# RA3100

## Omniace

# Simplified Instruction Manual

A&D Company, Ltd.

1WMPD4004445C

# CAUTION

(1) Turn off the power when the operation is abnormal.
If it is impossible to trace the causes of an abnormal operation, please contact our sales representative.

(2) The contents of this manual are subject to change without notice.

(3) This manual is copyrighted with all rights reserved. This manual may not be reproduced, modified, or translated without the written permission of A&D Company, Limited. No parts of this manual may be transcribed without permission.

(4) Please let us know if there are any points that are unclear or missing in this manual.

(5) A&D Company, Limited. will not be held responsible for any damages or loss of income caused by the operation of this device or any direct, indirect, special, or inevitable damages caused by defects in the product, even if there is notice that the corresponding damages may occur. We will also not be held responsible for any third party claims of rights. At the same time, we will not be held responsible for any loss of data. We will not be held responsible for any of such points as those indicated in item (4).

# Introduction

We thank you for your purchase of our data acquisition product OMNIACE RA3100 (hereinafter "the RA3100" or "this product").
This instruction manual explains cautions and basic methods for handling the RA3100.
Please read this manual before operating this instrument. For information on other handling, please read the following instruction manual contained on the included CD.
If you encounter any problems in the manual, please contact our company.

## <Instruction manual on CD>

| Manual | Contents |
|---|---|
| RA3100 Instruction Manual | Explains how to handle and configure the RA3100. |

# Examining Contents in Package

## When Opening Package

When opening the package in a warm room during the cold season, open the package after it has reached room temperature to avoid any operational failure due to condensation on the surface of the product.

## Examining Contents in Package

This instrument is delivered after a thorough examination at the factory prior to shipment. However, please examine the product's condition and verify that no obvious shipping damage has occurred after opening the package. Also, examine the specifications of the input units and accessories. If there are any missing or damaged items, please contact our sales representative.

## <Contents of RA3100 Package>

| Name | Model/document number | Quantity | Remarks |
|---|---|---|---|
| Omniace main unit | RA3100 | 1 | AC 100 V to 240 V |
| Simplified Instruction Manual | 1WMPD4004445 | 1 | This manual.<br>Describes cautions on use and operation methods |
| Instruction Manual CD-ROM | 1WMEK4010464 | 1 | Includes the RA3100 Instruction Manual |
| AC power cable | – | | The cable selected at ordering the product. |
| Thermal recording paper | YPS-106 | 1 roll | 30 m roll recording paper (5 rolls per box) |
| Recording paper holder | 5633–1794 | 2 | Recording paper both edges x 1 each |

# To Safely Use Products

## Safety Measures - Warnings and Cautions

- This product is designed and tested to conform to the EN61010 standard.
- The product is manufactured with safety in mind. However, accidents may occur due to misuse by the user. To avoid such accidents, read this manual carefully before use. Observe the following warning and cautions when using the product. The following statements are used in this manual to call the readers' attention.
- Be sure to observe the following instructions when using this product. The warranty does not cover damages resulting from the actions against instructions, cautions, or warnings mentioned in this manual. Besides, there are a lot of actions that are "cannot" and "do not". It is impossible to write all such descriptions in this manual. Accordingly, assume any actions to be "impossible" except the actions explicitly described as "possible".

## Meaning of Warning Signs

| | |
|---|---|
| **⚠WARNING** | This indicates a condition or practice that could result in personal injury or loss of life, or may result in light injury or physical damage if this equipment is misused due to neglect of a Warning. |
| **⚠CAUTION** | This indicates a condition or practice that could result in light injury or damage to the equipment or other property if this equipment is misused due to neglect of a Caution. |

## Meaning of Symbols

| | |
|---|---|
|  | △ symbols indicate cautions (including warnings).<br>Specific precautions are indicated inside figures (in the example on the left, a warning about electrocution). |
|  | ⃠ symbols indicate prohibited actions. Specific prohibited actions are indicated inside ⃠ or with nearby text or pictures. The example on the left indicates that disassembly is prohibited. |
|  | ● symbols indicate actions that must be taken. Specific actions that must be taken are indicated inside ● or with nearby text or pictures. The example on the left indicates an action that must be taken. |

### ⚠WARNING

#### Power

- Make sure that the power supply is within the rating indicated on the rating plate attached to this product.
  If any voltage exceeding the rated voltage was supplied, there would be risk of damage to this product, or even a fire. Also, in order to prevent electric shock and hazards such as a fire, be sure to use only the AC power cable supplied with this product.

## ⚠WARNING

### Protective Grounding

- ❑ Be sure to ground this product before supplying power. Grounding is necessary to use this product safely, as well as to protect the user and peripheral equipment from injury or damage. Be sure to observe the following instructions.
- ❑ The AC power cable included with this product contains a ground lead. Connect the power cable into only a 3-pin AC outlet with a ground pole.
- ❑ When grounding, do not connect the grounding lead to a water pipe, as water pipes are not necessarily conductive to the earth. Never connect the ground lead to a gas pipe either, as it is extremely dangerous.
- ❑ While the power is supplied to the product, do not cut or remove the protective grounding line. Otherwise, safety of the product is not guaranteed.

### Overvoltage Category (Installation Category)

- ❑ This product's Overvoltage Category is Category II. Do not use the product with higher categories, as connecting it to the line of a distribution board, etc. (CAT III) or the lead-in wire of a main power line (CAT IV) may lead to device failure.

### Measurement Category

- ❑ The measurement input terminal Measurement Category of this product differs according to the installed modules.
  Use the product for measurement within the Measurement Category that meets the module specifications. Do not use it with a Measurement Category that exceeds the module specifications.

### Connection of Input Signals

- ❑ Be sure to ground the grounding terminal of this product before connecting to the measurement target.
  Also, when connecting this product to another measurement instrument, be careful not to exceed the maximum allowable common mode input voltage range.
  A voltage exceeding the range can cause damage to this product.

### Use in Gaseous Atmosphere

- ❑ Never use this product in a flammable or explosive atmosphere, or an atmosphere containing steam. Use in such atmosphere will result in danger to users and the product.

### Disassembling the Frame

- ❑ It is dangerous to remove the frame of this product due to the high-voltage parts inside.
  The frame must not be removed from the product other than by our service engineers.

### Fuse at AC Power Supply Block

- ❑ The fuse for this product cannot be replaced by the customer because it is located inside the main unit.
  Please contact our sales representative if the fuse may be blown.

### Handling of Back-up Battery (Cautions when Disposing)

- ❑ This product includes a coin-type lithium battery (primary cell).
- ❑ When disposing of this product, please contact an A&D sales representative or distributor (see the end of this document for details).

## ⚠CAUTION

### Caution in Handling

When using this product, always follow the precautions below. Improper handling may lead to erroneous operations and damages.

- ❑ Users who are not familiar with the operation of this product should avoid using it.
- ❑ Use this product at locations that satisfy the overvoltage requirement, the Category II (CAT II) of the safety standard for electrical measurement instruments in EN61010-1.
- ❑ This product has a Pollution Degree of 2.
- ❑ This product is a Class A product for industrial environments.
  Use in household environments may cause electromagnetic interference. In such cases, the user must implement appropriate countermeasures.
- ❑ Store this product in the following storage environments. Avoid storing in places where the temperature could rise over the storage temperature and where there is direct sunlight exposure such as inside an automobile.
  Storage temperature range: -20 to 60°C  Storage humidity range: 20 to 85% RH (without condensation)
- ❑ Use this product in the following operating environments.
  Operating temperature range: 0 to 40°C  Operating humidity range: 35 to 85% RH (without condensation)
- ❑ Do not use this product at the following locations. In addition, carefully check the environment when using this product.
  - ■ Locations where the temperature and humidity rise due to direct sunlight or heaters
  - ■ Wet locations
  - ■ Locations where salt, oil, or corrosive gases exist
  - ■ Dusty locations
  - ■ Locations subject to strong vibrations
  - ■ Locations with a strong electromagnetic field
  - ■ This product is provided with ventilation openings in order to prevent overheating.
    Ensure that the ventilation openings remain unobstructed by covers or materials. Otherwise, the internal temperature of the product rises, causing malfunctions.
  - ■ Do not place highly combustible objects such as paper near the product.
- ❑ Be careful of power voltage fluctuations. Do not use the product when these are likely to exceed the rated voltage.
- ❑ If the power supply includes a lot of noise or high-voltage inductive noise, use noise filters to avoid operation errors.
- ❑ A solid-state drive is installed in this product.
  Please don’t power off during normal operation of the SSD (while data is being saved/read), due to the risk of data destruction.

## ⚠CAUTION

- ❑ This product uses an electrostatic capacitive touch panel.
  Press the touch panel gently with your bare fingertip. The touch screen may not react if you are wearing gloves. Also do not use a sharp object or push with higher pressure than necessary. Pressing three or more locations at once may cause misoperations. Be sure to press only one location when making a selection or two locations with pinching in/pinching out.
- ❑ LCD display
  This product has a TFT color LCD for display. There may be cases where the light of pixels does not come on or off in the LCD. In addition, the LCD includes unevenness slightly due to temperature changes. Please be aware that these cases are not disorders.
- ❑ Use the chart recording paper specified by A&D. Use of a chart that is not recommended may cause failure in printing or shorten the life of the thermal head.
- ❑ Recording straight line waveforms or waveforms in solid black in the same position for an extended period of time may shorten the life of the elements in that part of the thermal head. It is recommended that the waveform recording position is occasionally changed.
- ❑ Printing a waveform in solid black for an extended period of time causes printing waste of the recording paper to remain in the thermal head, and may prevent printing. Periodically clean the thermal head.
- ❑ When storing the product for an extended period of time, the recording paper feeding platen may become deformed if the printer cover is locked and cause printing irregularities, but this does not indicate product failure.
- ❑ When storing recording paper for an extended period of time before recording, remove the recording paper from the main unit and insert it in a plastic bag, or as-is if it is still in its original packaging, and then store it in a dark location with a temperature of 25°C or less and humidity of 70% RH or less.
- ❑ When storing recording paper for an extended period of time after recording, file it in a dark location with a temperature of 25°C or less and humidity of 70% RH or less. When using a file folder, make sure that it is made of a material that does not include plasticizer (such as polyethylene or polypropylene).
- ❑ If the recording paper touches the following materials or products, the printing surface may change color, lose color, or exhibit otherwise poor color performance.
  Vinyl chloride products, organic compounds, adhesive tape, pencil erase, rubber mats, magic markers, felt-tip pens, correction fluid, carbon, diazo photosensitive paper, hand cream, hairdressing products, cosmetic products, or leather products such as a wallet
- ❑ Do not insert a pointed or sharp object into the ventilation openings of this product.
- ❑ To clean this product, first turn off the power, place it in a well-ventilated location, and wipe the product using soft cloth moistened with ethanol. Do not use benzene, petroleum solvents, or chemically treated cloths, as they can cause deformation or discoloration.
- ❑ When transporting the product, use the package and packaging material supplied at factory shipment, or use a package and packaging material more shock-resistant than those supplied.
- ❑ We recommend a periodical calibration to maintain the accuracy of the input units. More reliable measurements are possible by calibrating the input units once a year (extra cost option).

## ⚠CAUTION

### Windows 10 IoT

This product adopts Windows 10 IoT as its operating system. Please read and understand the following instructions carefully before use.

- ❑ License

  The Windows 10 IoT operating system used in this product is provided with a license for embedded use only.

  This product cannot function as a general purpose PC, and it is limited exclusively for RA3100 use.

  The embedded system of this product is not allowed to be duplicated and used.

- ❑ Power on/off

  This product enters the standby state when the AC power cable is connected, where it consumes a tiny amount of standby power. When the Power key on the panel is pressed, the main power starts and the product enters the monitoring state.

  When turning off the power, confirm that the internal SSD of the product is not being accessed.

  When the Power key is pressed, the [Shut down] screen is displayed. Tap【Yes】to shut down the product. Directly removing the power cable to turn off the power may damage the data on the SSD and make the SSD unable to be used.

  When the product will not be used for an extended period of time, remove the power cable after the shut down process is complete.

- ❑ Use on a Network

  Please consult your network administrator to make sure that other tasks are not affected by connecting this product to the network.

- ❑ Computer Viruses

  This product does not include any virus search or removal software other than the standard Windows functions, in order to ensure it maintains adequate performance. Take care when connecting the product to a network or external media.

- ❑ Other

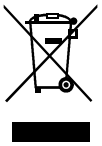
  We do not assume any responsibility or provide support for malfunctions if programs that are not provided by us are installed into the system, the operating system settings are changed, or programs are forcibly terminated via an input device such as a keyboard or mouse.

# Disposing of the Used Product

## In the European Union

EU-wide legislation as implemented in each Member State requires that used electrical and electronic products carrying the mark (right) must be disposed of separately from normal household waste. This includes electrical accessories, such as chargers or AC adapters.

The mark on the electrical and electronic products only applies to the current European Union Member States.



## Outside the European Union

If you wish to dispose of used electrical and electronic products outside the European Union, please contact your local authority and ask for the correct method of disposal.

# FCC Compliance Information

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

# Symbols in This Manual

Terms and symbols used in this manual deNote as follows.

| | |
|---|---|
| ⚠**WARNING** | This indicates a condition or practice that could result in personal injury or loss of life, or may result in light injury or physical damage if this equipment is misused due to neglect of a Warning. |
| ⚠**CAUTION** | This indicates a condition or practice that could result in light injury or damage to the equipment or other property if this equipment is misused due to neglect of a Caution. |
| Note | This indicates a condition or practice that could result in incorrect operation or damage to data if this equipment is misused due to neglect of a Note, as well as measurement limitations and additional explanations. |
| Tips | This indicates measurement limitations and additional explanations. |
| ☞ | Reference page |
|  | A tap is the act of lightly touching an item such as a key displayed on the screen with a finger.<br>Example Used for selecting or setting screen keys. |
|  | A swipe is the act of pressing the screen with a finger and moving it in a specific direction.<br>Example Used on screens such as the [Thumbnail] screen and [Channel Setup] screen. |
|  | A pinch in is the act of touching the screen with two fingers and moving those fingers closer to each other, and reduces the screen.<br>Example Used to reduce the content displayed on the screen, waveform amplitude, or time axis, etc. |
|  | A pinch out is the act of touching the screen with two fingers and moving those fingers apart from each other, and enlarges the screen.<br>Example Used to enlarge the content displayed on the screen, waveform amplitude, or time axis, etc. |
| ☐ key | Enclosed characters represent a key name on the operation panel.<br>Example START key |
| 【 】key | Text enclosed in【 】indicates touch panel keys displayed on the screen.<br>Example 【CH】key |
| [ ] screen | Text enclosed in [ ] indicates the text of items on the screen.<br>Example [Module 1] |
| k (lower case)<br>K (upper case) | Example 1 kg = 1000 g<br>1 KB = 1024 bytes |

# Warranty

## Warranty - General

We ship our products after conducting quality control, which covers from design to manufacturing. It is, however, possible that failures may occur in the products. If the product does not operate correctly, please make a check of the power supply, cable connections, or other conditions before returning this product to us.

For repair or calibration, contact our sales agency. Before returning, be sure to inform us of the model (RA3100), serial number, and problematic points.

The following is our warranty.

## Limited Warranty

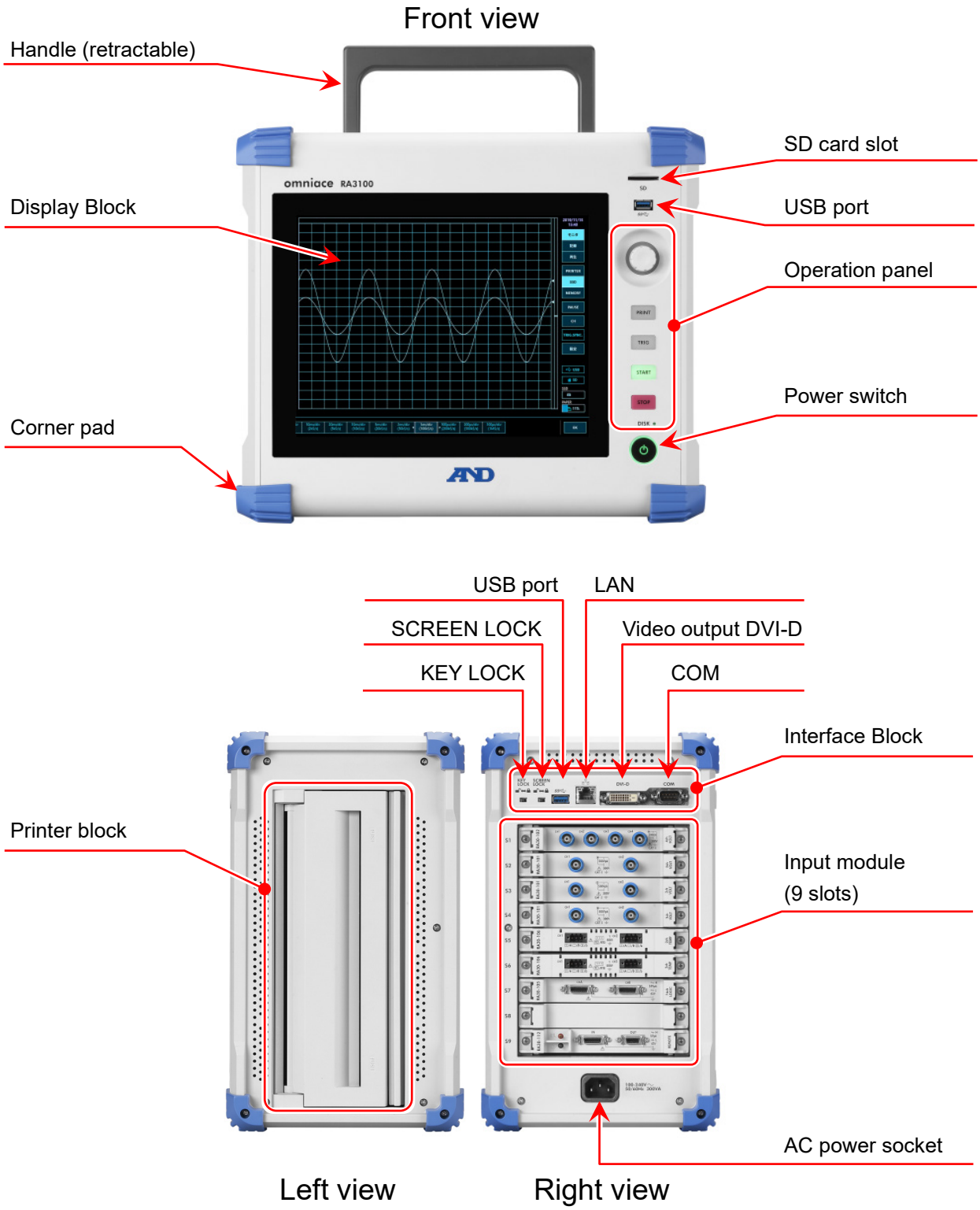
1. Warranty period: One year from our shipment.
2. Warranty scope: The warranty only covers the main unit of the product.
   We will repair the defects of our product free of charge within the warranty period; however, this warranty does not apply in the following cases.
   - ❑ Damage or faults caused by incorrect use
   - ❑ Damage or faults caused by fire, earthquake, traffic accident, or other natural disasters
   - ❑ Damage or faults caused by a repair or modification that is carried out by someone other than a service representative of A&D
   - ❑ Damage or faults caused by use or storage in environmental conditions that should be avoided
   - ❑ Periodical calibration
   - ❑ Damage or faults caused during transportation.
   - ❑ The thermal printing head may not be covered by the warranty even within the warranty period, depending on the usage conditions.
     Usage conditions: 30 million printing pulses or more or recording length 30 km or longer
   - ❑ The internal SSD, fan, and backup coin-type battery are treated as consumables and not covered by the warranty.
   - ❑ Data recorded on the SSD and external media is not covered by the warranty, regardless of the cause and type of product failure. Make sure to back up your recorded data.
3. Liability: We do not assume any liability for equipment other than A&D equipment.

# CONTENTS

# 1. Name and Function of Each Block

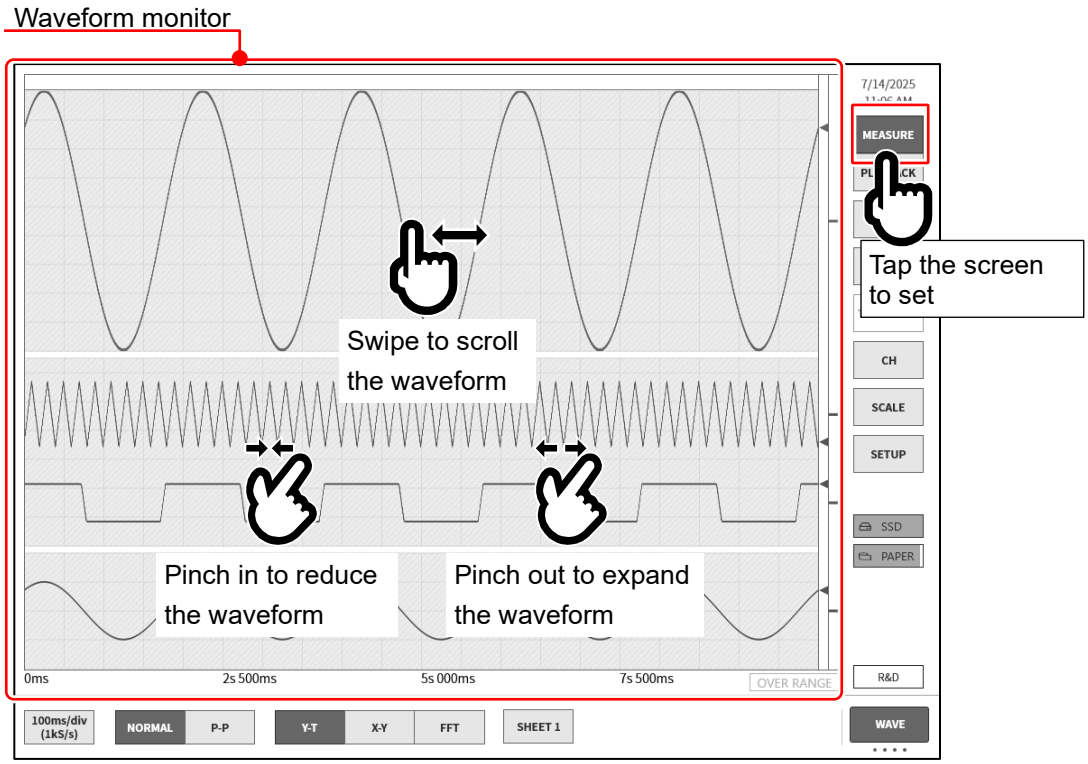
This product consists of the following blocks.

## 1.1. Name of Each Block



# 1.2. Display Block

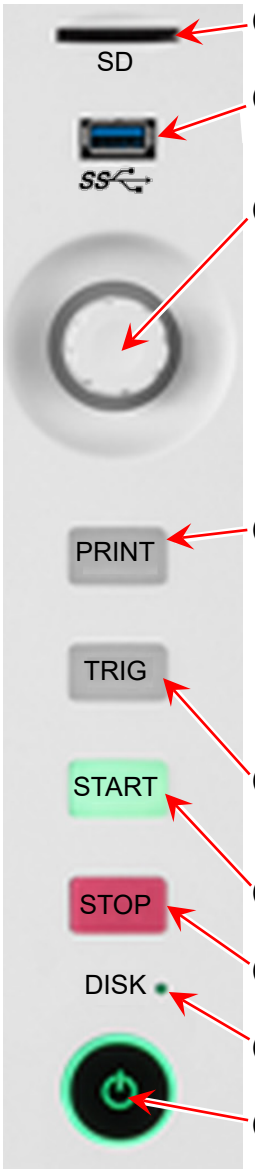
This product has a TFT color LCD display with touch panel.
The LCD displays the waveform monitor and setup keys, and users can configure setup by directly touching the panel.




## Note

❑ This product uses an electrostatic capacitive touch panel. The touch screen may not react if you are wearing gloves.

# 1.3. Operation Panel




(1) SD card slot
Used to save recorded data to an SD memory card, etc.

(2) USB port
Used to save recorded data to USB memory, etc. in the same manner as to an SD memory card.

(3) Rotary knob
Used to select the module ranges and setting values by turning it clockwise and counterclockwise.
When the rotary knob is enabled, the area around the knob lights in the blue color of the normal mode.
Push the rotary knob to switch the area around the knob to the orange of the fine adjustment mode.
Push it again to return the area around the knob to the blue color of the normal mode.

(4) [PRINT] key
Press this in the measurement state to start pen recording and again to end recording.
Press it during playback to print the waveform between cursors A and B on the monitor.
Press and hold it to print a copy of the screen (screenshot), which can be saved to the main unit or external media in the .png file format.

(5) [TRIG] key
Press the key to output a forced trigger.
The TRIG LED lights when a trigger is detected.

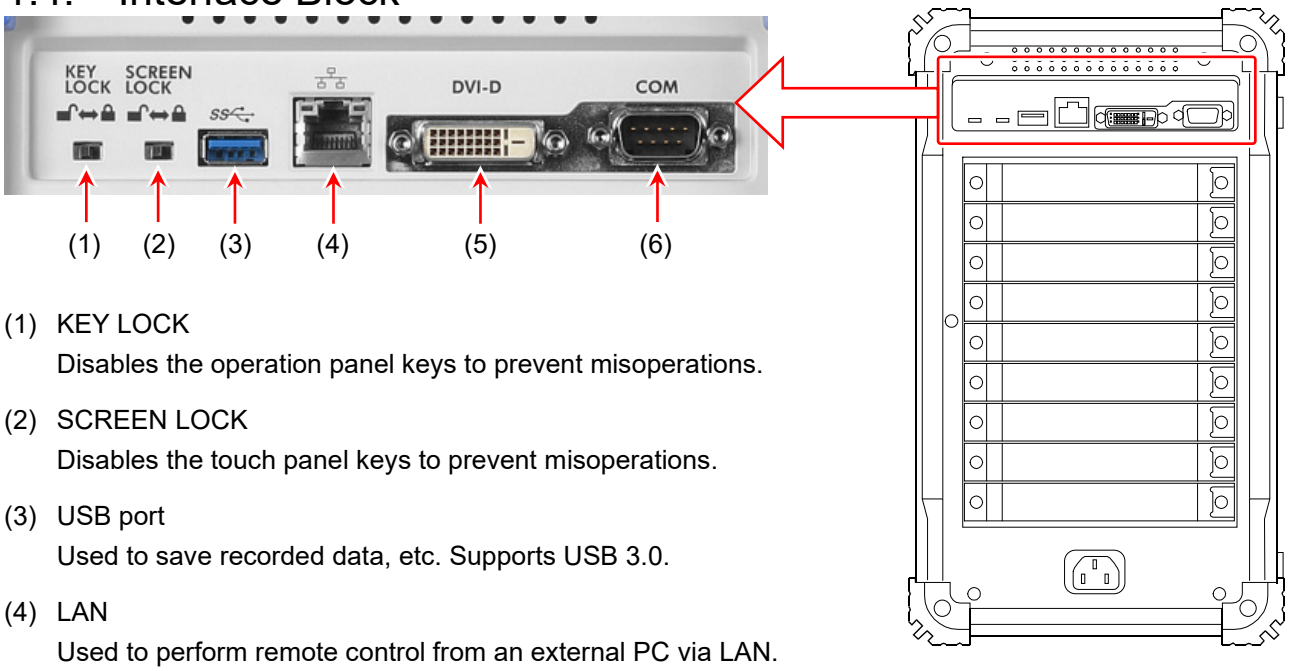
(6) [START] key
Starts recording.

(7) [STOP] key
Ends recording.

(8) DISK access light
The LED lights when accessing the internal SSD (for reading or writing).

(9) [Power] switch
Turns the power of the main unit on/off.
The [Shutdown] screen is displayed when turning the power off. Press the【OK】key to complete the shutdown process.
If this [Power] switch is pressed again while the [Shutdown] screen is displayed, this product automatically shuts down.

# 1.4. Interface Block




(1) KEY LOCK
Disables the operation panel keys to prevent misoperations.

(2) SCREEN LOCK
Disables the touch panel keys to prevent misoperations.

(3) USB port
Used to save recorded data, etc. Supports USB 3.0.

(4) LAN
Used to perform remote control from an external PC via LAN.

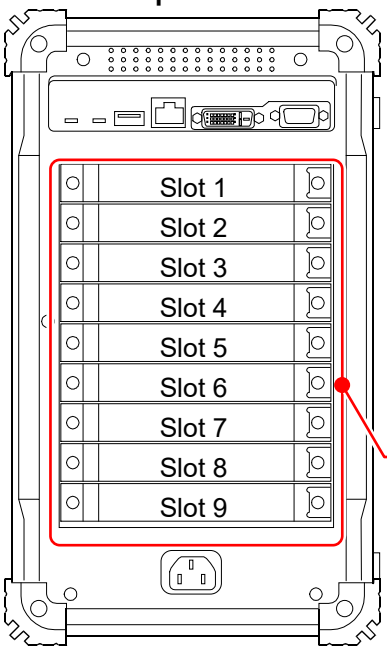
(5) DVI-D
The video output terminal.

**Note**

- ❑ Connect an external monitor with the power off.

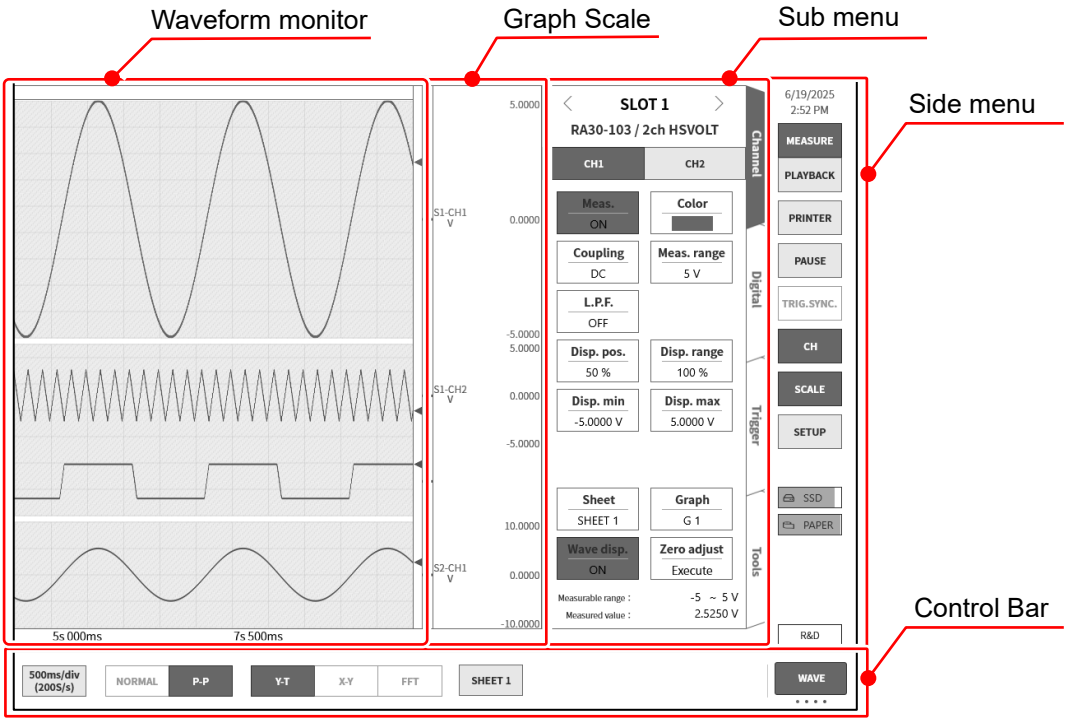
(6) COM
Used to perform remote control from an external PC via RS-232C.

# 1.5. Input Module Block




- ❑ Up to nine modules can be installed to the input module block of this product.
- ❑ For information on using each module, see the "RA3100 Instruction Manual".
- ❑ Standard signal input modules can be installed in any of Slot 1 to Slot 9.
- ❑ Select and install a module according to the target for measurement.
- ❑ The RA30-112 (remote control module) can only be installed to Slot 9.

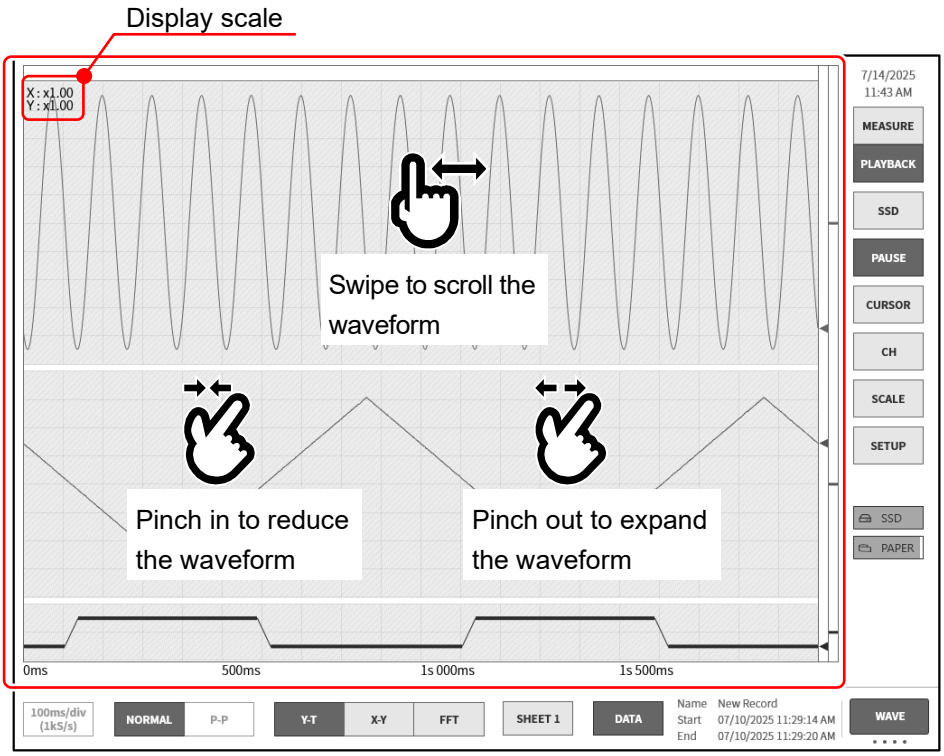
# 1.6. Screen and Setup Menu




## 1.6.1. Waveform Monitor

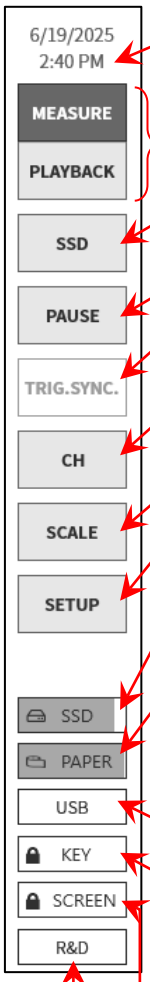
The waveform monitor displays the current input waveform or the playback waveform of recorded data. You can pinch in/out the waveform monitor during pause or playback to zoom the waveform in or out, or swipe the screen to scroll the waveform.

☞ For details, see the "RA3100 Instruction Manual".



## 1.6.2. Side menu

The side menu provides keys for switching the displayed screen, viewing the state of the product, and opening the screen for configuring the main unit and the input modules.




(1) Time: Displays the current time

(2) MEASURE/PLAYBACK: Switches the displayed waveform

MEASURE: Displays the current input waveform.

PLAYBACK: Displays the playback waveform of recorded data.

(3) Recording device:
Select PRINTER, SSD, or MEMORY as the recording device to display.

(4) PAUSE: Pauses the waveform displayed on the waveform monitor.

(5) TRIG.SYNC: Updates the input waveform display of a memory recording by synchronizing it with a trigger.

(6) CH: Opens the sub menu to configure the channel setup, digital display, and trigger setup.

(7) SCALE: Displays or hides the graph scale.

(8) SETUP: Opens the setup menu to configure the detailed settings of this product (recording setup, main unit setup, and management).

(9) SSD: Displays the remaining space on the internal SSD. Displayed in red when the remaining capacity is at 30% or lower.

(10) PAPER: Displays the remaining amount of recording paper in the printer block. Displayed in red when the remaining recording paper capacity is at 30% or lower. Press and hold this key to initialize the recording paper type (roll paper or Z-fold paper) and usage amount. When replacing the recording paper, press and hold this key to initialize the remaining amount of recording paper.

(11) SD / USB : Displays [SD] when an SD memory card is inserted, [USB] if USB memory is inserted, or [SD / USB] if both are inserted.

(12) KEY: Displayed when the KEY LOCK switch on the side of the main unit is set to on to disable the operation panel keys.

(13)SCREEN: Displayed when the SCREEN LOCK switch on the side of the main unit is set to on to disable the display touch panel.

(14)R&D / MFG : Displays either [R&D] or [MFG], depending on the measurement mode.
For the MFG mode, the data transfer status (●, ■, □, or !) is displayed.

## 1.6.3. Control Bar

The control bar provides a menu for frequently used functions, such as waveform display control of sampling, etc., thumbnail display, cursor display, and printer operations.
Tap the (5)【Display switch】key on the right edge of the control bar to switch the functions in the order indicated below.
【WAVE】⇒【THUMBNAIL】⇒【CURSOR】⇒【PEN REC】

### WAVE (waveform)

When the【MEASURE】key is selected in the side menu


(1) Sampling speed : Selects the sampling speed (20 MS/s to 10 S/min, EXT, or AnySpeed).
The speed selection range differs according to the recording device (printer, SSD, or memory).

(2) Data format : Selects either NORMAL or P-P as the format for the recorded data.
Only P-P is available for printer recording.
Only NORMAL is available for memory recording.

(3) Waveform format : Selects Y-T, X-Y, or FFT as the waveform format.
X-Y display and FFT analysis are only available when SSD recording is set.

(4) Sheet selection : Selects the waveform set to display on the screen.

(5) Display switch : Switches in the order【WAVE】→【THUMBNAIL】→【CURSOR】→【PEN REC】.

When the【PLAYBACK】key is selected in the side menu


(1) Sampling speed : Displays the sampling speed of the recorded data.

(2) Data format : Displays either NORMAL or P-P as the format for the recorded data.

(3) Waveform format : Selects Y-T, X-Y, or FFT as the waveform format.
X-Y display and FFT analysis are only available when SSD recording is set.

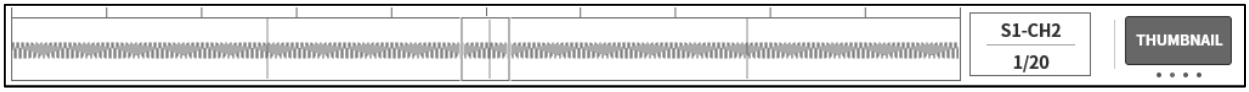
(4) Sheet selection : Selects the waveform set to display on the screen.

(5) DATA : Selects and play back recorded data.

(6) DATA information : The information of the displayed playback data.

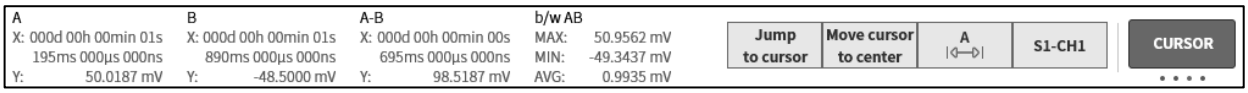
(7) Display switch : Switches the functions in the order【WAVE】→【THUMBNAIL】→【CURSOR】→【PEN REC】.

## THUMBNAIL



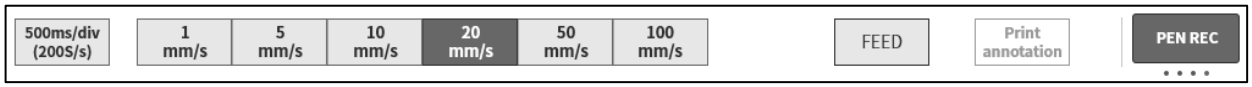

☞ For details, see the "RA3100 Instruction Manual".

## CURSOR




☞ For details, see the "RA3100 Instruction Manual".

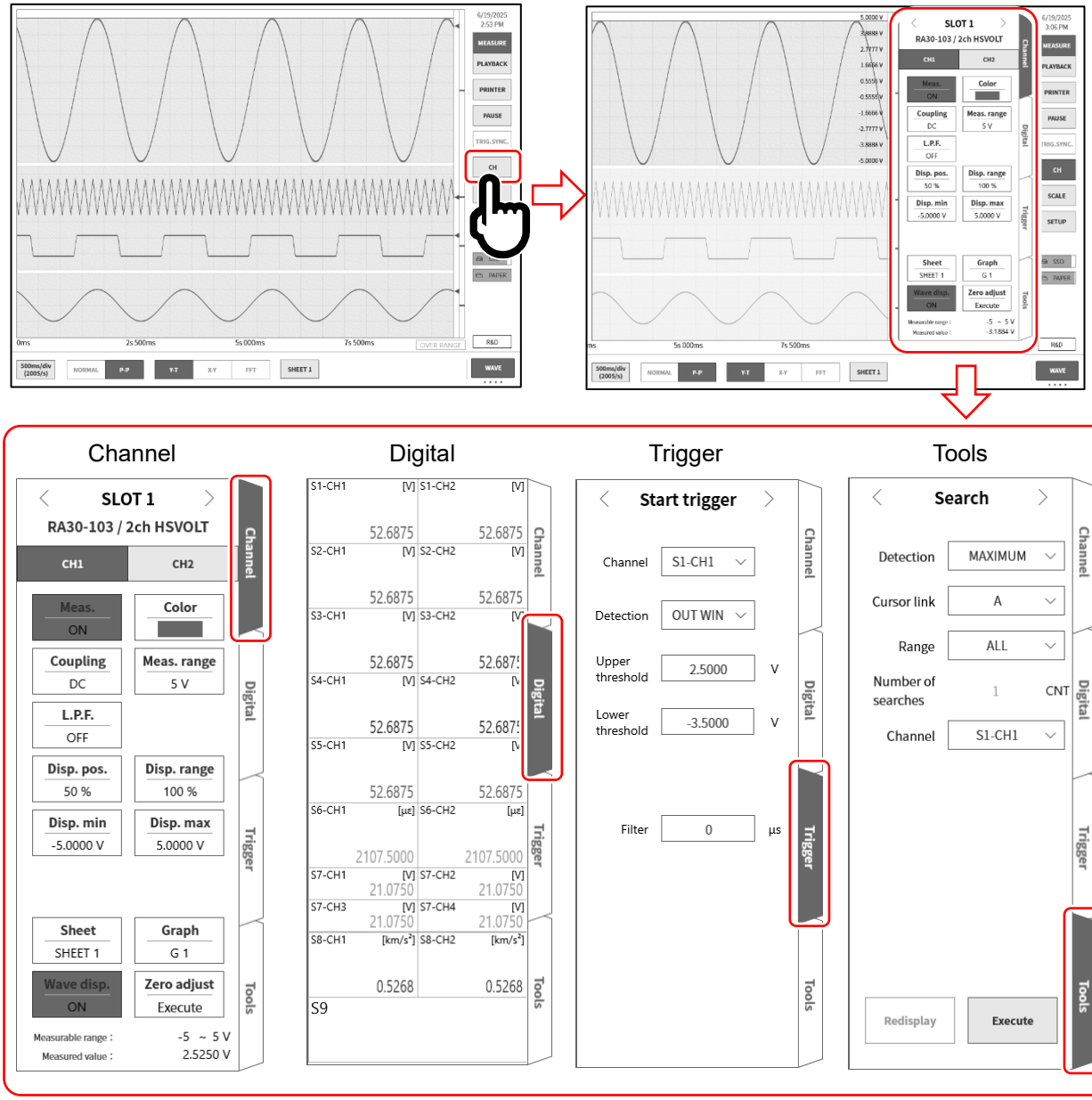
## PEN REC (pen recording)




☞ For details, see the "RA3100 Instruction Manual".

## 1.6.4. Sub Menu

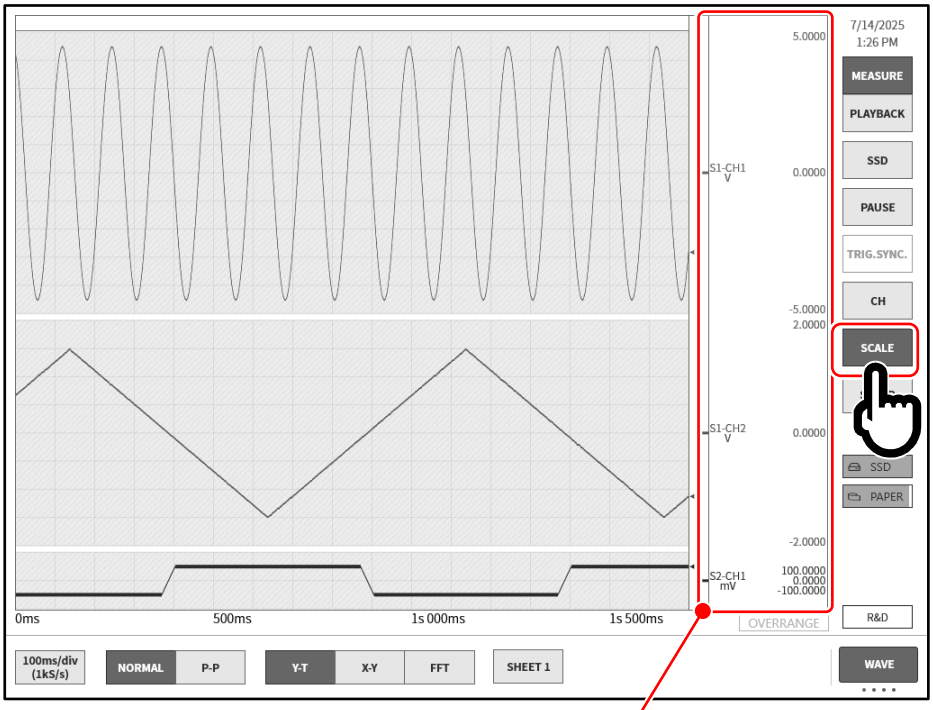
Tap the【CH】key on the side menu to display the sub menu.
The sub menu provides a digital display, menus for configuring modules and triggers, and a search/jump function used when playing back recorded data.

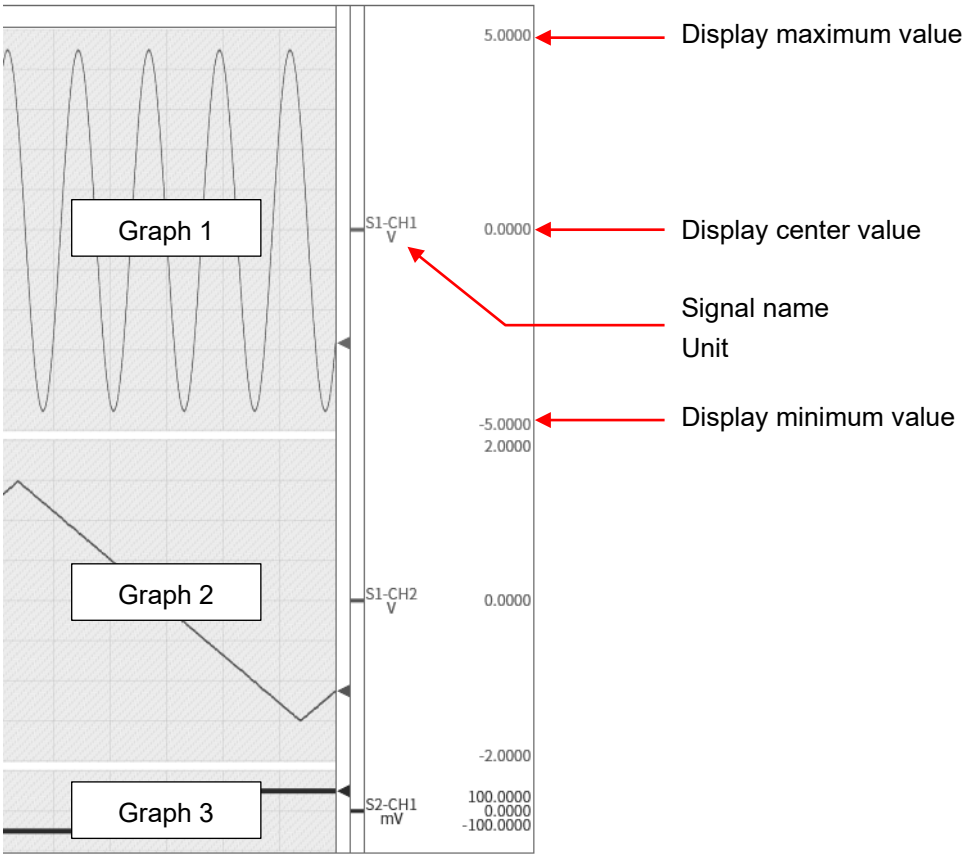


## 1.6.5. Graph Scale

Tap the【SCALE】key in the side menu to display the graph scale.
The graph scale can be displayed by selecting one channel of the analog input module for each graph.

