numerical operation page.

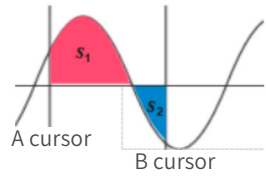
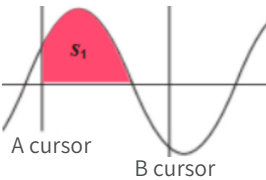
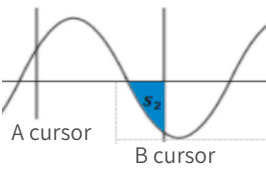
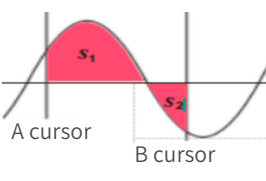
Utilize the display to show the selected waveform and numerical values.

Select numerical operation for the type of numerical display.



10.1.7 Numerical operation formulas

Item	Operation type	
Average value	Calculate the average value of the waveform data. $AVE = \frac{1}{n} \sum_{i=1}^n di$ AVE: Mean; n: Number of data points; i-th data point in channel di.	
P-P value	Find the value between the maximum and minimum values of the waveform data (peak-to-peak value).	Maximum value Minimum value
Maximum value	Find the maximum value of the waveform data.	Maximum value
Minimum value	Find the minimum value of the waveform data.	Minimum value
Maximum time	Calculate the time (in seconds) from the start of recording to reach the maximum value. If there are two or more maximum values, use the initial value of the waveform of the operand as the maximum value.	Maximum value
Minimum time	Calculate the time (in seconds) from the start of recording to reach the minimum value. If there are more than two minimum values, use the initial value of the waveform of the operand as the minimum value.	Minimum value

Cumulative (sum)	Calculate the cumulative value of the measured data. $SUM = \sum_{i=1}^n di$ S: Integral value n: Total number of data points di: The i-th data point in the channel	
Cumulative (positive)	Calculate the cumulative value of the positive measurement data. $SUM = \sum_{i=1, di > 0}^n di$ S: Integral value n: Total number of data points di: The i-th data point in the channel	
Cumulative (negative)	Find the cumulative value of the negative measurement data. $SUM = \sum_{i=1, di < 0}^n di$ S: Integral value n: Total number of data points di: The i-th data point in the channel	
Cumulative (absolute value)	Calculate the cumulative value of the absolute values of the measured data. $SUM = \sum_{i=1}^n di $ S: Integral value n: Total number of data points di: The i-th data point in the channel	
Total points (sum)	Calculate the difference between the area (V·s) enclosed by the positive portion of the signal waveform amplitude at the zero position (0V potential) and the area (V·s) enclosed by the negative portion of the signal waveform amplitude at the zero position (0V potential). When performing the operation within a specified range (using the A/B cursor to select the range), calculate the cumulative value between the cursors. $S = \sum_{i=1}^n di \times \Delta t$ S: Integral value n: Total number of data points di: The i-th data point in the channel Δt : Sampling period	 $S = S1 - S2$
Integral (positive)	Calculate the area (V·s) enclosed by the zero position (0 V potential) and the positive portion of the signal waveform amplitude. When performing calculations within a specified range (using the A/B cursor to select the range), calculate the cumulative value between the cursor positions. $S = \sum_{i=1, di > 0}^n di \times \Delta t$ S: Integral value n: Total number of data points di: The i-th data point in the channel Δt : Sampling period	Limited to the part with positive amplitude  $S = S1$
Integral (negative)	Calculate the area (V·s) enclosed by the zero position (0 V potential) and the negative portion of the signal waveform amplitude. When performing calculations within a specified range (using the A/B cursor to select the range), calculate the cumulative value between the cursor positions. $S = \sum_{i=1, di < 0}^n di \times \Delta t$ S: Integral value n: Total number of data points di: The i-th data point in the channel Δt : Sampling period	Limited to the part with negative amplitude  $S = -S2$
Integral (absolute value)	Calculate the area (V·s) enclosed by the zero position (0 V potential) and the signal waveform. When performing the operation within a specified range (using the A/B cursor to select the range), calculate the cumulative value between the cursor positions. $S = \sum_{i=1}^n di \times \Delta t$ S: Integral value n: Total number of data points di: The i-th data point in the channel Δt : Sampling period	 $S = S1 + S2$

10.2 Waveform Operations

10.2.1 Waveform Operations - Formulas

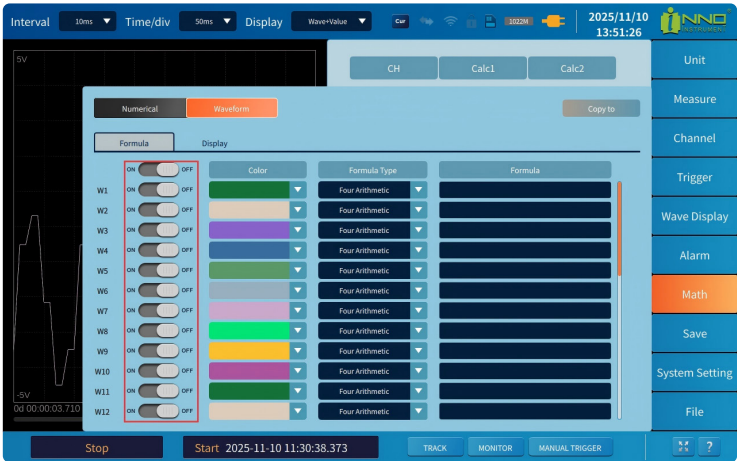
Arithmetic operations such as addition, subtraction, multiplication, and division, or moving average operations can be performed between channels (up to 30 types of operations). The operation types include arithmetic operations, accumulation, simple averaging, moving averaging, and integration. Operations are carried out simultaneously during measurement, and the resulting waveforms are displayed.

Waveform operations cannot be performed after measurement.

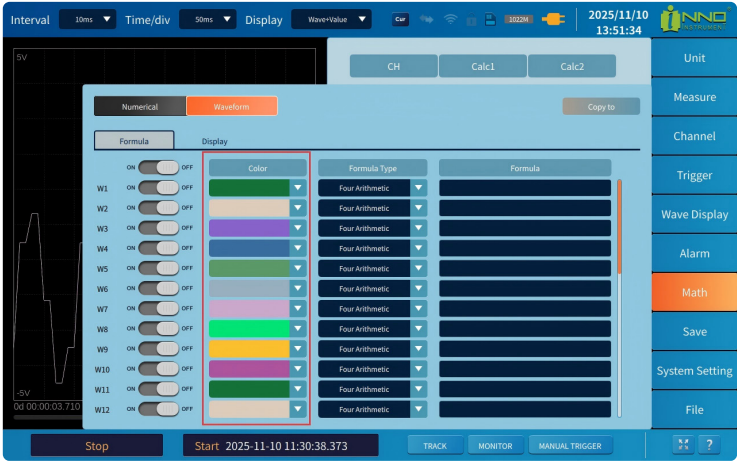
The results of waveform operations are displayed in the operation channels W1 to W30.

Make relevant settings for the formula

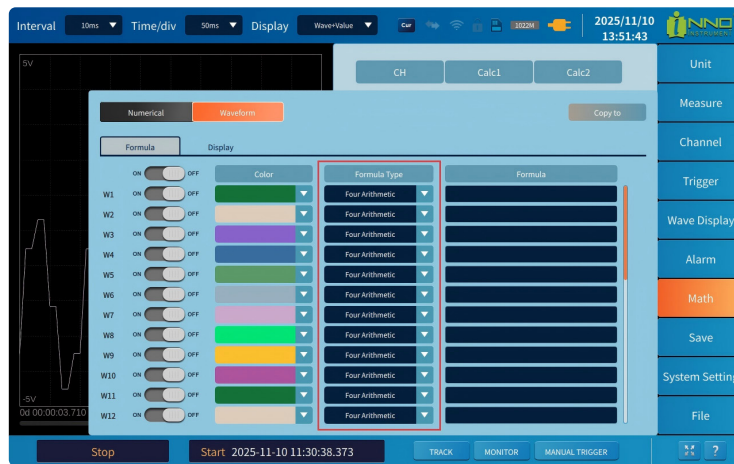
Switch: ON/OFF, default OFF, to enable or disable waveform operation.



Color: Select the corresponding waveform operation display color. The default value is assigned in sequence according to the current valid channel and color.



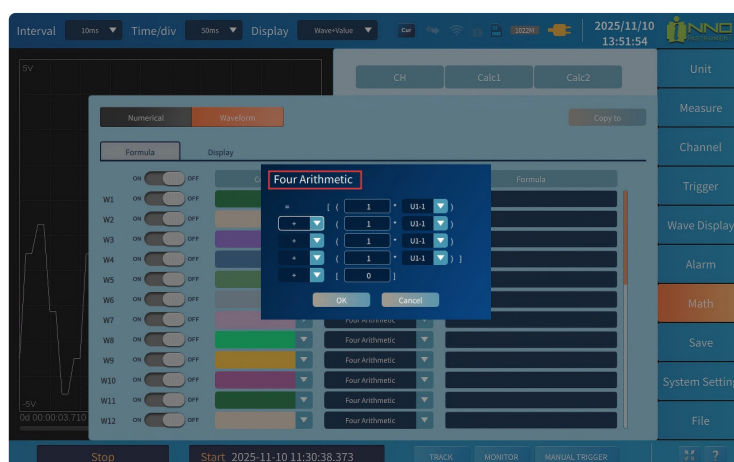
Formula types: arithmetic operations, cumulative calculations, simple averages, moving averages, integrals



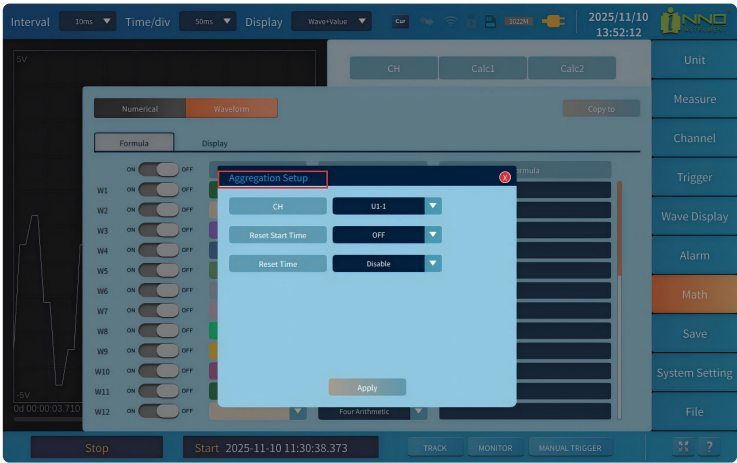
Set the type of waveform operation:

Item	Specification
Four arithmetic operations	Used for performing addition, subtraction, multiplication, and division operations between channels. Allows setting channels, coefficients, and constants.
Grand total	Perform addition on the measured data and plot the sum. Set the channel, [Start Reset], and [Reset Time]. Click the formula input to bring up the corresponding settings page, which contains the following: Channel Selection: All valid channels and pulse channels; Start Reset: OFF, Trigger Position, default OFF; Reset Time: No Segmentation, Segmentation, Timed Segmentation, default No Segmentation; With Segmentation: Reset Interval: Day, Hour, Minute, setting range 0 minutes to 30 days 23 hours 59 minutes, default 1 minute; With Timed Segmentation: Base Time: 0 minutes to 23 hours 59 minutes, default 0 minutes; Reset Interval: Day, Hour, Minute, setting range 0 minutes to 30 days 23 hours 59 minutes, default 1 minute.
Simple average	The system performs an additive average of all measurement data collected since the start of the measurement and plots the result. It also sets the channel, [Start Reset], and [Reset Time].
Moving average	Averaging is performed using a specified number of points during the movement. Averaging is performed using a specified number of points from each sampled data point, and the results are plotted. Set the channels and number of points; number of points: 1~600, default is 1.
Integral	The program adds the measured data multiplied by the sampling period and plots the sum. It also sets the channel, [Start Reset], and [Reset Time].