☞ For details, see the "RA3100 Instruction Manual".

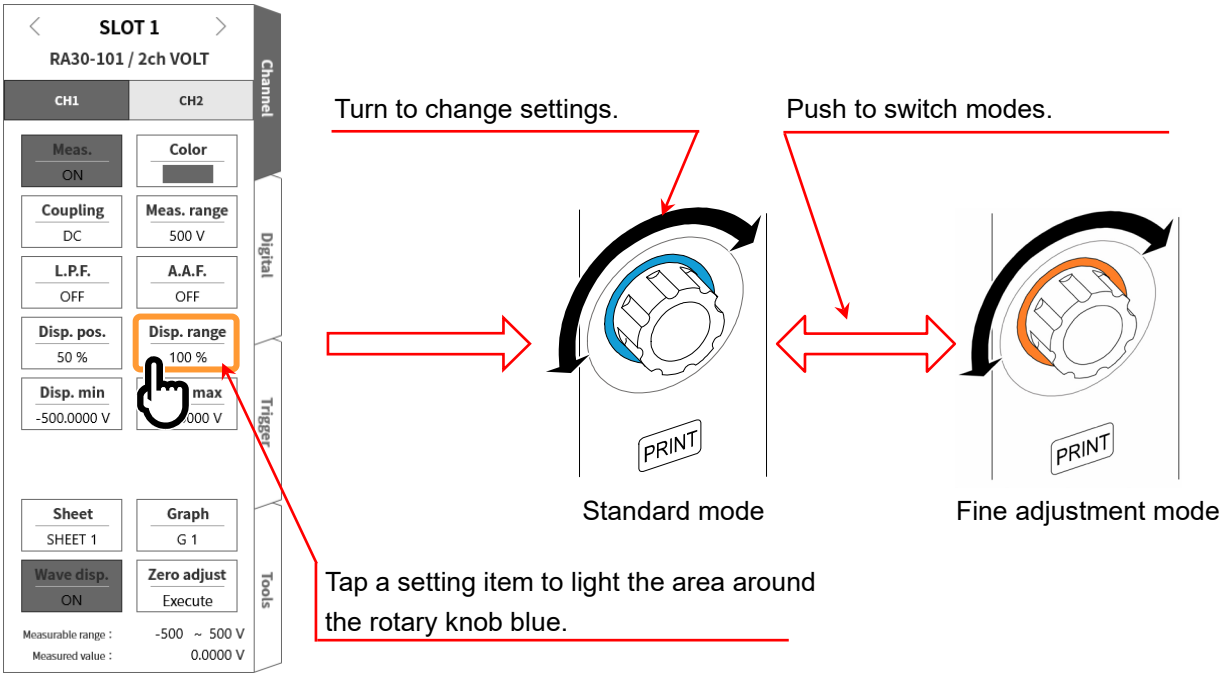


# 1.7. Screen Input Operations

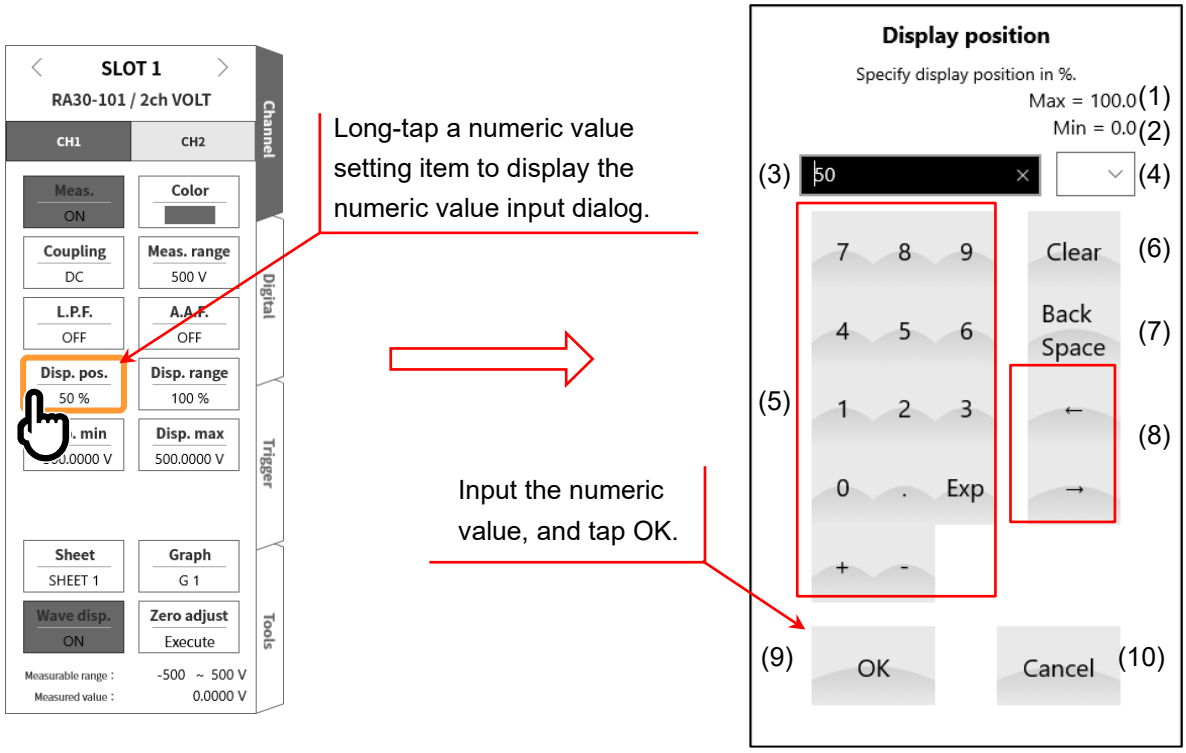
## 1.7.1. Rotary Knob

Turn the rotary knob clockwise or counterclockwise to change numeric values and selections.
The rotary knob is enabled when the area around it is lit. The area lights blue in the standard mode and orange in the fine adjustment mode.
You can push the rotary knob to switch modes.




## 1.7.2. Numeric Value Input Dialog

This dialog enables you to use numeric keys to input numeric values.

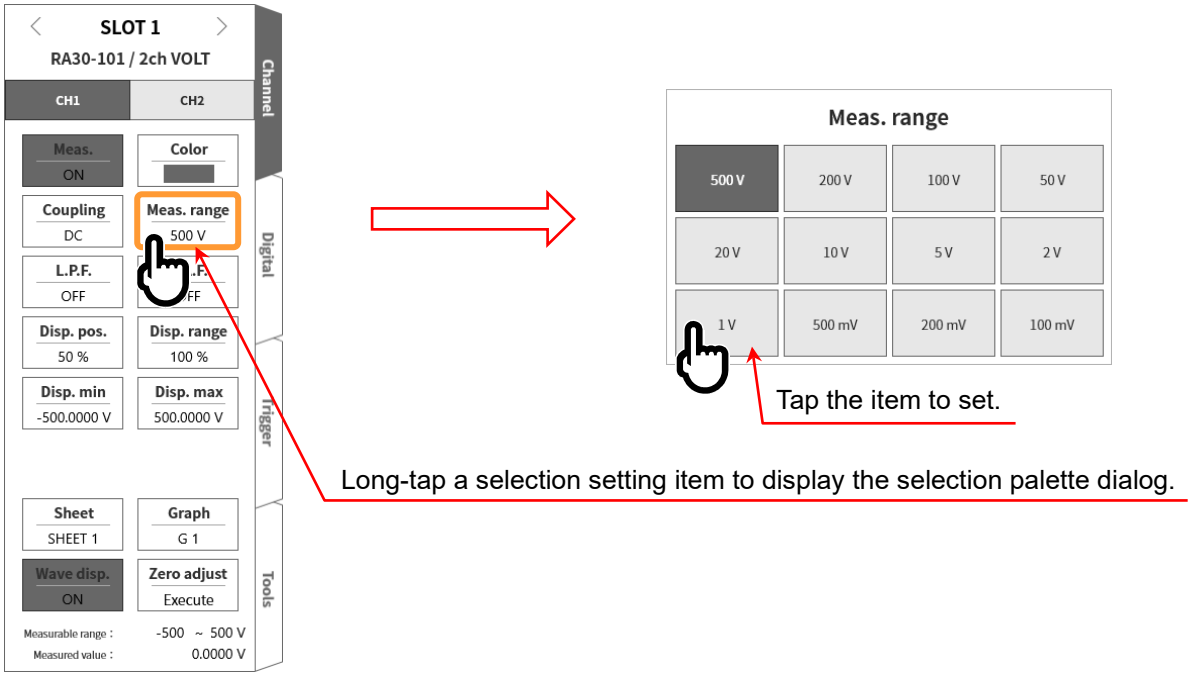



(1) Max: Displays the maximum value that can be input.

(2) Min: Displays the minimum value that can be input.
(3) Display window: Displays the numeric value that has been input.
(4) Prefix: Enables you to select G, M, k, (none), m, μ, or n as the prefix to use for numeric value input.
(5) Input keys: Enables you to input numbers, decimal points, exponential Es, plus symbols, and minus symbols in the position of the text cursor.
(6) Clear: Deletes the text in the display window.
(7) Back Space: Deletes one character to the left of the text cursor.
(8) Input position operations:
Moves the text cursor position left or right.
(9) OK: Reflects the numeric value that has been input and closes the dialog box.
(10) Cancel: Closes the dialog box without reflecting the numeric value that has been input.

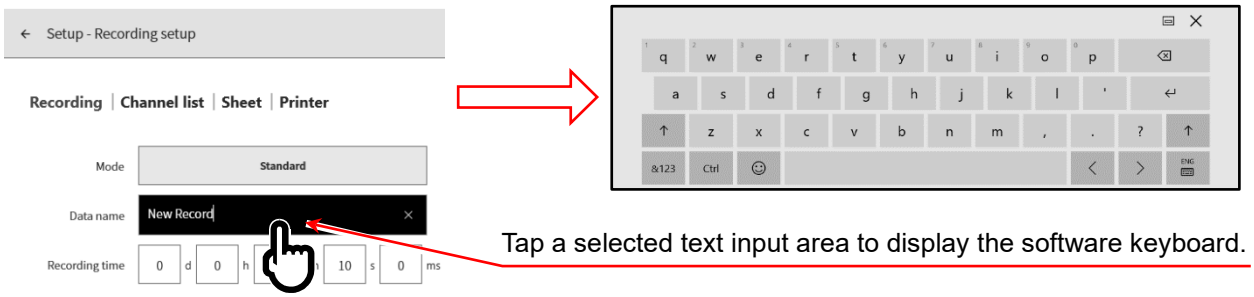
## 1.7.3. Selection Palette Dialog

This dialog enables you to select the item to set from a list.




## 1.7.4. Software Keyboard

The software keyboard enables you to input text.



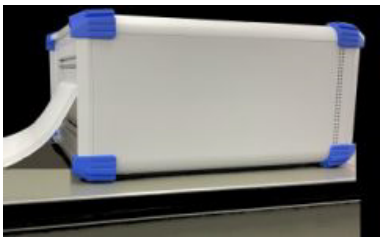
# 2. Pre-Measurement Procedures

## 2.1. Before Switching On the Power

The preparations for using this product and the cautions are explained below.

### 2.1.1. Installation and Usage Environment

Use this product on a flat, level surface.
When using the printer, install it so that the recording paper is level as indicated in the figure on the right.



**⚠CAUTION**

Cautions Regarding the Installation Environment

- ❑ Use this product at locations that satisfy the installation requirement, the Category II (CAT II) of the safety standard for electrical measurement instruments in EN61010-1.
- ❑ This product has a Pollution Degree of 2.
- ❑ Use this product in the following operating environments.
  Operating temperature range: 0 to 40°C  Operating humidity range: 35 to 85% RH (without condensation)
- ❑ Do not use this product at the following locations. In addition, carefully check the environment when using this product.
  - ■ Locations where the temperature and humidity rise due to direct sunlight or heaters
  - ■ Wet locations
  - ■ Locations where salt, oil, or corrosive gases exist
  - ■ Dusty locations
  - ■ Locations subject to strong vibrations
  - ■ Locations with a strong electromagnetic field
  - ■ This product is provided with ventilation openings in order to prevent overheating.
    Ensure that the ventilation openings remain unobstructed by covers or materials. Otherwise, the internal temperature of this product rises, causing malfunctions.


  - ■ Do not place highly combustible objects such as paper near this product.

## ⚠WARNING

- ❑ Module installation/removal and replacement must be performed after disconnecting all the cables connected to the module, turning off the power switch of the main unit, and disconnecting the power cable.
- ❑ Insert the module along the guide rails, and securely fix the two knurled screws with a Phillips head screwdriver. Incomplete module installation may lead to failure.
- ❑ Module disassembly is extremely dangerous. It must not be performed other than by our service engineers, as it may also lead to failure and prevent performance from being guaranteed.
- ❑ Make sure to install an empty panel on slots where no module is installed. Failure to do so may lead to failure due to the intrusion of foreign material or dust. (Empty panels are shipped together with the RA series main unit.)
- ❑ When storing the module, place it inside an anti-static bag and packaging box like those it was shipped with, as static electricity may lead to failure. This product can be stored in the range of -20 to 60°C and 20 to 85% RH (without condensation).
- ❑ Connect the input signal to the module after connecting the power cable of the RA series main unit where the module is installed to a 3-pole AC outlet, grounding it, and then turning on the power of the main unit.
  High voltage may already be applied as the input signal. Set the measurement range of the module to the maximum and connect the input cable to the module before connecting to the signal source. Take care to not directly touch the conductors when connecting to the signal source, in order to prevent electrocution.
- ❑ A dedicated input cable for each module is provided to meet the specifications such as the measurement category and insulation with stand voltage. Use the dedicated input cable for the type of measurement.

## ⚠CAUTION

- ❑ When transporting this product and modules, use the package and packaging material supplied at factory shipment, or use a package and packaging material more shock-resistant than those supplied.
- ❑ We recommend a periodical calibration to maintain the accuracy of the input units. More reliable measurements are possible by calibrating the input units once a year (extra cost option).

## 2.1.2. Installing Optional Modules

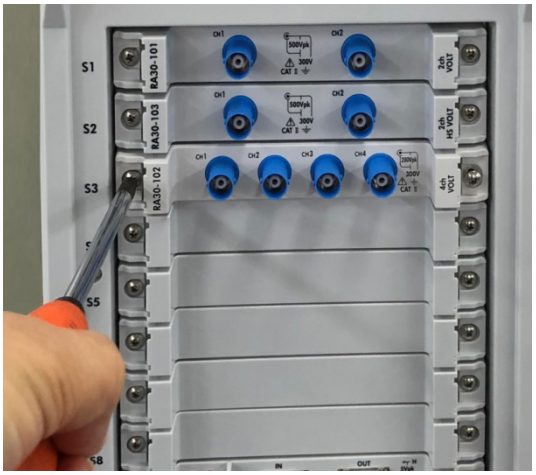
### Installation Procedure

Step 1. Turn the power OFF.

Step 2. Disconnect the power cable.

Step 3. Grip the handles on both edges and insert the module straight in along the guide rails.
The module type should be on the operation panel side.

Step 4. Tighten the screws on both edges with a Phillips head screwdriver (No. 2).


### Removal Procedure

Step 1. Turn the power OFF.

Step 2. Remove the connected input cable.

Step 3. Disconnect the power cable.

Step 4. Loosen the screws on both edges with a Phillips head screwdriver.

Step 5. Grip the handles on both edges and pull the module straight out.

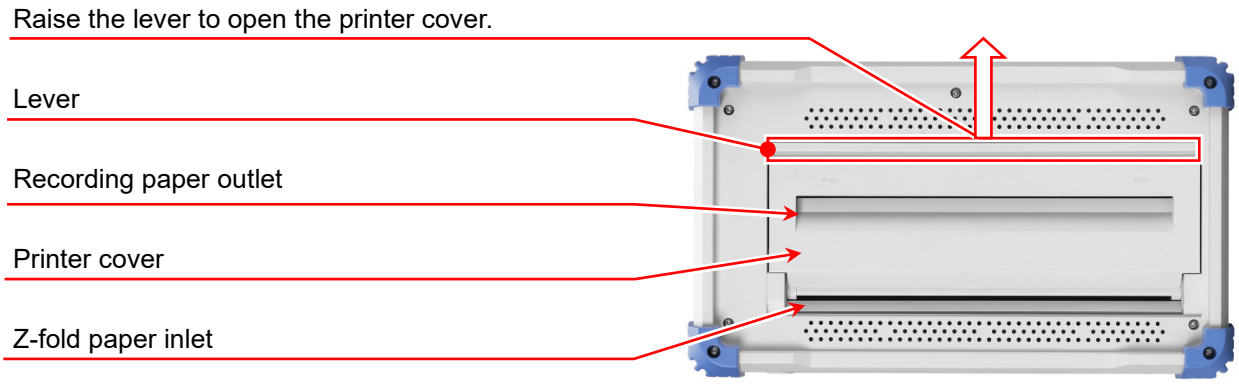
Step 6. Install an empty panel if the slot will not be used.

## 2.1.3. Paper Loading

The procedure for loading recording paper to the printer block is indicated below.
Load the recording paper to this product. There are two types of recording paper: paper rolls and Z-fold paper.
For information on loading Z-fold paper, see the "RA3100 Instruction Manual".

**⚠CAUTION**

- ❑ Use only the recording paper prepared exclusively for this product (YPS106 or YPS108 for paper roll and YPS112 for Z-fold paper) by our company. The quality of recording may not be guaranteed if other recording paper is used, as paper feed problems may occur or the print quality may be reduced.
- ❑ Do not use the portion of the new roll where the recording paper tip is covered with tape, as colors may not be printed normally on this area.



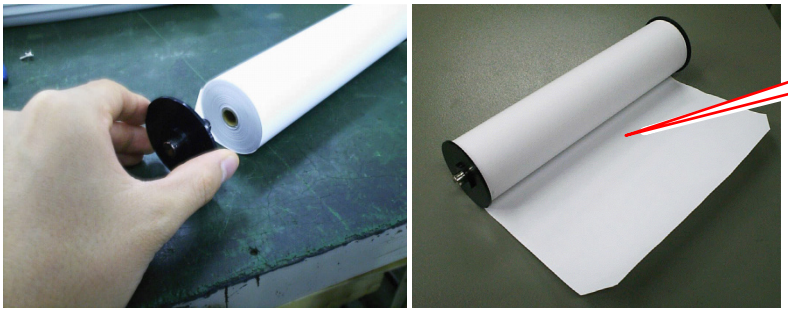

### Loading Roll Paper (Recording Paper)

Step 1. Attach the paper holders to the paper roll.

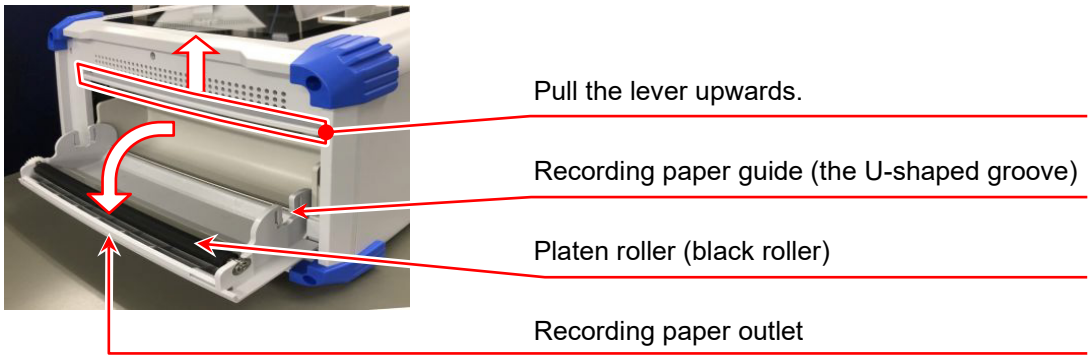
Attach a paper holder to both ends of the paper roll. If there is a gap between the recording paper and the paper holder, the recording paper may not be able to be loaded or the recording position may be shifted.

If there is a gap between the recording paper and the paper holder, the recording paper may not be able to be loaded or the recording position may be shifted. When loading a partially used roll, trim the edges for ease of loading, as shown in the figure.

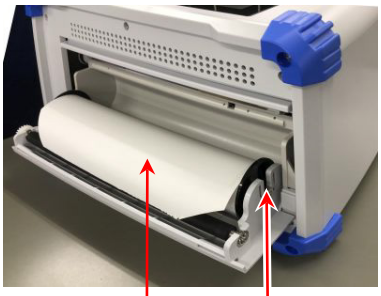
The inside of the roll paper is the back side and the outside is the thermal surface that is printed on.



Step 2. Open the printer cover by raising the lever of the printer block.




Step 3. Load the paper following the guide of this product, and press the paper holders into the guide until a click is heard.



Note

- Be sure the paper roll is loaded so that the thermally sensitive side is faced toward you; if this side is faced away, the paper cannot be printed.
  If the recording paper is not loaded securely, printing problems may occur or the recording paper may meander.

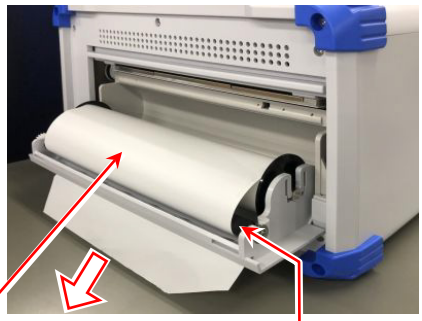
Check the winding direction carefully
Push it in so that the thermally sensitive side is faced up

Insert the paper holders into the guide of the printer block

Step 4. Feed the recording paper to the recording paper outlet. Insert the recording paper from above the platen roller of the printer block (black roller) from the recording paper outlet of the printer cover and pull it out about 10 cm.

Step 4-1. Feed the paper to the recording paper outlet from above the platen roller.

Step 4-2. Pull the recording paper out from the recording paper outlet about 10 cm.




Step 5. Close the printer cover.
After pulling the paper, close the cover firmly pressing down on both sides (until a click is heard). Pull the paper out keeping it straight. When using without both sides of the paper pushed into the recording section, recording cannot be performed correctly.

## 2.1.4. Connecting an External Device

Connect the DVI-D, LAN, and COM ports of this product with the power off.

Note

- If you remove or insert the DVI-D cable after the power has been turned on, the screen may not be displayed, which will make it impossible to operate this product.

# 2.2. Turning the Power On/Off

## 2.2.1. Connecting the AC Power Cable

Be sure to check the following points before connecting the AC power cable to this product.

- ❑ Make sure that the power supply matches the rating indicated on the rating plate attached to this product.
- ❑ Ensure modules are inserted securely.

**⚠WARNING**

- ❑ This product must be grounded before turning on the power.
- ❑ This grounding protection is for the safety of this product, as well as for that of the user and peripheral equipment.
  - ■ If the AC power cable that comes with this product is connected to a 3-pin power outlet equipped with a protective conductor pin, this product is automatically grounded.
  - ■ Do not use an extension cable without protective grounding.
  - ■ Do not use this product when protective grounding cannot be performed using a power outlet that matches the supplied AC power cable.

## 2.2.2. Turning On the Power

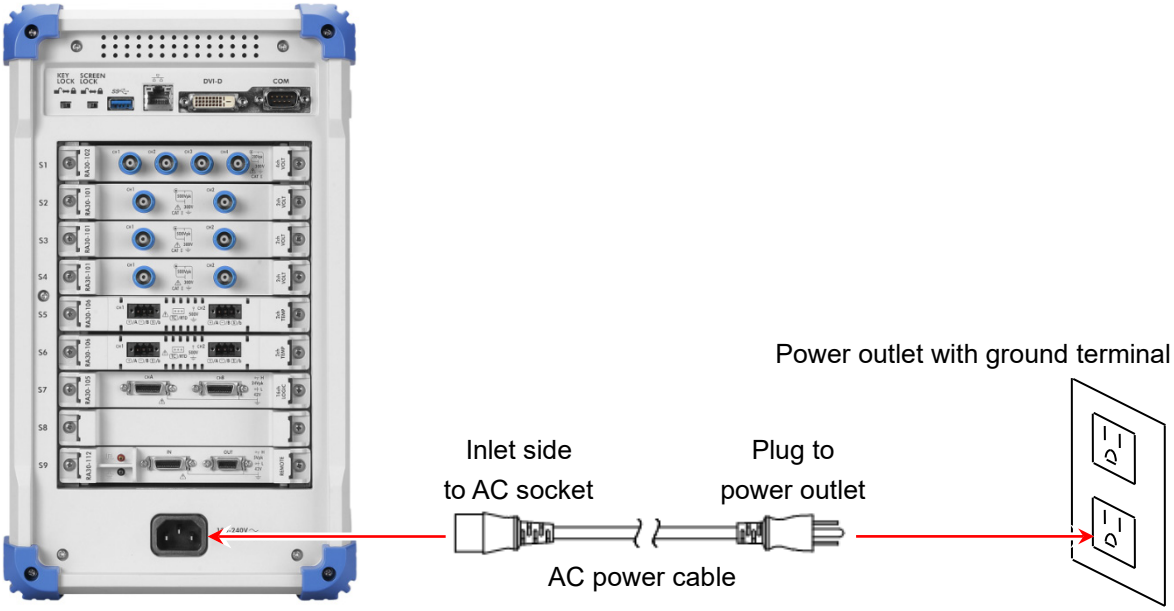
Step 1. Perform the check indicated below.

<Items to check before turning on the power>

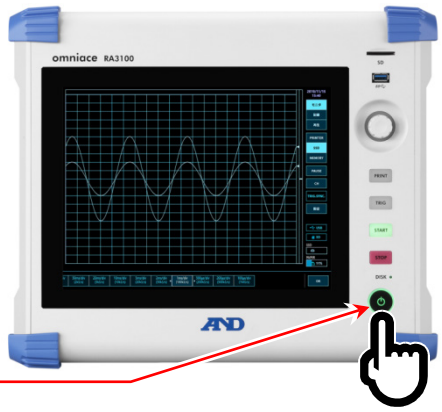
- ❑ Is this product installed in a safe location?
- ❑ Is the usage environment OK?
- ❑ Is the top of the touch panel free from any writing implements or tools, etc.?

Step 2. Upon confirming that all of the above check items are fine, connect the inlet side of the AC power cable to the AC socket of this product.

Step 3. Connect the plug of the AC power cable to the power outlet.



Step 4. Turn the power switch of this product on.
When the Power switch on the operation panel of this product is turned on, the green LED lights up and the power turns on.

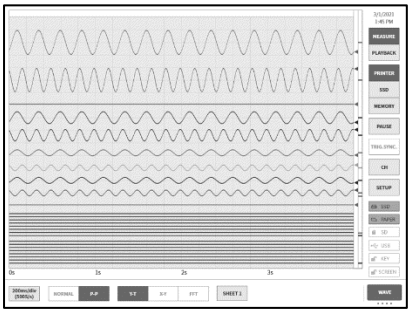



**Note**

- Standby current flows to this product when the AC power cable is connected to the power outlet.
  Remove the power cable when this product will not be used for an extended period of time.

## 2.2.3. Confirming Normal Startup

The monitor screen of the RA3100 is displayed about one minute after turning the power on.



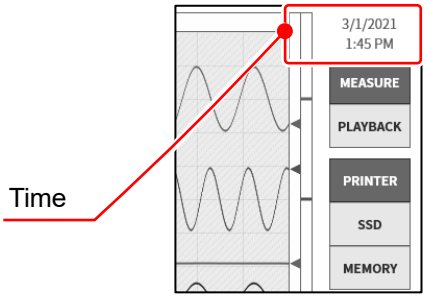
**Note**

- Do not touch the touch panel until the waveform monitor is displayed. Doing so may lead to erroneous operations.
- Immediately after purchase or initializing the main unit, measurement is turned off for all channels and no waveform is displayed.

## 2.2.4. Setup Date and Time

The current time is displayed on the top right of the screen, but if it differs greatly from the actual time, the time can be adjusted.

☞ For details, see the "RA3100 Instruction Manual".



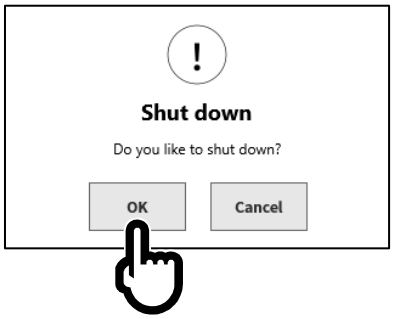

## 2.2.5. Preparing for More Precise Measurements

Warm up this product for about 60 minutes after turning on the power in order to perform more precise measurements.
After the warm up is complete, perform zero adjust for the voltage module and initial balancing for the AC strain module.

☞ For details, see "4. Configuring Measurement" and the "RA3100 Instruction Manual".

## 2.2.6. Turning Off the Power

When the Power switch on the operation panel is pressed while the power is on, the shutdown process starts and the [Shutdown] dialog box indicated below is displayed on the center of the screen. Tap the【OK】key to shutdown this product. Tap the【Cancel】key to continue without turning off the power.
If the Power switch is pressed again while the [Shutdown] dialog box is displayed, this product automatically shuts down.




**⚠CAUTION**

- Make sure to shutdown this product to turn off the power, as directly removing the power cable from the power outlet without shutting down can damage the files in the internal storage.

# 3. Flow of Measurement

This product records and play back input signals following the procedures described below.

## 3.1. Flow of Measurement

| | | |
|---|---|---|
| Perform the check before applying power and turn on the power. | "Chapter 2" ⇨ | Confirm that this product has been set in a safe place, and that all the accessories are properly attached. |
| Select the measurement mode. | "Chapter 4.1" ⇨ | Select the R&D mode (for research and development) or the MFG mode (for manufacturers). |
| Lower the measurement range, and connect the signal. | "Chapter 4.2" ⇨ | Note that applying a voltage greater than the maximum allowable input voltage of each input module may cause damage to the main unit or internal components. Connect the signal after confirming that the maximum allowed input voltage is not exceeded. |
| Set the input channel while viewing the waveform monitor. | "Chapter 4.3" ⇨ | Setup the input channel settings to the conditions for recording. Set the measurement range, filter, display position, and display range, etc. |
| Configure the monitor display. | "Chapter 4.3" ⇨ | Configure the graph division, digital display, and graph scale, etc. to make the monitor display easier to view. |
| Select the recording method. | "Chapter 4.3" ⇨ | Select to record to recording paper only or to both a file and recording paper. |
| Set the recording device and sample speed according to the target for measurement. | "Chapter 4.5" ⇨ | Set the sampling speed and the recording device to save, as well as the recording time, speed of input signal changes (frequency), and whether to perform analysis after recording, etc.<br>Printer : Low-speed long-term measurement with only the waveform recorded<br>SSD : Medium-speed long-term measurement for various uses<br>Memory : High-speed enlarged display of transient phenomena and abrupt phenomena |
| Set the triggers. | "Chapter 5" ⇨ | Set the triggers for starting recording. |
| Start and end recording. | "Chapter 6" ⇨ | Press the START key on the operation panel to start recording. Measurement stops when the specified time or data count is recorded or when the STOP key is pressed. |
| Playback and analysis. | "Chapter 7" ⇨ | Use the【PLAYBACK】key on the side menu to playback recorded data, the【DATA】key on the control bar to select data, and the【X-Y】key and【FFT】key on the control bar to perform data analysis. |

# 4. Configuring Measurement

## 4.1. Selecting the Measurement Mode

You can select one of two measurement modes: the R&D mode for research and development, which has various functions and excellent versatility, and the MFG mode for manufacturers, which limits some functions for improved data transfer and recording start/stop response speed.

**Tips**

- The R&D mode is recommended for those that want to adjust waveform analysis and settings while recording, and the MFG mode is recommended for those that want to perform continuous recording with settings determined in advance.

### 4.1.1. Characteristics

#### R&D mode

- Nine types of recording modes (start trigger, interval, etc.)
- Simultaneous recording to three recording devices (printer, SSD, and memory)
- XY and FFT waveform display
- Waveform pausing and enlargement/reduction
- Playback of recorded data

#### MFG mode

- External transfer of measured data (TCP/UDP)
- Improved response speed for starting/stopping recording
- Delete then save function for recorded data

### 4.1.2. Comparison of Measurement Mode Functions

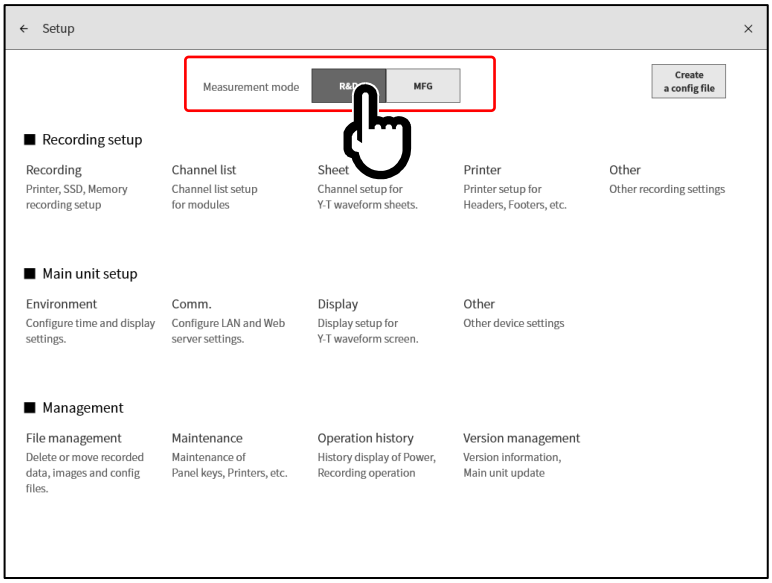
| | | R&D mode | MFG mode |
|---|---|---|---|
| Recording | Recording modes | 9 total | 2 *2 |
| | Printer recording | ✔ | ✔ |
| | SSD recording | ✔ | ✔ |
| | Memory recording | ✔ | |
| | Pen recording | ✔ | ✔ *1 |
| | Response speed for starting/stopping recording | Standard | High speed |
| Waveforms | Y-T waveform | ✔ | ✔ *1 |
| | X-Y waveform | ✔ | |
| | FFT waveform | ✔ | |
| | Time axis scrolling of Y-T waveform | ✔ | |
| Function | Playing Back Recorded Data | ✔ | |
| | Pausing (cursor, enlargement/reduction) | ✔ | |
| | Thumbnails | ✔ | |
| | Data transfer | | ✔ *1 |
| | Delete then save function for recorded data | | ✔ |

*1 Turning channel measurement on/off causes the waveform screen to be redrawn and will result in measurement data being temporarily lost.

*2 Normally start trigger only

## 4.1.3. Selection Method

Tap【Setup】in the Side menu to display the settings screen.
Tap【R&D】or【MFG】to select the measurement mode.



# 4.2. Connecting the Input Cable

When connecting the input cable, set the lowest input sensitivity (set the maximum measurement range).
Also note that applying a voltage greater than the maximum allowable input voltage of each input module may cause damage to the main unit or internal components. Connect the signal after confirming that the maximum allowed input voltage is not exceeded.

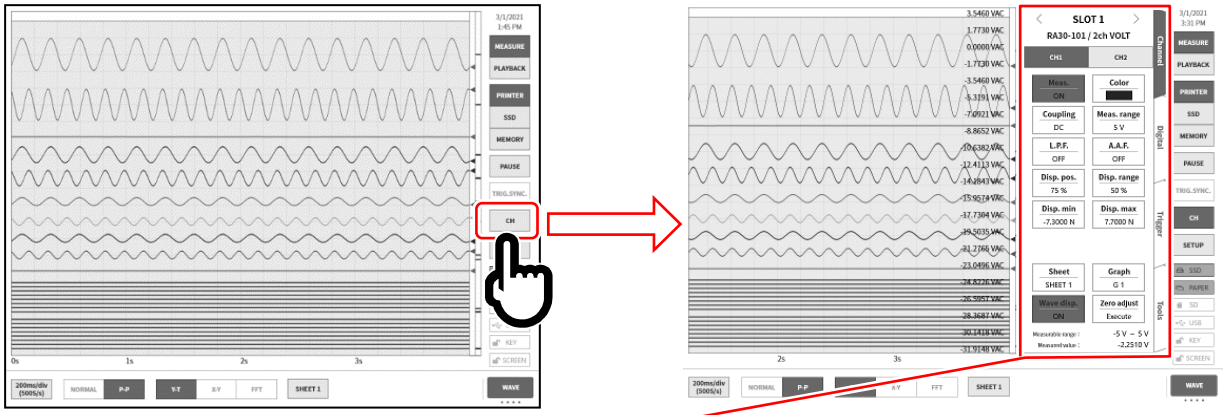
Step 1. The input signal can be displayed and checked in real-time by switching the【MEASURE/ PLAYBACK】key on the side menu to【MEASURE】.

Step 2. Tap the【CH】key on the side menu to display the sub menu.

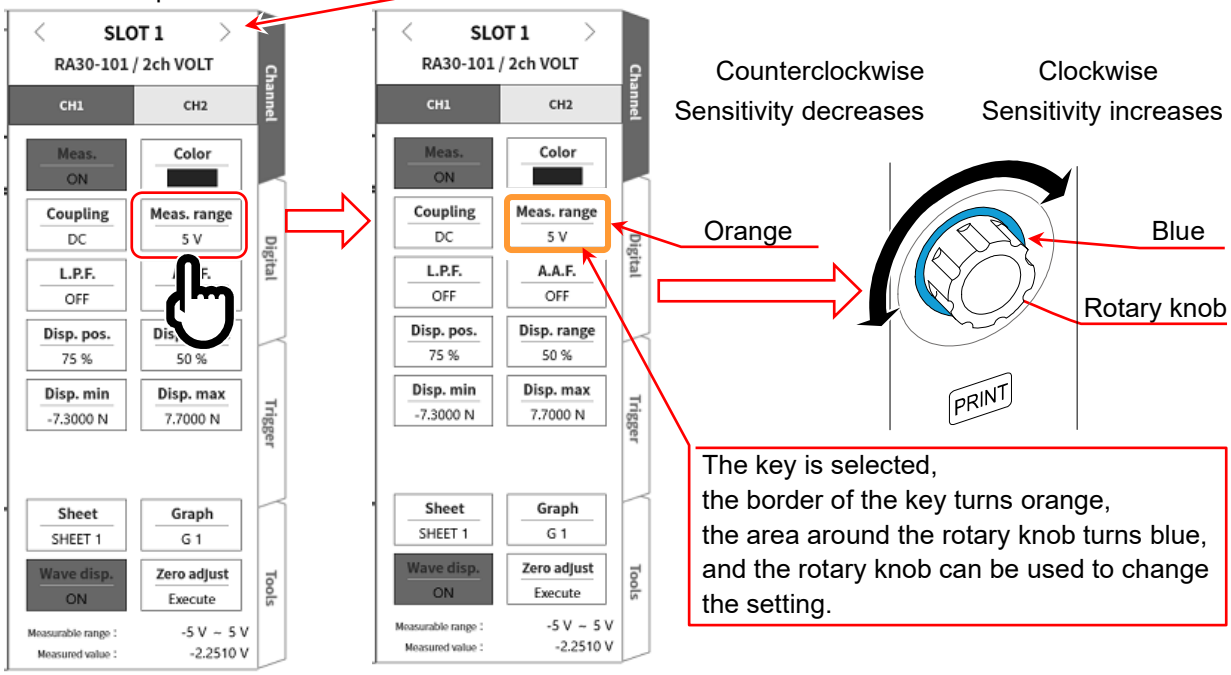
Step 3. Tap the【Channel】tab in the sub menu to display the channel setup sub menu.

Step 4. When the【Meas. range】key is tapped in the channel setup sub menu, the border of the key turns orange.
The area around the rotary knob turns blue, and the rotary knob can be used to change the setting.

Step 5. Turn the rotary knob counterclockwise to set the minimum input sensitivity (set the maximum measurement range).



Channel setup sub menu



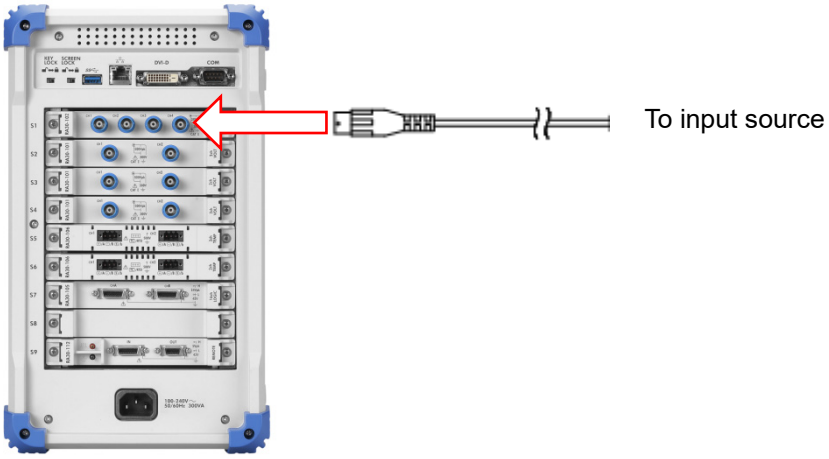
Step 6. Tap the【CHx】tab in the channel setup sub menu to change the displayed channel.

Step 7. To change the display slot of the input module, swipe the channel setup sub menu left or right, or tap the【<】or【>】key on the top.

Step 8. Next, connect the insulation BNC cable (standard) to the BNC terminal of the input module.

**⚠WARNING**

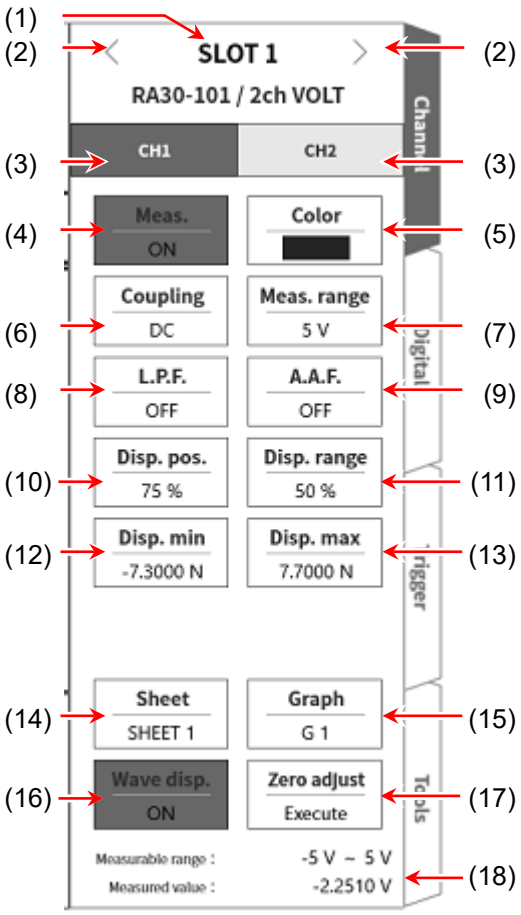
- Do not input voltages that exceed the maximum allowed input voltage or withstand voltage to an input module.



# 4.3. Setting the Input Channel

Tap the【Channel】tab in the sub menu to display the channel setup sub menu.

## 4.3.1. Channel setup sub menu (for RA30-101)




(1) Slot number, input module type

(2) Change slot: You can change the display slot by swiping this sub menu left or right or tapping the left【<】and right【>】key.

(3) Select channel:
Select the channel in the slot.

(4) Meas. ON/OFF
ON: Measure and record the input signal.

(5) Color: Change the display color of the waveform monitor.

(6) Coupling: Switch the input signal coupling in the order DC → GND → AC.

(7) Meas. range:
Change the measurement range of the input channel. When this key is tapped, the rotary knob is enabled (the LED lights up) and the range can be selected by turning the knob.

(8) L.P.F.: Change the low-pass filter of the input channel. When this key is tapped, the rotary knob is enabled (the LED lights up) and the filter can be selected by turning the knob.

(9) A.A.F.: Turns the anti-aliasing filter of the input channel on or off.

(10) Disp. pos.: Specify the position of the waveform monitor to display the specified range of the waveform display area. Specified as a percentage indicating the center position of the display range from the bottom of the graph when the full range of each graph is 100%.

(11) Disp. range: Specifies the display width in the amplitude direction of each graph.
Specified (by tapping the key and turning the knob) as the percentage of the display width with the full range of each graph at 100%.
Example) When 50% is set, the waveform display is 10 div of the total width of 20 div.

(12) Disp. min: Set (by tapping the key and turning the knob) the display lower limit value (scale value) of the bottom of the display range.

(13) Disp. max: Set (by tapping the key and turning the knob) the display upper limit value (scale value) of the top of the display range.

(14) Sheet: Set the monitor display/printer print sheet of the set channel.

(15) Graph: Set the graph.
When this key is tapped, the rotary knob is enabled (the LED lights up) and the graph can be changed by turning the knob.

(16) Waveform display area:
When enabled, the waveform is displayed. When disabled, the waveform is not displayed.

(17) Zero adjust: Cancels the input offset of the input channel. Execute zero cancellation to perform more accurate measurement.

(18) Available measurement range/measurement value:
Displays the current available measurement range and value of the input value.

## 4.3.2. Setup the input channels

The input waveform is displayed on the monitor when a signal is connected to the input module.
The overall procedure for setting the input channel is indicated below. See the following for details on each step.

Step 1. Set coupling. (When the input module is a voltage module)
Step 2. Set Meas. range according to the target for measurement.
Step 3. Set the input filter.
Step 4. Set the waveform division.
Step 5. Set the display range and display position.
Step 6. Set the display minimum and display maximum.
Step 7. Execute zero adjust.

### Step 1. Set Coupling

Select the input coupling using the【Coupling】key in the channel setup sub menu.
Tap the【Coupling】key and turn the rotary knob to change the setting in the order DC → GND → AC.

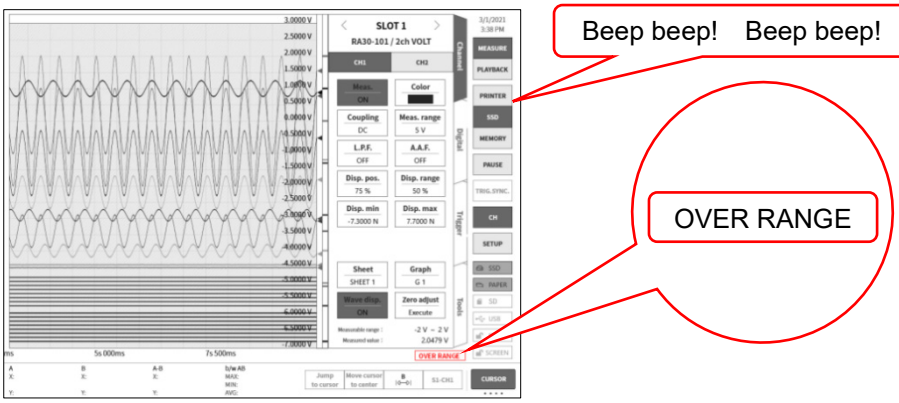
| Coupling | Contents |
|---|---|
| DC | Enables measurement of the actual input signal, including the DC and AC component. |
| AC | Measures the AC component of the input signal only. Set this when you want to measure only the amplitude of an AC signal, as it cancels the DC offset of the signal. |
| GND | Connects the channel input to GND without connecting the input signal inside the channel. Enables the input GND level to be checked with waveform monitoring or printer recording. |

### Step 2. Set the Measurement Range

The input sensitivity can be changed in【Meas. range】in the channel setup sub menu.
The value displayed for the measurement range (RANGE) indicates the input (measurement) maximum value and corresponds to 10 div on the waveform monitor. When the display position is 50%, the full measurement range of ±RANGE (20 div) is displayed.
When the【Meas. range】key is tapped in the channel setup sub menu, the border turns orange, the area around the rotary knob turns blue, and the rotary knob can be changed.
Turn the rotary knob counterclockwise to reduce the sensitivity and clockwise to increase the sensitivity.
The setting values of the measurement range differ according to the type of input module.

**Tips**

- When the input exceeds the measurement range, "OVER RANGE" is displayed on the bottom right of the screen, and the main unit emits a warning beep. Reduce the sensitivity with the measurement range so that the input signal does not exceed the range. To silence the warning beep, disable the buzzer sound setting. For more information, see the buzzer sound setting in the "RA3100 Instruction Manual".




## Step 3. Set the Filter

Set the filter of the selected channel.

This cuts out unnecessary frequency components and noise. As the filter differs according to the input module type, set the filter according to the characteristics of the input signal and measurement.

Low-pass filter (L.P.F.)

A gently sloping attenuation filter. Set the cutoff frequency in consideration of the frequency of the input signal.

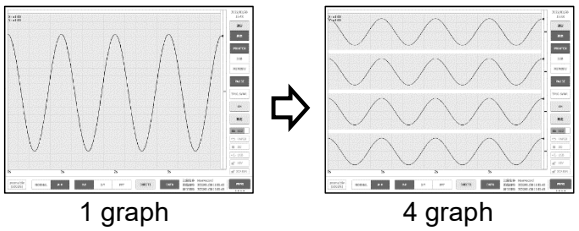
Anti-aliasing filter (A.A.F.)

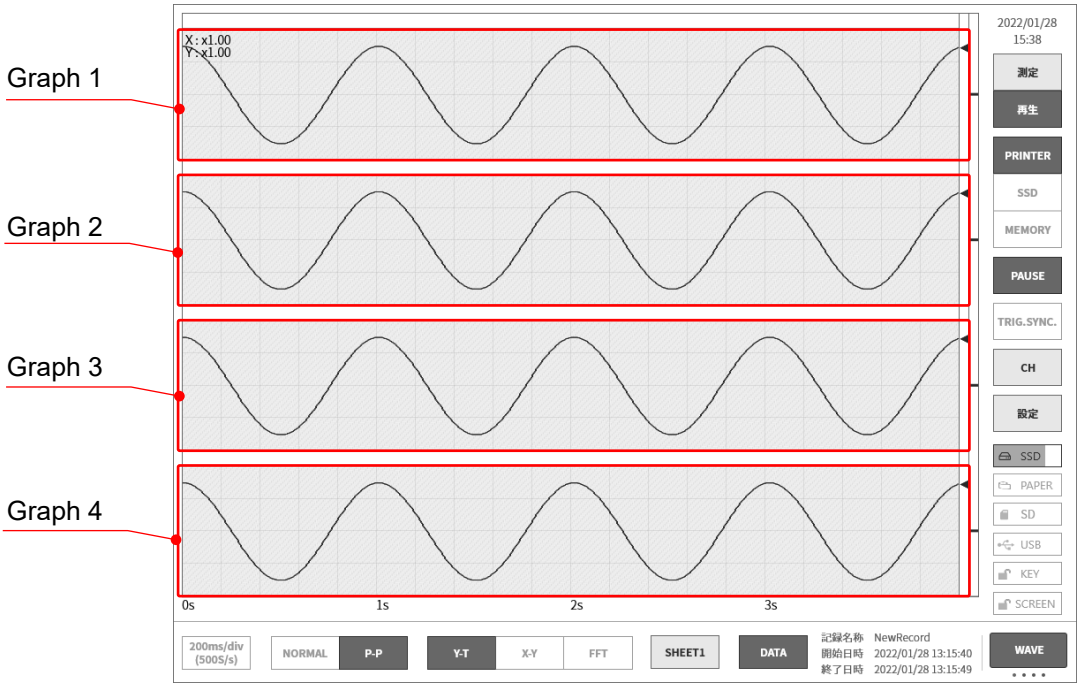
A steeply sloping attenuation low-pass filter. Enable this filter to automatically set the filter so that aliasing of the A/D data does not occur due to the sampling speed.

## Step 4. Set the Graph Division

"Graph" refers to the area in the Y-T waveform monitor where a channel waveform can be displayed.

The graph area can be divided into 1 to 18 graphs.



## Step 5. Set the Display Range and Display Position

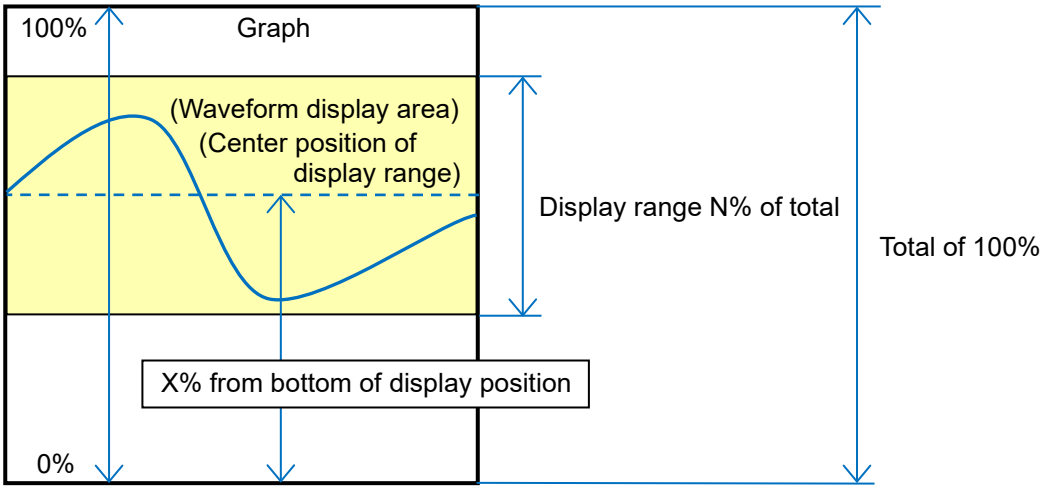
When displaying multiple channels, it may be difficult to recognize them because the waveforms overlap. Reducing the input sensitivity in the measurement range decreases the amplitude and changes the display position, which can stop the waveforms from overlapping and make them easier to recognize, but this also reduces the resolution of the data. The display range and display position settings can be used to change the display scale and display position of the waveform amplitude direction without reducing the resolution of the data of the channel being displayed.

Disp. range: The display width in the amplitude direction of the waveform display area in the graph specified as the percentage of the display width when the full range of each graph in the vertical direction is 100%.
Example) When 40% is set, the waveform display is reduced to 8 div of the total width of 20 div.

Disp. pos.: Specify the position of the graph to display the specified range of the waveform display area. Specified as a percentage indicating the center position of the display range from the bottom of the graph when the full range of each graph in the vertical direction is 100%.

When the【Disp. range】key or【Disp. pos.】key is tapped, the rotary knob is enabled and the setting value can be changed by turning the knob. The key can also be pressed and held to display numeric keys for directly entering values.

Relationship between the display range and display position of the input channel



## Step 6. Set the Display Maximum and Display Minimum

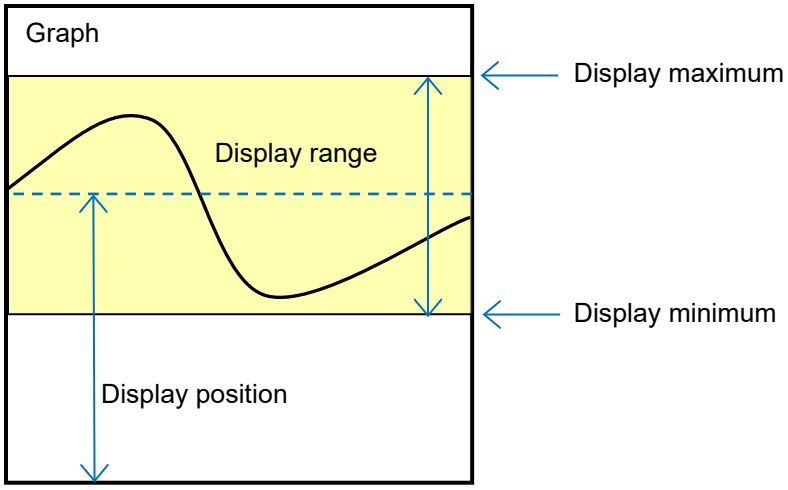
If the amplitude of the input signal is smaller than the set range, the signal change may be hard to recognize.
In this case, you can change the scale of the upper limit value and lower limit value for the display range to enlarge the amplitude of the displayed signal.

Disp. max: Set the display upper limit value of the top of the display range.

Disp. min: Set the display lower limit value of the bottom of the display range.

When the【Disp. max】or【Disp. min】key is tapped, the rotary knob is enabled and the setting value can be changed by turning the knob. The key can also be pressed and held to display numeric keys for directly entering values.

Relationship between the display maximum and display minimum of the input channel




### Note

- If the sensitivity of the measurement range is increased to enlarge the amplitude, the amplitude of the input signal will only become a little bigger and the range may be exceeded or the input maximum value may not be able to be read, etc.
  If the display is enlarged by changing the scale, the recorded data is recorded until the value set in the measurement range, and the display can only be enlarged.

## Step 7. Execute Zero Adjustment

After turning on the power, the internal temperature of this product will rise as time elapses, and cause temperature drift inside the input module, which leads to errors in the measurement data.
Execute zero adjust to cancel these errors.
In order to perform measurement with few errors, let this product warm up for 60 minutes after turning on the power, then tap the【Zero adjust】key in the channel setup sub menu to cancel the input drift.
This function may not be available, depending on the type of input module.

### Tips

- This function is for canceling internal offset and drift, and does not cancel the offset of the input signal.
- If you want to execute zero adjustment for multiple modules/channels at once, see "4.3.3 Batch Execution".

## 4.3.3. Batch Execution

You can perform batch operations such as zero adjustment or balance adjustment with measurement enabled for the following modules.

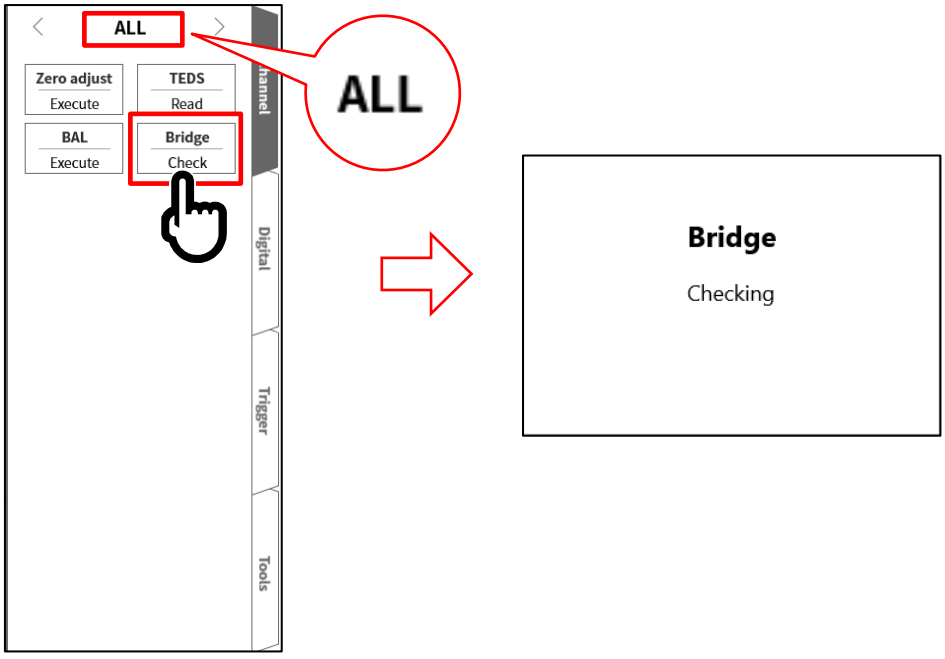
| Target Module | Process Executed |
|---|---|
| RA30-101/102/103/107/113 | Zero adjustment |
| RA30-104 | BAL |
| | Bridge check |
| RA30-109 | TEDS reading |

### Tips

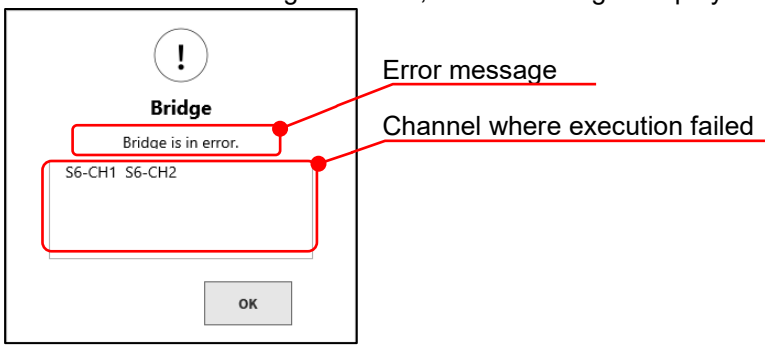
- ❑ If you want to execute the above processes for a channel with measurement disabled, execute them individually from the channel setup sub menu for each module.

Step 1. Tap the【CH】key on the side menu to display the sub menu.
Step 2. Tap the【Channel】tab in the sub menu to display the channel setup sub menu.
Step 3. Tap the【<】key on the left or【>】key on the right or swipe the sub menu to the left or right to switch the displayed slot to [ALL].
Step 4. Tap a key in the sub menu to start batch execution.
If the process terminates without an error, the dialog box automatically closes.

Channel setup sub menu



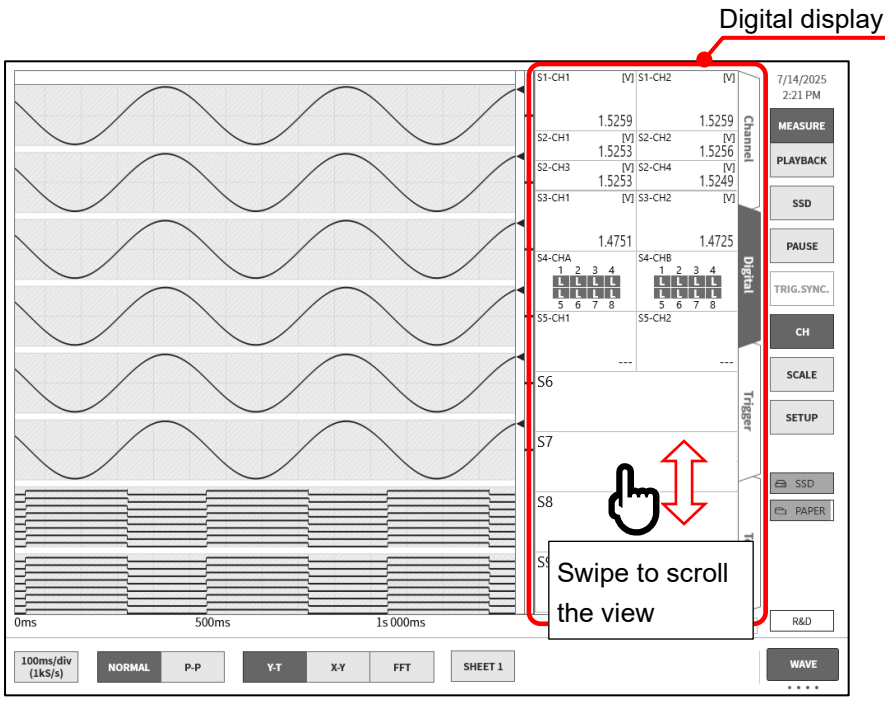

If an error is detected during execution, an error dialog is displayed.



## 4.3.4. Digital Display

A maximum of 45 measured values, units, or signal names are digitally displayed in the sub menu.

You can customize the items to display. The measured values differ according to the channel type and data format, and the latest values on the right edge of the Y-T waveform are displayed.

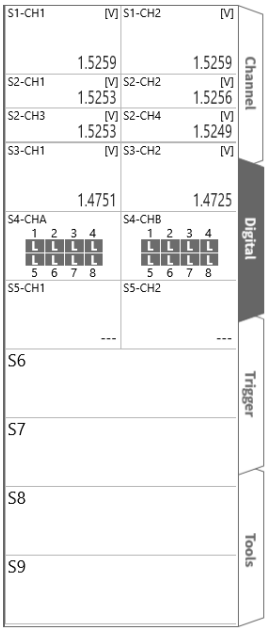



| Channel type | Data format | Measured value |
|---|---|---|
| Analog | NORMAL | Sample value |
| | P-P | Maximum value |
| Logic | NORMAL | Sample value |
| | P-P | |

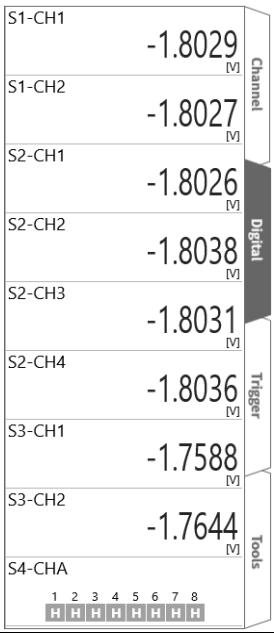
### 4.3.4.1. Customization

You can create customized screens such as those indicated below. You can display a slot or channel of your choice for each item.

Slot view



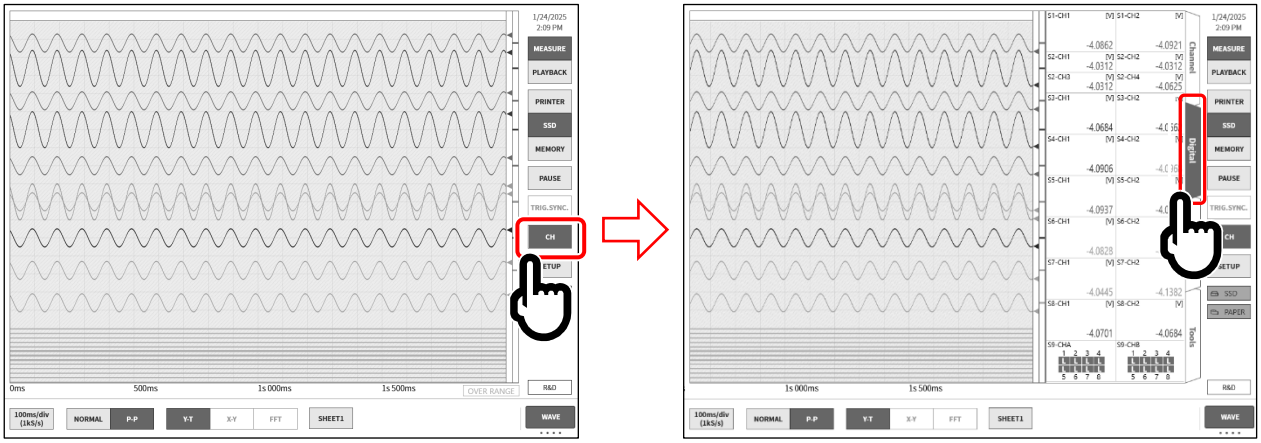

Channel view



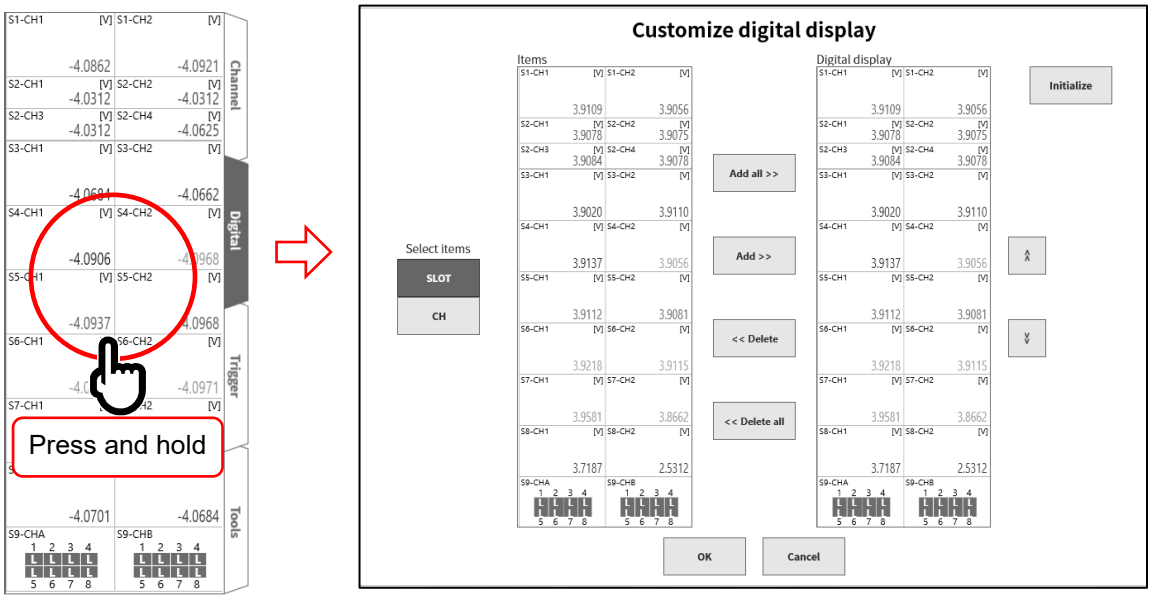
## 4.3.4.2. Configuration Method

Step 1. Tap the【CH】key in the side menu to display the sub menu.

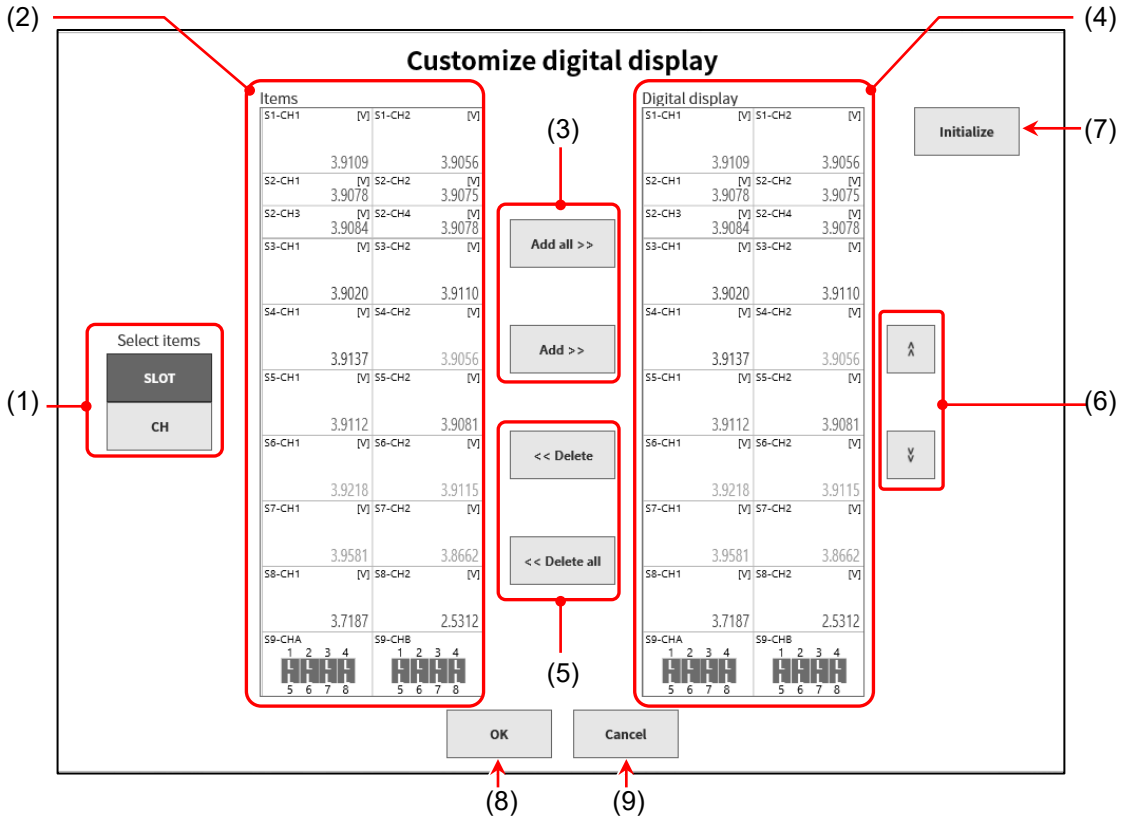
Step 2. Tap the【Digital】tab in the sub menu to display the digital display.




Step 3. Press and hold the digital display to display the [Customize digital display] screen.



Step 4. On the [Customize digital display] screen, you can change the items displayed in the digital display.




(1) Select items : Switches the items displayed in [Items].
Select【SLOT】to display/select items by slot or select【CH】to display/select items by channel.

(2) Items : A list of the attached modules or channels.
Select one item to add.

(3) Add/Add all : Adds the items in [Items] to [Digital display].
Add : Adds the item selected in [Items].
Add all : Adds all the items in [Items].

(4) Digital display : The information displayed in the digital display.
Select one item to delete or move.
Only one of each item can be registered.

(5) Delete/Delete all : Deletes the items in [Digital display].
Delete : Deletes the item selected in [Digital display].
Delete all : Deletes all the items in [Digital display].

(6) ∧ ∨ : Moves the position of the item selected in [Digital display].

(7) Initialize : Restores the initial values of the settings in [Digital display] (all slots are displayed again).

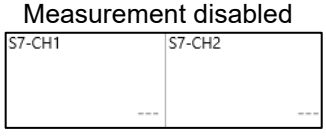
(8) OK : Reflects the settings and closes the screen.

(9) Cancel : Closes the screen without reflecting the settings.

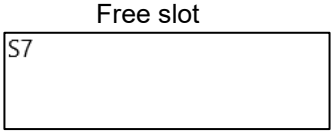
## Tips

❑ For items with a channel with measurement disabled selected, digital values are displayed as "– – –".
For items with a free slot selected, only the slot/channel number is displayed.

Measurement disabled




Free slot



# 4.4. Selecting the Recording Method

## 4.4.1. Recording to Recording Paper Only

Perform "pen recording" to record to recording paper only, without saving a file.

See "4.5.3. Chart Speed", "6.3.1. Pen Recording", and "6.3.3. Waveform Printing".

## 4.4.2. Recording to a File and Recording Paper

Save the measurement data to a file and print it to recording paper.

This function provides the following.

- Nine types of recording modes (start trigger, interval, etc.)
- Simultaneous recording to three recording devices (printer, SSD, and memory)
- Enabling/disabling of real-time waveform printing
- Memory recording via memory triggers at 18 trigger sources
- Starting recording via start triggers at arbitrary timing
- Delete then save function for recorded data

See "6.4. Recording".

# 4.5. Recording Devices

## 4.5.1. Features of Recording Devices

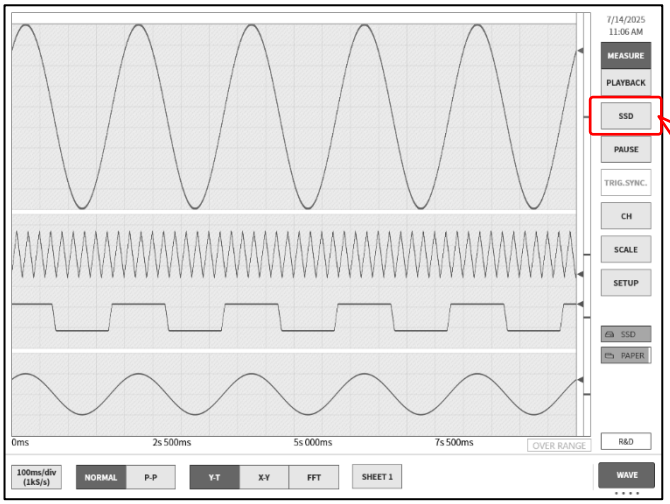
There are three types of recording device (printer, SSD, and memory).
The available sampling speed range and features of each device are indicated below.

| | | |
|---|---|---|
| PRINTER | Speed | Low speed sampling: Maximum 1 kS/s |
| | Features | Enables waveform recording for a maximum of 48 channels of input signals to be recorded to recording paper for a long time.<br>Because waveform recording is performed with P-P sampling, sudden transient phenomena can be recorded even with low speed recording.<br>Recording can be performed to recording paper and the internal SSD simultaneously, at an arbitrary step speed.<br>Sampling can also be performed in synchronization with an external signal.<br>This can be configured with the chart speed. |
| SSD | Speed | Medium speed sampling : Maximum 1 MS/s |
| | Features | Records data to the internal SSD with NORMAL or P-P sampling for a long time.<br>If data was recorded with NORMAL sampling. FFT analysis and an X-Y waveform can be displayed in addition to a Y-T waveform. |
| MEMORY | Speed | High speed sampling : Maximum 20 MS/s |
| | Features | Records data to the internal memory with NORMAL sampling when a trigger is detected, such as an abnormal waveform.<br>Because data is recorded to the high speed internal memory, data can be recorded at high speed with NORMAL sampling when a trigger is detected, such as an abnormal waveform.<br>By dividing the memory, multiple detected triggers can be recorded individually. |

For information on selecting the recording device, see "1.6.2. Side menu" and "6.4.1. Recording Setup".

## 4.5.2. Setup the Sampling Speed

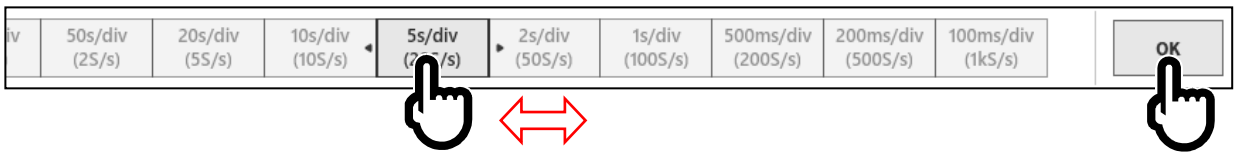
An image of the waveform recorded on the selected recording device (PRINTER, SSD, or MEMORY) is displayed on the waveform monitor.
The sampling speed of the image waveform recorded on the selected recording device is displayed on the left edge of the control bar.





An image of the waveform recorded on the selected device is displayed on the waveform monitor.


Tap to display the selectable sampling speed table.




Tap the sampling speed to display the waveform sampled at that speed.

Swipe the table to the left or right to display the hidden velocity table.

When the sampling speed is decided, tap【OK】on the right edge to close the table.

You can switch the unit for the sampling speed.
For details, see the "RA3100 Instruction Manual".

## 4.5.3. Chart Speed

When [PRINTER] is selected for the recording device, you can set the sampling speed with the chart speed.

By switching to the chart speed view, you can configure an arbitrary speed or perform a one-touch setting.

### Switching to the Chart Speed View

In [Other] in [Recording setup], set [Printer speed] to 【Chart speed】.

For details, see the "RA3100 Instruction Manual".

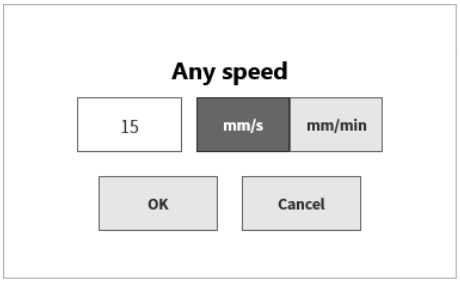

The sampling speed in the 【WAVE】 control bar switches to the chart speed.


### Configuring an Arbitrary Speed

You can configure the chart speed in single increments. Either mm/s or mm/min can be selected for the unit.

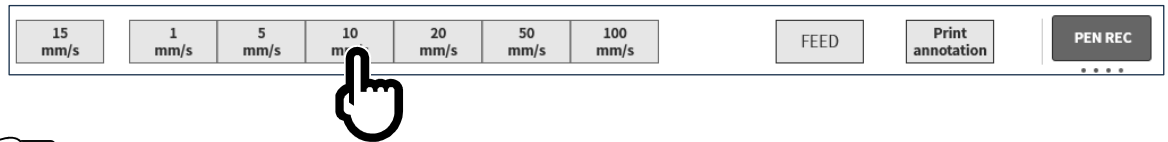
Step 1. Select 【Any Speed】 from the sampling speed table, then tap 【OK】.


Step 2. In the [Any speed] dialog, configure the speed and unit.




### Performing a One-Touch Setting

You can tap the chart speed key of the 【PEN REC】 control bar to change the speed with a single touch.




In [Other] in [Recording setup], register [Printer speed].

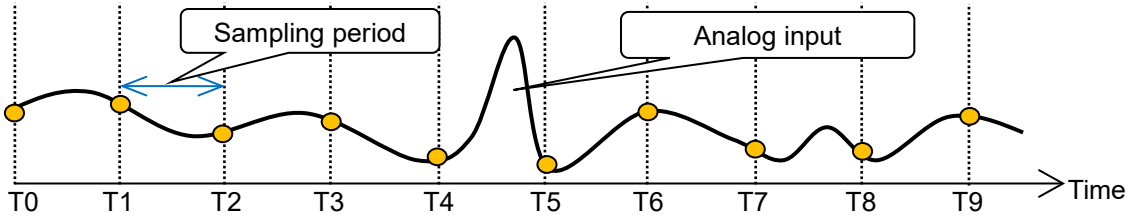
For details, see the "RA3100 Instruction Manual".

## 4.5.4. Sampling Data Format

This product has two data formats: NORMAL sampling and P-P sampling.

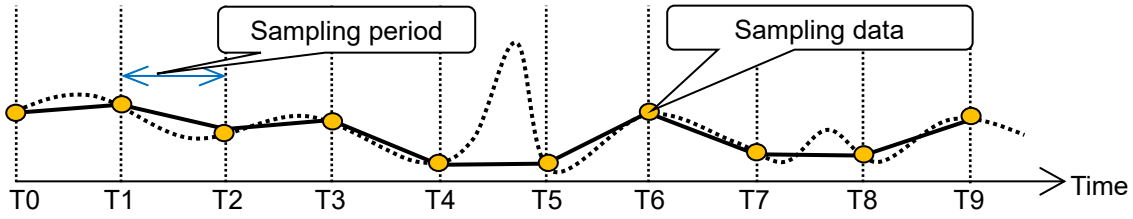
### 4.5.4.1. NORMAL Sampling

With NORMAL sampling, the A/D value of the sampling period is recorded as data and used for waveform reproduction and data analysis.

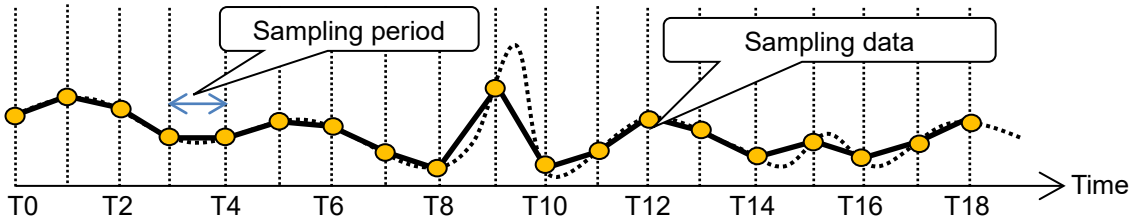



Playback the input waveform from sampling data

If the input signal is too fast for the sampling period, the waveform reproducibility may drop and lead to the unexpected loss of pulses.




Raising the sampling speed improves the waveform reproducibility but increases the recorded data.

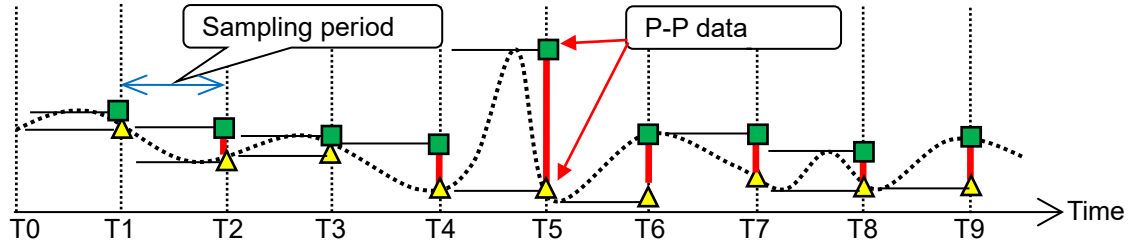



### 4.5.4.2. P-P Sampling

P-P sampling performs sampling with the data within the sampling period as the fastest sampling (20 MS/s), to detect the peak values (maximum value and minimum value) and record those peak values as the recorded data.

This data format is suitable for the waveform playback of long-term recording, as it enables waveform reproducibility of a wide band of data, without sudden spike noise, etc.

A disadvantage is that it cannot perform data analysis after recording (average, RMS, FFT, etc.)



## 4.5.5. Sampling

### 4.5.5.1. Internal Sampling

The sampling speed can be set for printer recording, SSD recording, and memory recording separately. The maximum sampling speed differs for each recording. For information on specifications, see "10.1.1. Main Unit Basic Specifications".

### 4.5.5.2. External Sampling

With pen recording, printer recording, and SSD recording, external sampling is possible, where sampling is performed synchronized to the input of an external clock signal. However, only one device can record, either printer recording or SSD recording.

The clock signal of external sampling is input to the "EXT SMPL IN" terminal of Remote Control Module (RA30-112).

### 4.5.5.3. Relationship between Sampling Speed and Chart Speed

The relationship between sampling speed and chart speed is indicated in the table below.

| Sampling | Sampling speed | | Chart speed |
|---|---|---|---|
| | Frequency | Period | |
| Internal | 100 ms/div (1 kS/s) | 100 ms/div (1 ms) | 100 mm/s |
| | 200 ms/div (500 S/s) | 200 ms/div (2 ms) | 50 mm/s |
| | 500 ms/div (200 S/s) | 500 ms/div (5 ms) | 20 mm/s |
| | 1 s/div (100 S/s) | 1 s/div (10 ms) | 10 mm/s |
| | 2 s/div (50 S/s) | 2 s/div (20 ms) | 5 mm/s |
| | 5 s/div (20 S/s) | 5 s/div (50 ms) | 2 mm/s |
| | 10 s/div (10 S/s) | 10 s/div (100 ms) | 1 mm/s |
| | 20 s/div (5 S/s) | 20 s/div (200 ms) | 30 mm/min |
| | 50 s/div (2 S/s) | 50 s/div (500 ms) | 12 mm/min |
| | 100 s/div (1 S/s) | 100 s/div (1 s) | 6 mm/min |
| | 2 min/div (50 S/min) | 2 min/div (1.2 s) | 5 mm/min |
| | 5 min/div (20 S/min) | 5 min/div (3 s) | 2 mm/min |
| | 10 min/div (10 S/min) | 10 min/div (6 s) | 1 mm/min |
| External | EXT. | | |

# 5. Trigger Setup

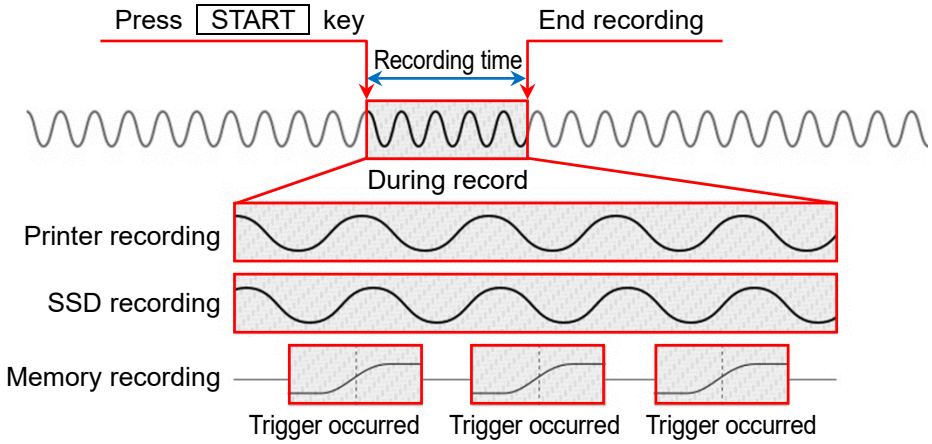
## 5.1. Trigger Types

This product has two types of triggers: Memory triggers for memory recording and Start triggers for starting recording.

## 5.2. Memory trigger

Memory trigger is a signal for enabling memory recording, and is occurred when the trigger conditions of the channel specified in the trigger source are established.

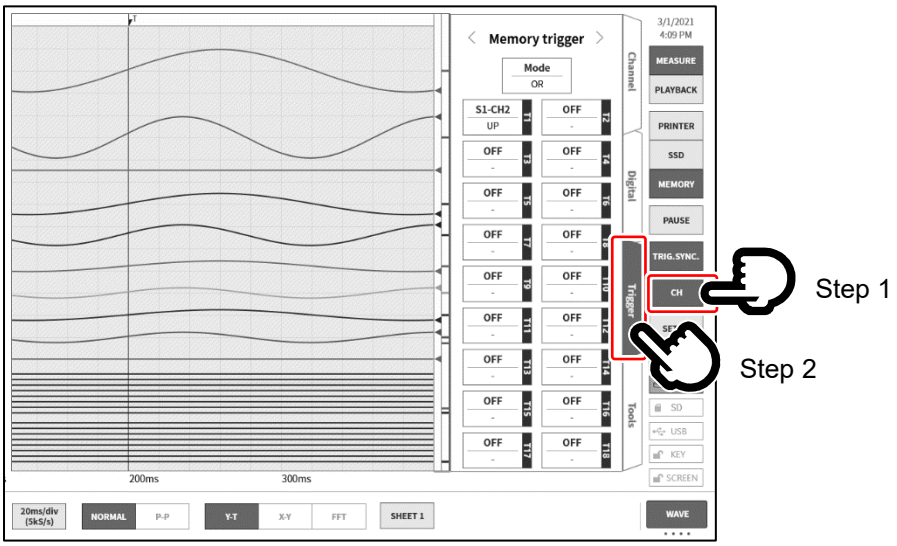
When a trigger is detected, memory recording is performed with the data count set in the pre-trigger and memory block size, which represents a single recording operation. When multiple memory blocks (memory divisions) are set, recording starts for the next block when one block has finished recording.



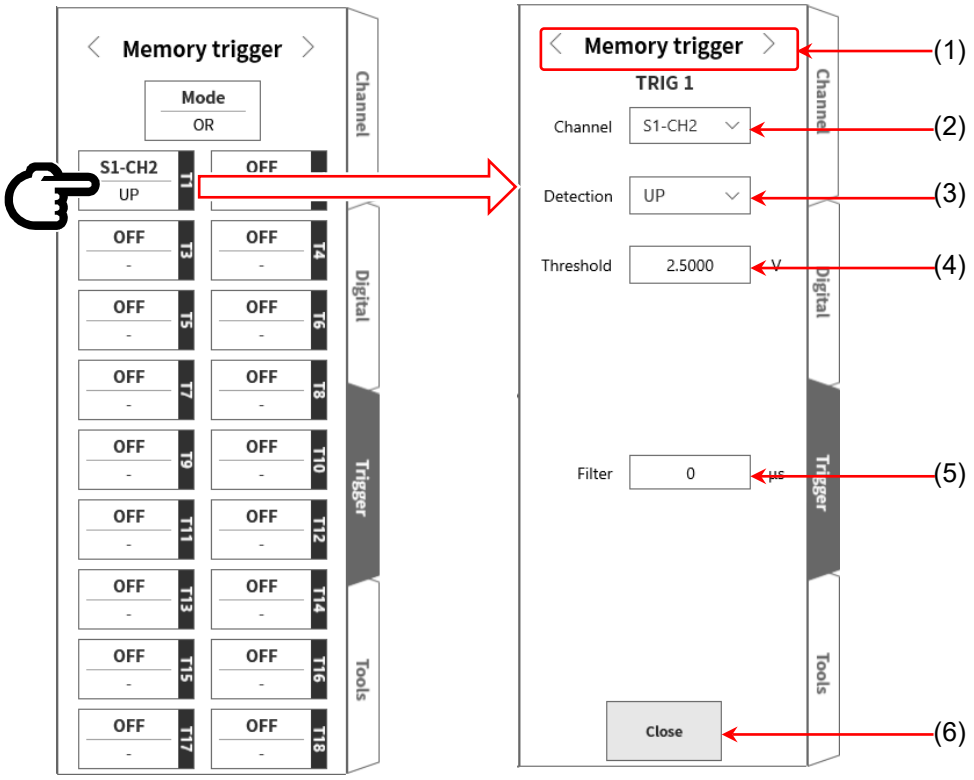

### 5.2.1. Memory Trigger Setup

Step 1. Tap the【CH】key on the side menu to display the sub menu.

Step 2. Tap the【Trigger】tab in the sub menu to display the trigger setup screen.



Step 3. Up to 18 trigger sources (【T1】 to 【T18】) can be set.
Tap the number of the trigger source to set to display the details screen.




(1) Trigger menu selection:
Switches between the Memory trigger, Start trigger, or Memory block menu

(2) Channel: Selects the TRIGn source channel.

(3) Detection: Selects UP, DOWN, INTO WIN, or OUT WIN for the polarity of the trigger signal.

| | |
|---|---|
| UP | The trigger is detected when the value exceeds the trigger level (threshold). |
| DOWN | The trigger is detected when the value is below the trigger level (threshold). |
| INTO WIN | The trigger is detected when the value enters the range of the upper limit value or lower limit value of the trigger level. |
| OUT WIN | The trigger is detected when the value leaves the range of the upper limit value or lower limit value of the trigger level. |

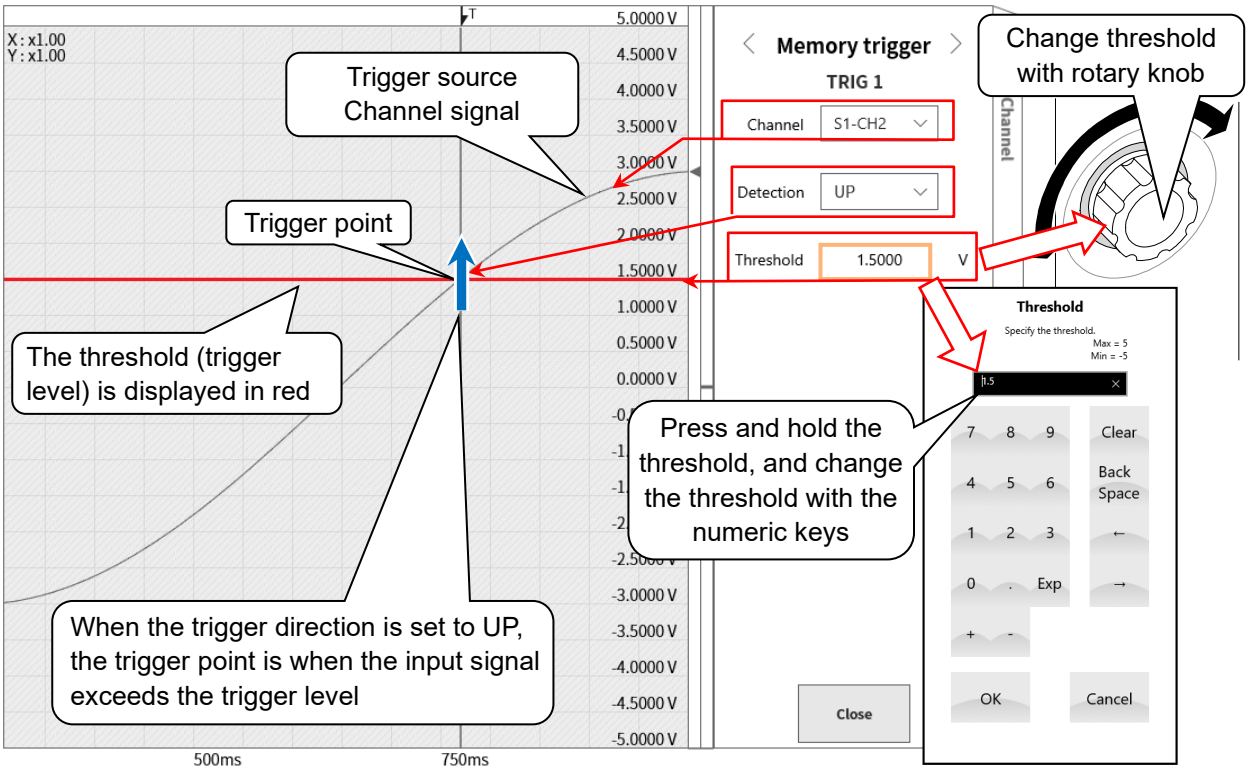
(4) Threshold: Sets the trigger level (threshold).
For INTO WIN / OUT WIN, there are two settings: the upper threshold and lower threshold.