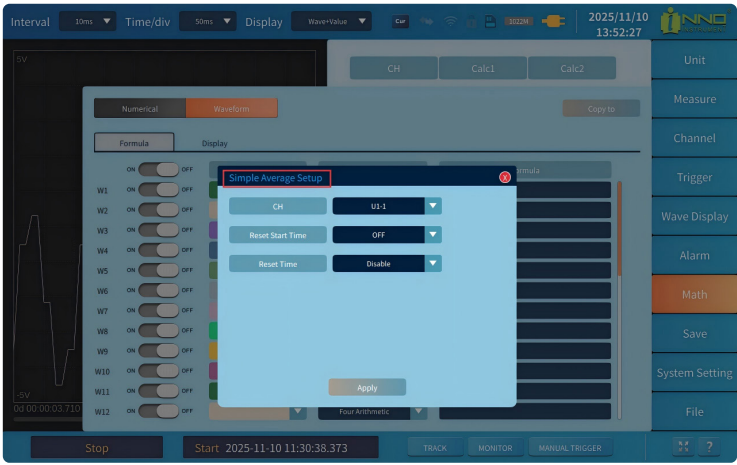
Four arithmetic operations



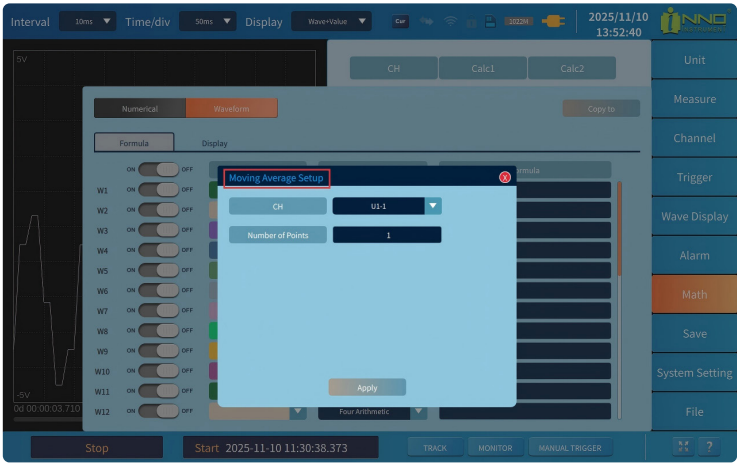
Grand total



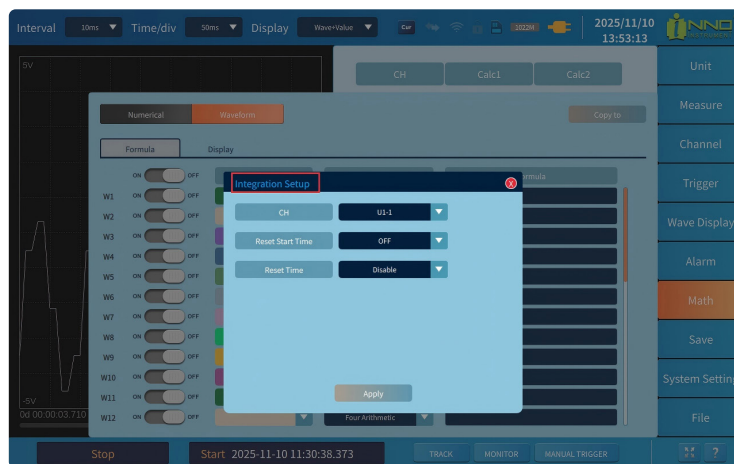
Simple average



Moving average

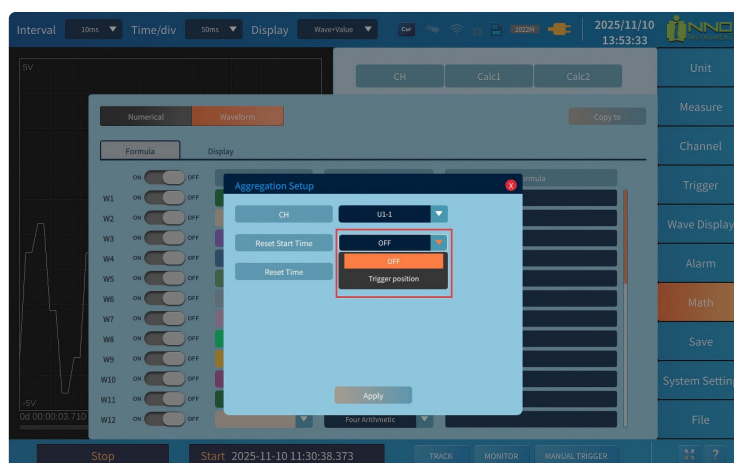


Integral



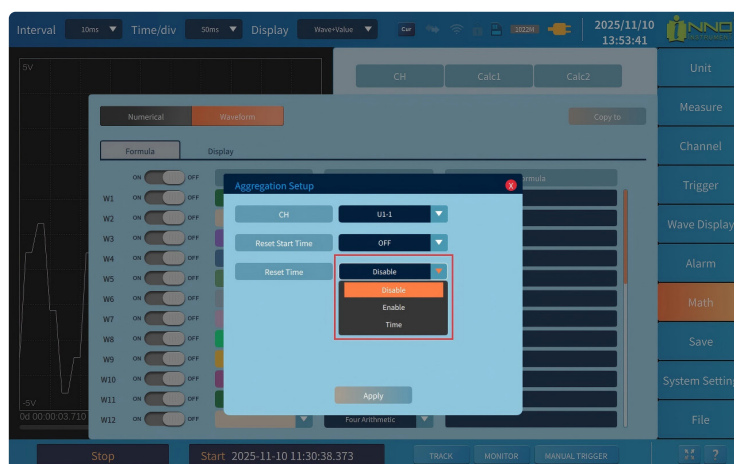
When selecting [Cumulative], [Simple Average], or [Integration] as the operation type, select the reset action at the start of the measurement in the Start Reset section.

Item	Specification
OFF	The calculation result is not reset.
Trigger position	After the trigger is executed, the calculation result is reset.



When selecting [Cumulative], [Simple Average], or [Integral] as the formula type, select the time to perform the reset action in the reset time settings.

Item	Specification
No division	Do not reset the operation result.
There is a division	Reset the operation results at the set time intervals.
Timed Segmentation	Reset the operation result at the set intervals starting from the specified time.



When there is a split: Reset interval: days, hours, minutes. Set range: 0 minutes to 30 days 23 hours 59 minutes. Default: 1 minute.
When setting up timed intervals: Reference time: 00:00 to 23:59, default is 00:00.
Reset interval: days, hours, minutes. Set range: 0 minutes to 30 days 23 hours 59 minutes. Default: 1 minute.

10.2.2 Waveform Operations - Display

Make display-related settings:



Item	Specification
Upper limit	The upper limit for displaying waveform calculation results on the screen, -9.9999E+29 to 9.9999E+29, with a default value of 100.00.
Lower limit	The lower limit value for displaying waveform calculation results on the screen, 9.9999E+29~-9.9999E+29, with a default value of -100.00.
Unit	The unit of the waveform calculation result is empty by default, and the setting range is 0 to 4 characters.

⚠ Copying of operation formulas :
Select "Copy to" in the settings to open the settings window.
Select the checkbox to copy. The source for copying can be selected from the drop-down menu.
After selecting the application, the waveform operation settings of the source to be copied will be copied to the waveform operations of other settings at that time.

Save

This chapter introduces the saving of waveform files.

11.1 Auto-save

Data is saved in real time during the measurement period according to the recording interval.

11.1.1 Save Path

You can choose any path on the SD card or USB drive to save. Tap to select the path. The default path for saving is the SD card.



11.1.2 Automatic - Automatic Naming Method

File folder and file creation rules when files are automatically saved

File classification and storage: When saving begins, based on the configuration of the waveform save and numerical calculation save switches, the auto/wave and auto/numeric calculation paths and folders are respectively created under the save path.

The named folder is created only once under each path. For subsequent automatic saves, this folder is used. If the folder is deleted, it will be recreated automatically at the start of the next save. Waveform files are automatically saved in the auto/wave folder, and numerical calculation files are automatically saved in the auto/numeric calculation folder.

The automatic naming format for saving files is: date, number, OFF. The default is date.

Item	Specification
Date	Name the file based on the system time when it is generated, following the naming rule: YYYYMMDD_HHmms.
Number	According to the naming convention of the files in the current path, which are named by serial numbers, they are accumulated in sequence. The naming rule is 000001, 000002, ...
OFF	Name by manually setting the file name

This option is invalid when the automatic naming method is set to date and number.

When the automatic naming mode is OFF, this item can be set. The input character range is 1 to 15 characters, and the default is "file".

When file names are duplicated, a sequential code (001, 002, etc.) will be automatically added after the file name. For example, if the file name is set as "file", the first file will be named "file", the second "file001", the third "file002", and so on.