(5) Filter: Sets the filter time for noise removal.

(6) Close: Ends the setting operation and returns to the trigger list.

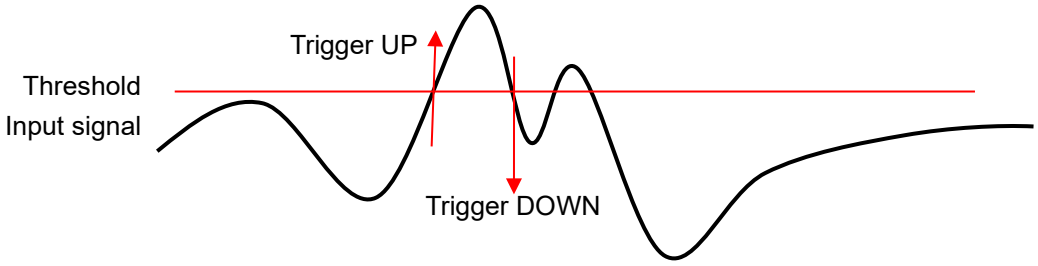
**⚠CAUTION**

❑ The trigger level is a value relative to the set measurement range. The value also changes when the measurement range is changed.
(Example) When the trigger level is set to 10 mV when the range is 100 mV, and then the measurement range is changed to 200 mV, the trigger level is changed to 20 mV.

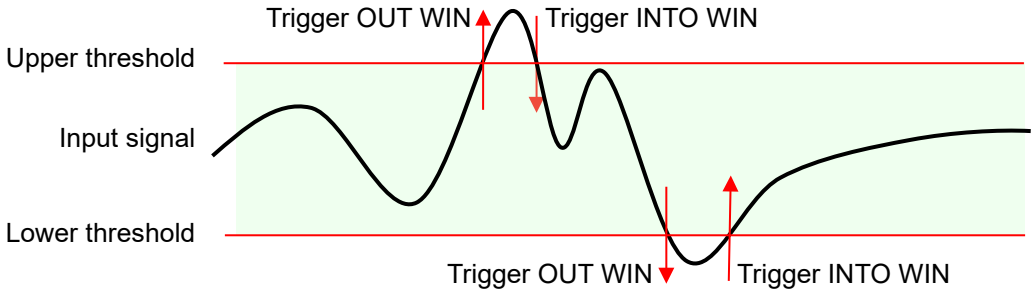



## Description of trigger source (3) Detection and (4) Threshold

❑ When the OR/AND trigger is used: (3) Trigger detection when the UP/DOWN trigger is selected for detection.



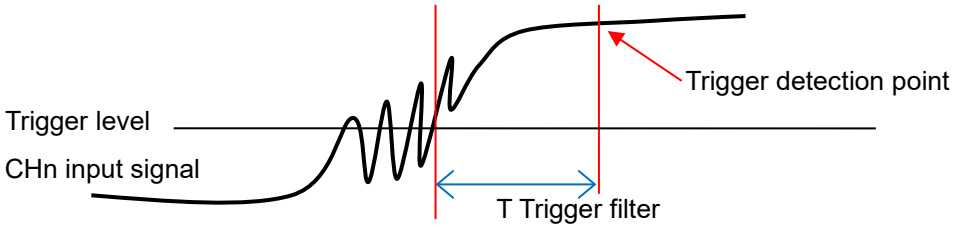

❑ When the window trigger is used: (3) Trigger detection when the INTO WIN / OUT WIN trigger is selected for detection.



### Description of trigger source (5) Filter

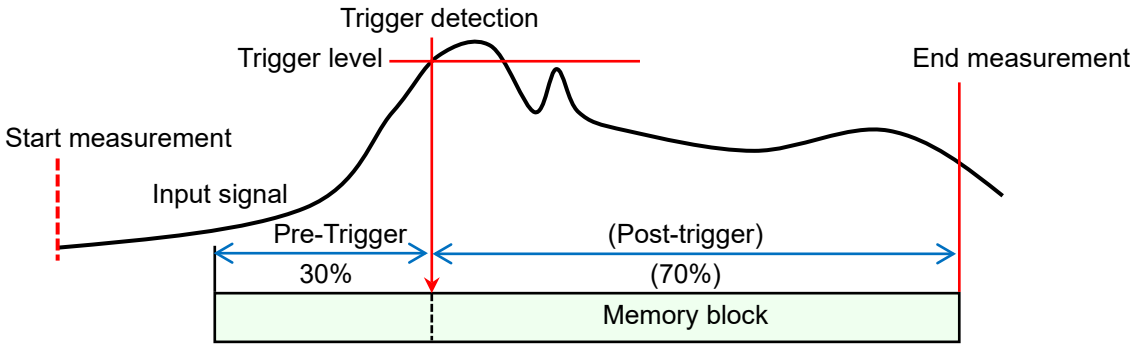
❑ Trigger filter

The trigger filter function ensures that a trigger is detected when the trigger conditions are met for a specified period of time, in order to prevent erroneous trigger detection due to noise or chattering in the signal near the trigger level.




## 5.3. Pre-Trigger

When performing memory recording, a pre-trigger can be set to adjust the recording length before and after the trigger detection point in the memory block.

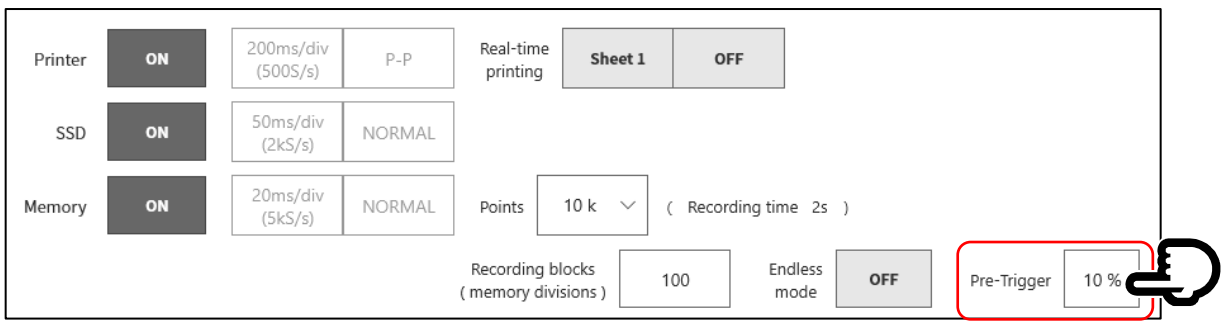



### 5.3.1. Pre-Trigger Setup

❑ Tap the【SETUP】key on the side menu to display the setup menu.

❑ Tap the【Recording】tab in the recording setup to display the recording setup screen.
The recording device settings are displayed below the recording setup.

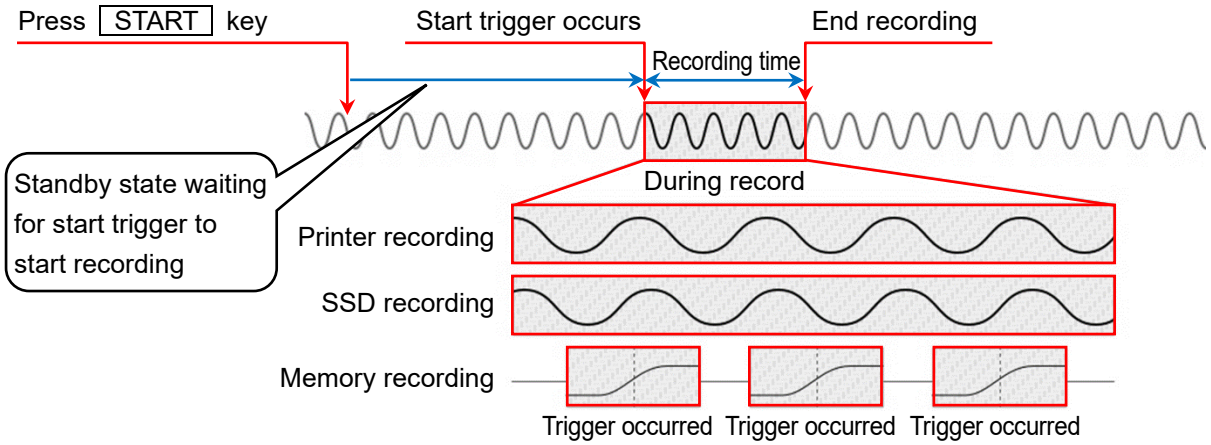
❑ Tap【Pre-Trigger】on the right of memory recording to set the pre-trigger.



# 5.4. Start Trigger

The start trigger function starts recording when the trigger conditions are established for the channel specified in the trigger source. Press the START key on the operation panel to put this product in the standby state.

Printer recording, SSD recording, and memory recording start when the start trigger is detected.

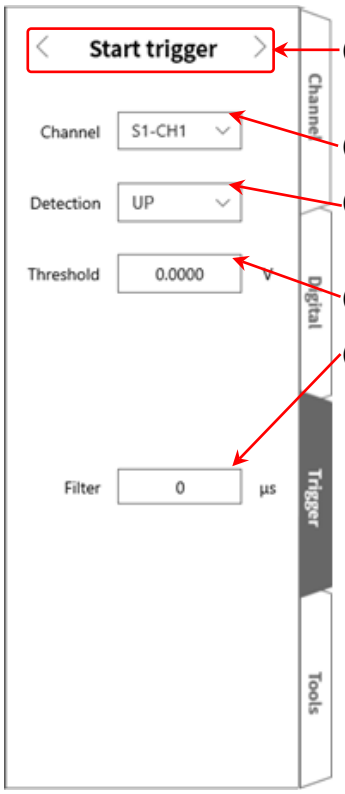



## 5.4.1. Start Trigger Setup

Step 1. Tap the【CH】key on the side menu to display the sub menu.

Step 2. Tap the【Trigger】tab in the sub menu to display the trigger setup screen.

Step 3. Tap the【trigger menu selection】on the top of the trigger setup screen (1) to display [Start trigger].




(1) Trigger menu selection: Switches the menu.

(2) Channel: Selects the start trigger source channel.

(3) Detection: Selects UP, DOWN, INTO WIN, or OUT WIN for the polarity of the trigger signal.

(4) Threshold: Sets the trigger level (threshold).

(5) Filter: Sets the filter time for noise removal.

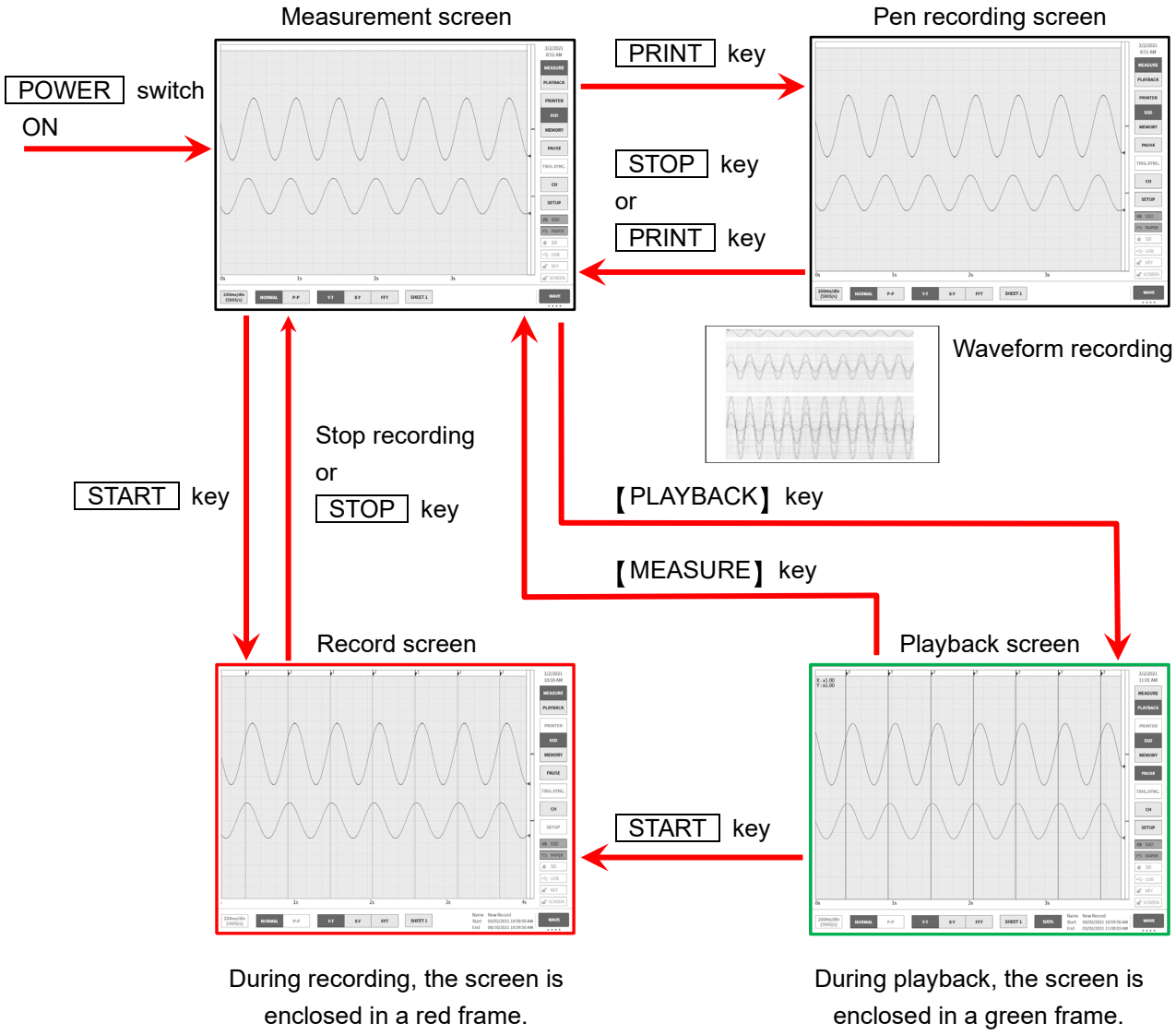
The setup and operations of (1) to (5) are the same as "5.2. Memory trigger".

# 6. Measuring Input Signals

## 6.1. State Transition of Main Unit Operation

This product is divided into three states according to the operation state: measure, record, and playback.

The [PRINT] key can also be pressed in the measurement state to perform pen recording (real-time waveform printing).The [START] key can also be pressed in the measure state to perform printer recording, SSD recording, and memory recording.




**Tips**

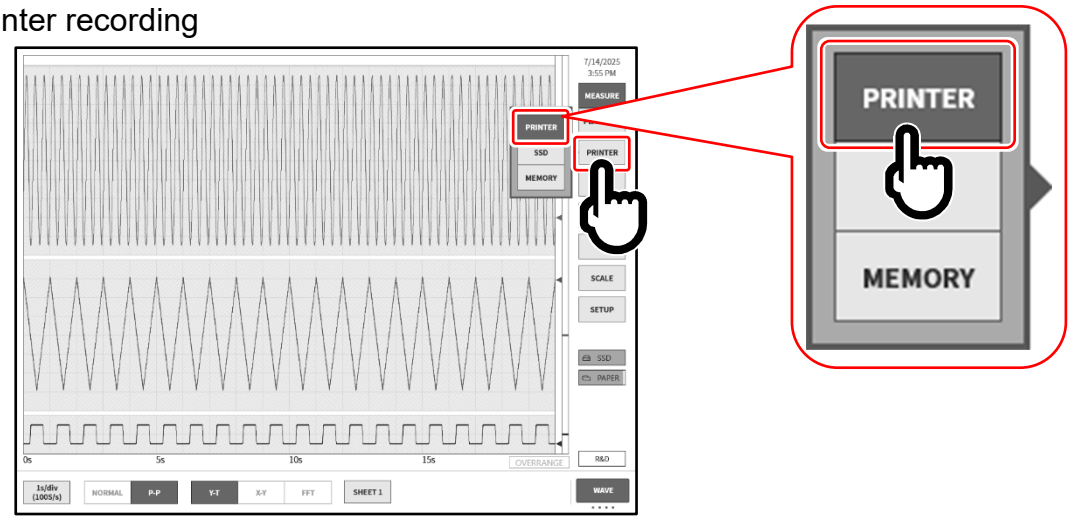
- With software version 1.x.x, this product automatically switches from the recording screen to the playback screen after recording is complete.

# 6.2. Waveform Monitor

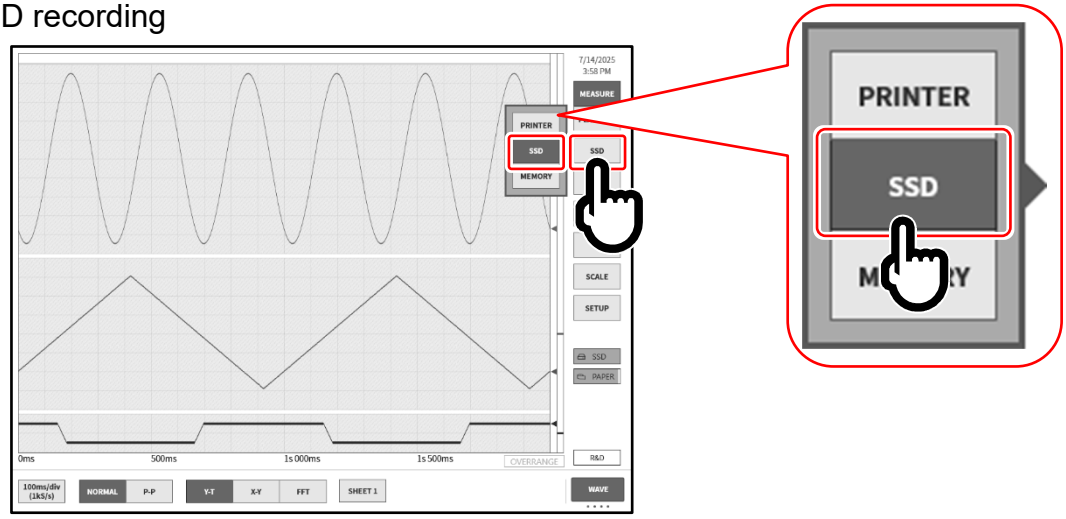
## 6.2.1. Selecting the Recording Device

Tap the recording device selection key in the side menu to display the image waveform recorded to the selected device on the monitor.

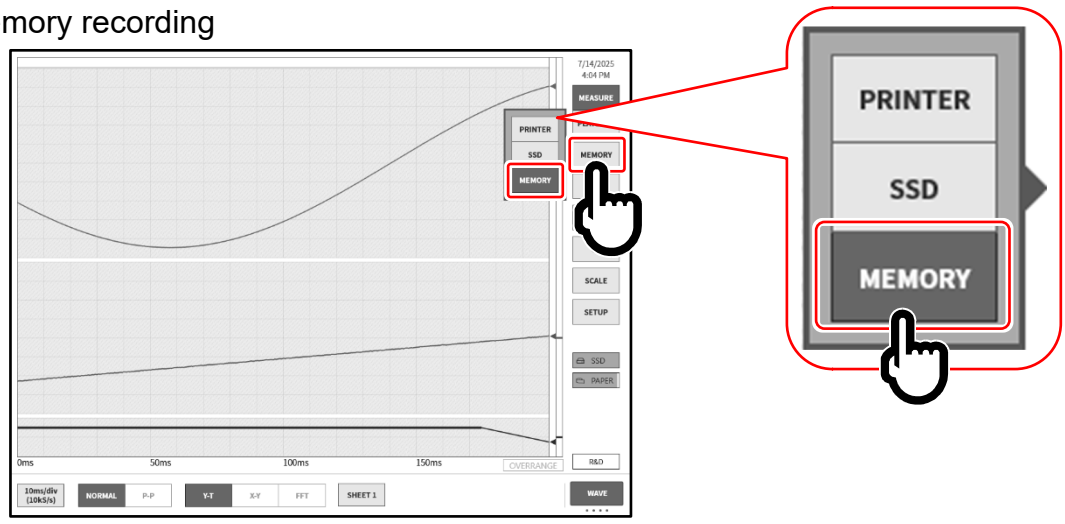
### Printer recording




### SSD recording



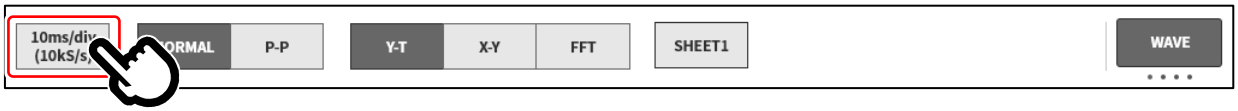

### Memory recording



## 6.2.2. Sampling speed

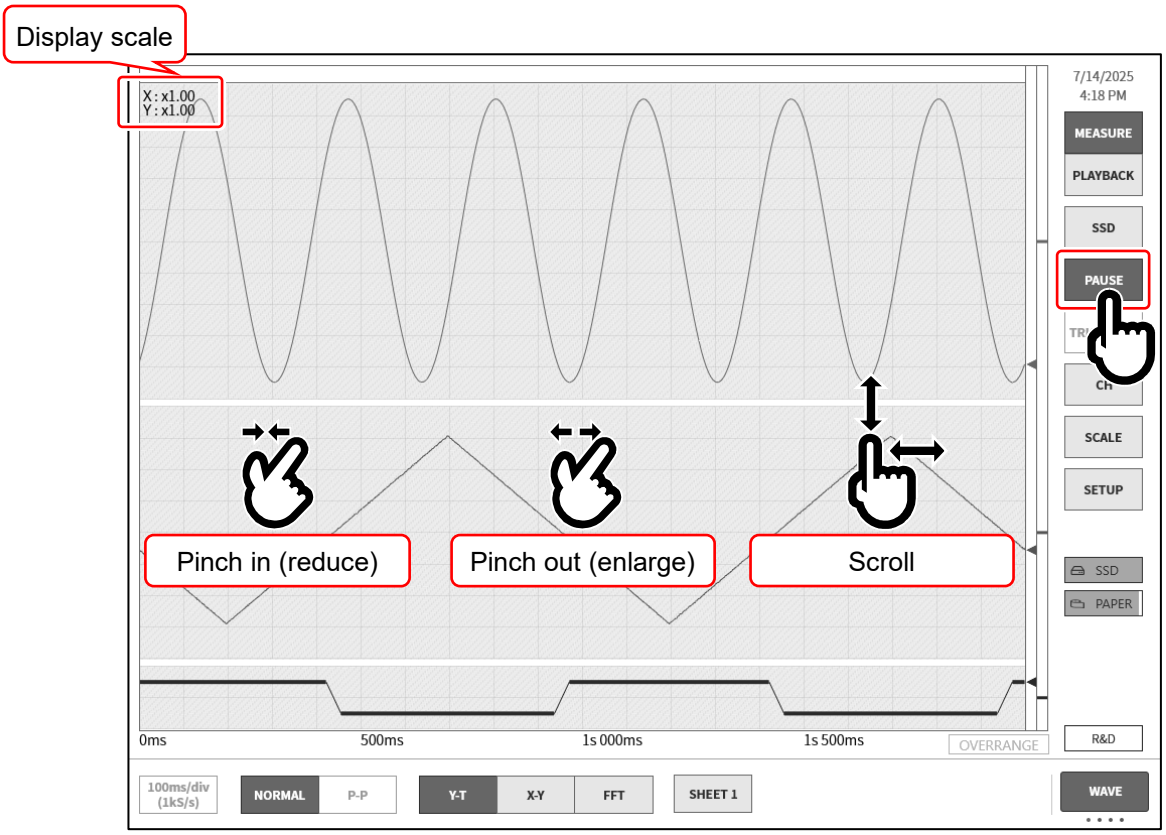
Use the【Sampling speed】key on the left edge of the control bar to change the sampling speed according to the recording device. Set the optimal sampling speed while viewing the waveform monitor.

☞ For details, see "4.5.1. Features of Recording Devices".



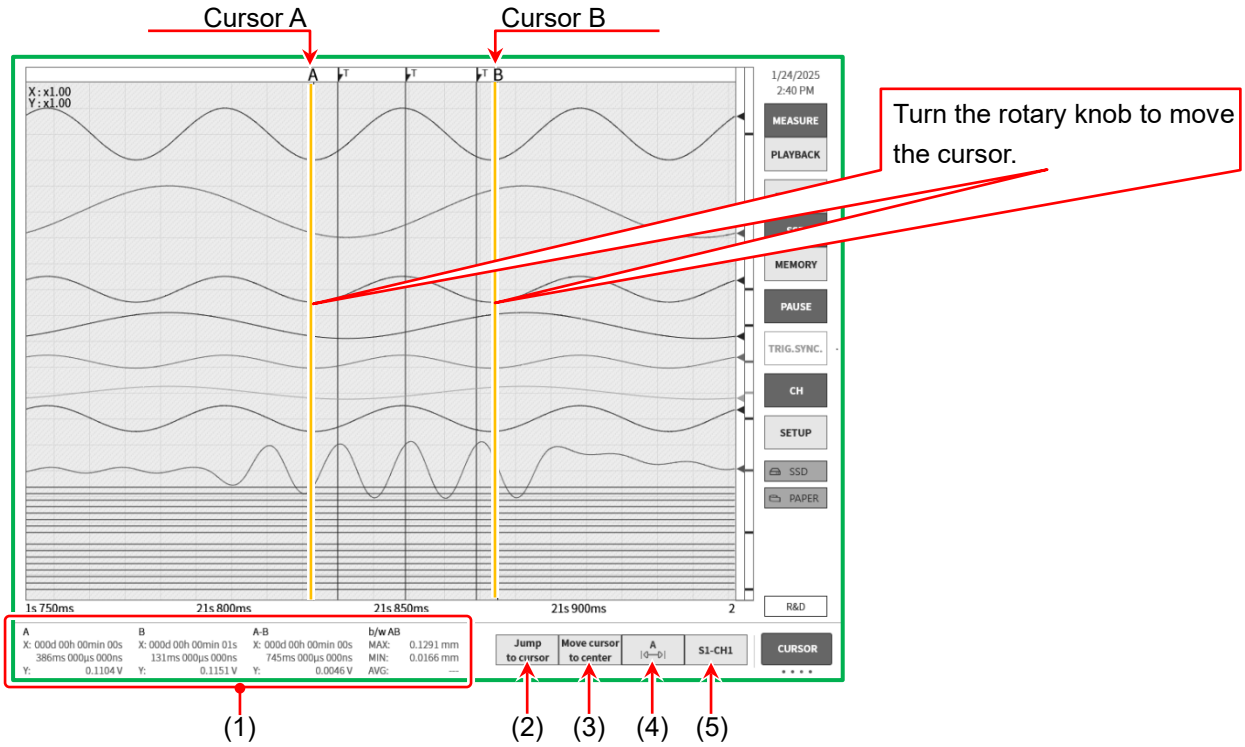

## 6.2.3. Pausing the Waveform Monitor (PAUSE)

Tap the【PAUSE】key in the side menu during waveform monitoring to pause the monitor.
You can pinch in/out the waveform monitor in this state to zoom the waveform in or out.
You can also swipe the screen up, down, left, or right with one finger to scroll the view area.



## 6.2.4. Cursors

By selecting【CURSOR】with the【Display Switch】key on the bottom right of the control bar while operation is paused, you can display two time axis cursors (Cursor A and Cursor B), which display the cursor value of the selected channel.




(1) Cursor values

A: The recorded information at the position of Cursor A

X: The time since recording started Y: The data value of the selected channel

B: The recorded information at the position of Cursor B

X: The time since recording started Y: The data value of the selected channel

A−B: The difference information between Cursor A and Cursor B

X: The time between Cursor A and Cursor B

Y: The difference in the data value between Cursor A and Cursor B

* Not displayed for a logic channel.

b/w AB: The maximum value (MAX), minimum value (MIN), and average value (AVG) between Cursor A and Cursor B

* The average value is not displayed for P−P sampling.

**Tips**

- ❑ For external sampling, X is displayed as the number of points.
- ❑ For P−P sampling, Y is displayed as the maximum data value.
  However, the minimum value (MIN) between A and B is calculated from the minimum data value of A and B.

(2) 【Jump to cursor】key

Tap this key to move the waveform so that the cursor position is in the center of the screen.

(3) 【Move cursor to center】key

Tap this key to move the specified cursor to the center of the monitor.

(4) Cursor selection

Selects the cursor to change the position of. Each time this key is tapped, the selected cursor switches in the order【A】>【B】>【A-B】.

If you select【A】then turn the rotary knob, Cursor A moves.

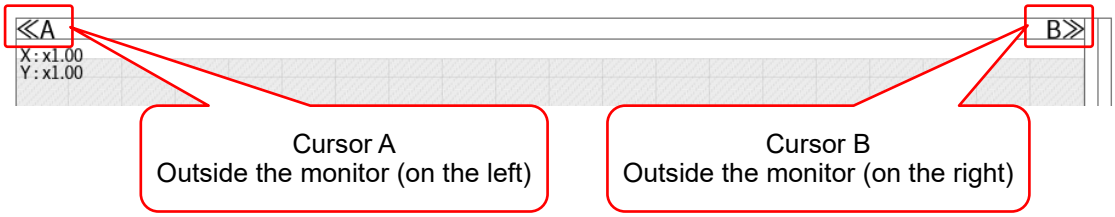
If you select【B】then turn the rotary knob, Cursor B moves.

If you select【A-B】then turn the rotary knob, Cursor A and Cursor B move with the distance between the cursors maintained.

**Tips**

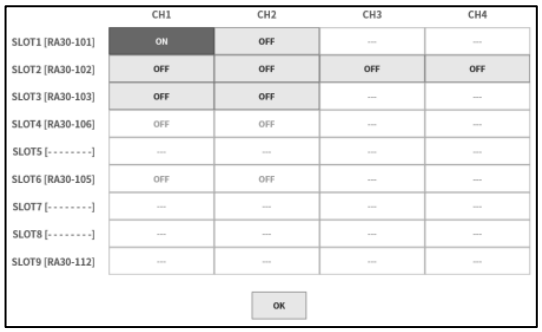
❑ You can also tap the A or B mark above a cursor to select that cursor.


❑ If a cursor is outside the waveform monitor, the << or >> mark is displayed above the cursor.




(5) Channel selection

Selects the channel to display in the cursor position information. Tap the【channel selection】key to display the channel selection screen, which enables you to select the channel to display in the cursor position information.




**Tips**

❑ A logic channel cannot be selected.

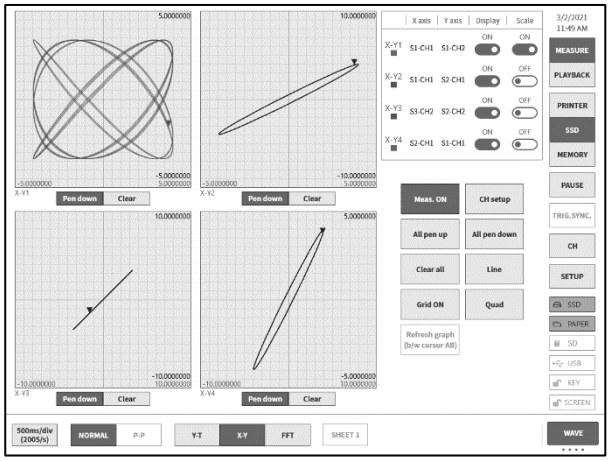
## 6.2.5. X-Y Waveform and FFT Analysis

When【SSD】is selected as the recording device and【NORMAL】is selected as the data format, FFT analysis and the X-Y waveform display for the control bar waveform format are enabled.

☞ For details on X-Y waveform display and FFT analysis, see the "RA3100 Instruction Manual".

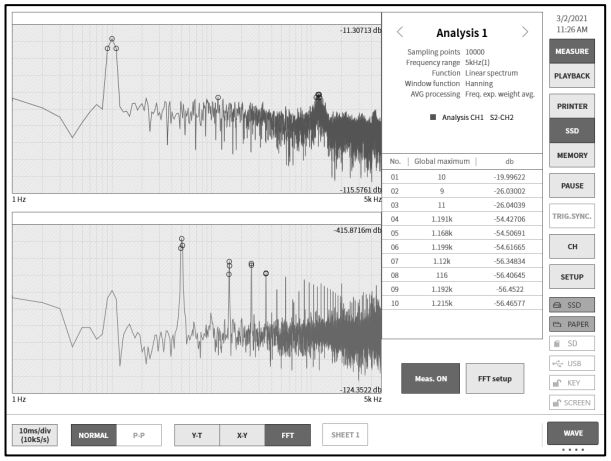

### X-Y waveform conditions

Recording device: SSD
Sampling speed: 1 kS/s or lower
Data format: NORMAL
Analog input module: 2 channels or above



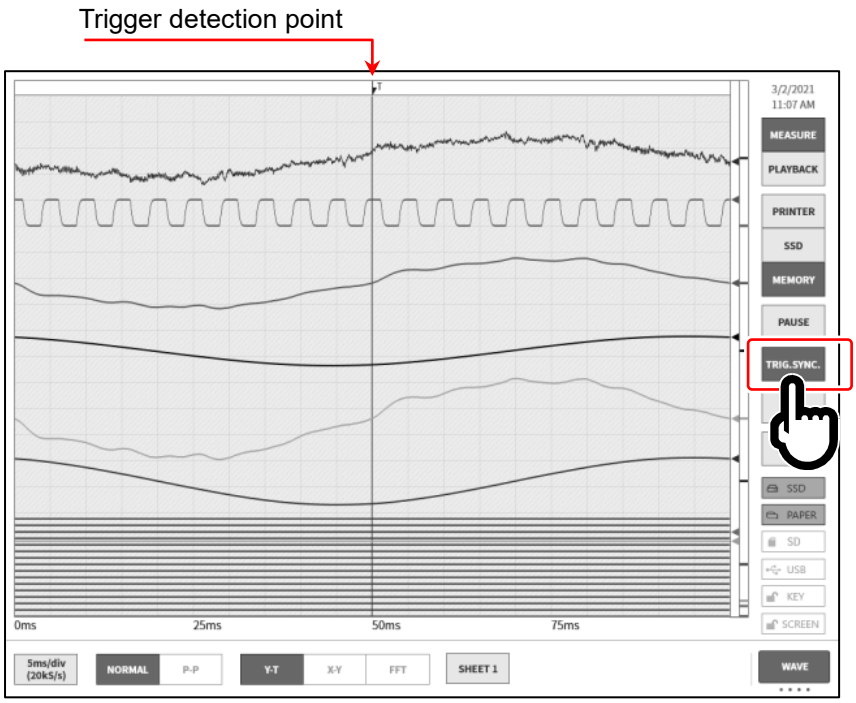
### FFT analysis conditions

Recording device: SSD
Sampling speed: 1 MS/s or lower
Data format: NORMAL
Analog input module: 1 channel or 2 channels



## 6.2.6. Trigger Synchronization

When the recording device is set to【MEMORY】, a trigger is set, and【TRIG.SYNC.】is enabled, the latest waveform is displayed with the displayed waveform synchronized to trigger detection.

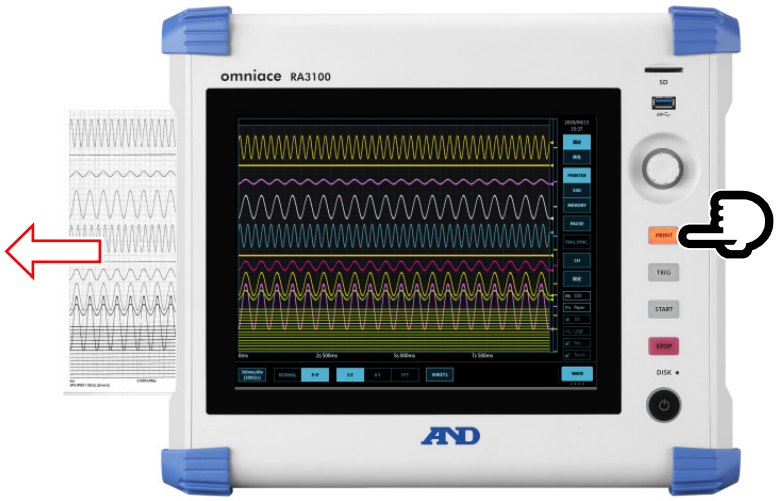


# 6.3. Pen Recording

Pen recording enables waveform printing to the recording paper without saving the measurement data. This enables single-touch simple and certain waveform recording like a conventional pen recorder.

## 6.3.1. Pen Recording

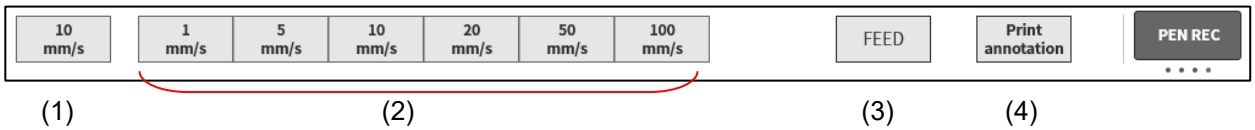
Press the PRINT key on the operation panel when the waveform format is set to【Y-T】to perform real-time waveform printing of the displayed sheet.
The chart speed (sampling speed) and input module settings can be changed while executing pen recording.




Press the PRINT key on the operation panel to start waveform recording with the printer.

## 6.3.2. Pen Recording Operations

Tap the menu on the right edge of the control bar and select【PEN REC】to enter the pen recording mode, which enables you to configure the chart speed and perform recording paper operations.




(1) Printer speed: Displays the chart speed and sampling speed of printer recording or pen recording.

(2) Chart speed (six items): Enables you to switch to a frequently used chart speed with a single touch. Chart speed keys can be registered with [Chart speed key] in [Other] in [Recording setup].

(3) FEED: The recording paper is fed (idle feeding) while this is pressed.

(4) Print annotation: Tap this key during waveform recording to print annotation text together with the waveform at a time of your choice. For information on annotation text, see "8.3.1. Printing Setup".

**Tips**

❑ (1) Printer speed and (2) Chart speed can only be operated when the recording device is set to【PRINTER】and the speed unit notation is set to chart speed. Otherwise, the key will be disabled.

## 6.3.3. Waveform Printing

When printing a waveform, you can print various information to the header, waveform, and footer.

Header: Enables you to print the header text and signal name before waveform recording.

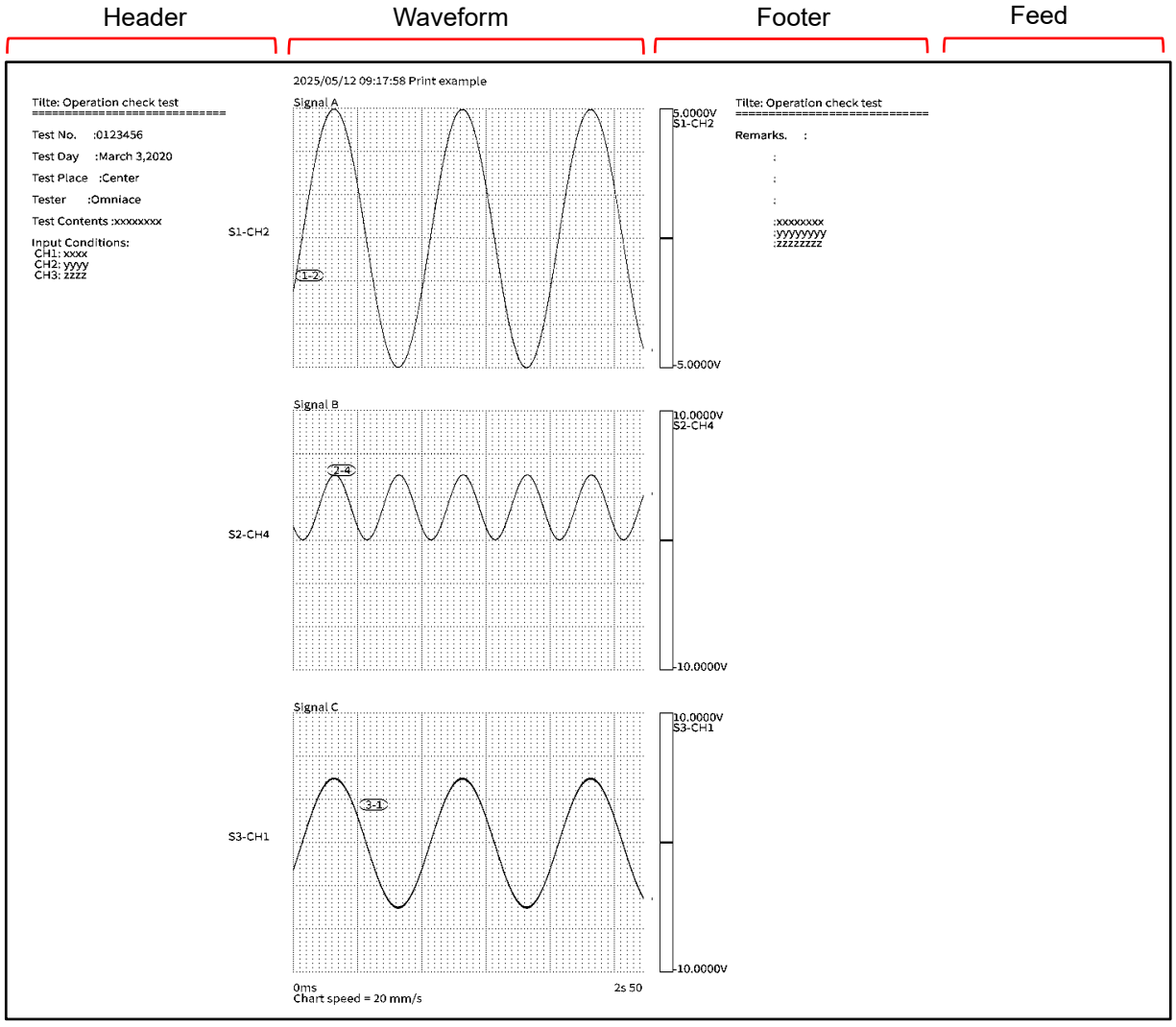
Waveform: Enables you to print the annotation text, grid, date, data name, channel mark, time axis, and recording speed during waveform recording.

Footer: Enables you to print the footer text and scale after waveform recording.

Feed: Enables you to feed the recording paper after footer printing.

For details, see "8.3. Printer".

Example of printing:

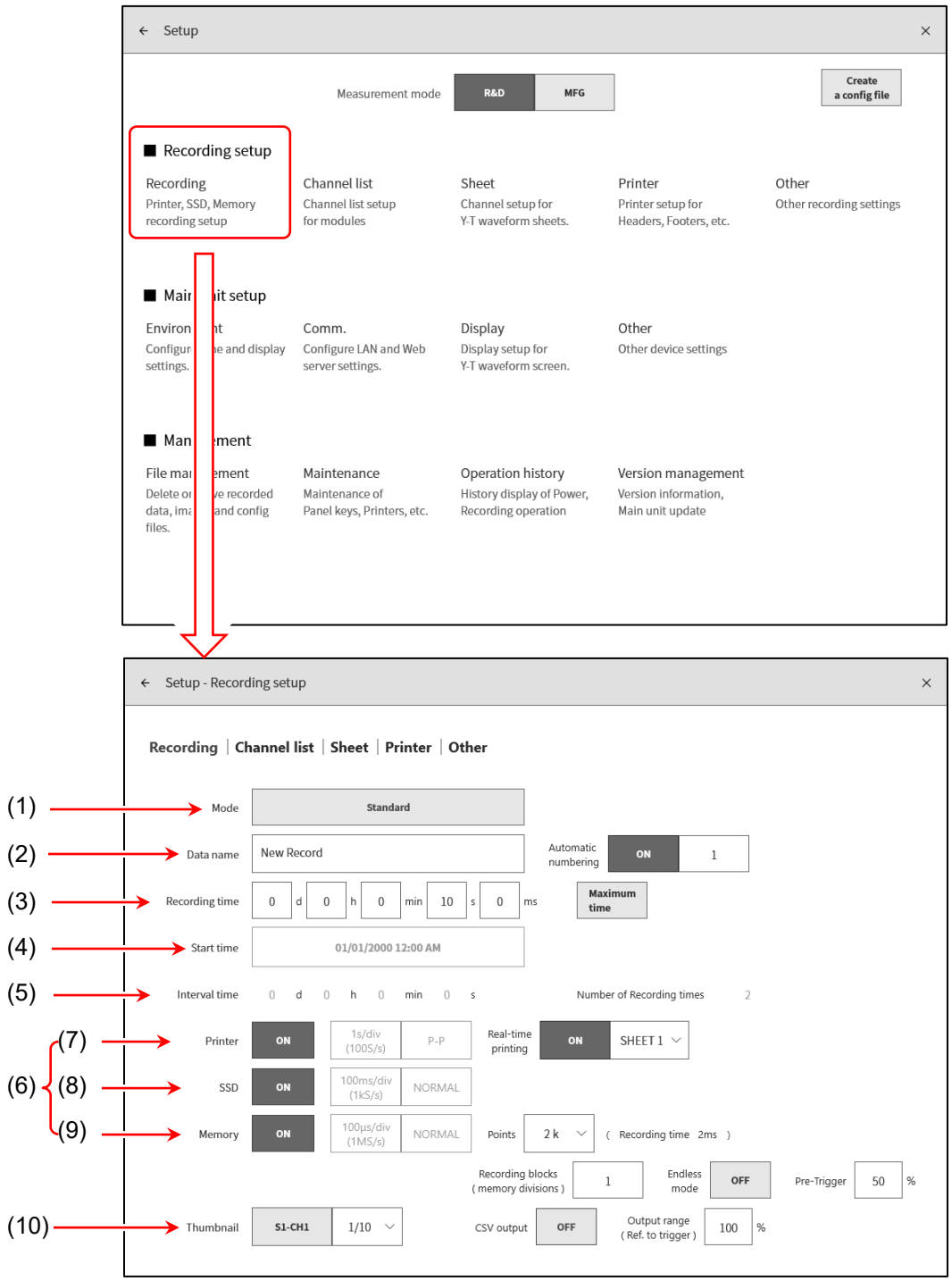


# 6.4. Recording

This product has three recording devices: printer, memory, or SSD. When recording is enabled for a device, the data recorded to each device is recorded to the SSD while it is recorded to the device.
For the printer, the waveform data (P-P values) printed to the recording paper are also recorded to the SSD.
For the memory, the memory data is recorded to the SSD when memory recording ends.

## 6.4.1. Recording Setup

Tap【SETUP】→【Recording setup】on the side menu.



(1) Mode: Selects the optimal mode from the nine recording modes.

(2) Data name: Specifies the name of the recorded data.
When [Automatic numbering] is enabled, numbers are automatically appended to the name.

(3) Recording time: Ends recording after recording for the specified time after recording starts.

Maximum time: Automatically sets the recording time based on the free capacity of the SSD. However, if the delete then save function for recorded data is enabled, the recording time is automatically set based on the maximum size of the recorded data.

(4) Start time: Starts recording at the specified time after starting measurement with the START key.

(5) Interval time: Performs recording at the specified interval. Recording ends when recording has been performed the number of times specified in [Number of Recording times].

(6) Recording device: Enables/disables recording to the recording device (Printer, SSD, or Memory). The devices can be set independently. When using external sampling, set only the target recording device to [ON].