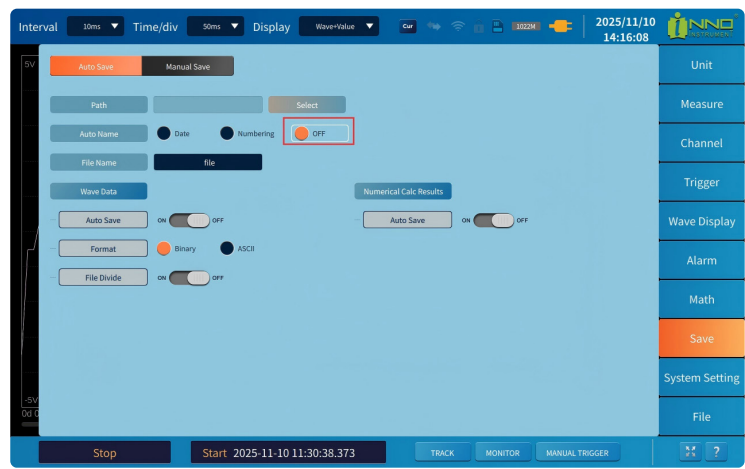
When manually setting the file name, only numbers and letters (both uppercase and lowercase) are supported.

Punctuation marks, special characters, and formula operations cannot be entered.

Date preservation:



OFF:

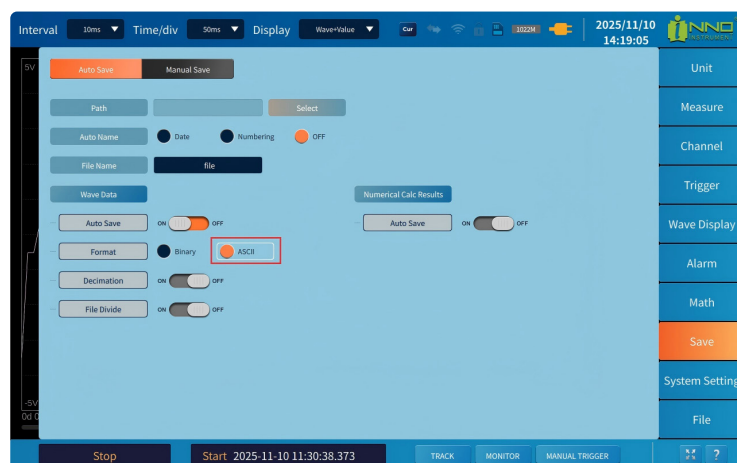


11.1.3 Waveform Data Storage

Save switch: Tap to select whether to enable or disable the automatic save function.

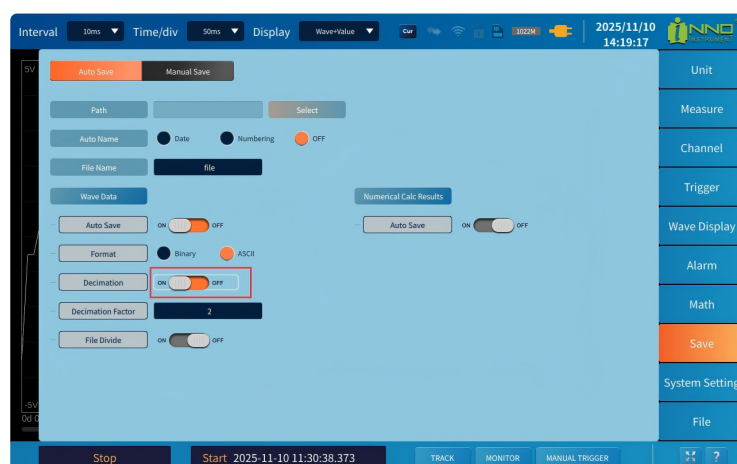
Item	Specification
Open state	After the collection is completed, the waveform is automatically saved according to the set parameters.
Off state	Do not save the waveform after collection.

Save format:
Binary: File format is .ssf.
ASCII: The file format is .csv.



Sampling points

Item	Specification
Open state	The sampling factor setting box is displayed below.
Off state	The sampling factor setting box is not displayed below.

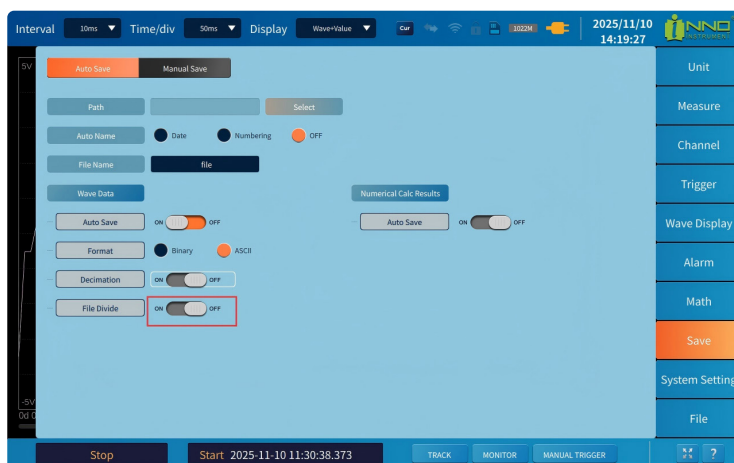


Sampling point setting: OFF, 2 to 1/100,000. For example, when set to 5, one data point is retained out of every five data points. This parameter is only applicable when the save format is ASCII.

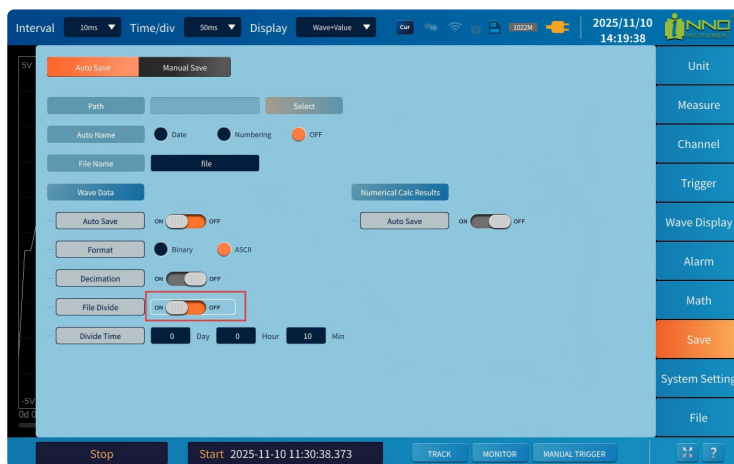
· Split files:

OFF - One measurement creates one waveform file. When the file type is Binary and the file size exceeds 1 GB, it will be automatically split. When the file type is ASCII, the system calculates the size of the waveform file data to be saved based on the number of open channels. When the size of the generated waveform data file reaches the calculated value, it will be automatically split.

ON - Start splitting the file and saving the waveform data at the [Split Time] from the beginning of the measurement. Set the file split time in [Split Time]. If the file type is Binary, the file will be split even before the split time when the file size exceeds 1GB. If the file split type is ASCII, the file will be split even before the split time when the file size exceeds the system calculated value. The recording cannot exceed the specified time range when it is set to a specified time.



Split time: The parameter format is days, hours, and minutes.



When splitting files, the naming rule for the files is to add sequential numbers such as +001, 002, etc. to the original name. For example, if the file is named by date and is split into three files this time, the file names will be YYYYMMDD_HHmms, YYYYMMDD_HHmms_001, and YYYYMMDD_HHmms_002 respectively. If the file is named by number, the names will be 000001, 000001_001, and 000001_002 respectively. For custom naming, the names will be file, file_001, and file_002 respectively.