(7) Printer: Enables/disables printer recording.
When enabled, the P-P data is recorded to the SSD with sampling of printer recording.

Real-time printing: When printer recording is enabled, real-time printing to the printer can be enabled/disabled.
When enabled, the waveform of the specified sheet is printed from the printer while saving the data of the printer recording.
When disabled, printing to the printer is not performed.

(8) SSD: Enables/disables [SSD].

(9) Memory: Enables/disables [Memory].

Points: Specifies the sampling count (the data count per channel) to record for each memory recording.

Recording blocks: Specifies the number of blocks (number of memory divisions) to use for memory recording, from 1 to 200.

When [Endless mode] is enabled, set a number of 2 or above.

Endless mode: If [Endless mode] is enabled, the blocks start to be overwritten from the first block when the specified number of memory blocks are full.

Pre-trigger: Specifies the pre-trigger in the memory block, from 0 to 99%.

CSV output: When [CSV output] is enabled, the data in the memory block is also automatically output to a CSV file after recording finishes.
For information on the format for CSV files, see the "RA3100 Instruction Manual".

Output range: Configures the data range to output to the CSV file, from 1 to 100%, based on the trigger point. If you specify 100%, the entire data range of memory recording will be saved to the CSV file.

Example: If memory recording is set to a pre-trigger of 20% and 10,000 points, the number of points will be 5,000 if the output range is set to 50% (1,000 points before the trigger and 4,000 points after the trigger).

**Tips**

- ❑ The CSV file is saved to the "<date/time of recording (yyyymmdd-HHMMSS)> – 0000" folder.

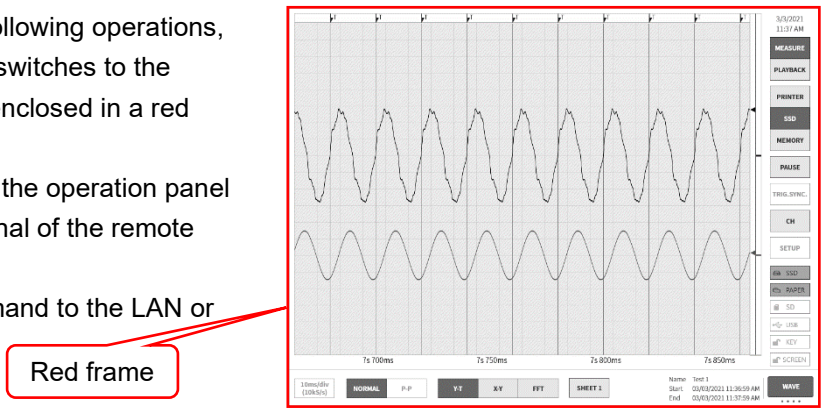
(10) Thumbnail: Specifies the channels to display thumbnails for during recording, and the compression rate.

## 6.4.2. Starting and Ending Recording

### Start recording

When you perform either of the following operations, recording starts and this product switches to the recording screen. The screen is enclosed in a red frame.

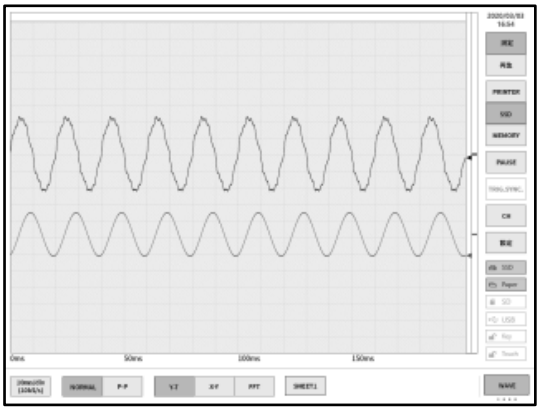
- ❑ Press the START key on the operation panel
- ❑ Set the START/STOP IN signal of the remote control module to LOW
- ❑ Send a start recording command to the LAN or COM port




### Stop recording

When you perform either of the following operations, recording ends and this product switches to the measurement screen. The red frame disappears.

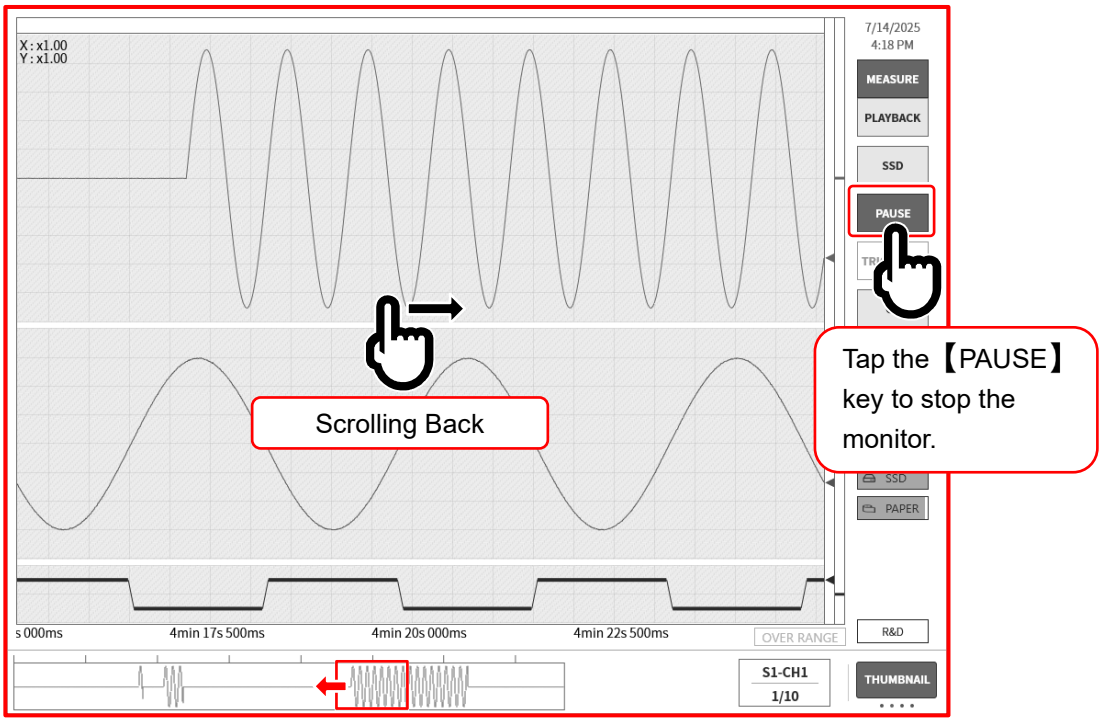
- ❑ Wait for the recording time to end
- ❑ Press the STOP key on the operation panel
- ❑ Set the START/STOP IN signal of the remote control module to HIGH
- ❑ Send an end recording command to the LAN or COM port
- ❑ All memory blocks have been recorded with the recording device set to memory recording only.



## 6.4.3. Scrolling Back during Recording

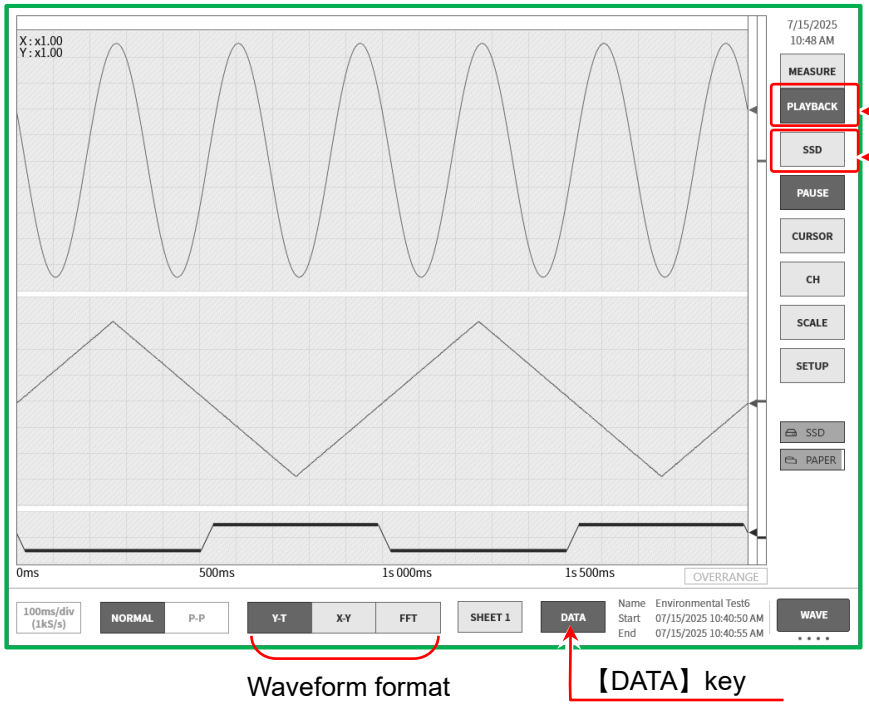
Tap the【PAUSE】key in the side menu during recording to pause the waveform monitor while continuing to record. Swiping the waveform monitor right while it is paused will scroll the waveform back, which enables you to check the past waveform that has already been recorded. You can also scroll the waveform monitor left to display the waveform recorded after pausing.

Tap the【PAUSE】key again to resume the operation of the waveform monitor.



# 7. Playback Recorded Data

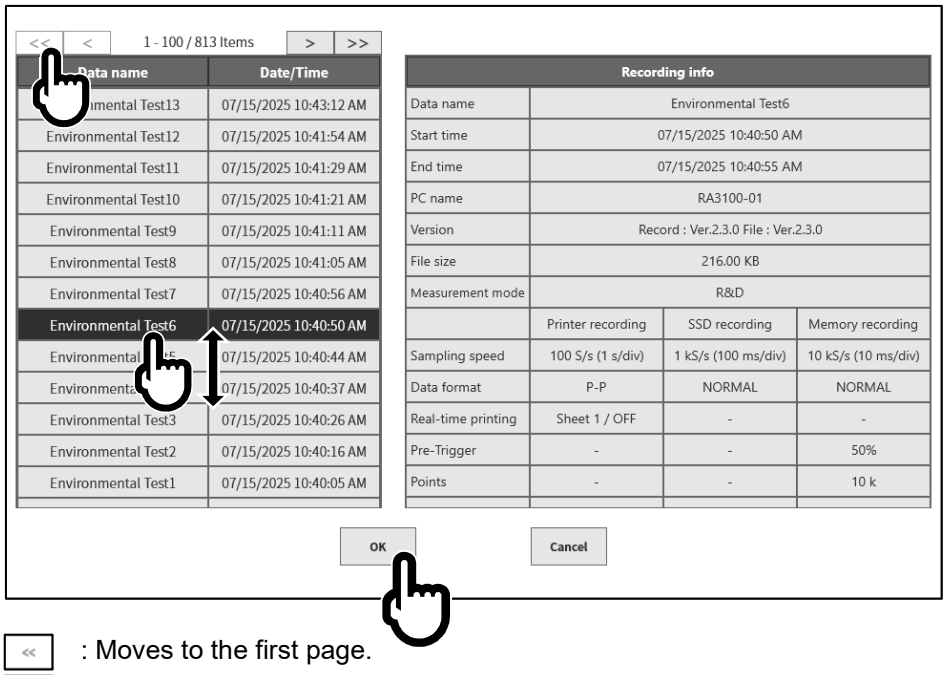
To play back recorded data, tap the【PLAYBACK】key in the side menu to switch the monitor to the playback screen.




## 7.1. Select Recorded Data

Tap the【DATA】key in the control bar to display up to 100 items of the recorded data list on one page.

Select the data and tap the【OK】key to display that waveform.




<< : Moves to the first page.

>> : Moves to the last page.

< : Moves to the previous page.

> : Moves to the next page.

Data name: The recording name set in the recording settings. Setting an easy-to-understand name when recording makes it easier to search for the data to playback.
Date/Time: The date and time that the data was recorded
Recording info: Displays information on the selected recorded data.

## Selection procedure

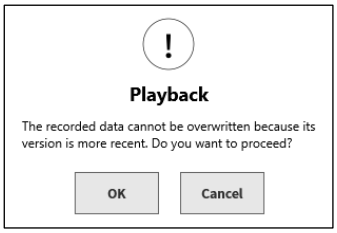
Step 1. Display the Recorded Data List
Tap the【DATA】key on the control bar to display the recorded data list.

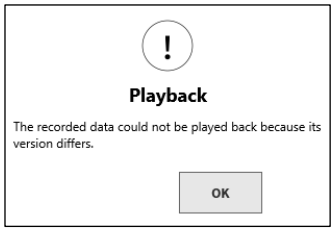
Step 2. Select the Recorded Data
Swipe the list up or down or switch pages to display the recorded data, then tap the data.

Step 3. Play Back the Recorded Data
Tap the【OK】 key to play back the selected recorded data.

## Tips

- If the file version of the recorded data differs from the software version of the main unit, this product may be unable to playback the data or be able to playback but unable to overwrite the data.
  This limitation can be overcome by performing a file update if the file version of the recorded data is older than the software version of the main unit, or a system update if the version is newer.



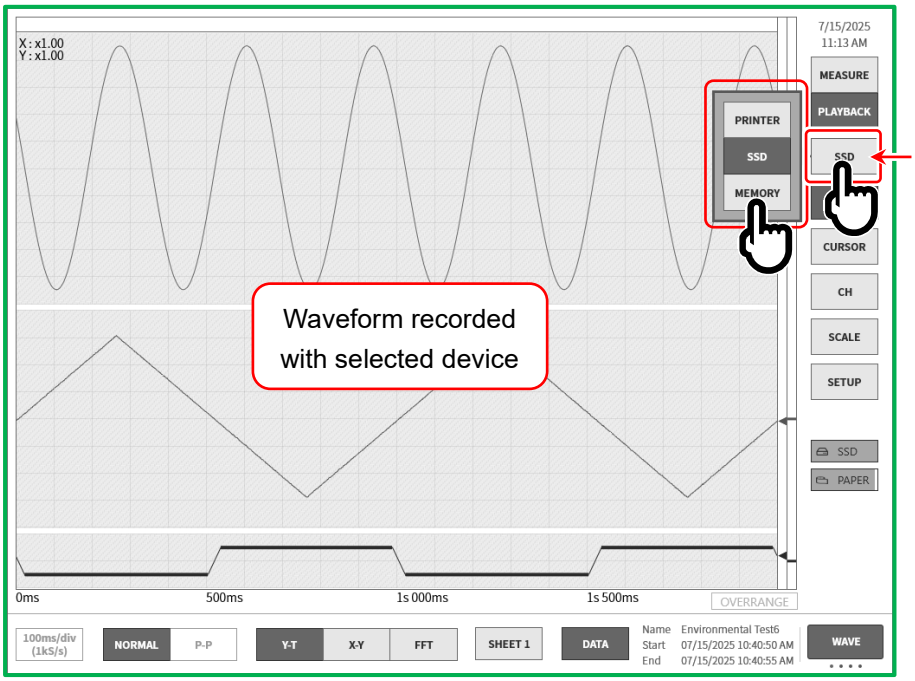




☞ For information on the versions, see the "RA3100 Instruction Manual".

# 7.2. Playback Screen

## 7.2.1. Selecting the Recording Device

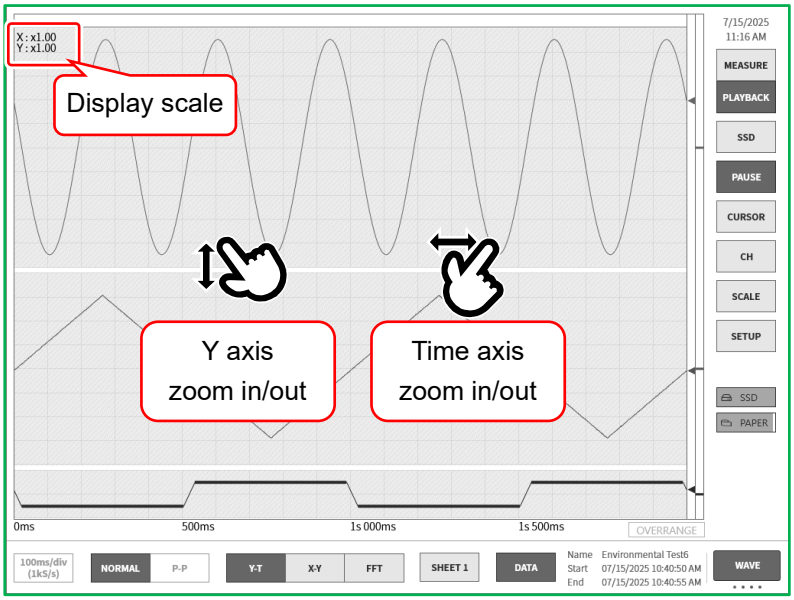
When the recorded data is displayed on the waveform monitor, you can tap the recording device selection key in the side menu to display the waveform recorded to another device.




## 7.2.2. Zooming In/Out during Playback

### Zooming the Waveform In

You can pinch in/pinch out the waveform monitor to freely zoom in/out the waveform in the time axis direction or amplitude direction in the range 1x to 100x. The current display scale is displayed on the top left of the waveform monitor.

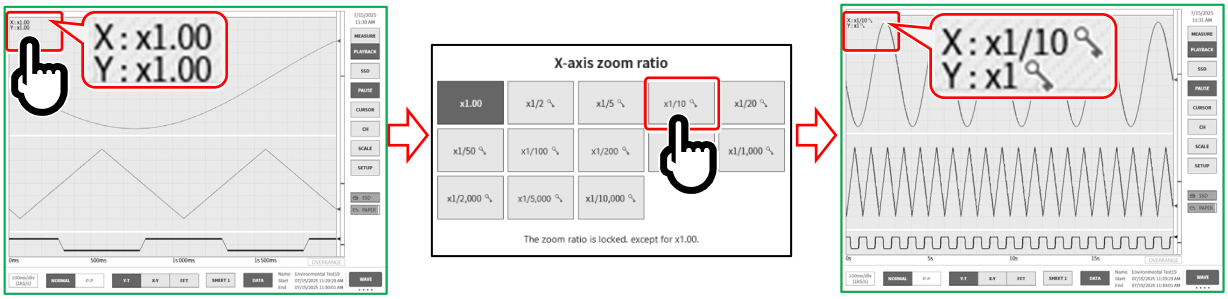



**Tips**

- This function cannot be used when the display scale is set to a value less than 1x (x1/2 to x1/10,000).

### Reducing the Waveform (Time Axis Compressed View)

You can tap the display scale on the top left of the waveform monitor to display the waveform compressed in the time axis direction to a display scale below 1x.

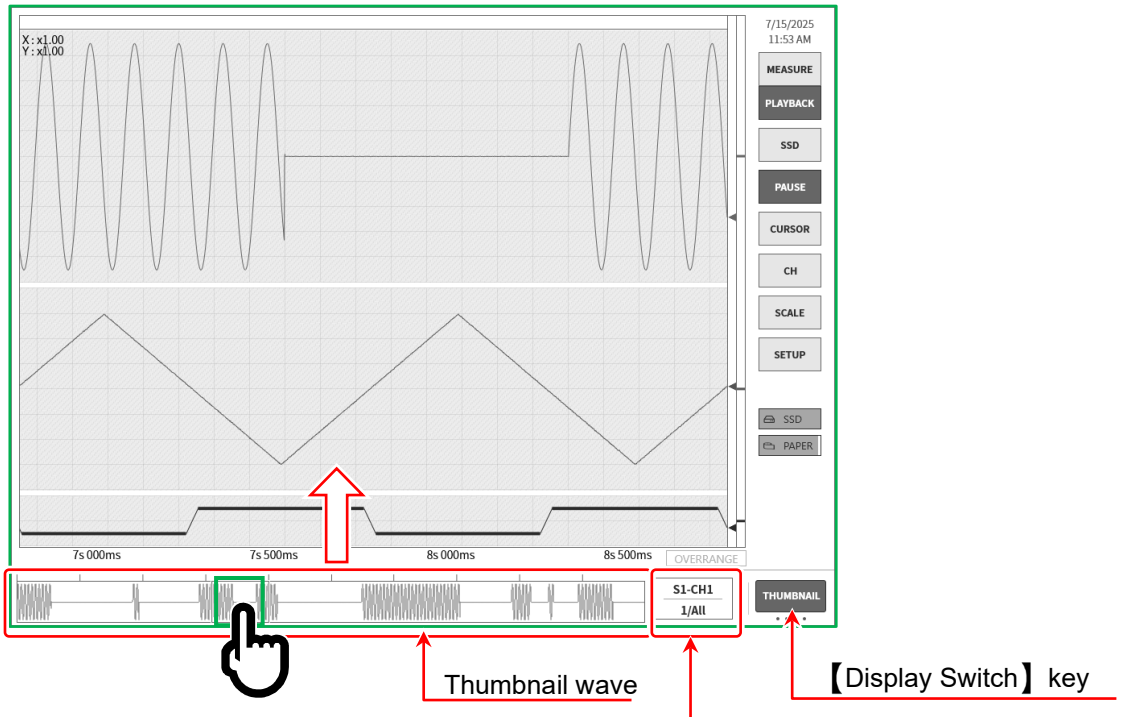



**Tips**

- While the waveform is reduced, a 🔑 mark is displayed with the display scale and pinch out/in operations cannot be performed.

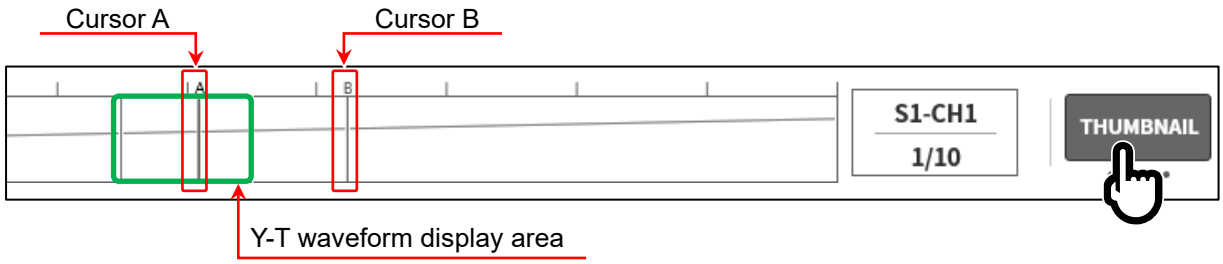
## 7.2.3. Thumbnails

You can also select【THUMBNAIL】with the【Display Switch】key to display the thumbnail waveform of the selected channel.



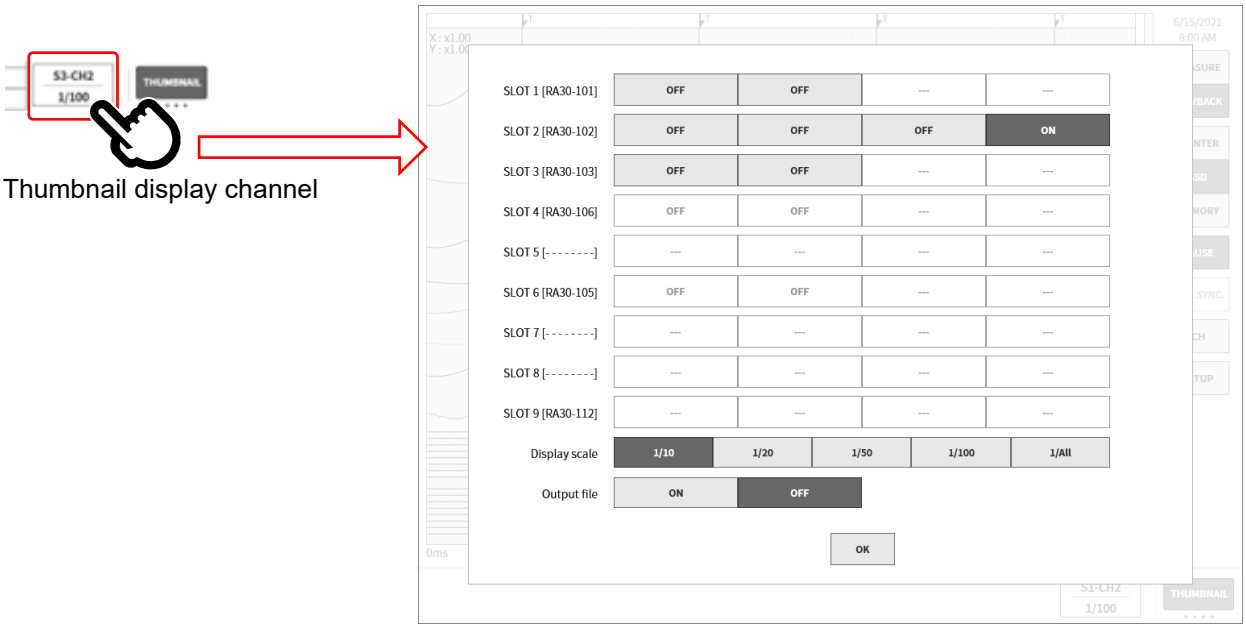

Tap the thumbnail waveform to display the waveform at the tapped position.

The thumbnail waveform displays the display area of the Y-T waveform and the positions of Cursor A and Cursor B.




## Thumbnail display channel

Tap the【Thumbnail display channel】key to display the channel selection dialog. Select one channel with analog input module measurement enabled, which you want to display the thumbnail for. A logic channel cannot be selected.




Display scale: 1/10, 1/20, 1/50, 1/100, 1/All

Specifies the display scale for the thumbnail waveform. The smaller the display scale, the wider the time range that the waveform is displayed for.

During recording, you can select a display scale of 1/10, 1/20, 1/50, or 1/100. During playback, the display scale is fixed to 1/All (which displays all the recorded data as the thumbnail).

Output file: OFF, ON

The thumbnail display reads the recorded data and performs decimation.

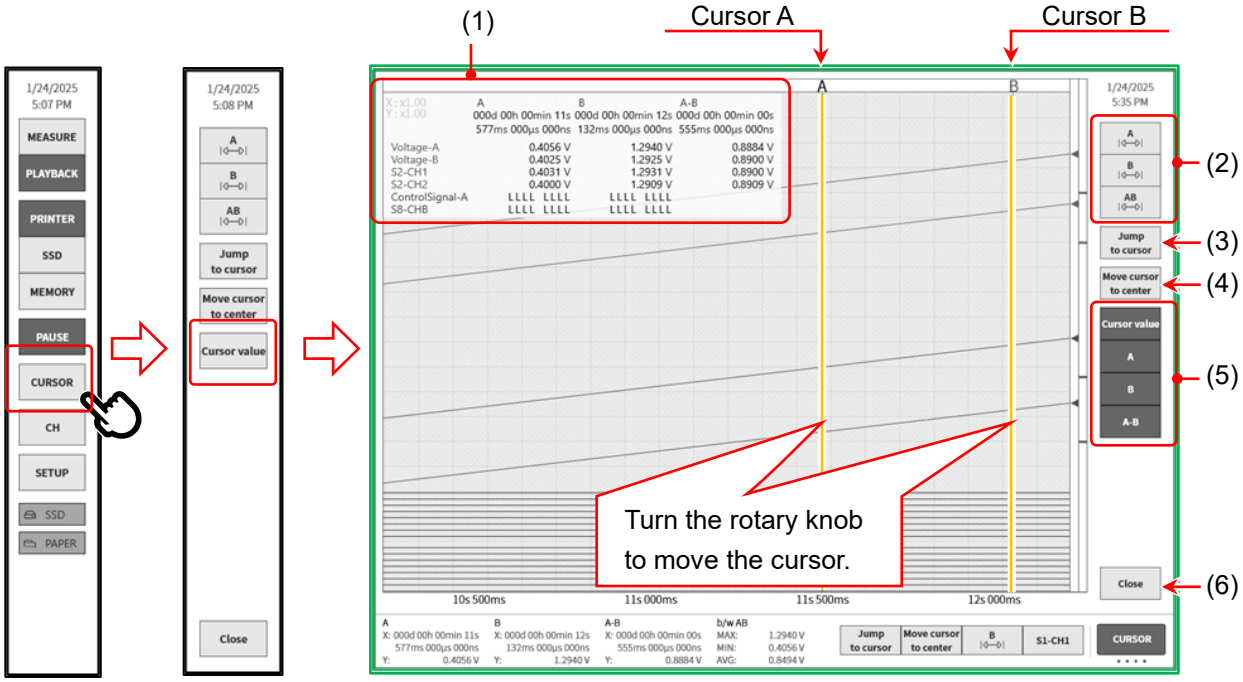
OFF Do not output the thumbnail display data after decimation to the SSD. Decimation occurs each time the recorded data is switched.

ON Output the thumbnail display data after decimation to the SSD. The display process is faster because decimation is not required, but more SSD space is consumed.

## 7.2.4. Cursor

If you tap the【CURSOR】key in the side menu during Y-T waveform playback, the time axis cursor and cursor menu are displayed for Cursor A and Cursor B.

If you tap the【Cursor value】key in the cursor menu, the cursor values of all channels are displayed on the top left of the Y-T waveform.




(1) List of cursor values

A: The recorded information at the position of Cursor A

X: The time since recording started Y: The data value of the selected channel

B: The recorded information at the position of Cursor B

X: The time since recording started Y: The data value of the selected channel

A−B: The difference information between Cursor A and Cursor B

X: The time between Cursor A and Cursor B

Y: The difference in the data value between Cursor A and Cursor B

* Not displayed for a logic channel.

Channel/signal name:

If a signal name is set, the signal name is displayed.

If a signal name is not set, the channel number is displayed.

### Tips

- ❑ For external sampling, X is displayed as the number of points.
- ❑ For P−P sampling, Y is displayed as the maximum data value.
  However, the minimum value (MIN) between A and B is calculated from the minimum data value of A and B.

(2) Cursor selection

Selects the cursor to change the position of.

If you select【A】then turn the rotary knob, Cursor A moves.

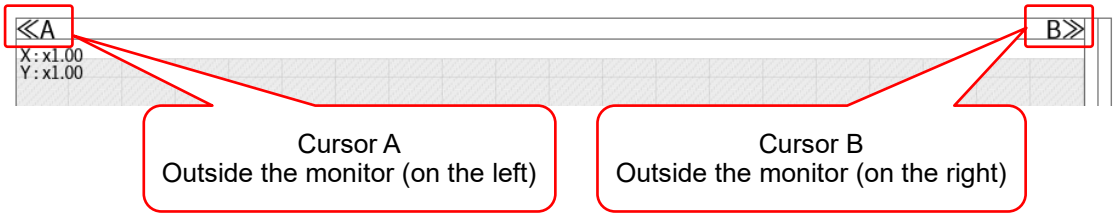
If you select【B】then turn the rotary knob, Cursor B moves.

If you select【A-B】then turn the rotary knob, Cursor A and Cursor B move with the distance between the cursors maintained.

**Tips**

- You can also tap the A or B mark above a cursor to select that cursor.


- If a cursor is outside the waveform monitor, the << or >> mark is displayed above the cursor.




(3) 【Jump to cursor】key

Tap this key to move the waveform so that the cursor position is in the center of the screen.

(4) 【Move cursor to center】key

Tap this key to move the specified cursor to the center of the monitor.

(5) 【Cursor value】key

Tap this key to display the list of cursor values.

Tap the【A】key to display the recording information for the Cursor A position.

Tap the【B】key to display the recording information for the Cursor B position.

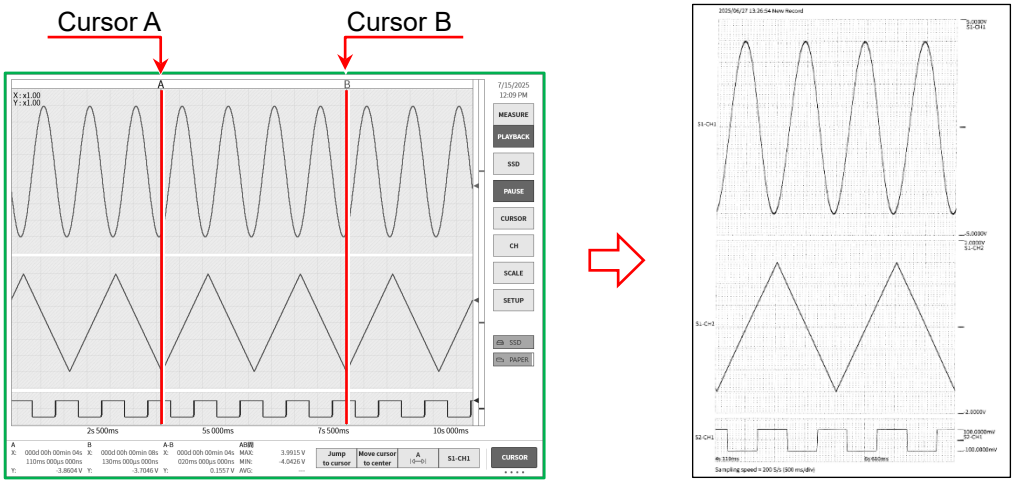
Tap the【A-B】key to display the difference information between Cursor A and Cursor B.

(6) 【Close】key

Closes the cursor menu.

## 7.2.5. Printing Out

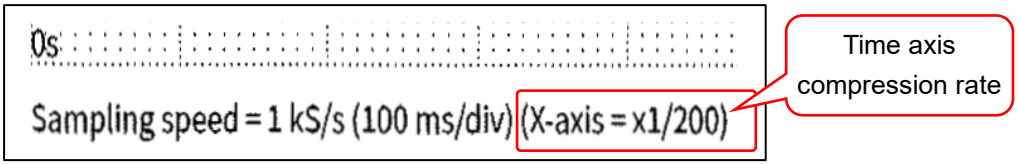
Press the PRINT key on the operation panel with the waveform of the recording data displayed to use the printer to print the waveform between cursors A and B on the monitor.




### Tips

- Immediately after recorded data is read, cursor A indicates the start of the data and cursor B indicates the end of the data.

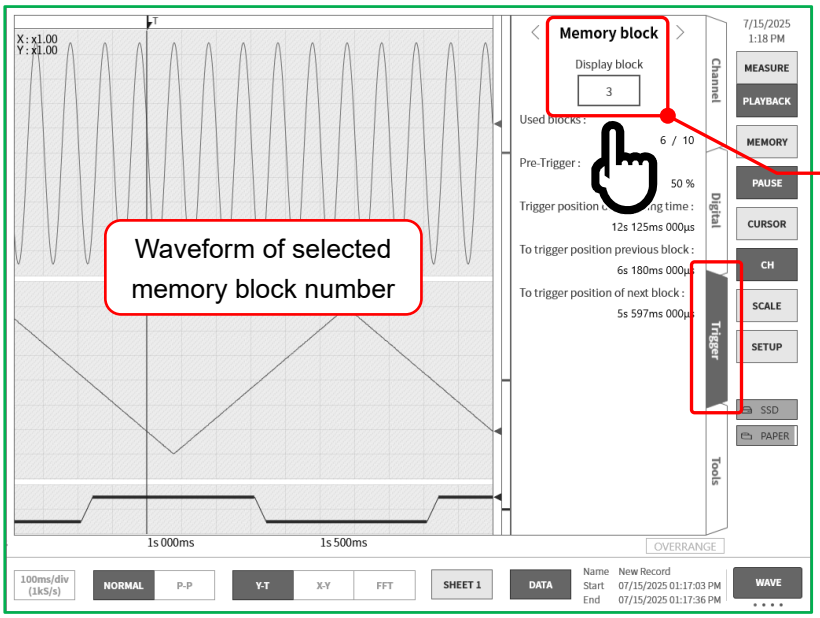
If printing is performed while the waveform is reduced (during the time axis compressed view), printing is performed with the compressed waveform.
Information on the compression rate is added to the printed recording speed.



## 7.2.6. Selecting a Memory Block

When there is memory data in the recorded data, you can select the memory block to display.

Step 1. Select [MEMORY] for the recording device selection key.
Step 2. Tap the【CH】key on the side menu to display the sub menu.
Step 3. Tap the【Trigger】tab in the sub menu to display the trigger setup screen.
Step 4. Tap the top of the trigger setup screen to display [Memory block].
Step 5. Tap [Display block], then specify the number of the memory block to display.




(1) Display block: Select the memory block to display the waveform for.

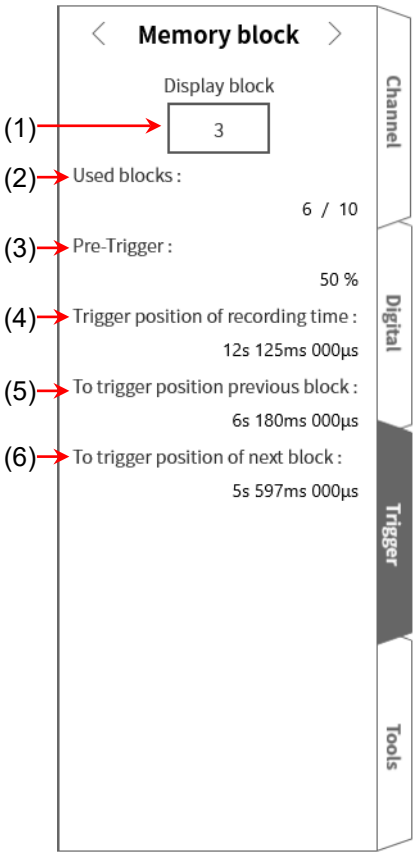
(2) Used blocks: The number of memory blocks set when recording and the number of memory blocks actually used.

(3) Pre-Trigger: The pre-trigger set when recording.

(4) Trigger position of recording time:
The time taken from the start of recording until the selected memory block trigger occurred.

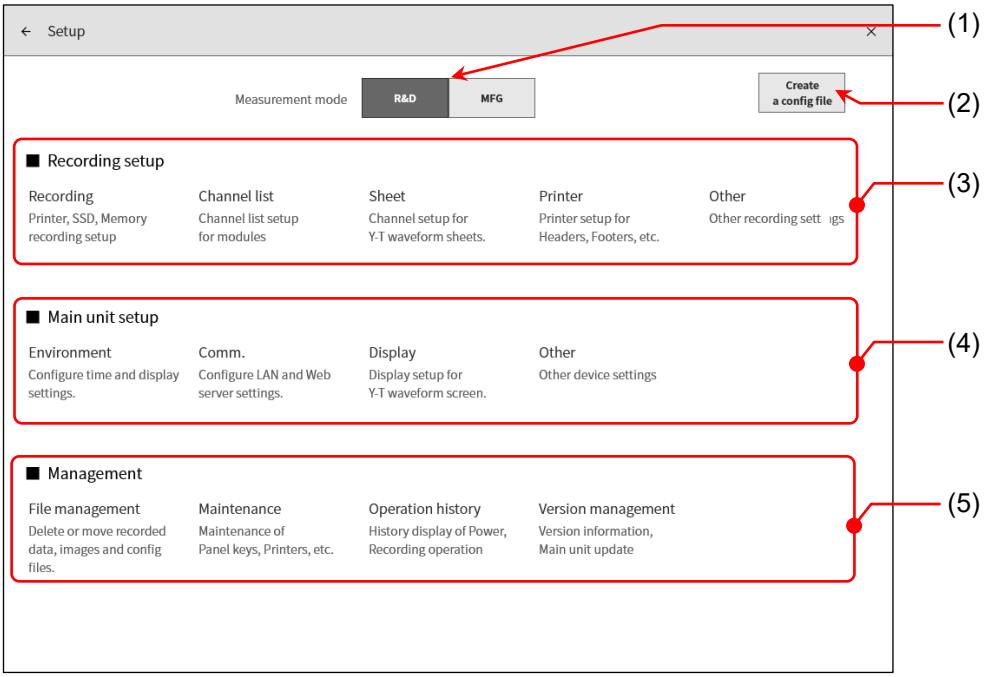
(5) To trigger position previous block:
The time taken from the selected memory block to the trigger of the previous memory block.

(6) To trigger position of next block:
The time taken from the selected memory block to the trigger of the next memory block.



# 8. Setup Details

This chapter describes the function for configuring the various settings from Settings in the side menu.




(1) Measurement mode: Selects the measurement mode. “4.1. Selecting the Measurement Mode”

(2) Create a config file: Creates configuration data containing the measurement mode, recording setup, and main unit setup. “8.1. Create a config file”

(3) Recording Setup: Configures settings related to recording, such as the recording conditions and channel. For details, see the "RA3100 Instruction Manual".

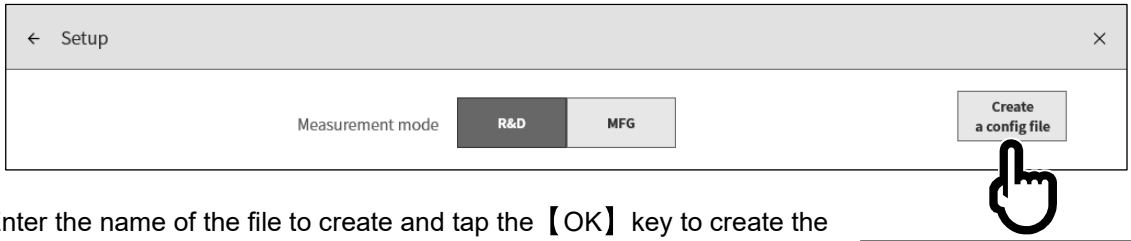
(4) Main Unit Setup: Configures settings related to the main unit, such as the time and communication. For details, see the "RA3100 Instruction Manual".

(5) Management: Performs management of the main unit, such as file operations and maintenance. “8.4. Management”

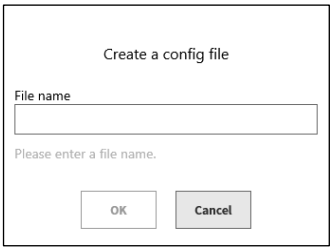
# 8.1. Create a config file

Create configuration data containing the current measurement mode, recording setup, and main unit setup. The created configuration data is recorded to the SSD in the main unit and displayed in the list for setup management. Settings can be restored from the configuration data.

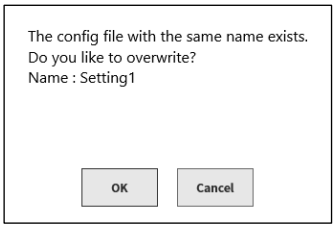
Tap the【Create a config file】key on the setup screen to display the [Create a config file] dialog.




Enter the name of the file to create and tap the【OK】key to create the configuration file.

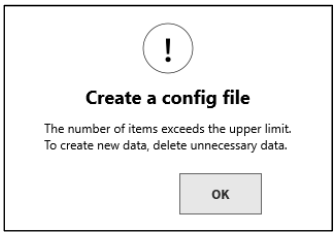



If a configuration file with the same name already exists, a dialog confirming whether you want to overwrite the file is displayed. To overwrite the file, tap the【OK】key. Tap the【Cancel】key to return to the [Create a config file] dialog.




## Tips

- Up to 40 single-byte alphanumeric characters can be entered for the file name.
  Windows reserved file names or characters cannot be used.
- If there are already 100 configuration files in the main unit, a new configuration file cannot be created.



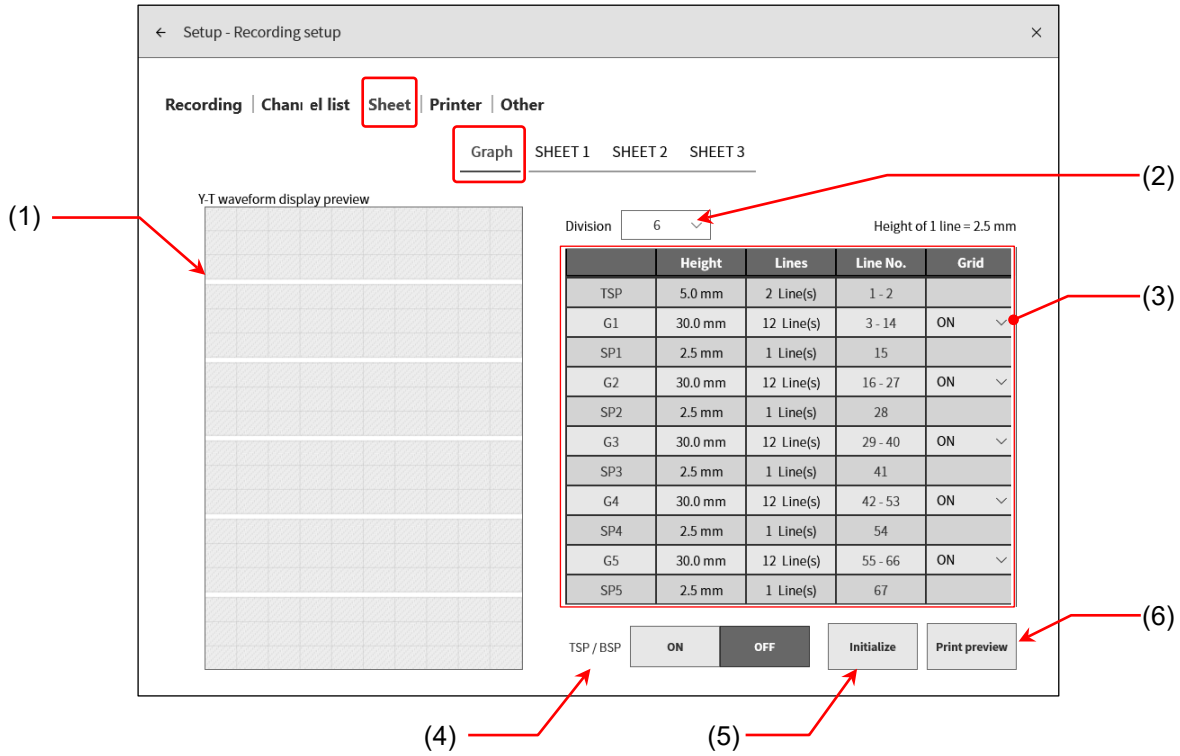
# 8.2. Sheet Setup

Tap【Sheet】in the recording settings to display the graph settings and a list of the monitor display and printer waveform sheet settings.

## 8.2.1. Graph

Tap【Graph】to display the settings related to the number of divisions (number of graphs) of the Y-T waveform.

You can tap a cell to change the setting value of that cell.




(1) Y-T waveform dislplay preview:

Displays a preview of the grid on the Y-T waveform screen when you change settings such as the number of divisions or the height.

(2) Number of divisions:

Selects the number of divisions (number of graphs) of the Y-T waveform. (maximum 18)

(3) Division settings:

Sets the graph height and space height, and enables/disables the grid.

The settings are displayed for the selected number of graphs.

| | |
|---|---|
| TSP (Top SPace) | Indicates a space on the top. |
| BSP (Bottom SPace) | Indicates a space on the bottom. |
| G# (Graph) | Indicates each graph. (# is the graph number) |
| SP# (SPace) | Indicates the space between each graph. (# is the space number) |

Height/number of lines:

Sets the graph (G#) or space (SP#) to print on the recording paper by the height or number of lines.

When setting by height, it is set in increments of 2.5 mm (the height of one line).

Line number: Displays the line number of the print position.

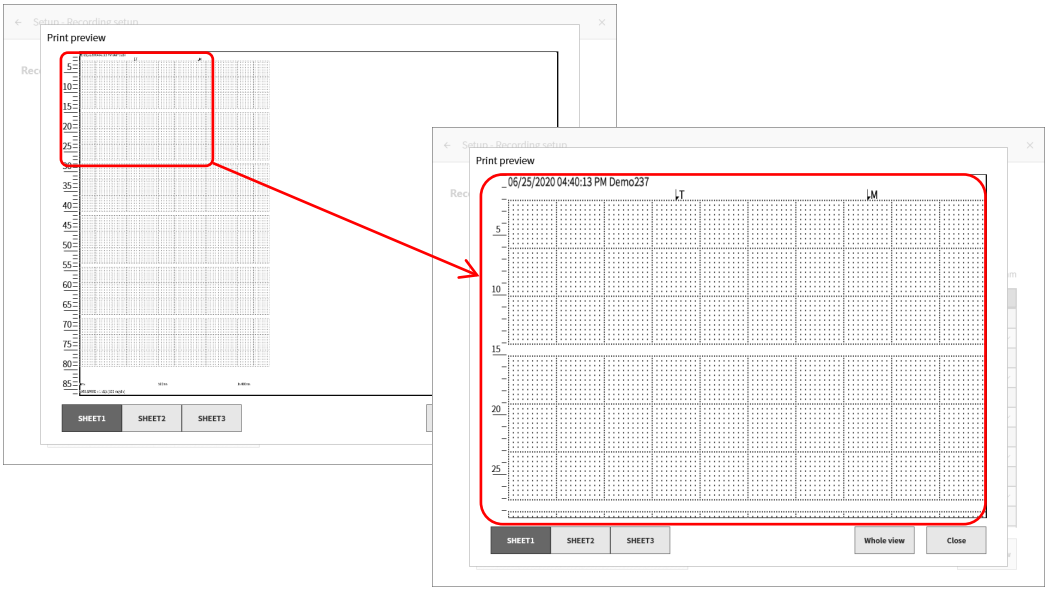
Grid: Enables/disables the displaying/printing of the grid.
To display a grid, enable the grid setting in "8.3.1. Printing Setup" or the Environment in the main unit settings.