11.1.4 Saving Results of Numerical Operations

Tap to select and turn on or off the switch for saving the results of numerical operations:

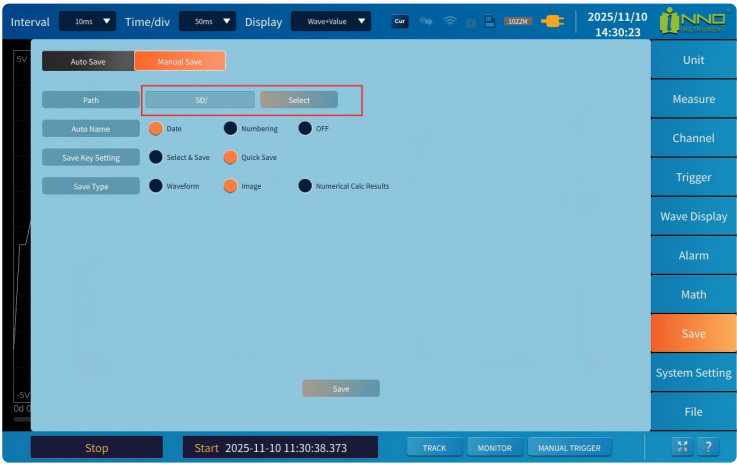
Item	Specification
Open state	After the measurement stops, save the result of the numerical operation.
Off state	Do not save the results of numerical operations.

11.2 Manual Save

Data can be saved when the measurement stops. Data cannot be saved during the measurement.

11.2.1 Save Path

You can choose any path on the SD card or USB drive to save. Tap to select the path. The default save path is the SD card.



11.2.2 Manual-Automatic Naming Method

The default automatic file naming format is date, followed by a number and "OFF". The default setting is date only.

Item	Specification
Date	Name the file based on the system time when it is generated, following the naming rule: YYYYM-MDD_HHmmss.
Number	According to the naming convention of the files in the current path, which are named by serial numbers, they are accumulated in sequence. The naming rule is 000001, 000002, ...
OFF	Name by manually setting the file name

This option is invalid when the automatic naming method is set to date and number.
When the automatic naming mode is OFF, this item can be set. The input character range is 1 to 15 characters, and the default is "file".
When file names are duplicated, a sequential code of 001, 002, etc. will be automatically added after the file name. For example, if the file name is set as "file", the first file will be named "file", the second "file001", the third "file002", and so on.

11.2.3 Save Key Settings

Select Save:
Press the "Save" button on the device to open the Save menu and enter the manual save page. Select the parameters to be saved and click "Save" to complete the saving process.
Save immediately:
After pressing the button, the save action will be executed immediately without the need to select save parameters.



11.2.4 Save Type

Save type: Waveform, image, numerical operation result. The default is waveform.

Item	Specification
Waveform	Save the current waveform on the interface to a file.
Picture	Save the current interface as an image to a file.
Numerical value	Include all numerical operation items and fix the CSV format.

Save the waveform data.

Save type:
Binary: binary format
ASCII: CSV format

Save range:
All data, A-B, Front A, Front B, A-Last, B-Last, default to All data;
Full data: Regardless of whether there are A/B cursors or not, the waveforms of the entire record length will be saved.
Pre-A: Save the waveform from the beginning to the position of cursor A. This function is invalid when the cursor is not activated.
Pre-List B: Save the waveform from the beginning to the position of cursor B. This function is invalid when the cursor is not activated.
A - Final: Save the waveform between the A cursor and the end of the waveform. This is invalid when the cursor is not activated.
B - Final: Save the waveform between the B cursor and the end of the waveform. This function is invalid when the cursor is not activated.

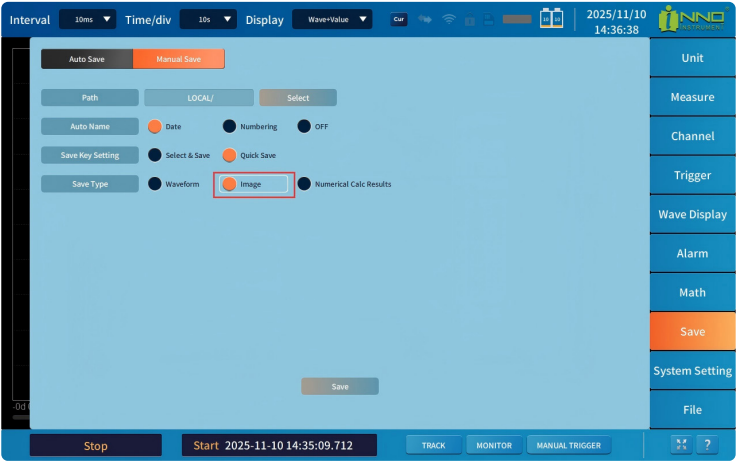


When saving as ASCII, decimation: decimation factor: 2 to 100,000, default is 2.

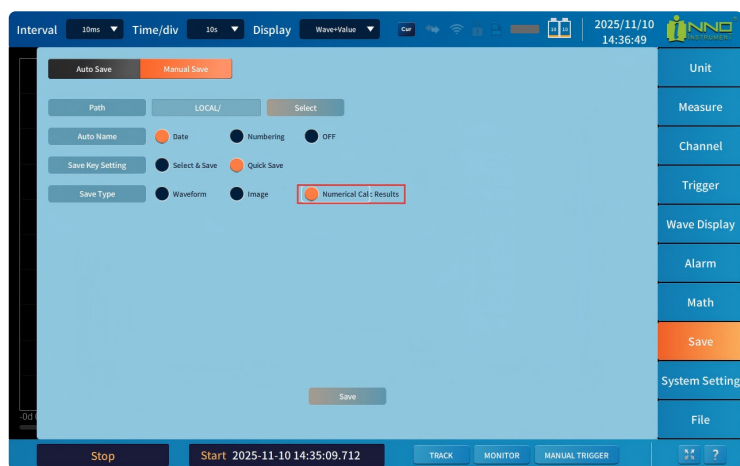
Item	Specification
Open state	The sampling factor setting box is displayed below.
Off state	The sampling factor setting box is not displayed below.



Save image



Save numerical calculation data



Chapter 12

System Settings

This chapter introduces the settings of the system, including initialization, general, network, system information, and other settings.

12.1 General Settings

12.1.1 Initialization

- Initialization: Restore the settings of this instrument to the factory default.
- Initialization content configurable items: setting conditions, wireless unit registration information, waveform data, communication settings. By default, setting conditions and waveform data are checked.
- Set the conditions: Restore the settings outside the LAN to the factory default state.
- Wireless unit registration information: Delete the information of the wireless units registered to this instrument;
- Waveform data: Delete waveform data;
- Communication settings: Restore the LAN settings to factory defaults;
- After clicking the "setting" button, a prompt box will pop up asking "Are you sure you want to perform initialization?" with options "Confirm" and "Cancel". Select "Confirm" to proceed with the initialization, or choose "Cancel" to exit the initialization operation.



12.1.2 Date

- The date display format is yyyy/mm/dd hh:mm:ss.
- Tap the screen to set the date. You can also input the date via the keyboard and press Enter to confirm. Click the "Set" button according to the set conditions to change the system time. Date and time setting range and default parameters

Parameter item	Parameter setting range	Parameters are displayed by default.
Time and date parameter settings	Parameter range:2000-1-1 00:00:00~2099-12-31 23:59:59	2000-1-1 00:00:00



12.1.3 Self-inspection

Self-check items include: buttons, LCD screen, default buttons.

- Buttons: Confirm the recognition of the buttons. When the confirmation of all buttons is completed, the inspection is finished. In case of an abnormality or if you exit halfway, you can directly close the detection interface.
- LCD screen: Confirm the display. Each time a key is pressed, the color of the screen changes in sequence and returns to the original color. The color sequence is: white → black → red → green → blue.



12.1.4 Language Switching

Tap to switch languages, and all the font displays of the system will switch between Chinese and English.

- Chinese mode:
All text displayed in the interface is in Chinese.



- English mode:
All text displayed in the interface is in English.



12.1.5 Automatic Start of Measurement

Start automatically at startup. Default is off.

- On: Waveform measurement starts automatically when the machine is turned on;
- Off: Do not start automatically when launching.



12.1.6 LCD Off

Tap to turn on or off the LCD backlight.

Tap to turn on or off the LCD auto-off function.

When opened, the screen turns black (without shutting down), similar to a screen-off state. Pressing a button will light up the screen again.

The LCD will automatically turn off within a set period of time.

The LCD does not turn off automatically. It only turns off when manually closed; otherwise, it remains on constantly.



12.1.7 Screen Brightness

The auto-off time and screen brightness can be adjusted by keyboard input. Press Enter to confirm.
Screen brightness parameter: 1 to 10, default 3



12.1.8 Background color intensity of the workspace

The background colors of the workspace include: dark, light, and default to dark.
Dark work area background display:



Light-colored workspace background display:



12.1.9 Preventing Misoperation of the START · STOP Keys

If the START or STOP key is pressed, an operation confirmation window will be displayed. If [Yes] is selected and the ENTER key is pressed, the measurement will start or stop.

Press the START STOP button to start the measurement immediately. Press the stop button to stop the measurement immediately.



12.1.10 Power frequency filter

Power supply frequency filter: 50Hz, 60Hz, default 50Hz.

Filter out the waveforms with frequencies greater than 50 Hz or 60 Hz from the received input waveforms.



12.2 Communication Settings

Communication settings are divided into TCP/IP settings, wireless local area network - unit connection, FTP server, FTP network drive, and NTP settings.

12.2.1 TCP/IP Settings

Tap to enable or disable DHCP.
Enable DHCP to automatically identify the IP address. All settings except DNS will be grayed out. Click the Connect button to establish the connection.
Disable DHCP and manually set the IP address, subnet mask, gateway, and DNS server. Then click the Connect button to establish the connection.
After clicking the "setting" button, a prompt box will pop up asking "Are you sure you want to perform initialization?" with options "Confirm" and "Cancel". Select "Confirm" to proceed with the initialization, or choose "Cancel" to exit the initialization operation.



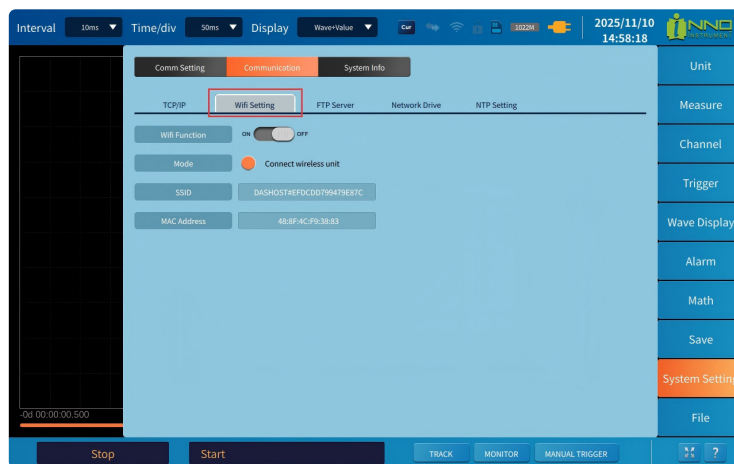
TCP/IP Parameter Settings Range and Default Values

Parameter item	Parameter setting range	Parameters are displayed by default
IP address	0.0.0.0~255.255.255.255	0.0.0.0
Subnet mask	0.0.0.0~255.255.255.255	0.0.0.0
Gateway	0.0.0.0~255.255.255.255	0.0.0.0
DNS Server 1	0.0.0.0~255.255.255.255	0.0.0.0
DNS Server 2	0.0.0.0~255.255.255.255	0.0.0.0

Note:Please ensure that the network cable is connected before setting the IP.

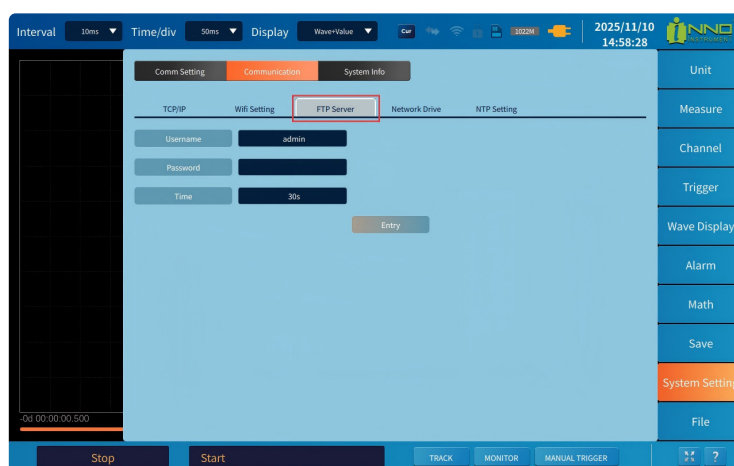
12.2.2 Wireless Local Area Network - Unit Connection

- Wireless function: On/Off, default is Off.
- Connection mode: Fixed display as wireless unit;
 - SSID: Host Service Identification Code, which is fixedly displayed as a 15-character string automatically identified, defined as DASHOST#XXXXXXXXXX (host serial number);
 - MAC Address: Displays the MAC address of the current host;



12.2.3 FTP Server

Tap to enter the username and password, set the timeout period, and click the confirm button to connect. If the connection time exceeds the set period, it will stop.