(4) TSP/BSP: When it is enabled, the TSP (Top SPace) and BSP (Bottom SPace) settings are also reflected in the waveform monitor.

(5) Initialize: Initializes the division setting of the currently selected division count.

(6) Print preview: Opens a screen displaying a print preview of the Y-T waveform.
This enables you to check the print position and the grid

Pinch out to enlarge the display. Swipe to move.



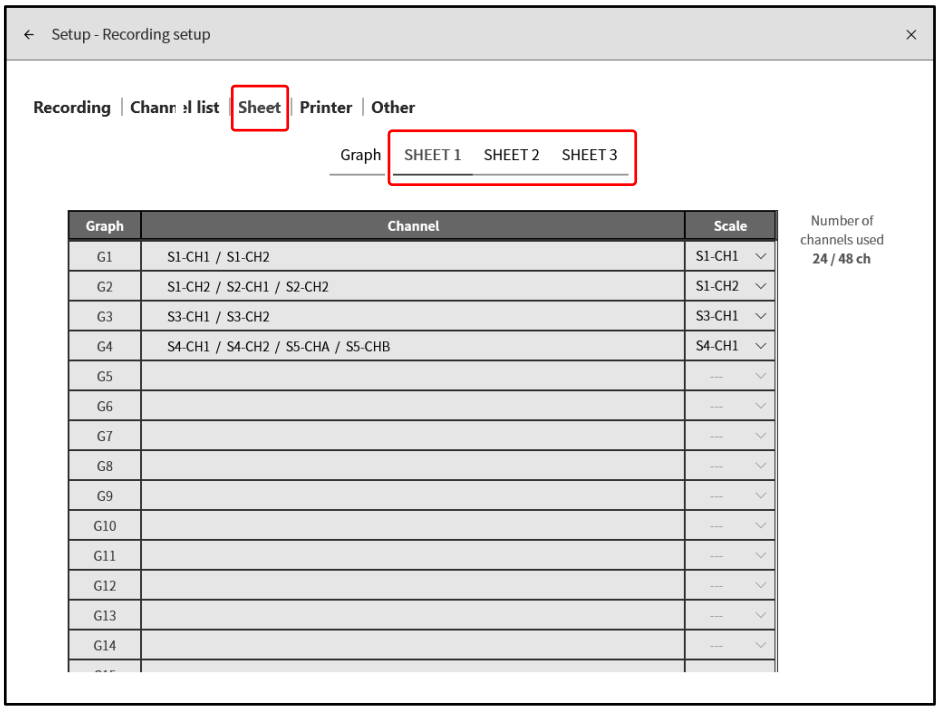

Sheet switching keys:
The【SHEET1】,【SHEET2】,【SHEET3】keys on the bottom left enable you to check the display of each sheet. You can check the signal names and scale values.

Whole view: When the display is enlarged, tap the Whole view key to resize the display to match the height.

Close: Closes the screen.

## 8.2.2. SHEET1/ SHEET2/ SHEET3

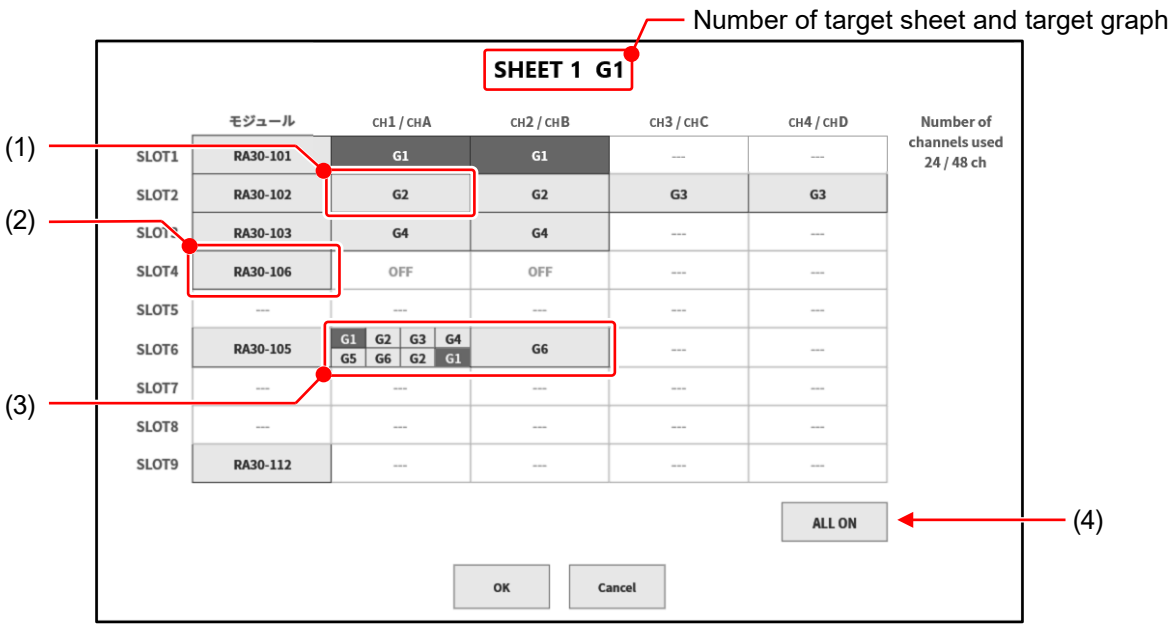
You can assign the input channels and scale to display for the graphs on each sheet.




### Assigning the Input Channel

Tap the target sheet to configure and the graph channel field to display the screen for assigning a channel.

You can set a maximum of 48 channels to a single sheet. If the number of channels used exceeds 48, assign the remaining channels to another sheet.



(1)【Analog channel】key: Tap to assign the selected channel to the graph of the sheet.

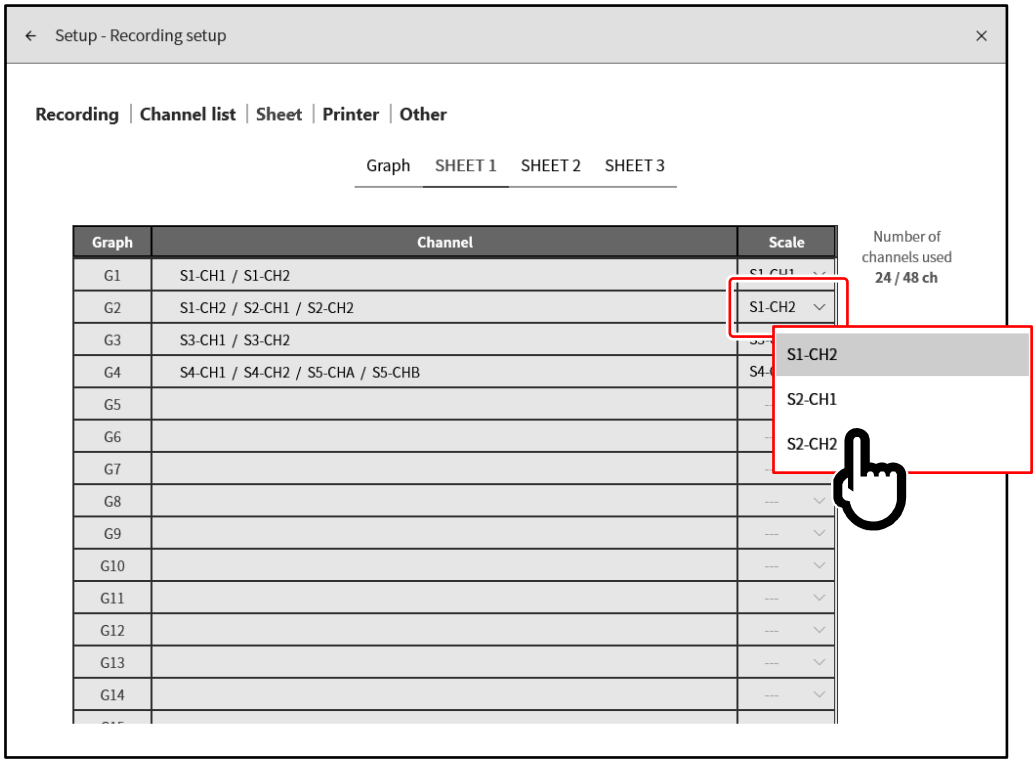
(2)【Module】key: Tap to assign all channels of the module to the graph of the sheet.

(3)【Logic channel】key: This is displayed for the 16ch Logic Module (RA30-105).
If the signal unit of the logic module is set to "8 CH", tap this to assign the channels to the graphs of the sheet 8 channels at a time (CHA/CHB).
If the signal unit is set to "1 CH", tap the channel key to display the single channel selection dialog box to assign the channels to the graphs of the sheet one channel at a time.


(4)【ALL ON】key: Tap to assign all channels of all modules to the graph of the sheet.

## Assigning the Scale

Tap the target sheet to configure and the graph scale field to select the channel to display in the scale from among the analog modules assigned to the graph.

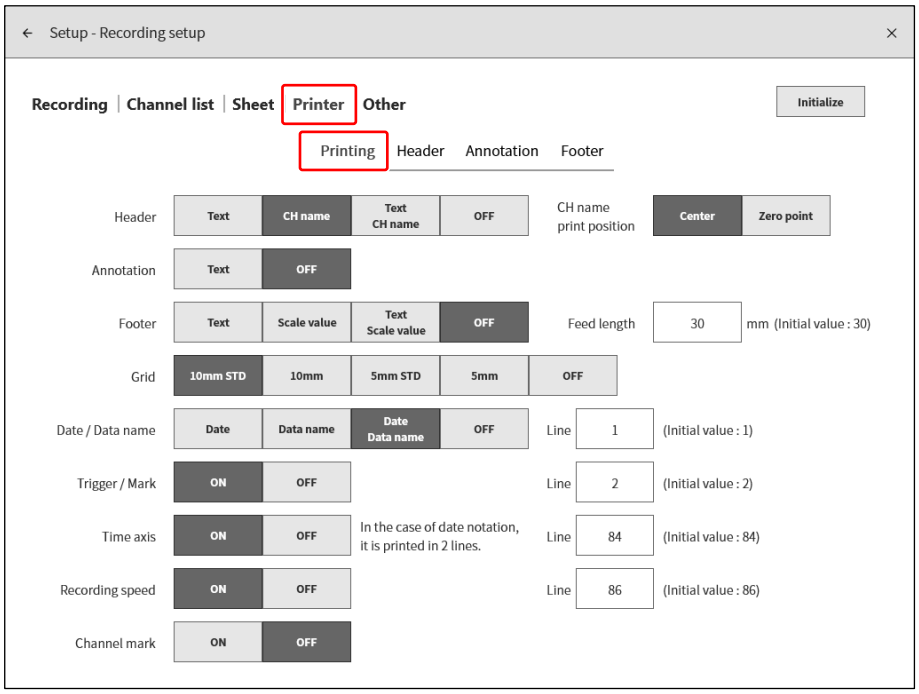


# 8.3. Printer

Tap【Printer】in the recording settings to configure the various print functions for printer output.

## 8.3.1. Printing Setup

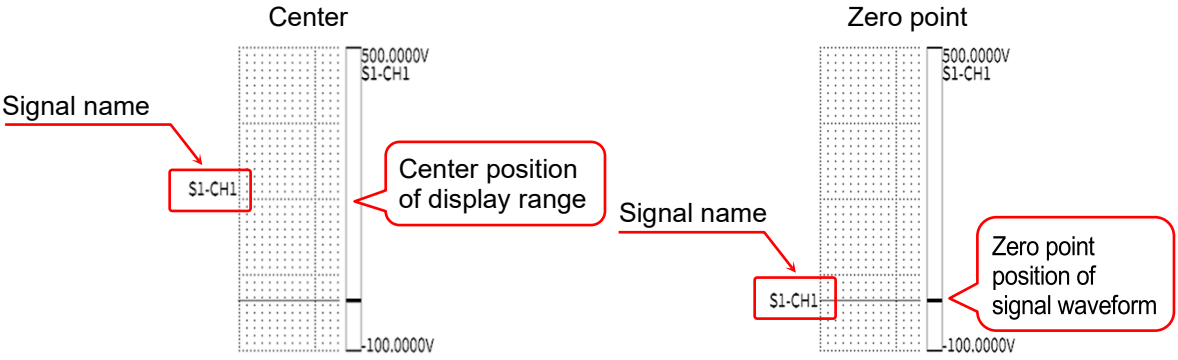
Tap【Printing】to configure the various information printed at the same time as the waveform.




Header: For【Text】,【CH name】, and【Text/CH name】, the signal name and header text are printed before starting to print the waveform.

CH name print position:

Sets the print position for the signal name. Displayed when the header is set to【CH name】, and【Text/CH name】.

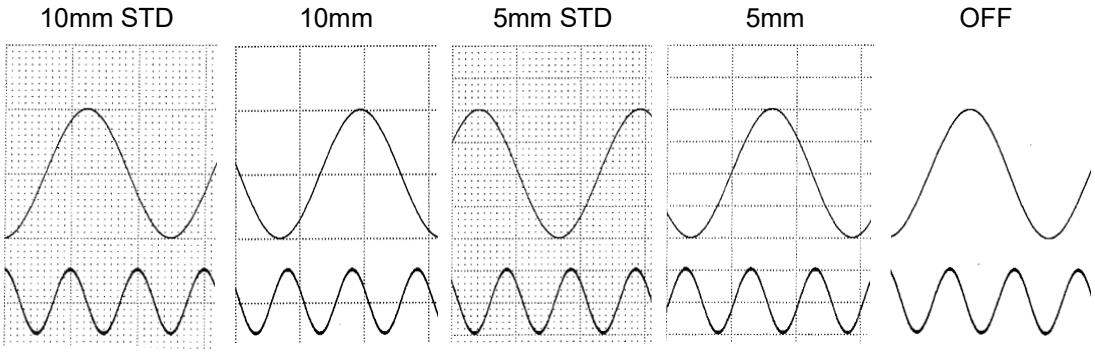



Annotation: For【Text】, the annotation text is automatically printed over the waveform every 300 mm while printing the waveform. You can also print annotations at arbitrary times by tapping the【Print annotation】key of the【PEN REC】control bar.

Footer: For【Text】,【Scale value】, and【Text/Scale value】, the scale value and footer text are printed after the printing of the waveform is finished.

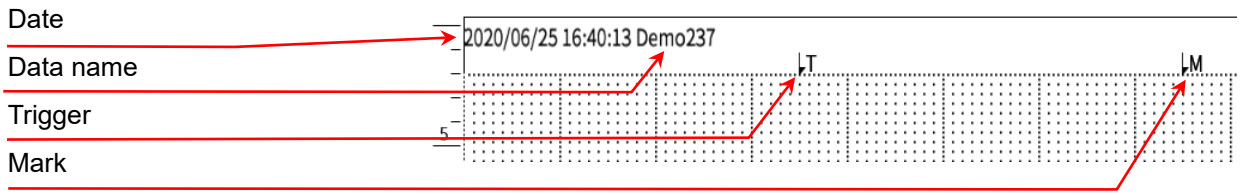
Feed length: Sets the length to feed after all printing is complete, including waveform printing and screen copy (screenshot) printing.

Grid: For【10mm STD】, 【10mm】, 【5mm STD】, and 【5mm】, a grid is printed.



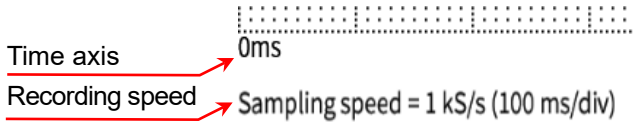
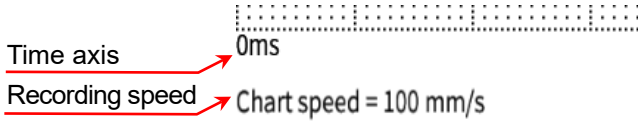

Date / Data name: For【Date】, 【Date name】, and 【Date / Date name 】, the date and data name are printed.

Trigger / Mark: For【ON】, the T or M mark is printed when a trigger or mark is detected.



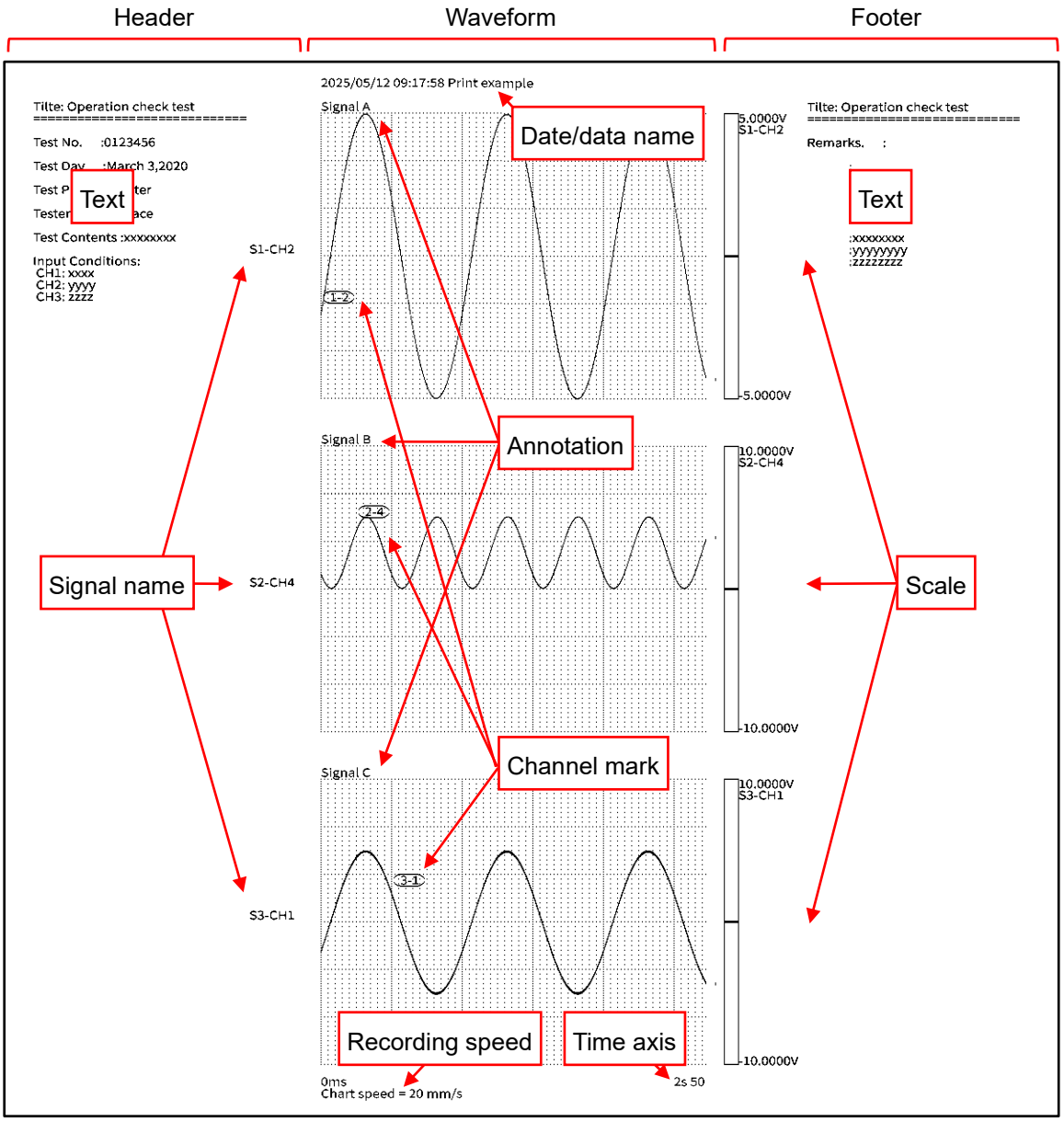

Time axis: For【ON】, the time axis scale value is printed. The X axis notation set in [Other] in [X axis notation] is used as the notation. When the X axis notation is set to "date", two lines are printed. If set for the last line (line 86), only one line is printed.

Recording speed: For【ON】, 【Sampling speed】 or 【Chart speed】 is printed for the printer speed.

| Printer speed | Example of printing |
|---|---|
| Sampling speed (for frequency) |   |
| Chart speed |   |

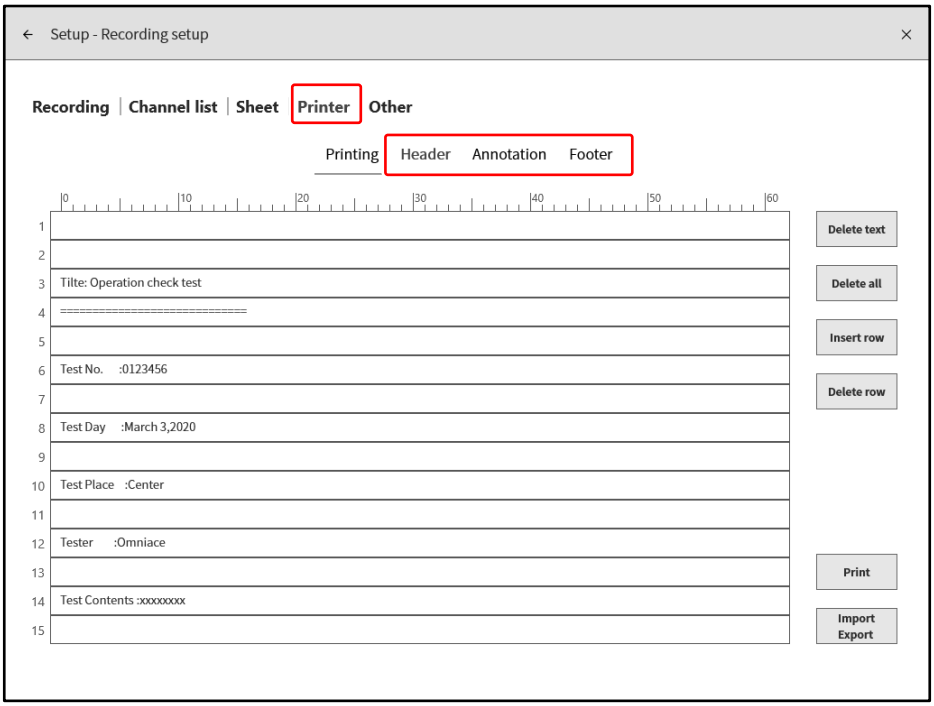
Channel mark: For【ON】, the channel mark is automatically printed near the waveform every 300 mm while printing the waveform.

## Printing example



## 8.3.2. Header, Annotations, and Footer (Text to Print)

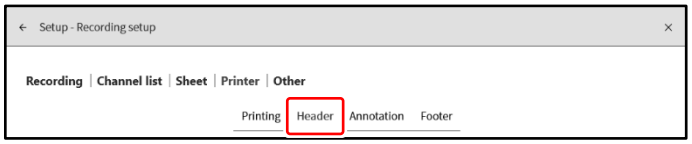
Tap【Header】, 【Annotation】, or 【Footer】 to display the screen for configuring the text to print. The operation method is the same for the annotations, header, and footer.



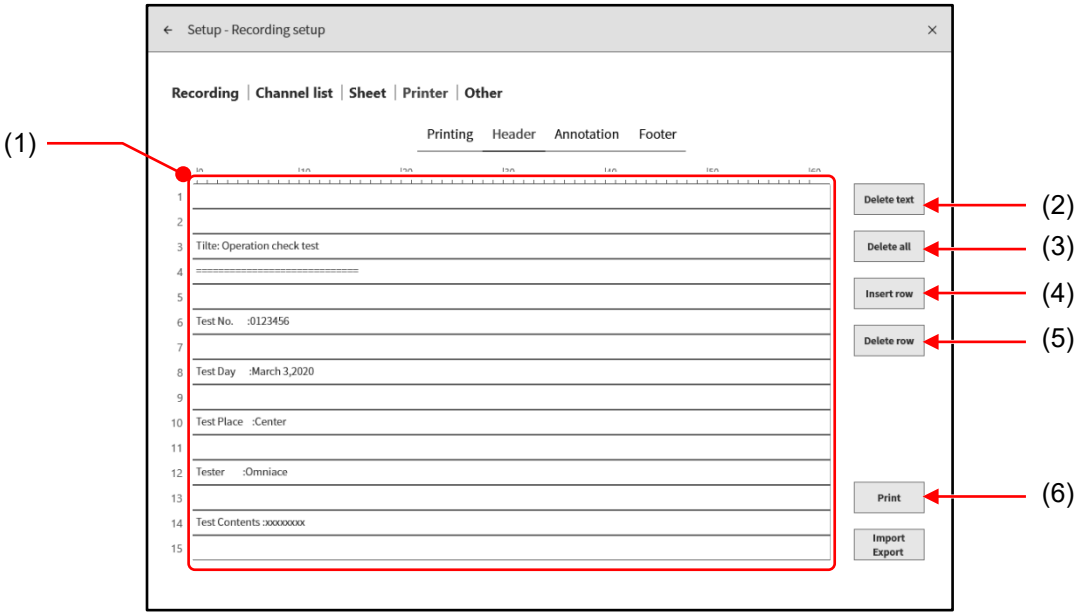

### Configuring the Text to Print

The configuration method is the same for the annotations, header, and footer.
In this example, the header text is configured.

Step 1. Select the [Header] tab.




Step 2. Enter the text to print.



| | |
|---|---|
| (1) Text: | Double-tap this to display the software keyboard and enter up to 60 characters for the text to print. The first row is the top edge of the recording paper, and the 86th row is the bottom edge. |
| (2) Delete text: | Deletes the text of the specified row. |
| (3) Delete all: | Deletes all the text. |
| (4) Insert row: | Inserts a row above the specified row. |
| (5) Delete row: | Deletes the specified row and moves the rows below it up one row. |
| (6) Print: | Prints the text to recording paper. |

# 8.4. Management

Configure/display【File management】, 【Maintenance】, 【Operation history】, and 【Version management】.
Tap a settings category to display the details screen for that category.

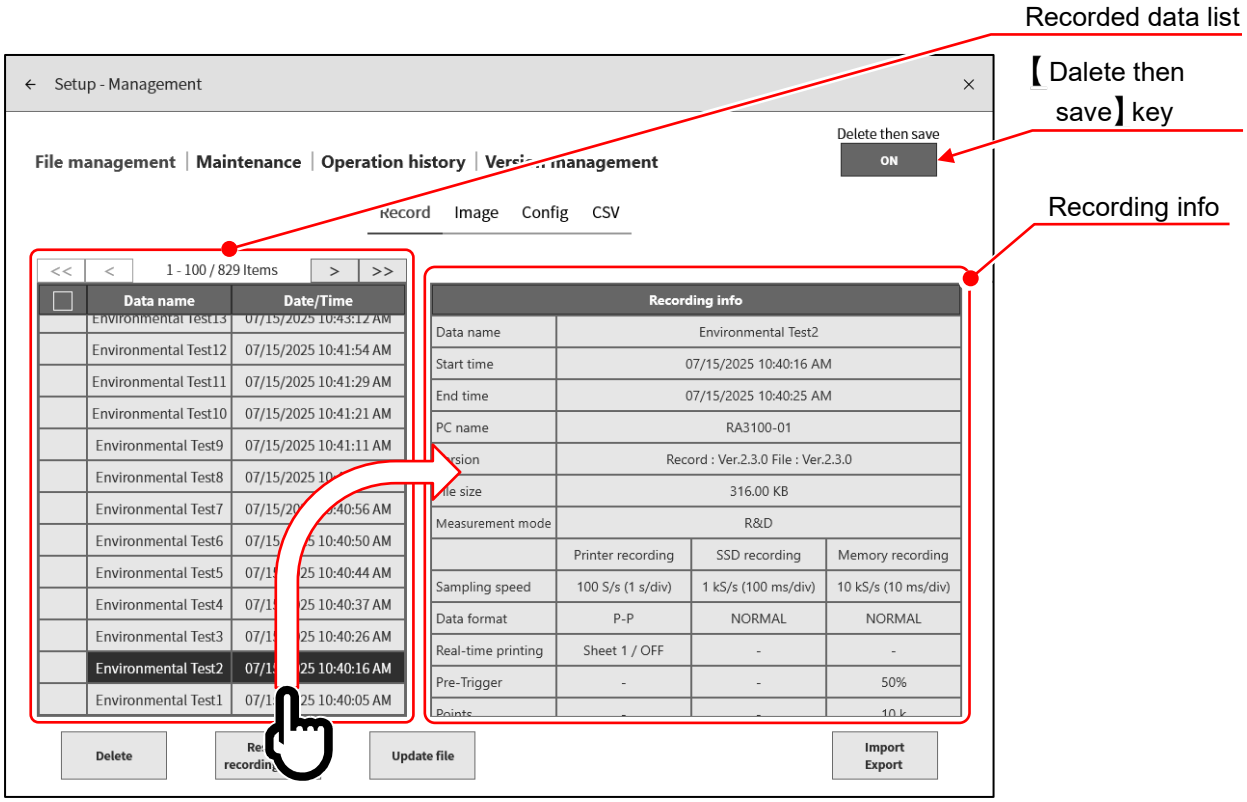
## 8.4.1. File Management

Tap【File management】 in the management settings to display the [File management] screen.
Operations can be performed on the data saved to this product on the [File management] screen.

### 8.4.1.1. Record

Tap the【Record】key in the center of the [File management] screen to display the [Recording] management screen.

A list of the recorded data on the internal SSD of this product is displayed on the left side of the [Recording] management screen.
Tap the Data name or Date/Time in the recording data to display [Recording info] for that recorded data on the right.

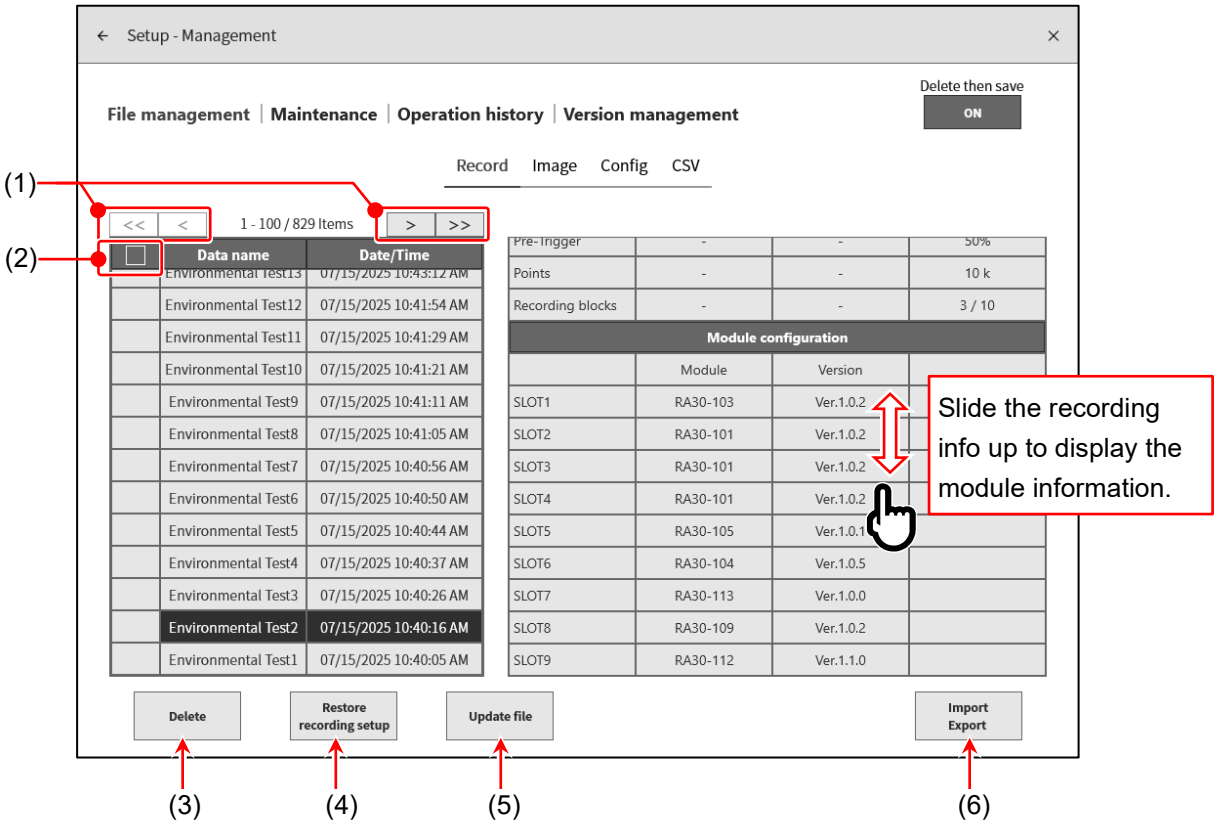



Delete then save: When enabled, old recorded data is deleted if the number of recorded items exceeds the upper limit or the SSD used for recording does not have enough free space. This setting is only valid when the measurement mode is set to the MFG mode.

**Tips**

- ❑ The key is not displayed when the measurement mode is set to the R&D mode.

## Record management Operations




Tap a selection field on the left of the list to display "✓" to select that recorded data as the target for operation. Tap the selection field again to deselect the data.

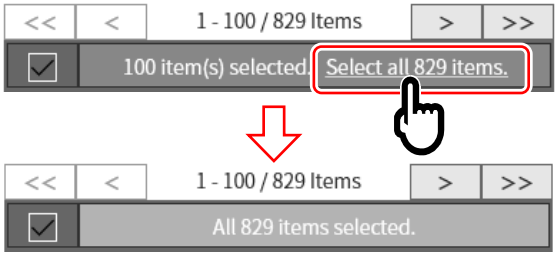
(1) Page switch: Switches the displayed page of the list.

【<】【>】 Displays the previous or next page.

【<<】【>>】 Displays the first or last page.

(2) Select/deselect all: Selects or deselects all the data on the page.

Tap [Select all * items.] to select all the data on all the pages.




(3) Delete: Deletes the selected recorded data.

(4) Restore recording setup: Restores the settings saved together with the recorded data to the main unit.

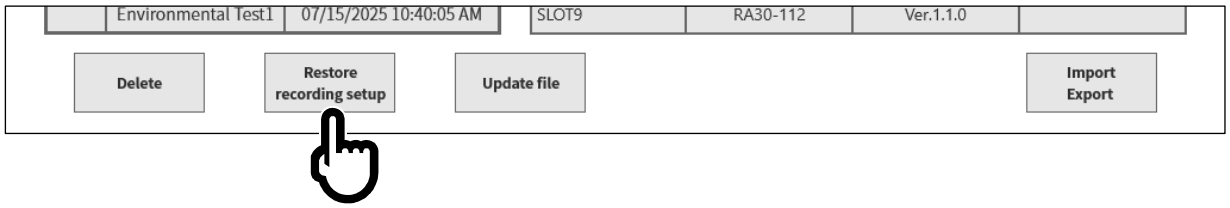
(5) Update file: Updates the file format of old recorded data.

(6) Import/Export: Exports recorded data to external media (such as an SD memory card or USB stick) or imports (reads) the data backed up to external media.

## Restoring recording setup

The recording settings of this product are saved together with the recorded data.

Select the data for the recording conditions to restore/set again on the [Recording] management screen, and tap the【Restore setting】key to set the recording conditions to the main unit.




## Tips

❑ If the file version of the recorded data differs from the software version of the main unit, this product may be unable to restore the recording setup.

This problem can be solved by performing a file update if the file version of the recorded data is older than the software version of the main unit, or a system update if the version is newer.


## Updating a File

You can update the file format of recorded data that cannot be played back because the file version is too old.

Select the file to update on the [Recording] management screen, and tap the【Update file】key to update the file.

## Tips

❑ If you update the file of recorded data with file version 1.x.x., the following items must be set again.

・Feed length

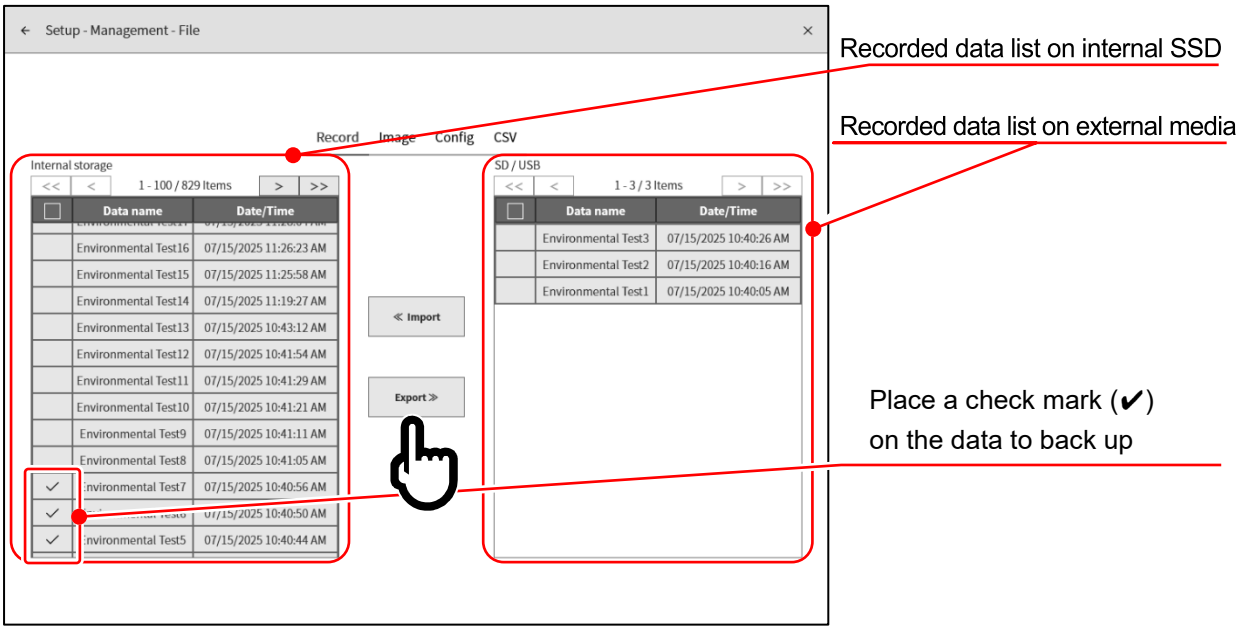
・Output recording info XML file

## Export - Backing Up Recorded Data

Connect the external storage media (such as SD memory card or USB stick) to the main unit and confirm that the SD/USB indicator on the side menu activates.

Tap the【Import/Export】key on the bottom right of the [Record management] screen to display the external media selection dialog and select the target external media.


Tap【OK】to switch to the [Import/Export] screen.




Place a check mark (✔) in the selection field of the data to back up and tap the【Export】key in the center to export the recorded data.

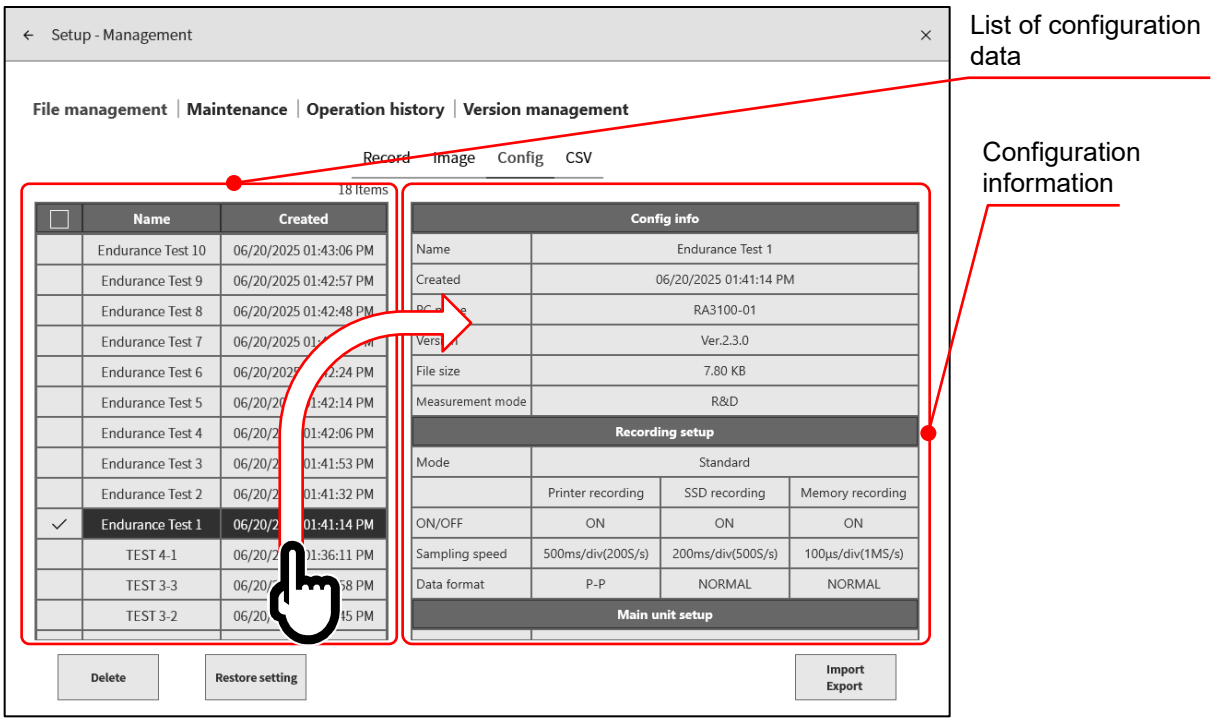
The recorded data that is exported can be displayed as a waveform or converted to a file.

### 8.4.1.2. Config

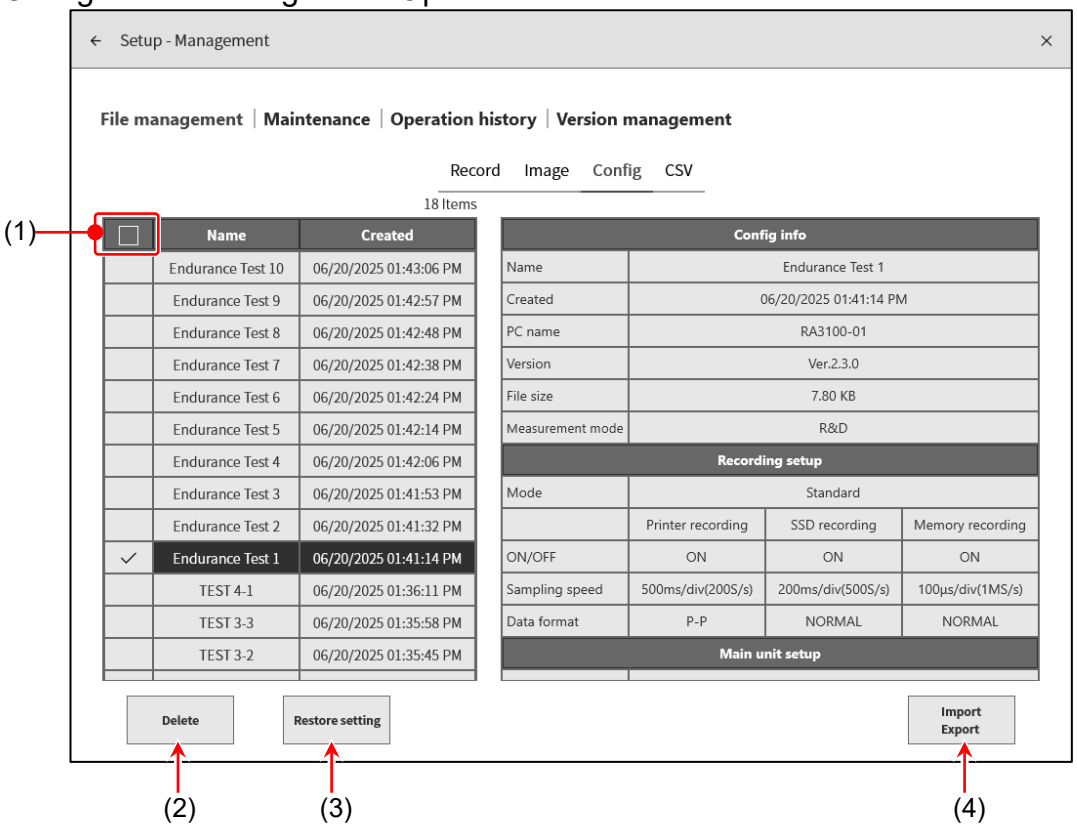
Tap the【Config】 key in the center of the [File management] screen to display the [Config] management screen.

The [Config] management screen enables you to manage the configuration data created with [Create a config file].

A list of the configuration data on the internal SSD of this product is displayed on the left side of the screen. Tap the Name or Created field in the list to display the configuration information on the right.




## Configuration Management Operations



Tap a selection field on the left of the list to display "✓" to select that setting data as the target for operation. Tap the selection field again to deselect the data.

(1) Select/deselect all: Selects or deselects all the data.

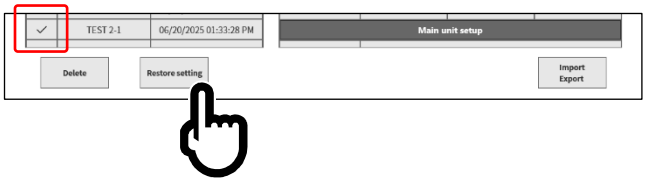
(2) Delete: Deletes the selected recorded data.

(3) Restore setting: Updates the main unit with the configuration information of the selected configuration data.

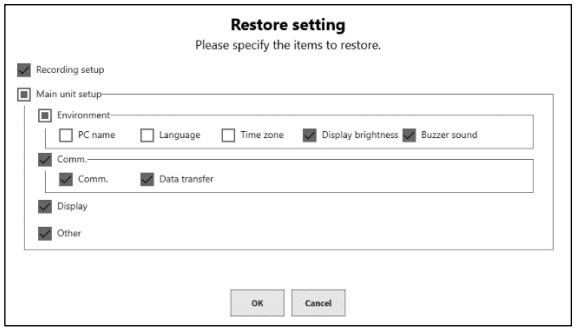
(4) Import/Export: Exports configuration data to external media (such as an SD memory card or USB stick) or imports (reads) the configuration data backed up to external media.

## Restore setting:

Select the configuration data to restore/set again on the [Setup] management screen, then tap the【Restore setting】key to display the [Restore setting] dialog.




Select the items to restore, then tap the【OK】key to update the setting values.




### Tips

- ❑ The measurement mode is always restored.
- ❑ If you selected to restore the PC name or language, this product shuts down automatically after the data is restored.

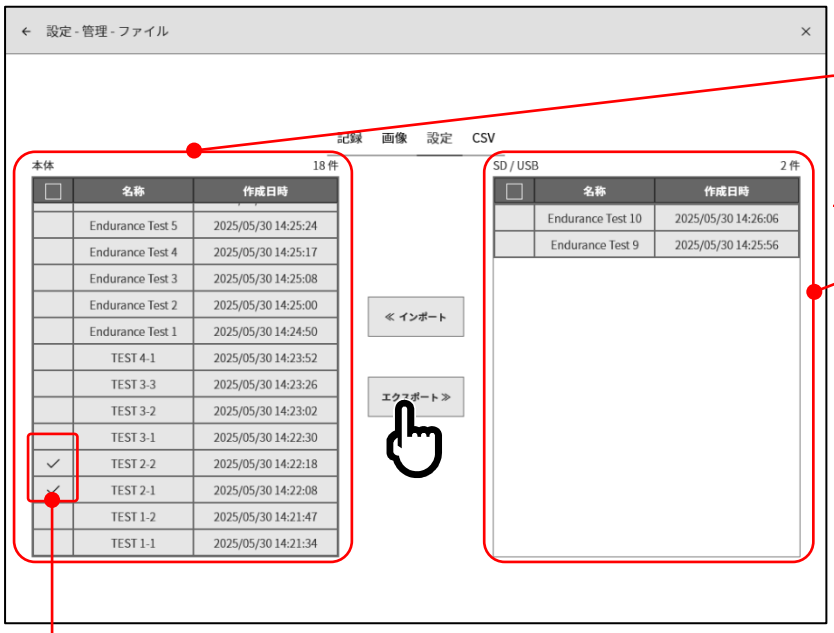
## Exporting Settings

Connect the external storage media (such as SD memory card or USB stick) to the main unit and confirm that the SD/USB indicator on the side menu activates.

Tap the【Import/Export】key on the bottom right of the [Setup] management screen to display the external media selection dialog and select the target external media.


Tap the【OK】key to switch to the [Import/Export] screen.

Place a check mark (✔) in the selection field of the configuration data to back up and tap the【Export】key in the center to export the configuration data.




List of configuration data on internal SSD

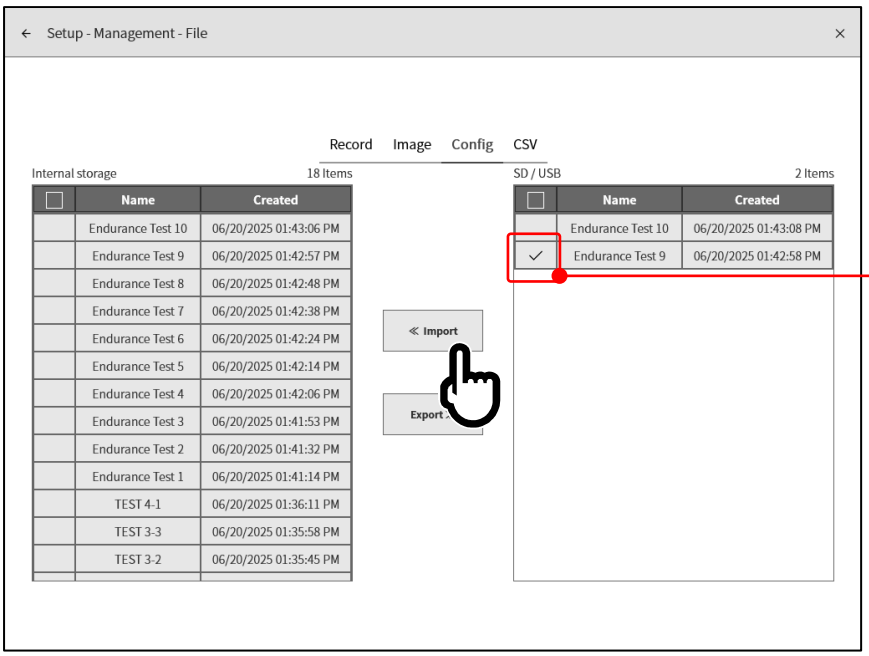
List of configuration data on external media

Place a check mark (✔) on the configuration data to back up

## Importing Settings

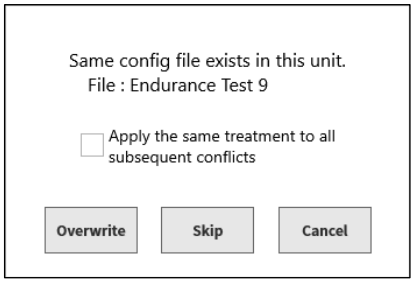
Open the [Import/Export] screen in the same way as when exporting data, and import backup data backed up to external media to the main unit.

When importing, place a check mark (✔) in the configuration data list for external media on the right, and tap the【Import】key in the center.




Place a check mark (✔) in the configuration data to read

When the same configuration data as the backup exists in the internal storage, a cautionary dialog box is displayed, and you can select the appropriate operation using the【Overwrite】,【Skip】, or【Cancel】key.



# 9. Maintenance

The frame must not be removed from this product other than by our service engineers, as this product is a precision device.
This section describes the maintenance of this product.

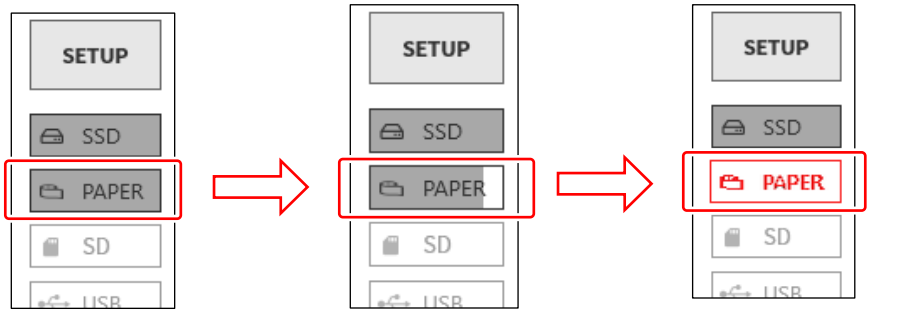
## 9.1. Managing/Handling Recording Paper and Printer Recorded Data

### 9.1.1. Replacing Recording Paper and Monitoring Remaining Paper

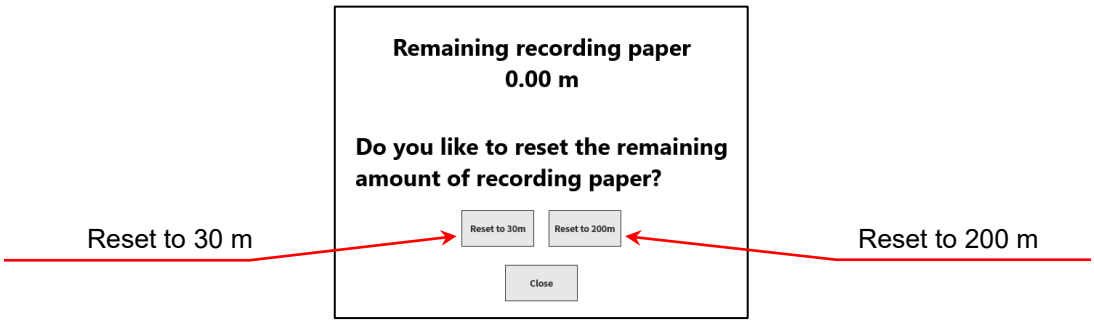
Use the chart recording paper specified by A&D. Use of a chart that is not recommended may cause failure in printing or shorten the life of the thermal head.
Red is printed on the recording paper when the recording paper is running low. The remaining paper monitor (PAPER) is displayed on the side menu of the monitor. Follow these to replace the recording paper.
For information on the replacement method, see "2.1.3. Paper Loading".

Remaining Paper Monitor Operations

<After replacing recording paper> <During use> <No paper remaining>




Reset the remaining paper monitor after replacing the recording paper. Press and hold【PAPER】(remaining paper monitor) on the side menu to display the dialog box for resetting.
Tap【Reset to 30 m】 for a 30 m paper roll (YPS-106 or YPS-108) or【Reset to 200 m】 for a 200 m Z-fold paper (YPS-112), and then tap【CLOSE】.



## 9.1.2. Storing Recording Paper

### Storing Recording Paper before Recording

- ❑ Avoid storing recording paper in high temperature or high humidity environments. Take care as storing it in a high temperature environment for an extended period of time will cause the white background to change color.
- ❑ When storing recording paper, remove it from the main unit and insert it in a plastic bag, or as-is if it is still in its original packaging, and then store it in a dark location with a temperature of 25°C or less and humidity of 70% RH or less.
- ❑ Do not expose it to sunlight for extended periods of time. Take care when performing measurement or storage outdoors, as exposing it to light for an extended period of time will cause the white background to change color.

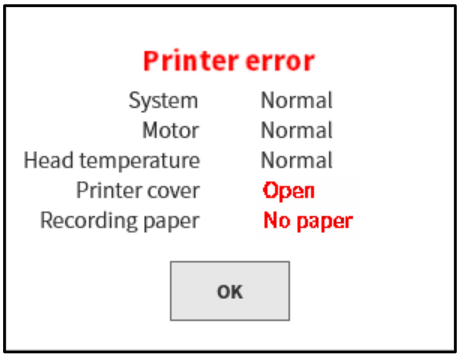
### Storing Recording Paper after Recording

- ❑ Avoid storing recorded data in high temperature or high humidity environments or exposing it to sunlight or strong light for an extended period of time, as it may lose color or the white background may change color.
- ❑ When storing recording paper for an extended period of time after recording, file it in a dark location with a temperature of 25°C or less and humidity of 70% RH or less. When using a file folder, make sure that it is made of a material that does not include plasticizer (such as polyethylene or polypropylene).
- ❑ If the recording paper touches the following materials or products, the printing surface may change color, lose color, or exhibit otherwise poor color performance.
  Vinyl chloride products, organic compounds, adhesive tape, pencil erase, rubber mats, magic markers, felt-tip pens, correction fluid, carbon, diazo photosensitive paper, hand cream, hairdressing products, cosmetic products, or leather products such as a wallet
- ❑ Recorded data that has colored cannot be removed by rubbing or wetting it. However, do not rub the recorded data part, as rubbing the recording paper strongly will cause it to color due to the frictional heat.

## 9.1.3. Printer Block Errors

The state of the following three items is monitored for the printer block to control recording. If an error occurs during recording, the error is displayed on the monitor and recording ends.

- ❑ Existence of recording paper
- ❑ Printer cover lock state
- ❑ Thermal head temperature




Printer error dialog box

**Note**

- ❑ The thermal head temperature may be high after performing printer recording for an extended period of time, which can cause an error. Take the installation location, printing density, and recording speed into consideration so that no error occurs.

# 9.2. Backing Up Recorded Data

This product records measured data on the internal SSD. Make sure to periodically perform maintenance (data backup or deletion) on the SSD, because failing to do so may prevent measurement from being performed due to insufficient space.
The SSD remaining capacity monitor (SSD) is displayed on the side menu of the monitor, and maintenance can be performed based on that display.
For information on backing up recorded data and deleting it from the SSD, see “Record” of "8.4.1. File Management".


<SSD remaining capacity monitor>
Displays the remaining capacity of the internal SSD in the indicator.

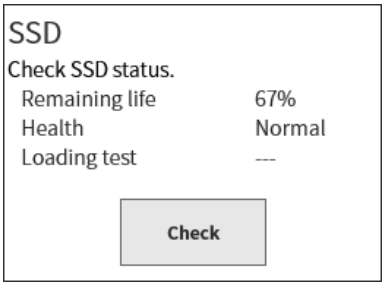
## Maintenance procedure

Step 1. Copy the recorded data to back up to external media using the export function.

Step 2. Delete unnecessary recorded data.

## 9.2.1. Internal SSD Errors

The life of the internal SSD of the recording device greatly varies according to the number of times data has been overwritten.
The health of the SSD can be checked in [Remaining life] and [Health] in【 SSD】 on the [Maintenance] screen.
When the life remaining is close to 0%, please contact our sales representative to replace the SSD.




# 9.3. Display Cleaning

When the surface of the display is dirty, wipe it clean with a soft, dry cloth or gauze dampened with ethanol.

# 9.4. Thermal Head Cleaning/Life

## 9.4.1. Cleaning

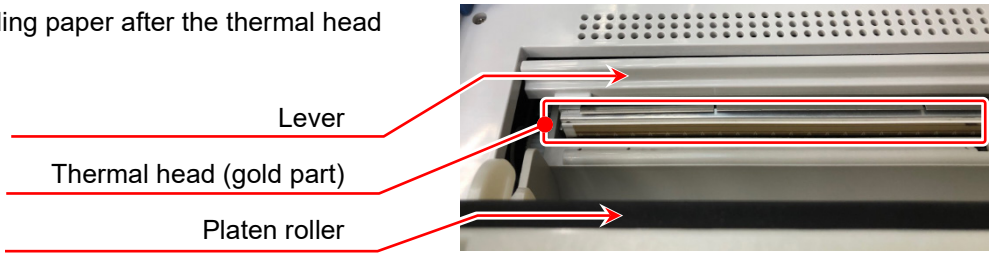
When recording has been performed for an extended period of time, material such as dust or printing waste may adhere to the thermal head thermocouple. This may cause printing to become unclear and reduce the image quality. In this case, follow the procedure below to clean the thermal head.

Step 1. Open the printer cover by pulling the lever of the printer block up.

Step 2. The thermal head can be seen in the top inside of the printer block. The thermocouple is at a line 4.4 mm from the thermal head edge. Clean that line area.

Step 3. Gently wipe it clean with a cotton bud or gauze dampened with ethanol. The recording paper colors when exposed to ethanol, so it is recommended that you remove it from the stock area before cleaning.

Step 4. Load the recording paper after the thermal head dries.




## 9.4.2. Life

The wear resistance of the thermal head is about 30 km (approximately 1,000 rolls of YPS106 recording paper) or about 30 million printing pulses. Recording quality may not be able to be maintained after that. In this case, please contact our sales representative to replace the thermal head (at an extra cost).

# 9.5. Platen Roller Maintenance

Foreign material or dust adhering to the platen roller may cause damage to the thermal head or may cause printing to become unclear and reduce the image quality. In this case, gently wipe the platen roller clean using gauze dampened with ethanol.

# 9.6. Power Outages

If a power outage occurs or the power cable becomes disconnected during recording, the internal SSD may become damaged and unable to be accessed. An UPS (uninterruptible power supply) is recommended to be used.

# 9.7. Battery Replacement

The life of the backup battery for the internal clock is about 10 years (at 23°C). If the clock resets every time the power is turned on, the battery may need to be replaced.
In this case, please contact our sales representative.

## 9.8. Fan Replacement

If the internal fan stops due to failure, the internal temperature of this product will rise and may cause damage to other devices inside this product. The state of the fan can be checked in【Fan】 on the [Maintenance] screen.

If an error occurs, please contact our sales representative for a repair.

## 9.9. Cautions for Disposing This Product

Take care of the following when disposing of this product.

**⚠WARNING**

- ❑ This product includes a coin lithium battery (primary cell) for backup purposes.
- ❑ When disposing of this product, please contact an A&D sales representative or distributor (see the end of this document for details).
- ❑ Follow national and regional laws when disposing of this product.

## 9.10. Troubleshooting and Inspection

If this product does not operate normally after performing the indicated countermeasure or a repair is required, output an OS info report file and contact our sales representative.

| Symptom | Possible cause | Countermeasure |
|---|---|---|
| The power does not turn on.<br>Nothing is displayed on the screen. | The power cord is not connected to the connector properly. | Connect the power cord properly and turn on the power switch |
| | The fuse has blown. | The fuse for this product cannot be replaced by the customer because it is located inside the main unit. Please contact our sales representative if the fuse may be blown. |
| | The screen is set to turn off automatically. | Press any key to turn on the screen. |
| The touch panel or operation panel keys do not respond. | This product is recording.<br>The start LED is on. | Perform the operation again after pressing stop on the operation panel to stop measurement. |
| | The SCREEN LOCK or KEY LOCK is switched ON. | Switch OFF the SCREEN LOCK or KEY LOCK on the side of this product. |
| Printer recording is not performed. | There is no recording paper. | Load recording paper. |
| | The printer cover is open. | Close the printer cover. |
| | The thermal head is at an abnormally high temperature. | Use this product in a location at a temperature between 0 and 40°C. Do not continuously print solid black areas. |
| | Real-time waveform printing is disabled in the recording settings. | Enable real-time waveform printing in the recording settings and start recording. |
| Memory recording cannot be replayed. | Memory data is not saved because the trigger is not enabled. | Cause a manual trigger using the TRIG key on the operation panel. |

| Symptom | Possible cause | Countermeasure |
|---|---|---|
| Recording does not start when the START key is pressed. | The recording mode is set to trigger start or time start. | Disable the START trigger. |
| | External sampling recording is enabled. | Press the start key after inputting the signal, as recording cannot start unless a pulse signal is input to the remote terminal. |
| | Recording paper has not been loaded. | Load recording paper. |
| | KEY LOCK is switched ON. | Switch OFF the KEY LOCK on the side of this product. |
| | There is no free space remaining on the SSD. | Delete unnecessary recorded data or CSV files. |
| | The recorded data has exceeded 1,000 items. | |
| | The number of CSV files has exceeded 1,000 items. | |
| | The maximum size of recorded data when the delete then save function is enabled (100 MB) has been exceeded. | Enable [Maximum time] in [Recording] or set [Recording time] to a time at or below the maximum time. |
| Data cannot be saved to the specified media. | The media has not been formatted. | Format the media. |
| | There is insufficient free space on the media. | Delete unnecessary files or use new media. |
| | The media is set to read-only. | Disable the read-only setting of the media. |
| The media is not recognized. | The format of the media is invalid. | Use the FAT16, FAT32, NTFS, or exFAT file system to format the media. |
| | The media is damaged. | Use other media. |
| | The device cannot be recognized as removable media. | Use other media. |
| The communication interface cannot be used to configure settings and control operation. | The communication parameter settings do not match. | Match the address and communication parameters. |
| This product does not shut down with the POWER switch. | KEY LOCK is switched ON. | Switch OFF the KEY LOCK on the side of this product. |
| | The main unit software is unable to detect switch operations. | Press and hold the POWER switch until the power turns off. |

# 10. Specifications

## 10.1. General Specifications

### 10.1.1. Main Unit Basic Specifications

| Item | Specifications | | | |
|---|---|---|---|---|
| Input block | Number of module slots | 9 slots | | |
| | Analog input | Maximum 36 channels | | |
| | Logic input | Maximum 144 channels | | |
| Recording device | Internal SSD | 256 GB | | |
| | Internal memory | 4 GB | | |
| | Internal printer | 216 mm thermal printer | | |
| Recording function | SSD recording | Directly recording to internal SSD | | |
| | Memory recording | Recording high-speed phenomena to memory | | |
| | Printer recording | Directly recording input signals to printer | | |
| Sampling speed | SSD recording | 1 MS/s | to | 10 S/min |
| | Memory recording | 20 MS/s | to | 10 S/min |
| | Printer recording | 1 kS/s (100 mm/s) | to | 10 S/min (1 mm/min) |
| Sampling accuracy | Accuracy | ±10 ppm (max)<br>* With an arbitrary chart speed, ±30 ppm (max). | | |
| Printer block | Thermal printer | | | |
| | Recording width | 216 mm | | |
| | Recording speed | 100 mm/s to 1 mm/min | | |
| | Chart speed accuracy | Within ±2 % (25 °C, 65 % RH) | | |
| | Recording paper | 219 mm x 30 m | Paper roll | (YPS-106, YPS-108) |
| | | 219 mm x 200 m | Z-fold paper | (YPS-112) |
| Display block | 12.1" XGA TFT color LCD (1024 x 768 dots)<br>With electrostatic capacitive touch panel (supporting two point multi-touch) | | | |
| Operation panel | Operation panel key | POWER | Power on/off | |
| | | START | Start recording | |
| | | STOP | Stop recording | |
| | | TRIG | Forced trigger | |
| | | PRINT | Start printer recording/screen copy | |
| | Rotary knob | Change measurement range or waveform position, etc. | | |
| Lock function | Key lock | Operation panel key lock | | |
| | Screen lock | Touch panel key lock | | |
| Interfaces | LAN, USB, SD, COM, DVI-D<br>For details, see "10.2.12. Interface Specifications". | | | |

## 10.1.2. General Specifications

| Item | Specifications | | |
|---|---|---|---|
| Power | Rated power voltage | AC 100 to 240 V | |
| | Allowed range of variation in power voltage | AC 90 to 264 V | |
| | Rated power frequency | 50/60 Hz | |
| | Allowed range of variation in power frequency | 47 to 63 Hz | |
| | Withstand voltage | Between power and case | 1500 V AC for 1 minute |
| | Insulation resistance | Between power and case | 100 MΩ or more at 500 VDC |
| | Power consumption | For printer recording | 300 VA (maximum printing state) |
| | | When recording is stopped | 80 VA |
| | | For standby | 5 VA (power cord connected and power off) |
| | Power fuse | Internal (not replaceable) | |
| Locations for use | Indoor, Pollution Degree 2 *1, elevation 2000 m or lower | | |
| Warmup time | 60 minutes or longer | | |
| Operating environment | Temperature | 0 to 40 °C | |
| | Humidity | 35 to 85 RH% (without condensation) | |
| Storage environment | Temperature | -20 to 60 °C | |
| | Humidity | 20 to 85 RH% (without condensation) | |
| Vibration resistance | Sine wave vibration | | |
| | Vibration frequency | 10 to 55 Hz | |
| | Vibration level | 20.0 $m/s^2$, 3 axis, 20 cycles each | |
| | Random vibration | | |
| | Vibration frequency | 5 to 500 Hz | |
| | Acceleration rms value | X, Y axis 6.5 $m/s^2$, Z axis 10.2 $m/s^2$, 1 hour each | |
| Backup battery life | Approx. 10 years (ambient temperature 23°C), for clock backup | | |
| Standards | Safety standards | EN61010-1<br>EN61010-2-30 | Overvoltage Category II (CAT II) *2<br>Measurement Category *3<br>Dependent on specifications of installed modules |
| | EMC | EN61326-1 Class A | |
| Dimensions | Approx. 394 mm (W) x 334 mm (H) x 199 mm (D) *Excluding protrusions | | |
| Mass | 9.5 kg or less (main unit only) | | |
| Warranty period | 1 year | | |

*1 The Pollution Degree indicates the level of pollution that can exist in the ambient environment.

Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.

Pollution degree 2: Only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is to be expected.

Pollution degree 3: Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation which is to be expected.

Pollution degree 4: The pollution generates persistent conductivity caused by conductive dust or by rain or snow.

*2 The Overvoltage Category (Installation Category) indicates how much overvoltage (impulse voltage) from an AC power supply an electrical device can withstand. Overvoltage Category II (CAT II) is suitable for devices powered by wire from the switchboard of a building.

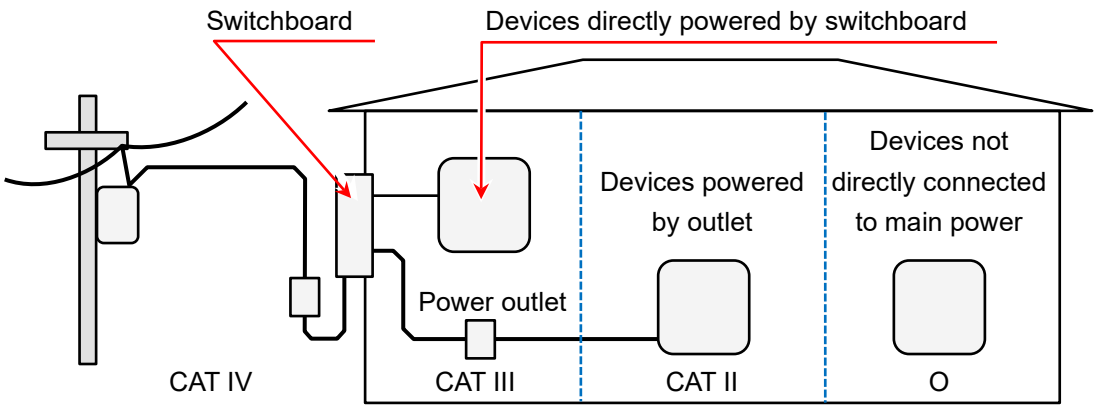
*3 The Measurement Category categorizes a testing or measurement circuit according to the type of main power circuit intended to be connected for testing or measurement, and differs according to the modules installed to this product. Use this product within the Measurement Category that meets the module specifications.

CAT II: Applies to testing and measurement circuits directly connected to the point of use (power outlet or similar location) of a low voltage main power supply system.

CAT III: Applies to testing and measurement circuits connected to the switchboard of the low voltage main power supply system in a building.

CAT IV: Applies to testing and measurement circuits connected to the source of the low voltage main power supply system in a building.

No category (O): Applies to circuits not directly connected to a main power supply.




O : Other circuits not directly connected to main power
CAT II : Measurement Category II
CAT III : Measurement Category III
CAT IV : Measurement Category IV

# 10.2. Functional Specifications

## 10.2.1. Measurement Function

| Item | Specifications | |
|---|---|---|
| Measurement modes | R&D mode | For research and development |
| | MFG mode | For manufacturers |
| Recording mode | The recording modes are indicated below.<br>(1) Standard<br>(2) Start time<br>(3) Start trigger<br>(4) Interval (N times) *1<br>(5) Start time + Start trigger<br>(6) Start trigger + Interval (N times) *1<br>(7) Start time + Interval (N times) *1<br>(8) Start time + Start trigger + Interval (N times) *1<br>(9) Window recording | |
| Recording device | Recording to SSD, memory, or printer, and recording to various recording devices at the same time | |
| Display | Y-T waveform | Waveform with amplitude on vertical axis and time on horizontal axis |
| | X-Y waveform | Waveform with X axis (horizontal) and Y axis (vertical) |
| | FFT waveform | Waveform for FFT analysis |
| | Digital value | Displays numeric values for measured values |
| Sampling speed | Differs according to recording device. | |
| Maximum recording time | 100 days | |
| Maximum number of recorded items | 1,000 | |

*1 Interval time setting range: <Recording time + 1 minute> to <one day>

## 10.2.2. SSD Recording

| Item | Specifications | |
|---|---|---|
| Function | Records the input signal to the internal SSD. | |
| Recording device | Internal SSD | |
| Number of channels | Analog | 36 ch (max) |
| | Logic | 144 ch (max) |
| Data format | NORMAL data | Samples and records data at the set sampling speed. |
| | P-P data | Records the two peak values (max/min) of the data within the set sampling speed period sampled at 20 MS/s. |
| Sampling speed | 1 MS/s to 10 S/min | 500 kS/s (max) for P-P data<br>The speed can be set to 1, 2, or 5 series |
| | External sampling*1 | Maximum input frequency: 250 kHz |
| Information data | Records information related to the recorded data, such as the version of this product, module configuration, channel settings, data format, and recording time. | |
| Recorded data | Records input data, trigger information, and marks. | |
| Window recording | Records the last data specified at the recording time when recording stops.<br>Cannot be used in conjunction with memory recording or printer recording. | |

*1 Enabled when the Remote Control Module (RA30-112) is installed.
External sampling cannot be recorded to the SSD and printer at the same time.

## 10.2.3. Memory Recording

| Item | Specifications | |
|---|---|---|
| Function | Records the input signal to the internal memory. | |
| Recording device | Internal memory | 2 GW *1 |
| | Record blocks (number of memory divisions) | Divided into 1 to 200 user-defined blocks *2 |
| | Points | The number of data items per channel that can be recorded to a recording block<br>2 kW to 2 GW (selected in step 1-2-5)<br>Channels x points x blocks ≤ 2 GW |
| Number of channels | Analog | 36 ch (max), 18 ch at 20 MS/s |
| | Logic | 144 ch (max) |
| Data format | NORMAL data | |
| Sampling speed | 20 MS/s to 10 S/min | The speed can be set to 1, 2, or 5 series |
| Information data | Records information related to the recorded data, such as the version of this product, module configuration, channel settings, data format, and recording time. | |
| Recorded data | Records input data and trigger information. | |
| CSV output | Enables the recorded data saved when recording is finished to be automatically saved to a CSV file.<br>Can be used with the standard, start time, start trigger, or start time + start trigger recording modes. | |

*1 W (word) refers to a unit of data. 1 W = 2 bytes

*2 The number of memory blocks available for recording with the overwrite mode is the number of recording blocks minus one.

## 10.2.4. Printer Recording

| Item | Specifications | |
|---|---|---|
| Function | Simultaneously records the input signal to recording paper and the internal SSD. | |
| Recording devices | Internal printer<br>Internal SSD | |
| Channel count | Analog<br>Logic | 36 channels (max)<br>144 channels (max)<br>48 channels (max) when printing realtime waveforms |
| Data format | P–P | |
| Recording speed | 100 mm/s to 1 mm/min<br>External sampling*1 | The recording speed is either a 1, 2, or 5 series speed or an arbitrary chart speed<br>Maximum input frequency: 500 Hz<br>Paper feed length per pulse: 0.1 mm |
| Printing resolution | Amplitude axis (Y axis)<br>Time axis (T axis) | 8 dots/mm<br>20 to 80 dots/mm |
| Length of each division | Amplitude axis (Y axis)<br>Time axis (T axis) | 5 mm or 10 mm<br>10 mm<br>* One division equals 100 samples |

*1 Enabled when the Remote Control Module (RA30-112) is installed.
External sampling cannot be recorded to the SSD and printer at the same time.

## 10.2.5. Pen Recording

| Item | Specifications | |
|---|---|---|
| Function | Records the input signal to recording paper. | |
| Recording devices | Internal printer | |
| Channel count | 48 channels (max) | |
| Data format | P–P | |
| Recording speed | 100 mm/s to 1 mm/min<br>External sampling*1 | The recording speed is either a 1, 2, or 5 series speed or an arbitrary chart speed<br>Maximum input frequency: 500 Hz<br>Paper feed length per pulse: 0.1 mm |
| Printing resolution | Amplitude axis (Y axis)<br>Time axis (T axis) | 8 dots/mm<br>20 to 80 dots/mm |
| Length of each division | Amplitude axis (Y axis)<br>Time axis (T axis) | 5 mm or 10 mm<br>10 mm<br>* One division equals 100 samples |

*1 Enabled when the Remote Control Module (RA30-112) is installed.

## 10.2.6. Trigger Function

### [Basic trigger function]

| Item | Specifications | |
|---|---|---|
| Trigger function | Start trigger | Start trigger for recording operation |
| | Memory trigger | Trigger for memory recording |
| Trigger type | Analog input signal *2 | |
| | Level trigger<br>Window trigger | Trigger when an analog signal transects (rises above/falls below) the set threshold |
| | | INTO WIN: Trigger when the analog signal enters the upper/lower limit range |
| | | OUT WIN: Trigger when the analog signal leaves the upper/lower limit range |
| | Logic input signal *2 | |
| | Bit pattern trigger | Logic signal bit pattern judgment trigger |
| | Forced trigger | When the trigger key of the operation panel is pressed |
| | External trigger *1 | When the external trigger input signal becomes active *1 |
| Trigger filter | This function generates a trigger if the trigger conditions continue to be established for the specified period of time (to ensure that a trigger is not generated by noise, etc.) | |
| | Filter time | 0 to 100 s |
| Hysteresis | 1% of RANGE | |

*1 Enabled when the Remote Control Module (RA30-112) is installed.

*2 Analog input and logical input triggers (triggers from input channels) are collectively referred to as channel triggers.

### [Start trigger]

| Item | Specifications |
|---|---|
| Trigger source | Channel trigger, forced trigger, external trigger |
| Channel trigger specified number of channels | 1 ch |

### [Memory trigger]

| Item | Specifications |
|---|---|
| Trigger source | Channel trigger, forced trigger, external trigger |
| Channel trigger specified number of channels | 18 channel AND/OR setting available |

## 10.2.7. Waveform Monitor Function

| Item | Specifications | |
|---|---|---|
| Display screen | MEASURE | Displays the waveform of the input signal |
| | PLAYBACK | Playback the memory, SSD, or printer recorded data |
| Waveform type | Y-T waveform, X-Y waveform, FFT waveform | |
| | Enables waveform display for an arbitrary analog signal and logic signal | |
| | Y-T waveform | Enables 48 channel/sheet signal display |
| | X-Y waveform | Enables a maximum of four X-Y waveform sets to be displayed *1 |
| | FFT waveform | Enables FFT analysis results to be displayed for a maximum of two channels *1 |

*1 Enabled for SSD recording with the data format set to NORMAL. Sampling speed limitations apply.

## 10.2.8. Y-T waveform

| Item | Specifications | |
|---|---|---|
| Target data | All memory, SSD, and printer recording data | |
| Display screen | MEASURE | Displays the state waveform of the input signal |
| | PLAYBACK | Playback the memory, SSD, or printer recorded data |
| Display width | 20 div x 20 div<br>Time axis (T axis)<br>Amplitude axis (Y axis)<br>Display area | 1 div = 100 samples<br>1 div = 1/10 RANGE (with display range at 100%)<br>Specifies the display position, display range, display maximum, and display minimum |
| Sheet | Enables waveform screens to be managed as three waveform screens (display channel sets) | |
| Number of graphs | 1 to 18 | |
| Display functions | Digital display | Numeric value display of input signal |
| | Scale | Scale display of amplitude axis |
| | Grid | Grid display of waveform area |
| | Trigger/mark | Displays detected trigger/mark |
| | Pen position | Displays the signal amplitude position |
| | Zero position | Displays the signal zero position |
| | Time display | Displays the time information at the bottom of the view area |
| | Pinch in/out | Enlarges/reduces the display waveform |
| | Swipe | Change Y-T waveform display position |
| | Time axis compressed view | Compresses the view of the Y-T waveform time axis 1/1x to 1/10,000x (the compression rate can be set to a multiple of 1, 2, or 5) |

| Item | Specifications |
|---|---|
| Cursors | Two cursors are displayed.<br>The signal information (position and value) of the cursor positions, difference information between the cursors, and maximum, minimum, and average between the cursors are displayed.<br>* The maximum, minimum, and average can only be displayed for a single selected channel. |
| TRIG.SYNC | Updates the waveform of memory recording in synchronization with a trigger<br>The trigger point is in the center of the waveform monitor |

## 10.2.9. X-Y Waveform

| Item | Specifications | |
|---|---|---|
| Target data | SSD recorded data | Data format: NORMAL; Sampling speed: 1 kS/s or lower |
| X-Y axis | X axis channel:<br>Y axis channel: | User-defined analog channel<br>User-defined analog channel<br>Four waveforms can be set |
| Sampling speed | 1 kS/s (max) | |
| Display format | Select single screen or quad screen<br>Single<br>Quad | <br>Displays four sets of X-Y waveforms on a single screen<br>Displays a separate X-Y waveform on each of four screens |
| Pen up | Pauses measurement | The pen up operation can be performed for one waveform at a time or all waveforms at once |
| Pen down | Resumes measurement | The pen down operation can be performed for one waveform at a time or all waveforms at once |
| Clear | Clears the displayed waveform | The clear operation can be performed for one waveform at a time or all waveforms at once |
| Refresh graph | Redraws the X-Y waveform between cursors A and B on the Y-T waveform. | |
| Display functions | Dot/line<br>Scale<br>Grid<br>Pen position<br>Zero position<br>Pinch in/out | Renders the X-Y waveform with dots or lines<br>Input signal scale display of X axis and Y axis<br>Grid display of waveform area<br>Displays the input signal position<br>Displays the signal zero position<br>Enlarges/reduces the waveform |

## 10.2.10. FFT Analysis

| Item | Specifications |
|---|---|
| Target data | SSD recorded data<br>Data format: NORMAL; Sampling speed: 1 MS/s or lower |
| Sampling points | Set the analysis sampling points: Select 1000, 2000, 5000, or 10000 points |
| Frequency range | 500 kHz (max), the frequency range is calculated as 0.5 x the sampling speed |
| Analysis range selection | Selects the analysis range using two cursors. |
| Window function | Supports amplitude gain using a window function. Hanning, hamming, rectangular |
| Analysis function | Time scale waveform, linear spectrum, RMS spectrum, power spectrum, power spectrum density, 1/1 octave analysis, 1/3 octave analysis, cross power spectrum, transfer function, coherence function |
| Analysis count | 2 |
| Display format | Single/Dual |
| X axis scale | Time, linear frequency, log frequency, 1/1 octave, 1/3 octave |
| Y axis scale | Amplitude, linear real part, linear imaginary part, linear amplitude, log amplitude, phase |
| Manual scale | Manually sets the X axis and Y axis display area |
| Averaging | Time simple averaging, frequency simple averaging, frequency exponential weight averaging,<br>frequency axis peak hold, None |
| Average number of additions | 1 to 10 |
| Peak value display | Identifies a maximum of 10 local maximums or global maximums from the analysis results. |
| Cursor | Displays two cursors for each analysis and displays the X value and Y value of each cursor. |
| Pinch in/out | Enlarges/reduces the FFT analysis results with pinch in/pinch out operations. |

## 10.2.11. Setup/Record management

| Item | Specifications | |
|---|---|---|
| Recording Setup | | |
| Recording | Mode | Nine type recording mode display and selection. |
| | Data name | Data name, automatic numbering. |
| | Recording time | Recording time setting for one time, maximum time settable from remaining SSD capacity |
| | Start time | Set the recording start time |
| | Interval time | Set the Interval time and number of recordings |
| | Printer | Enable/disable printer recording when performing measurement, sheet selection, enable/disable real-time waveform printing during measurement. |
| | SSD | Enable/disable SSD recording when performing measurement. |
| | Memory | Enable/disable memory recording when performing measurement, record blocks, points, endless mode, pre-trigger settings. |
| | Thumbnails | Configures the channels to display thumbnails for during recording and the view compression rate (1/10 to 1/100). |
| Channel List | Common | Displays and configures a list of common settings set in modules and the input module installed in this product.<br>Display items: Channel number, module type.<br>Display items and settings: CH name, measurement, color, display position, display range, display maximum, and display minimum. |
| | Conversion | List of physical conversion for the installed analog input module.<br>Display items and settings: Conversion method (2-pt /gain), conversion value (conversion 1, conversion 2), unit. |
| | Sheet | Channel registration to Sheet and Graph, Wave display and Wave inversion list view and settings.<br>Display items and settings: Sheet, Graph, Wave display, Wave inversion |
| | List by input module type | Displays and configures a list of the settings unique to each module. Each item can be configured individually or together. |
| Sheet | Graph | Settings regarding the division of Y-T waveforms and graph previews. |
| | SHEET1 to SHEET3 | List of registered channels and channel registration to sheets 1 to 3 |
| Printer | Printing | Print settings for the header, annotation, footer, grid, date/data name, trigger/mark, time axis, recording speed, channel mark, and feed length |
| | Text settings | Inputs and imports/exports text for printing headers, annotations, and footers<br>60 characters for the text (in the paper feed direction) x 86 lines (waveform amplitude direction) |

| Item | Specifications | |
|---|---|---|
| Recording setup - Other setup | Sampling speed | The sampling speed unit is frequency or period. |
| | Printer speed | The speed unit for pen recording or printer recording is the sampling speed or chart speed. |
| | Chart speed key | Enables six chart speeds to be registered. |
| | X axis notation | Sets the label notation of the X axis scale on the waveform screen. Three types can be set. |
| | Output recording info XML file | Sets whether to output an XML format file of the recording info to the recorded data. |
| Environment | PC name | Sets the name of the main unit using 15 characters or less. This name is used for identification purposes on the network and in recorded data. |
| | Language | English |
| | Time zone | Sets the time zone (regional standard time). |
| | Date and time | Sets the current date and time. |
| | Display brightness | Sets the brightness of the LCD display. |
| | Buzzer sound | Switches the overrange buzzer on or off |
| Display | Grid | Switches the grid lines of the waveform screen on or off and configures their brightness. |
| | Trigger line | Switches the trigger lines of the waveform screen on or off. |
| | Mark line | Switches the mark lines of the waveform screen on or off. |
| | Search result line | Switches the search result line of the waveform screen on or off. |
| Main unit setup - Other setup | CSV format | Configures the format for saving CSV files. |
| | Follow cursor | Sets whether to follow the cursor when the cursor moves outside the waveform monitor. |
| | TRIG key | Sets the operation performed when the TRIG key on the operation panel is pressed. |
| | Delete then save | Sets whether to enable the delete then save function when recording |
| File management | Record | Lists or deletes the data saved to this product, restores the recording setup, and imports/exports data. |
| | Image | Lists, deletes, and exports image data saved to this product. |
| | Config | Lists or deletes the configuration saved to this product, restores settings, and imports/exports data. |
| | CSV | Lists, deletes, and exports CSV files saved to this product. |
| | Delete then save | Sets whether to enable the delete then save function when recording |

## 10.2.12. Interface Specifications

| Item | Specifications | |
|---|---|---|
| LAN | Supported standard connectors | IEEE802.3 (1000BASE-T, 100BASE-TX, 10BASE-T) |
| | | RJ-45 |
| | Number of ports | 1 |
| USB | Supported standard connectors | USB3.0 |
| | | Type-A |
| | Number of ports | 2 |
| SD | Supported standard connectors | SD standard (SD/SDHC/SDXC supported) |
| | | Slot for SD memory cards |
| | Number of ports | 1 |
| COM | Supported standard connectors | EIA-574 |
| | | D-Sub9 |
| | Number of ports | 1 |
| DVI-D | Supported standard connectors | DVI-D (dual link not supported) |
| | | DVI-D |
| | Number of ports | 1 |

## 10.2.13. Communication Setup

### 10.2.13.1. COM

| Item | Specifications | |
|---|---|---|
| RS-232C | Baud rate | 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200, 230400, 460800 bps |
| | Data bits | 8 bit |
| | Stop bits | 1, 2 bit |
| | Parity | None, Odd, Even, Mark, Space |
| | Flow control | None, XON/XOFF, Hardware (CTS/RTS) |
| | Function | Communication commands |

### 10.2.13.2. LAN

| Item | Specifications | |
|---|---|---|
| Network | Connection method | IPv4 |
| | Function | Communication commands, Web server, FTP server, data transfer |
| Web server | HTTP | Enables RA3100 screen and key operations via a Web browser. |
| | Authentication | Restricts login via a user name and password |
| | Access restrictions | Restricts RA3100 operations from a Web Browser |
| | Screen refresh speed | Refresh speed of the RA3100 screen in the Web browser |
| | Save screen | Saves the screen of the RA3100 to the PC in the PNG format |
| | Time synchronization | Synchronizes the date and time of the RA3100 with a PC |
| FTP server | File transfer | File transfer of recording/image/configuration data |
| | Authentication | Restricts login via a user name and password |
| | Access restrictions | Read only |
| | Maximum number of connections | 8 |
| Data transfer | Data transfer | Realtime transfer of measurement data to a PC *1 |
| | Transfer period | 100 ms |
| | Transfer conditions | Always, linked with recording, or manual operation |
| | Protocols | TCP and UDP |
| | Transfer data | One-shot: The one latest item of sample data<br>Continuous: Measurement data synchronized with the sampling speed |
| | Decimation | 1/1 to 1/1000 *2 |
| | Maximum number of connections | 1 |

*1 MFG mode only

*2 Continuous transfer data only

### 10.2.13.3. List of Network Port Numbers Used

| Port Number | Protocols | function | Remarks |
|---|---|---|---|
| 20 | TCP | FTP server | For file transfer |
| 21 | TCP | FTP server | For control |
| 80 | TCP | Web server (HTTP server) | |
| 3000 | TCP | Communication commands | |
| 3100 | TCP or UDP | Data transfer | |

## 10.2.14. Other Setup (Maintenance/Operation History/Version Management)

| Item | Specifications |
|---|---|
| SSD check | SSD life remaining, health check, and loading test |
| Fan check | Displays the state of the internal cooling fan |
| LCD check | LCD screen check and pixel defect check |
| Brightness check | LCD back light brightness control check |
| Printer | Prints a test patter from the printer<br>Printer state check: System, motor, head temperature, printer cover, recording paper |
| Buzzer | Controls the buzzer on/off to check the buzzer |
| Panel keys | Press the panel keys to check whether they operate normally |
| Panel key LED | Turns the panel LEDs on/off to check whether they operate normally |
| Initialize | Returns the settings of this product to the factory defaults. |
| Operation history display | Displays the history of the past 100 operations. |
| Version management | Displays the serial number and version of this product and the version information of each module |

# 10.3. Module Specifications

## 10.3.1. 2ch Voltage Module (RA30-101)

| Item | Specifications | |
|---|---|---|
| Number of input channels | 2 ch | |
| Input connectors | Insulated BNC | |
| Input format | Unbalanced input<br>(insulation between channels and between channels and chassis) | |
| Coupling | AC/DC/GND | |
| Input impedance | 1 MΩ ±1% | |
| Measurement range (RANGE) | 100, 200, 500 mV<br>1, 2, 5, 10, 20, 50, 100, 200, 500 V (the measurement range is ±RANGE) | |
| Measurement probability | ±0.3 % of RANGE (23 °C ±5 °C, DC coupling, L.P.F. 3 Hz, after zero adjust) | |
| Temperature coefficient | ±(400 ppm of RANGE)/°C | |
| Frequency characteristics | DC coupling | DC to 100 kHz (-3 dB to 1 dB) (with L.P.F. and A.A.F. disabled) |
| | AC coupling | 0.3 Hz to 100 kHz (-3 dB to 1 dB) (with L.P.F. and A.A.F. disabled) |
| Low-pass filter (L.P.F.) | Cutoff frequency | 3 Hz, 30 Hz, 300 Hz, 3 kHz, OFF (-1.6 dB ±1 dB) |
| | Characteristics | Secondary bessel |
| Anti-aliasing filter (A.A.F.) | Cutoff frequency | 20, 40, 80, 200, 400, 800, 2k, 4k, 8k, 20k, 40 kHz, OFF, with 0.4 times the sampling speed of SSD recording set for the cutoff frequency. When 200 kS/s or higher, A.A.F. is disabled. |
| | Attenuation | -66 dB or less at 1.5 times the cutoff frequency |
| Input conversion noise | 1 mVp-p max (0.1 V range, input short circuit) | |
| A/D conversion | A/D resolution | 16 bits |
| | Sampling rate | 1 MS/s |
| Common mode rejection ratio | 80 dB or higher (50/60 Hz) | |
| Maximum allowed input voltage | ±500 V peak | |
| Maximum rated voltage to ground | 300 V (DC + AC peak) CAT II | |
| Withstand voltage | AC 3 kV, 1 minute (between channels and between channels and chassis) | |
| Usage environment | Temperature: 0 to +40 °C, humidity: 35 to 85 %RH or less (without condensation) | |
| Storage environment | Temperature: -20 to +60 °C, humidity: 20 to 85 %RH or less (without condensation) | |
| Dimensions | Approx. 140 mm (W) x 223 mm (D) x 20 mm (H) | |
| Mass | Approx. 300 g | |
| Standards | Safety | EN61010-1, EN61010-2-030 |
| | EMC | EN61326-1, Class A |

## 10.3.2. 4ch Voltage Module (RA30-102)

| Item | Specifications | |
|---|---|---|
| Number of input channels | 4 ch | |
| Input connectors | Insulated BNC | |
| Input format | Unbalanced input<br>(insulation between channels and between channels and chassis) | |
| Coupling | DC/GND | |
| Input impedance | 1 MΩ ±1 % | |
| Measurement range (RANGE) | 1, 2, 5, 10, 20, 50, 100, 200 V (the measurement range is ±RANGE) | |
| Measurement probability | ±0.2 % of RANGE (23 °C ±5 °C, DC coupling, L.P.F. 3 Hz, after zero adjust) | |
| Temperature coefficient | ±(400 ppm of RANGE)/°C | |
| Frequency characteristics | DC coupling | DC to 100 kHz (-3 dB to 1 dB) (with L.P.F. disabled) |
| Low-pass filter (L.P.F.) | Cutoff frequency | 3 Hz, 30 Hz, 300 Hz, 3 kHz, OFF (-1.6 dB ±1 dB) |
| | Characteristics | Secondary bessel shape |
| Input conversion noise | 5 mVp-p max (1 V range, input short circuit) | |
| A/D conversion | A/D resolution | 16 bits |
| | Sampling rate | 1 MS/s |
| Common mode rejection ratio | 80 dB or higher (50/60 Hz) | |
| Maximum allowed input voltage | ±200 V peak | |
| Maximum rated voltage to ground | 300 V (DC + AC peak) CAT II | |
| Withstand voltage | AC 3 kV, 1 minute (between input terminals and chassis, between channels) | |
| Usage environment | Temperature: 0 to +40 °C, humidity: 35 to 85 %RH or less (without condensation) | |
| Storage environment | Temperature: -20 to +60 °C, humidity: 20 to 85 %RH or less (without condensation) | |
| Dimensions | Approx. 140 mm (W) x 223 mm (D) x 20 mm (H) | |
| Mass | Approx. 300 g | |
| Standards | Safety | EN61010-1, EN61010-2-030 |
| | EMC | EN61326-1, Class A |