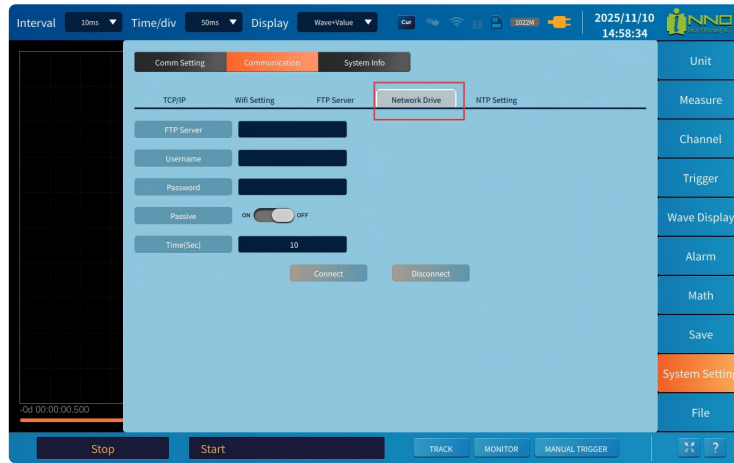
Settings range and default values for FTP server

Parameter item	Parameter setting range	Parameters are displayed by default
Username	Up to 15 characters	admin
Password	Up to 15 characters	Empty
Timeout period	30 to 3,600 seconds	30 seconds

12.2.4 FTP Network Drive

Tap to enter the FTP server host name, user name, password and timeout period. Click the Connect button. If the connection does not complete within the set timeout period, it will be stopped.

Tap the Disconnect button to disconnect.



Connect to network drive settings range and default values

Parameter item	Parameter setting range	Parameters are displayed by default
FTP server hostname	0.0.0.0~255.255.255.255	Empty
Username	Up to 15 characters	Empty
Password	Up to 15 characters	Empty
Passive mode	ON/OFF	OFF
Timeout period	1~30 seconds	10 seconds

12.2.5 NTP Settings

Before starting the measurement, connect to the NTP server and compensate for the time. After selecting "Synchronize Now", press the ENTER key. Once the settings are reflected, it will connect to the specified NTP server and perform time compensation.

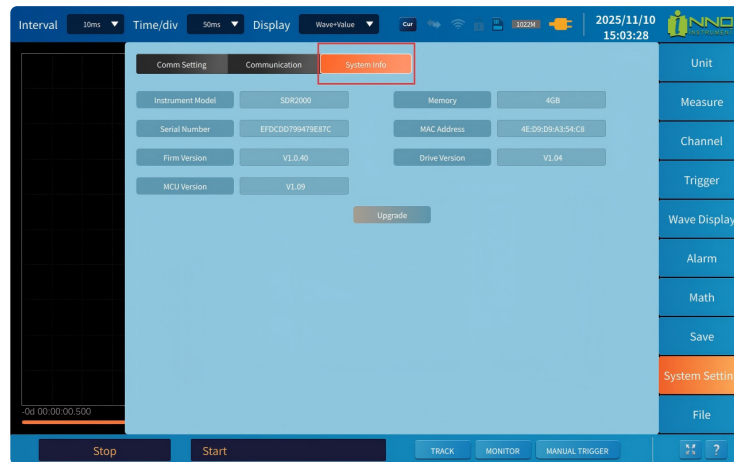
Parameter item	Parameter setting range	Parameters are displayed by default
NTP switch	On/Off	Close
Synchronization timing	OFF, Per hour, Per day	OFF
Server address	0~64 characters	Empty

Item	Specification
OFF	Asynchronous time
Per hour	Synchronize the time once every hour.
Per day	Synchronize the time once a day.

12.3 System Information

Display the specific information of each item of the system.

Including: instrument model, memory, serial number, MAC address, firmware version, driver version, MCU version information.



The device supports upgrading via USB flash drive or SD card, allowing for software, driver, sub-board, and MCU upgrades.

Copy the upgrade package to a USB flash drive/SD card;

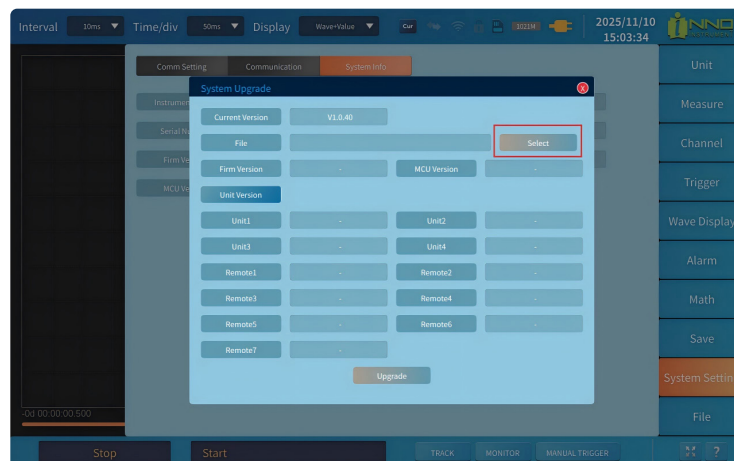
Enter the system information page and click the upgrade button.

Select the path of the upgrade package and click Upgrade.

Start the upgrade. A prompt box for upgrade will pop up. The scroll bar on the right can be slid to view the upgrade information.

After the upgrade is completed, a prompt box will appear above with the message "Upgrade completed! Please restart the instrument!"

Restart the device. The upgrade is complete.

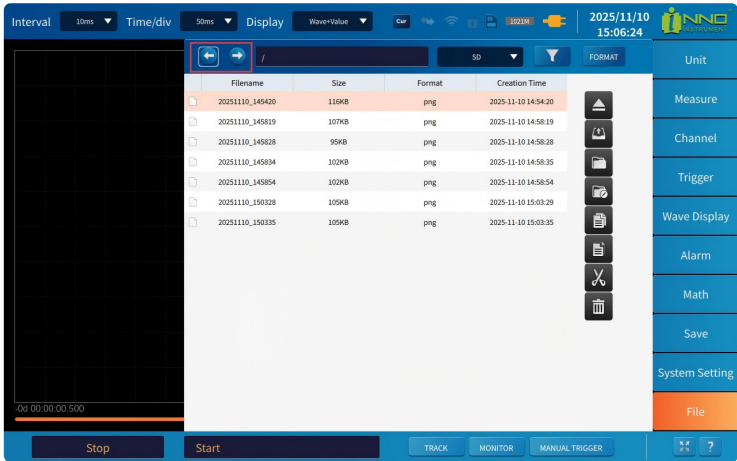


File Management

This chapter introduces the management of files on various storage devices in the instrument.

13.1 Back and Forward Buttons

Back: Return to the previous operation path. When there is no previous path to return to, the operation cannot be performed. Forward: Enter the next-level directory. When the current path is already at the last level, the operation cannot be performed.



13.2 File Storage Path

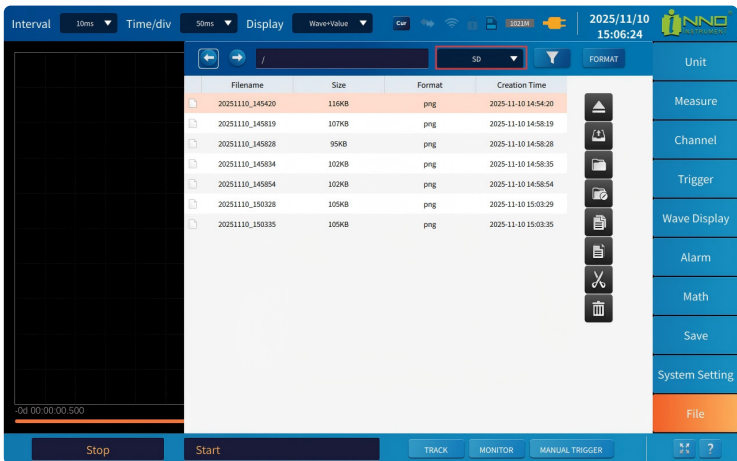
Click the drop-down menu to display the file storage location and path, and show the current path.

Disk Switching: SD, USB, default SD

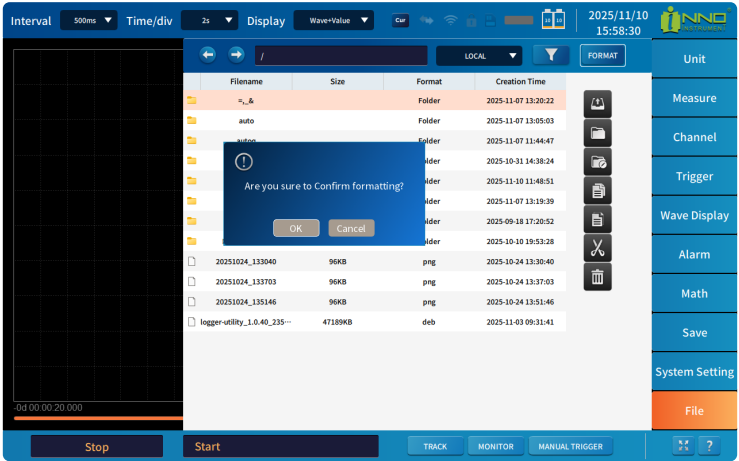
If the SD card is not installed, the file manager shows a blank screen.

USB refers to the USB flash drive. It displays the corresponding USB flash drive name based on the number of connected USB flash drives.

No display when none is connected.

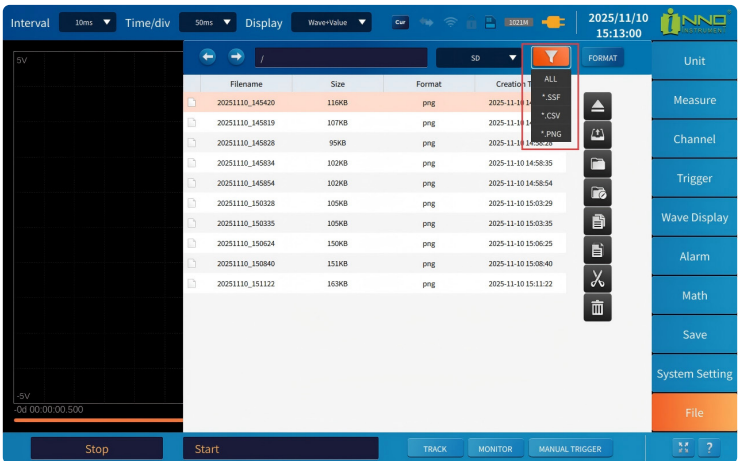


Formatting: To format an SD card or USB drive, click to pop up a confirmation prompt box asking "Are you sure you want to format the SD/ USB device?" Select "Confirm" to proceed with initialization.



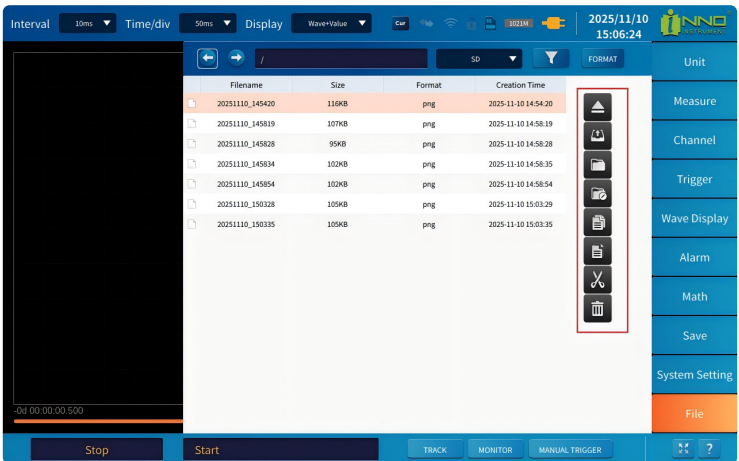
13.3 Document Screening

Tap to select the file type you need to filter. Filter files by the suffix format of files/folders. The filterable suffix formats include *.*, *.SSF, *.CSV, *.PNG.

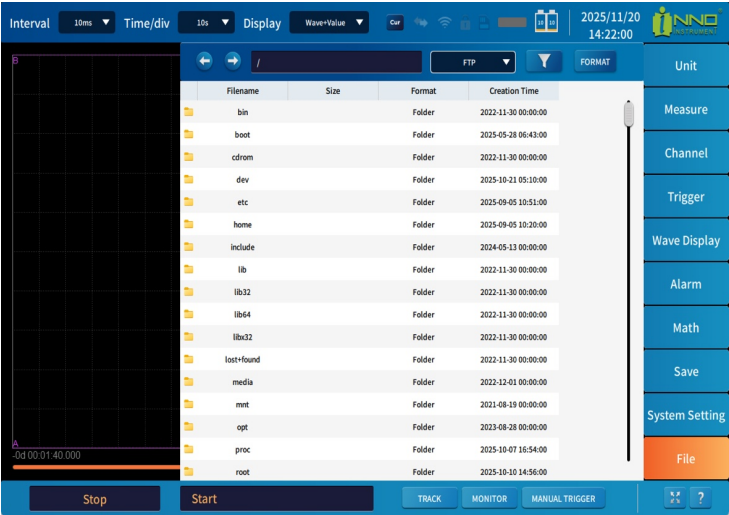


13.4 Function Introduction

The right navigation bar on the right side shows the operations on files, from top to bottom: eject device, upload, create new file, rename file, copy file, paste file, cut file, and delete file.

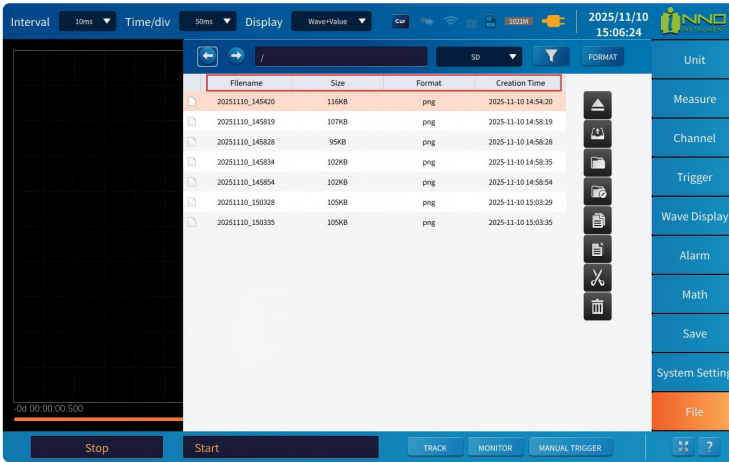


Files under the FTP path can only be uploading.



13.5 File Display

Display the file name, file size, file format, and file creation time.



END

* Products models and specifications are subject to change without prior notice.