## 10.3.3. 2ch High Speed Voltage Module (RA30-103)

| Item | Specifications | |
|---|---|---|
| Number of input channels | 2 ch | |
| Input connectors | Insulated BNC | |
| Input format | Unbalanced input<br>(insulation between channels and between channels and chassis) | |
| Coupling | AC/DC/GND | |
| Input impedance | 1 MΩ ±1% | |
| Measurement range (RANGE) | 100, 200, 500 mV<br>1, 2, 5, 10, 20, 50, 100, 200, 500 V (the measurement range is ±RANGE) | |
| Measurement probability | ±0.5 % of RANGE (23 °C ±5 °C, DC coupling, L.P.F. 5 Hz, after zero adjust) | |
| Temperature coefficient | ±(500 ppm of RANGE)/°C | |
| Frequency characteristics | DC coupling | DC to 5 MHz (-3 dB to 1 dB) (with L.P.F. disabled) |
| | AC coupling | 6 Hz to 5 MHz (-3 dB to 1 dB) (with L.P.F. disabled) |
| Low-pass filter (L.P.F.) | Cutoff frequency | 5 Hz, 50 kHz, 500 kHz, OFF (-3 dB ±1 dB) |
| Input conversion noise | 2 mVp-p max (0.1 V range, input short circuit) | |
| A/D conversion | A/D resolution | 14 bits |
| | Sampling rate | 20 MS/s |
| Common mode rejection ratio | 80 dB or higher (50/60 Hz) | |
| Maximum allowed input voltage | ±500 V peak | |
| Maximum rated voltage to ground | 300 V (DC + AC peak) CAT II | |
| Withstand voltage | AC 3 kV, 1 minute (between channels and between channels and chassis) | |
| Usage environment | Temperature: 0 to +40 °C, humidity: 35 to 85 %RH or less (without condensation) | |
| Storage environment | Temperature: -20 to +60 °C, humidity: 20 to 85 %RH or less (without condensation) | |
| Dimensions | Approx. 140 mm (W) x 223 mm (D) x 20 mm (H) | |
| Mass | Approx. 300 g | |
| Standards | Safety | EN61010-1, EN61010-2-030 |
| | EMC | EN61326-1, Class A |

## 10.3.4. 2ch AC Strain Module (RA30-104)

| Item | Specifications | |
|---|---|---|
| Number of input channels | 2 ch | |
| Input connectors | NDIS4109: EPRC07-R9FNDIS | |
| Input format | Balanced differential input (insulation between channels and between channels and chassis) | |
| Compatible bridge resistance | 120 Ω to 350 Ω | |
| Gauge ratio | Fixed to 2.00 | |
| Bridge power | 0.5, 2 Vrms sine wave 5 kHz | |
| Balance adjustment range | Resistance | ±2 % (10000 (μm/m=με)) or less |
| | Capacity | 2000 pF or less |
| Balance adjustment precision | ±0.3% of RANGE or less | |
| Temperature coefficient | ± (400 ppm of RANGE)/°C | |
| Measurement range (RANGE) | Bridge power at 2 Vrms | 500, 1000, 2000, 5000, 10000, 20000 (μm/m=με) |
| | Bridge power at 0.5 Vrms | 2000, 4000, 8000, 20000, 40000, 80000 (μm/m=με) |
| Nonlinearity | ±0.1% of RANGE or less | |
| Frequency characteristics | DC to 2 kHz ±10% or less | |
| Low-pass filter (L.P.F.) | Cutoff frequency | OFF, 10 Hz, 30 Hz, 100 Hz, 300 Hz (-3 dB ±1 dB) |
| | Characteristics | Secondary Butterworth |
| Internal calibrator | ±1 to 9999 (μm/m=με)<br>Precision ±0.5 % of RANGE or less (23°C ±5 °C) | |
| Input conversion noise | 5 (μm/m=με) p-p max<br>(500 (μm/m=με) range, BV = 2 Vrms, 120 Ω bridge) | |
| A/D conversion | A/D resolution | 16 bit |
| | Sampling rate | 100 kS/s |
| Auto balance function | Cancel imbalance in the strain gauge bridge. | |
| Simple bridge check | Enables bridge edge short circuits and some bridge edge and cable open circuits to be detected. | |
| Maximum rated voltage to ground | 100 V (DC + AC peak) | |
| Withstand voltage | AC 300 V, one minute (between channels and between channels and chassis) | |
| Usage environment | Temperature: 0 to +40 °C, | humidity: 35 to 85 %RH or less (without condensation) |
| Storage environment | Temperature: -20 to +60 °C, | humidity: 20 to 85 %RH or less (without condensation) |
| Dimensions | Approx. 140 mm (W) × 223 mm (D) × 20 mm (H) | |
| Mass | Approx. 300 g | |
| Standards | Safety | EN 61010-1, EN61010-2-030 |
| | EMC | EN 61326-1, Class A |

## 10.3.5. 16ch Logic Module (RA30-105)

| Item | Specifications | |
|---|---|---|
| Number of input channels | 16 ch | |
| I/O connectors | 8 ch x 2 ports | |
| Input format | Single input, common input (non-insulated), insulation between input signals and chassis | |
| Voltage detection | Input range | 0 to 24 V |
| | Threshold | 1.4 V (High level 1.8V or more, Low level 1.0 V or less)<br>2.5 V (High level 3.0V or more, Low level 2.0 V or less)<br>4 V (High level 4.6V or more, Low level 3.4 V or less) |
| | Input impedance | 1 MΩ ±1 % |
| Contact detection | Threshold | 2 kΩ (Open 2.0 kΩ or more, Short 250 Ω or less)<br>5 kΩ (Open 5.0 kΩ or more, Short 1.5 kΩ or less)<br>9 kΩ (Open 9.0 kΩ or more, Short 3.0 kΩ or less) |
| | Load current | 0.5 mA (typ) @ load resistance 0 to 18 kΩ |
| Response pulse | 2 µs or more | |
| Sampling rate | 1 MS/s | |
| Maximum allowed input voltage | DC 30 V | |
| Maximum rated voltage to ground | 42 V (DC+ACpeak) | |
| Withstand voltage | AC 300 V, 1 minute (between channels and between channels and chassis) | |
| Power output for options | +5 V (±5 %) | |
| Usage environment | Temperature: 0 to +40 °C, humidity: 35 to 85 %RH or less (without condensation) | |
| Storage environment | Temperature: -20 to +60 °C, humidity: 20 to 85 %RH or less (without condensation) | |
| Dimensions | Approx. 140 mm (W) x 223 mm (D) x 20 mm (H) | |
| Mass | Approx. 250 g | |
| Standards | Safety | EN61010-1 |
| | EMC | EN61326-1, Class A |

## 10.3.6. 2ch Temperature Module (RA30-106)

| Item | Specifications | | | | |
|---|---|---|---|---|---|
| Number of input channels | 2 ch | | | | |
| Input connectors | Removable socket (front panel)<br>Temperature sensor connector coupling wire: 0.2 SQ to 1.5 SQ (AWG24 to AWG16) | | | | |
| Input format | Unbalanced input (insulation between channels and between channels and chassis) | | | | |
| Input impedance | 5 MΩ or higher | | | | |
| Adaptive sensor | Thermocouple (TC) type<br>Platinum resistance temperature detector (RTD) | K, E, J, T, N, R, S, B, C (JIS C1602:2015)<br>Pt100, Pt1000 (JIS C1604:2013) | | | |
| A/D conversion | A/D resolution<br>Data update rate | 16 bits<br>High speed (1.5 ms), Medium speed (100 ms), Low speed (1 s) | | | |
| Thermocouple (TC) | | | | | |
| Reference junction compensation method | Internal/external switching mode | | | | |
| Internal contact compensation temperature | ±1 °C (23 °C ±5 °C) ±1.5 °C (full temperature range) | | | | |
| LFD | Switchable on/off | | | | |
| Measurement range (RANGE)<br>Measurement probability | Type | Measurement range | Measurement range (°C) | | Measurement probability |
| | K | 200 °C | -200 to | 200 | -200 to 0 °C, ±(0.1 % of RANGE +2 °C) |
| | | 600 °C | -200 to | 600 | 0 to 1370 °C, ±(0.1 % of RANGE +1 °C) |
| | | 1370 °C | -200 to | 1370 | |
| | E | 200 °C | -200 to | 200 | -200 to 0 °C, ±(0.1 % of RANGE +2 °C) |
| | | 600 °C | -200 to | 600 | 0 to 1000 °C, ±(0.1 % of RANGE +1 °C) |
| | | 1000 °C | -200 to | 1000 | |
| | J | 200 °C | -200 to | 200 | -200 to 0 °C, ±(0.1 % of RANGE +2 °C) |
| | | 400 °C | -200 to | 400 | 0 to 1100 °C, ±(0.1 % of RANGE +1 °C) |
| | | 1100 °C | -200 to | 1100 | |
| | T | 100 °C | -100 to | 100 | -200 to 0 °C, ±(0.1 % of RANGE +2 °C) |
| | | 200 °C | -200 to | 200 | 0 to 400 °C, ±(0.1 % of RANGE +1 °C) |
| | | 400 °C | -200 to | 400 | |
| | N | 200 °C | -200 to | 200 | -200 to 0 °C, ±(0.1 % of RANGE +2 °C) |
| | | 600 °C | -200 to | 600 | 0 to 1300 °C, ±(0.1 % of RANGE +1 °C) |
| | | 1300 °C | -200 to | 1300 | |
| | R | 200 °C | 0 to | 200 | 0 to 400 °C, ±(0.1 % of RANGE +3.5 °C) |
| | | 1000 °C | 0 to | 1000 | 400 to 1760 °C, ±(0.1 % of RANGE +3 °C) |
| | | 1760 °C | 0 to | 1760 | |
| | S | 200 °C | 0 to | 200 | 0 to 400 °C, ±(0.1 % of RANGE +3.5 °C) |
| | | 1000 °C | 0 to | 1000 | 400 to 1700 °C, ±(0.1 % of RANGE +3 °C) |
| | | 1700 °C | 0 to | 1700 | |
| | B | 600 °C | 400 to | 600 | 400 to 1800 °C, ±(0.1 % of RANGE +3 °C) |
| | | 1000 °C | 400 to | 1000 | |
| | | 1800 °C | 400 to | 1800 | |
| | C | 600 °C | 0 to | 600 | 0 to 400 °C, ±(0.1 % of RANGE +3.5 °C) |
| | | 1200 °C | 0 to | 1200 | 400 to 2300 °C, ±(0.1 % of RANGE +3 °C) |
| | | 2300 °C | 0 to | 2300 | |
| Temperature coefficient | (Measurement probability x 0.1)/°C | | | | |

| Item | Specifications | | | | |
|---|---|---|---|---|---|
| Platinum resistance temperature detector (RTD) | | | | | |
| Measurement method | Three wire method | | | | |
| Measurement current | Switch between 0.5 mA and 1 mA (when Pt100)<br>Fixed to 0.1 mA (when Pt1000) | | | | |
| Measurement range (RANGE)<br>Measurement probability | Type | Measurement range | Measurement range (°C) | | Measurement probability |
| | Pt100 | 200 °C | -200 to | 200 | -200 to 850 °C,<br>±(0.1 % of RANGE +0.5 °C) |
| | | 400 °C | -200 to | 400 | |
| | | 850 °C | -200 to | 850 | |
| | Pt1000 | 200 °C | -200 to | 200 | |
| | | 400 °C | -200 to | 400 | |
| | | 850 °C | -200 to | 850 | |
| Temperature coefficient | (Measurement probability x 0.1)/°C | | | | |
| Common mode rejection ratio | 50/60 Hz Signal source resistance (100 Ω or less) | | 100 dB (refresh data: low speed, medium speed)<br>80 dB (refresh data: high speed) | | |
| Maximum allowed input voltage | 30 Vpeak | | | | |
| Maximum rated voltage to ground | 300 V (DC + AC peak) | | | | |
| Withstand voltage | AC 3 kV, 1 minute (between channels and between channels and chassis) | | | | |
| Usage environment | Temperature: 0 to +40 °C, humidity: 35 to 85 %RH or less (without condensation) | | | | |
| Storage environment | Temperature: -20 to +60 °C, humidity: 20 to 85 %RH or less (without condensation) | | | | |
| Dimensions | Approx. 140 mm (W) x 223 mm (D) x 20 mm (H) | | | | |
| Mass | Approx. 300 g | | | | |
| Standards | Safety EN61010-1, EN61010-2-030<br>EMC EN61326-1, Class A | | | | |

## 10.3.7. 2ch High Voltage Module (RA30-107)

| Item | Specifications |
|---|---|
| Number of input channels | 2 ch |
| Input connector | Safety banana terminal |
| Input format | Balanced differential input (insulation between channels and between channels and chassis) |
| Coupling | AC/DC/GND |
| Meas. mode | DC mode (voltage measurement)/RMS mode (effective value measurement) |
| Input impedance | 4 MΩ ±1 % |
| Response time (RMS mode) | High speed 100 ms ±10 % or less<br>Medium speed 250 ms ±10 % or less<br>Low speed 1000 ms ±10 % or less<br>*1 All of the above are rise 0 % → 90 % of RANGE and fall 100 % → 10 % of RANGE |
| Measurement range (RANGE) | DC mode: 2, 5, 10, 20, 50, 100, 200, 500, 1000 V (the measurement range is ±RANGE)<br>RMS mode: 2, 5, 10, 20, 50, 100, 200, 500, 1000 Vrms (the measurement range is RANGE*2)<br>Crest factor: 2 (with 2 to 500 Vrms range), 1.4 (with 1000 Vrms range)<br>*2 The maximum measurement range is 700 Vrms at 1000 Vrms |
| Measurement probability | DC mode: ±0.3 % of RANGE (DC coupling, L.P.F. 3 Hz)<br>RMS mode:<br>DC coupling ±0.3 % of RANGE<br>AC coupling ±0.5 % of RANGE (10 Hz to 1 kHz, sine wave input, with low speed response)<br>±0.5 % of RANGE (40 Hz to 1 kHz, sine wave input, with medium speed response)<br>±0.5 % of RANGE (100 Hz to 1 kHz, sine wave input, with high speed response)<br>±1.5 % of RANGE (1 kHz to 10 kHz, sine wave input)<br>*3 All of the above are at 23 °C ±5 °C, after zero adjust is executed |
| Temperature coefficient | ± (300 ppm of RANGE)/°C |
| Frequency characteristics | DC coupling DC to 100 kHz (-3 dB to +1 dB) (DC mode, with L.P.F. disabled)<br>AC coupling 1 Hz to 100 kHz (-3 dB to +1 dB) (DC mode, with L.P.F. disabled) |
| Low-pass filter (L.P.F.) | Cutoff frequency 3 Hz, 30 Hz, 300 Hz, 3 kHz, 30 kHz, OFF (-1.6 dB ±1 dB)<br>Characteristics Secondary vessel |
| Input conversion noise | 20 mVp-p max (2 V range, input short circuit) |
| A/D conversion | A/D resolution 16 bit<br>Sampling rate 1 MS/s |
| Common mode rejection ratio | 80 dB or higher (50/60 Hz) |
| Maximum allowed input voltage | ±1000 V peak |

| Item | Specifications | |
|---|---|---|
| Maximum rated voltage to ground | 1000 V (DC + AC peak) | CAT II |
| | 600 V (DC + AC peak) | CAT III |
| Withstand voltage | AC 3 kV, 1 minute (between channels and between channels and chassis) | |
| Usage environment | Temperature: 0 to +40 °C, humidity: 35 to 85 %RH or less (without condensation) | |
| Storage environment | Temperature: -20 to +60 °C, humidity: 20 to 85 %RH or less (without condensation) | |
| Dimensions | Approx. 140 mm (W) × 223 mm (D) × 20 mm (H) | |
| Mass | Approx. 300 g | |
| Standards | Safety | EN61010-1, EN61010-2-030 |
| | EMC | EN61326-1, class A |

## 10.3.8. 2ch Frequency Module (RA30-108)

| Item | Specifications | |
|---|---|---|
| Number of input channels | 2 ch | |
| Number of measurement channels | 4 ch | CH1: Meas. mode, CH3: CH1 input volt<br>CH2: Meas. mode, CH4: CH2 input volt |
| Input connectors | Insulated BNC | |
| Input format | Unbalanced input (insulation between channels and between channels and chassis) | |
| Coupling | AC/DC/GND | |
| Input impedance | 1 MΩ ±1 % | |
| Measurement mode | Period, Frequency, Rotation speed, Pulse width, Duty cycle, Power freq., Freq. deviation, Pulse count, or Pulse integ. | |
| Input voltage | Measurement range (RANGE) | 1, 2, 5, 10, 20, 50, 100, 200, or 500 V |
| | Measurement probability | ±3 % of RANGE (23 ±5 °C, DC coupling, L.P.F. 300 Hz) |
| | Measurable range | ±1, ±2, ±5, ±10, ±20, ±50, ±10, ±200, or ±500 V |
| Period mode | Measurement range (RANGE) | 1, 2, 5, 10, 20, 50, 100, 200 or 500 ms<br>1, 2, 5, 10, 20, 50, or 100 s |
| | Measurement probability | ±0.5 % rdg (1 ms RANGE)<br>±0.3 % rdg (2 ms RANG)<br>±0.1 % rdg (5 ms RANGE)<br>±0.05 % rdg (10 ms to 100 s RANGE) |
| | Measurable range | 5 µs to 100 s |
| Frequency mode | Measurement range (RANGE) | 2, 5, 10, 20, 50, 100, 200, or 500 Hz<br>2, 5, 10, 20, 50, 100, 200, or 500 kHz |
| | Measurement probability | ±0.5 % rdg (200 kHz RANGE)<br>±0.3 % rdg (100 kHz RANGE)<br>±0.1 % rdg (50 kHz RANGE)<br>±0.05 % rdg (2 Hz to 20 kHz RANGE) |
| | Measurable range | 0 to 200 kHz |
| Rotation speed mode | Measurement range (RANGE) | 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000 rpm,<br>50000 rpm, 100, 200, 500, 1000 krpm |
| | Measurement probability | ±0.05 % rdg |
| | Measurable range | 0 to 1000 krpm |
| Pulse width mode | Measurement range (RANGE) | 1, 2, 5, 10, 20, 50, 100, 200, or 500 ms<br>1, 2, 5, 10, 20, 50, or 100 s |
| | Measurement probability | ±0.25 % rdg (1 ms RANGE)<br>±0.15 % rdg (2 ms RANGE)<br>±0.05 % rdg (5 ms to 100 s RANGE) |
| | Measurable range | 2.5 µs to 100 s (minimum pulse width 2.5 µs) |

| Item | Specifications | |
|---|---|---|
| Duty cycle mode | Measurement range (RANGE) | 100 % (20 Hz), 100 % (200 Hz), 100 % (2 kHz), 100 % (20 kHz) |
| | Measurement probability | ±0.25 % (1 kHz) to ±5 % (20 kHz) of 100 % (20 kHz) RANGE<br>* ±5% × input frequency/20 kHz<br>±0.05 % (100 Hz) to ±1 % (2 kHz) of 100 % (2 kHz) RANGE<br>* ±1% × input frequency/2 kHz<br>±0.05 % (10 Hz) to ±1 % (200 Hz) of 100 % (200 Hz) RANGE<br>* ±1% × input frequency/200 Hz<br>±0.05 % (1 Hz) to ±1 % (20 Hz) of 100 % (20 Hz) RANGE<br>* ±1% × input frequency/20 Hz |
| | Measurable duty cycle range | 0 to 100 % |
| | Measurable frequency range | 1 kHz to 20 kHz :<br>100% (20 kHz) RANGE (minimum pulse width 2.5 µs)<br>100 Hz to 2 kHz :<br>100% (2 kHz) RANGE (minimum pulse width 5 µs)<br>10 Hz to 200 Hz :<br>100% (200 Hz) RANGE (minimum pulse width 50 µs)<br>1 Hz to 20 Hz :<br>100% (20 Hz) RANGE (minimum pulse width 500 µs) |
| Power freq. mode | Measurement range (RANGE) | 50 Hz (30 to 70 Hz)<br>60 Hz (40 to 80 Hz)<br>400 Hz (360 to 440 Hz) |
| | Measurement probability | ±0.002 % rdg (50 Hz RANGE)<br>±0.003 % rdg (60 Hz RANGE)<br>±0.005 % rdg (400 Hz RANGE) |
| Freq. deviation mode | Measurement range (RANGE) | ±50 % (center frequency range 6.6 Hz to 13.2 kHz) |
| | Measurement probability | ±0.05 % rdg |
| | Measurable range | 3.3 Hz to 19800 Hz |
| Pulse count mode | Measurement range (RANGE) | 40000<br>* Gate time 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, or 60 s |
| | Measurement probability | ±0.003 % rdg |
| | Measurable range | 16.6666 mHz to 200 kHz (minimum pulse width 2.5 µs) |
| Pulse integ. mode | Measurement range (RANGE) | 50, 100, 200, or 500 k<br>1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, or 2000 M |
| | Measurement probability | ±0.002 % rdg |
| | Measurable range | 5 mHz to 200 kHz (minimum pulse width 2.5 µs) |

| Item | Specifications | | | | |
|---|---|---|---|---|---|
| Threshold | Voltage range | 1 V RANGE : | -0.4 | to | +0.4 V variable (0.01 V increments) |
| | | 2 V RANGE: | -0.8 | to | +0.8 V variable (0.02 V increments) |
| | | 5 V RANGE: | -2 | to | +2 V variable (0.05 V increments) |
| | | 10 V RANGE: | -4 | to | +4 V variable (0.1 V increments) |
| | | 20 V RANGE: | -8 | to | +8 V variable (0.2 V increments) |
| | | 50 V RANGE: | -20 | to | +20 V variable (0.5 V increments) |
| | | 100 V RANGE: | -40 | to | +40 V variable (1 V increments) |
| | | 200 V RANGE: | -80 | to | +80 V variable (2 V increments) |
| | | 500 V RANGE: | -200 | to | +200 V variable (5 V increments) |
| | Hysteresis | 1 to 10% of RANGE (1% increments) | | | |
| Low-pass filter (L.P.F.) | Cutoff frequency | 300 Hz, 3 kHz, 30 kHz, OFF (-1.6 dB ±1 dB) | | | |
| | characteristics | Secondary vessel | | | |
| A/D conversion | A/D resolution | 12 bit | | | |
| | Sampling rate | 1 MS/s | | | |
| Response speed | OFF, 1 to 1000 ms (1 ms increments) | | | | |
| Deceleration stop process function | If the pulse input is interrupted. calculates the deceleration state in real-time, and gradually sets the measured value to 0 or overrange.<br>Supports measurement in the Period mode, Frequency mode, Rotation speed mode, Pulse width mode, Duty cycle mode, Power freq. mode, and Freq. deviation mode. | | | | |
| Pulses per revolution | Pulses / Rev.: 1 to 100<br>Specify the pulse count per revolution. Available in the Rotation speed mode. | | | | |
| Pulse polarity | Select the polarity of the pulse (positive or negative).<br>Available in the Pulse width mode, Duty cycle mode, Freq. deviation mode, Pulse count mode, and Pulse integ. mode. | | | | |
| Integrated auto reset (Auto reset) | Automatically resets the measured data of the Pulse integ. mode.<br>The count is reset when recording starts (Start) and when the range upper limit is reached (Over). OFF, Start, Over, Start & Over can be selected. | | | | |
| Integrated manual reset (Reset) | Manually resets the measured data of the Pulse integ. mode. | | | | |
| Pulse average processing function | Number for pulse average: 2 to 4096<br>Available in the Period mode, Frequency mode, Rotation speed mode, Pulse width mode, Duty cycle mode, Power freq. mode, and Freq. deviation mode. | | | | |
| Smoothing function | OFF, 2 to 100<br>Available in the Period mode, Frequency mode, Rotation speed mode, Pulse width mode, Duty cycle mode, Power freq. mode, and Freq. deviation mode. | | | | |
| Maximum allowed input voltage | ±500 Vpeak | | | | |
| Maximum rated voltage to ground | 300 V (DC + AC peak) CAT Ⅱ | | | | |
| Withstand voltage | AC 3 kV, 1 minute (between channels and between channels and chassis) | | | | |
| Usage environment | Temperature: 0 to +40 °C, humidity: 35 to 85 %RH or less (without condensation) | | | | |
| Storage environment | Temperature: -20 to +60 °C, humidity: 20 to 85 %RH or less (without condensation) | | | | |
| Dimensions | Approx. 140 mm (W) × 223 mm (D) × 20 mm (H) | | | | |
| Mass | Approx. 300 g | | | | |
| Standards | Safety | EN61010-1, EN61010-2-030 | | | |
| | EMC | EN61326-1, class A | | | |

## 10.3.9. 2ch Acceleration Module (RA30-109)

| Item | Specifications | | |
|---|---|---|---|
| Number of input channels | 2 ch | | |
| Input connectors | BNC (metallic) | | |
| Input format | Unbalanced input (insulation between channels and between channels and chassis) | | |
| Measurement mode | OFF, Acceleration, Velocity, Displacement | | |
| Sensor supply power | 4.2 mA ±5 %, 22.5 V ±5 % | | |
| Measurement range (RANGE) | * All the values below are when using a sensor incorporating a preamp. When using a charge output type acceleration sensor, the sensor sensitivity is the charge converter gain multiplied by the sensor sensitivity of the charge output type acceleration sensor.<br>The measurement range differs according to the sensor sensitivity. | | |
| | Acceleration | 1, 2, 3.16, 5, 10, 20, 31.6, 50, 100, 200, 316, 500 $m/s^2$<br>1, 2, 3.16, 5,10, 20, 31.6, 50 $km/s^2$ | |
| | | Sensor sensitivity | Measurement range |
| | | 0.100 to 0.250 mV/($m/s^2$) | 500 $m/s^2$ to 50 $km/s^2$ |
| | | 0.251 to 0.500 mV/($m/s^2$) | 200 $m/s^2$ to 20 $km/s^2$ |
| | | 0.501 to 1.000 mV/($m/s^2$) | 100 $m/s^2$ to 10 $km/s^2$ |
| | | 1.001 to 2.500 mV/($m/s^2$) | 50 $m/s^2$ to 5 $km/s^2$ |
| | | 2.501 to 5.000 mV/($m/s^2$) | 20 $m/s^2$ to 2 $km/s^2$ |
| | | 5.001 to 10.000 mV/($m/s^2$) | 10 $m/s^2$ to 1 $km/s^2$ |
| | | 10.001 to 25.000 mV/($m/s^2$) | 5 $m/s^2$ to 500 $m/s^2$ |
| | | 25.001 to 50.000 mV/($m/s^2$) | 2 $m/s^2$ to 200 $m/s^2$ |
| | | 50.001 to 100.000 mV/($m/s^2$) | 1 $m/s^2$ to 100 $m/s^2$ |
| | Velocity | 10, 20, 31.6, 50, 100, 200, 316, or 500 mm/s<br>1, 2, 3.16, 5, 10, 20, 31.6, 50, 100, 200, 316, or 500 m/s | |
| | | Sensor sensitivity | Measurement range |
| | | 0.100 to 0.250 mV/($m/s^2$) | 5 m/s to 500 m/s |
| | | 0.251 to 0.500 mV/($m/s^2$) | 2 m/s to 200 m/s |
| | | 0.501 to 1.000 mV/($m/s^2$) | 1 m/s to 100 m/s |
| | | 1.001 to 2.500 mV/($m/s^2$) | 500 mm/s to 50 m/s |
| | | 2.501 to 5.000 mV/($m/s^2$) | 200 mm/s to 20 m/s |
| | | 5.001 to 10.000 mV/($m/s^2$) | 100 mm/s to 10 m/s |
| | | 10.001 to 25.000 mV/($m/s^2$) | 50 mm/s to 5 m/s |
| | | 25.001 to 50.000 mV/($m/s^2$) | 20 mm/s to 2 m/s |
| | | 50.001 to 100.000 mV/($m/s^2$) | 10 mm/s to 1 m/s |

| Item | | Specifications | |
|---|---|---|---|
| Measurement range (RANGE) | Displacement | 100, 200, 316, or 500 µm<br>1, 2, 3.16, 5, 10, 20, 31.6, 50, 100, 200, 316, or 500 mm<br>1, 2, 3.16, or 5 m | |
| | | Sensor sensitivity | Measurement range |
| | | 0.100 to 0.250 mV/(m/s$^2$) | 50 mm to 5 m |
| | | 0.251 to 0.500 mV/(m/s$^2$) | 20 mm to 2 m |
| | | 0.501 to 1.000 mV/(m/s$^2$) | 10 mm to 1 m |
| | | 1.001 to 2.500 mV/(m/s$^2$) | 5 mm to 500 mm |
| | | 2.501 to 5.000 mV/(m/s$^2$) | 2 mm to 200 mm |
| | | 5.001 to 10.000 mV/(m/s$^2$) | 1 mm to 100 mm |
| | | 10.001 to 25.000 mV/(m/s$^2$) | 500 µm to 50 mm |
| | | 25.001 to 50.000 mV/(m/s$^2$) | 200 µm to 20 mm |
| | | 50.001 to 100.000 mV/(m/s$^2$) | 100 µm to 10 mm |
| Measurement probability | Acceleration | ±1% rdg | |
| | Velocity | ±2% rdg | |
| | Displacement | ±3% rdg | |
| | * All of the above values are at 23 °C ±5 °C, with an 80 Hz sine wave, and L.P.F. A.A.F. disabled | | |
| Temperature coefficient | ± (300 ppm of RANGE)/°C | | |
| Frequency characteristics | Acceleration | 5 Hz to 20 kHz (-0.5 dB to +0.5 dB)<br>1.5 Hz to 50 kHz (-1 dB to +1 dB)<br>1 Hz to 70 kHz (-3 dB to +1 dB) | |
| | Velocity | 15.9 Hz (0 dB ±1 dB) to 1.59 kHz (-40 dB ±1 dB)<br>Characteristics: -6 dB/oct | |
| | Displacement | 15.9 Hz (0 dB ±1 dB) to 159 Hz (-40 dB ±1 dB)<br>Characteristics: -12 dB/oct | |
| | * All of the above are with L.P.F. disabled | | |
| Low-pass filter (L.P.F.) | Cutoff frequency | OFF, 20 Hz, 200 Hz, 2 kHz, 20 kHz（-3 dB ±1 dB） | |
| | Characteristics | Tertiary Butterworth | |
| Anti-aliasing filter (A.A.F.) | Cutoff frequency | OFF, 20, 40, 80, 200, 400, 800, 2k, 4k, 8k, 20k, 40 kHz with 0.4 times the sampling speed of SSD recording set for the cutoff frequency. When 200 kS/s or higher, A.A.F. is disabled. | |
| | Attenuation | -66 dB or less, at 1.5 times the cutoff frequency | |
| Input conversion noise | 5 m/s$^2$ p-p max (acceleration 500 m/s$^2$, sensor sensitivity 0.1 mV/(m/s$^2$), input short circuit) | | |
| A/D conversion | A/D resolution | 16 bit | |
| | Sampling rate | 1 MS/s | |

| Item | | Specifications |
|---|---|---|
| RMS calculation function | Response speed | High speed: 300 ms ±10 % or less<br>Medium speed: 600 ms ±10 % or less<br>Low speed: 2.4 s ±10 % or less<br>* All of the above are rise 0 % → 90 % of RANGE and fall 100 % → 10 % of RANGE, with the acceleration mode |
| | Measurement probability | ±1% rdg (10 Hz to 1 kHz, at low speed)<br>±1% rdg (30 Hz to 1 kHz, at medium speed)<br>±1% rdg (50 Hz to 1 kHz, at high speed)<br>±1.5% rdg (1 kHz to 5 kHz) |
| Envelope calculation function | Band pass filter (1 kHz to 20 kHz) → absolute value modulation → low-pass filter (1 kHz) | |
| TEDS | IEEE 1451.4 Class 1 compliant (template ID: 25, sensor sensitivity automatically set) | |
| Common mode rejection ratio | 80 dB or higher (50 Hz/60 Hz) | |
| Maximum rated voltage to ground | 42 V (DC + AC peak) | |
| Usage environment | Temperature: 0 to +40 °C, humidity: 35 to 85 %RH or less (without condensation) | |
| Storage environment | Temperature: -20 to +60 °C, humidity: 20 to 85 %RH or less (without condensation) | |
| Dimensions | Approx. 140 mm (W) × 223 mm (D) × 20 mm (H) | |
| Mass | Approx. 300 g | |
| Standards | Safety | EN61010-1, EN61010-2-030 |
| | EMC | EN61326-1, Class A |

## 10.3.10. Remote Control Module (RA30-112)

| Item | Specifications |
|---|---|
| input connectors | Half pitch connector 20 pin |
| Output connectors | Half pitch connector 14 pin |
| External input | Function: Controllable via external signal |
| Control signals | START/STOP, MARK, FEED, PRINT, TRIG |
| Input level | High level: 2.1 V to 5.0 V, Low level: 0 V to 0.5 V (active low) |
| Response speed | Switch between high speed/medium speed/low speed<br>* External sampling input (EXT SMPL IN) is not supported |
| Effective pulse width | For high speed response:<br>High level period 1 µs or more, low level period 1 µs or more<br>For medium speed response:<br>High level period 1 ms or more, low level period 1 ms or more<br>For low speed response:<br>High level period 10 ms or more, low level period 10 ms or more |
| Maximum allowed input voltage | 30 V |
| Feed | Recording paper idle feeding speed of 50 mm/sec |
| External output | Function: Externally output external input control signal<br>START/STOP and TRIG are the OR output with the external input signal and output signal from the RA3100 main unit |
| Control signals | START/STOP, MARK, FEED, PRINT, TRIG, EXT.1/EXT.2 (outputs the state of this product externally) |
| Output level | High level: 3.8 V to 5.0 V, Low level: 0 V to 0.5 V (active low) |
| Output current | Maximum 5 mA (per pin) |
| Output pulse width (RA3100 main unit output signal) | START/STOP, FEED, PRINT: Active output during operation period<br>TRIG, MARK, for high speed response: 1 µs<br>For medium speed response: 1 ms<br>For low speed response: 10 ms |
| External sampling input | Enables synchronization via an external sampling signal (either pen recording, printer recording, or SSD recording). |
| Input level | High level: 2.1 V to 5.0 V, Low level: 0 V to 0.5 V |
| Effective pulse width | 2 µs or more |
| Maximum input frequency | SSD recording : 250 kHz<br>Printer recording : 500 Hz |
| Maximum allowed input voltage | 30 V |
| External sampling output | Output external sampling input signal |
| Output level | High level: 3.8 V to 5.0 V, Low level: 0 V to 0.5 V |
| Synchronization signal for AC strain input/output | Function : Synchronization signal generator for using AC strain<br>Carrier wave : 0 V to 5 V, square wave, 5 kHz<br>Synchronization : Synchronization possible with other RA3000 product including RA30-112 |

| Item | Specifications |
|---|---|
| Output terminal for waveform confirmation | Function:<br>Square wave signal output for confirming the operation of the voltage input module |
| Output level | 0 V to 5 V (±1 %) |
| Output frequency | 1 kHz (±1 %) |
| Duty ratio | 50% (±5 %) |
| Withstand voltage | AC 300 V, 1 minute (input, between output and chassis) |
| Maximum rated voltage to ground | 42 V (DC+ACpeak) |
| Usage environment | Temperature: 0 to +40 °C, humidity: 35 to 85 %RH or less (without condensation) |
| Storage environment | Temperature: -20 to +60 °C, humidity: 20 to 85 %RH or less (without condensation) |
| Dimensions | Approx. 140 mm (W) x 223 mm (D) x 20 mm (H) |
| Mass | Approx. 250 g |
| Standards | Safety EN61010-1<br>EMC EN61326-1, Class A |

## 10.3.11. 4ch Voltage Module (RA30-113)

| Item | Specifications | |
|---|---|---|
| Number of input channels | 4 ch | |
| Input connectors | Insulated BNC | |
| Input format | Unbalanced input<br>(insulation between channels and between channels and chassis) | |
| Coupling | DC/GND | |
| Input impedance | 1 MΩ ±1 % | |
| Measurement range (RANGE) | 2, 5, 10, 20, 50, 100, 200, 500 V (the measurement range is ±RANGE) | |
| Measurement probability | ±0.2 % of RANGE (23 °C±5 °C, DC coupling, L.P.F. 3 Hz, after zero adjust) | |
| Temperature coefficient | ±(400 ppm of RANGE)/°C | |
| Frequency characteristics | DC coupling | DC to 100 kHz (-3 dB to 1 dB) (with L.P.F. disabled) |
| Low-pass filter (L.P.F.) | Cutoff frequency | 3 Hz, 30 Hz, 300 Hz, 3 kHz, OFF (-1.6 dB ±1 dB) |
| | Characteristics | Secondary bessel shape |
| Input conversion noise | 10 mVp-p max (2 V range, input short circuit) | |
| A/D conversion | A/D resolution | 16 bits |
| | Sampling rate | 1 MS/s |
| Common mode rejection ratio | 80 dB or higher (50/60 Hz) | |
| Maximum allowed input voltage | ±500 V peak | |
| Maximum rated voltage to ground | 300 V (DC + AC peak) CAT II | |
| Withstand voltage | AC 3 kV, 1 minute (between input terminals and chassis, between channels) | |
| Usage environment | Temperature: 0 to +40 °C, humidity: 35 to 85 %RH or less (without condensation) | |
| Storage environment | Temperature: -20 to +60 °C, humidity: 20 to 85 %RH or less (without condensation) | |
| Dimensions | Approx. 140 mm (W) x 223 mm (D) x 20 mm (H) | |
| Mass | Approx. 300 g | |
| Standards | Safety | EN61010-1, EN61010-2-030 |
| | EMC | EN61326-1, Class A |

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(iv) **Remote access.** Users may access the licensed device from another device using remote access technologies, but only on devices separately licensed to run the same or higher edition of this software.

(v) **Remote assistance.** You may use remote assistance technologies to share an active session without obtaining any additional licenses for the software. Remote assistance allows one user to connect directly to another user’s computer, usually to correct problems.

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(viii) **Desktop Functions**. If your system performs desktop functions, then you must ensure that they: (i) are only used to support the application, and (ii) operate only when used with the application.

**e. Windows IoT Enterprise Features for Development and Testing Only.**

**(1) Device Health Attestation.** You may only implement Device Health Attestation in a commercial use if you execute a Microsoft Windows IoT Core Services Agreement at: https://azure.microsoft.com/en-us/services/windows-10-iot-core/.

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   We hope we never have a dispute, but if we do, you and we agree to try for 60 days to resolve it informally. If we can't, you and we agree to **binding individual arbitration before the American Arbitration Association ("AAA") under the Federal Arbitration Act ("FAA"), and not to sue in court in front of a judge or jury**. Instead, a neutral arbitrator will decide and the arbitrator's decision will be final except for a limited right of appeal under the FAA. **Class action lawsuits, class-wide**

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**a.** **Disputes covered—everything except IP.** The term "dispute" is as broad as it can be. It includes any claim or controversy between you and the manufacturer or installer, or you and Microsoft, concerning the software, its price, or this agreement, under any legal theory including contract, warranty, tort, statute, or regulation, **except disputes relating to the enforcement or validity of your, your licensors', our, or our licensors' intellectual property rights.**

**b.** **Mail a Notice of Dispute first.** If you have a dispute and our customer service representatives can't resolve it, send a Notice of Dispute by U.S. Mail to the manufacturer or installer, ATTN: LEGAL DEPARTMENT. If your dispute is with Microsoft, mail it to Microsoft Corporation, ATTN: CELA ARBITRATION, One Microsoft Way, Redmond, WA 98052-6399. Tell us your name, address, how to contact you, what the problem is, and what you want. A form is available at https://go.microsoft.com/fwlink/?LinkId=245499. We'll do the same if we have a dispute with you. After 60 days, you or we may start an arbitration if the dispute is unresolved.

**c.** **Small claims court option.** Instead of mailing a Notice of Dispute, and if you meet the court's requirements, you may sue us in small claims court in your county of residence (or if a business your principal place of business) or our principal place of business–King County, Washington USA if your dispute is with Microsoft. We hope you'll mail a Notice of Dispute and give us 60 days to try to work it out, but you don't have to before going to small claims court**.**

**d.** **Arbitration procedure.** The AAA will conduct any arbitration under its Commercial Arbitration Rules (or if you are an individual and use the software for personal or household use, or if the value of the dispute is $75,000 USD or less whether or not you are an individual or how you use the software, its Consumer Arbitration Rules). For more information, see https://aka.ms/adr or call 1-800-778-7879. To start an arbitration, submit the form available at https://aka.ms/arbitration to the AAA; mail a copy to the manufacturer or installer (or to Microsoft if your dispute is with Microsoft). In a dispute involving $25,000 USD or less, any hearing will be telephonic unless the arbitrator finds good cause to hold an in-person hearing instead. Any in-person hearing will take place in your county of residence (or if a business, your principal place of business) or our principal place of business—King County, Washington if your dispute is with Microsoft. You choose. The arbitrator may award the same damages to you individually as a court could. The arbitrator may award declaratory or injunctive relief only to you individually to satisfy your individual claim.

**e.** **Arbitration fees and payments.**

(i) **Disputes involving $75,000 USD or less**. The manufacturer or installer (or Microsoft if your dispute is with Microsoft) will promptly reimburse your filing fees and pay the AAA's and arbitrator's fees and expenses. If you reject our last written settlement offer made before the arbitrator was appointed, your dispute goes all the way to an arbitrator's decision (called an "award"), and the arbitrator awards you more than this last written offer, the manufacturer or installer (or Microsoft if your dispute is with Microsoft) will: (1) pay the greater of the award or $1,000 USD; (2) pay your reasonable attorney's fees, if any; and (3) reimburse any expenses (including expert witness fees and costs) that your attorney reasonably accrues for investigating, preparing, and pursuing your claim in arbitration. The arbitrator will determine the amounts unless you and we agree on them.

(ii) **Disputes involving more than $75,000 USD.** The AAA rules will govern payment of filing fees and the AAA's and arbitrator's fees and expenses.

(iii) **Disputes involving any amount.** If you start an arbitration, we won't seek our AAA or arbitrator's fees and expenses, or your filing fees we reimbursed, unless the arbitrator finds the arbitration frivolous or brought for an improper purpose. If we start an arbitration we will pay all filing, AAA, and arbitrator's fees and expenses. We won't seek our attorney's fees or expenses from you in any arbitration. Fees and expenses are not counted in determining how much a dispute involves.

**f.** **Must file within one year.** You and we must file in small claims court or arbitration any claim or dispute (except intellectual property disputes — see Section 8.a.) within one year from when it first could be filed. Otherwise, it's permanently barred.

**g.** **Severability**. If the class action waiver is found to be illegal or unenforceable as to all or some parts of a dispute, those parts won't be arbitrated but will proceed in court, with the rest proceeding in arbitration. If any other provision of Section 8 is found to be illegal or unenforceable, that provision will be severed but the rest of Section 8 still applies.

**h**. **Conflict with AAA rules.** This agreement governs if it conflicts with the AAA's Commercial Arbitration Rules or Consumer Arbitration Rules.

**i.** **Microsoft as party or third-party beneficiary.** If Microsoft is the device manufacturer or if you acquired the software from a retailer, Microsoft is a party to this agreement. Otherwise, Microsoft is not a party but is a third-party beneficiary of your agreement with the manufacturer or installer to resolve disputes through informal negotiation and arbitration.

**9.** **Governing Law.** The laws of the state or country where you live (or, if a business, where your principal place of business is located) govern all claims and disputes concerning the software, its price, or this agreement, including breach of contract claims and claims under state consumer protection laws, unfair competition laws, implied warranty laws, for unjust enrichment, and in tort, regardless of conflict of law principles. In the United States, the FAA governs all provisions relating to arbitration.

**10.** **Consumer Rights, Regional Variations.** This agreement describes certain legal rights. You may have other rights, including consumer rights, under the laws of your state or country. You may also have rights with respect to the party from which you acquired the software. This agreement does not change those other rights if the laws of your state or country do not permit it to do so. For example, if you acquired the software in one of the below regions, or mandatory country law applies, then the following provisions apply to you:

**a.** **Australia.** References to "Limited Warranty" are references to the express warranty provided by Microsoft or the manufacturer or installer. This warranty is given in addition to other rights and remedies you may have under law, including your rights and remedies in accordance with the statutory guarantees under the Australian Consumer Law.

In this subsection, "goods" refers to the software for which Microsoft or the manufacturer or installer provides the express warranty. Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

**b.** **Canada.** You may stop receiving updates on your device by turning off Internet access. If and when you re-connect to the Internet, the software will resume checking for and installing updates.

**c.** **Germany and Austria.**

(i) **Warranty.** The properly licensed software will perform substantially as described in any Microsoft materials that accompany the software. However, the manufacturer or installer, and Microsoft, give no contractual guarantee in relation to the licensed software.

(ii) **Limitation of Liability**. In case of intentional conduct, gross negligence, claims based on the Product Liability Act, as well as, in case of death or personal or physical injury, the manufacturer or installer, or Microsoft is liable according to the statutory law.

Subject to the preceding sentence, the manufacturer or installer, or Microsoft will only be liable for slight negligence if the manufacturer or installer or Microsoft is in breach of such material contractual obligations, the fulfillment of which facilitate the due performance of this agreement, the breach of which would endanger the purpose of this agreement and the compliance with which a party may constantly trust in (so-called "cardinal obligations"). In other cases of slight negligence, the manufacturer or installer or Microsoft will not be liable for slight negligence.

**d.** **Other regions**. See https://go.microsoft.com/fwlink/?LinkId=534978 for a current list of regional variations

**11. Additional Notices.**

**a.** **Networks, data and Internet usage.** Some features of the software and services accessed through the software may require your device to access the Internet. Your access and usage (including charges) may be subject to the terms of your cellular or internet provider agreement. Certain features of the software may help you access the Internet more efficiently, but the software's usage calculations may be different from your service provider's measurements. You are always responsible for (i) understanding and complying with the terms of your own plans and agreements, and (ii) any issues arising from using or accessing networks, including public/open networks. You may use the software to connect to networks, and to share access information about those networks, only if you have permission to do so.

**b.** **H.264/AVC and MPEG-4 visual standards and VC-1 video standards.** The software may include H.264/MPEG-4 AVC and/or VC-1 decoding technology. MPEG LA, L.L.C. requires this notice:

THIS PRODUCT IS LICENSED UNDER THE AVC, THE VC-1, AND THE MPEG-4 PART 2 VISUAL PATENT PORTFOLIO LICENSES FOR THE PERSONAL AND NON-COMMERCIAL USE OF A CONSUMER TO (i) ENCODE VIDEO IN COMPLIANCE WITH THE ABOVE STANDARDS ("VIDEO STANDARDS") AND/OR (ii) DECODE AVC, VC-1, AND MPEG-4 PART 2 VIDEO THAT WAS ENCODED BY A CONSUMER ENGAGED IN A PERSONAL AND NON-COMMERCIAL ACTIVITY AND/OR WAS OBTAINED FROM A VIDEO PROVIDER LICENSED TO PROVIDE SUCH VIDEO. NO LICENSE IS GRANTED OR SHALL BE IMPLIED FOR ANY OTHER USE. ADDITIONAL INFORMATION MAY BE OBTAINED FROM MPEG LA, L.L.C. SEE WWW.MPEGLA.COM

**c.** **Malware protection.** Microsoft cares about protecting your device from malware. The software will turn on malware protection if other protection is not installed or has expired. To do so, other antimalware software will be disabled or may have to be removed.

**12. Entire Agreement.** This agreement (together with the printed paper license terms or other terms accompanying any software supplements, updates, and services that are provided by the manufacturer or installer, or Microsoft, and that you use), and the terms contained in web links listed in this agreement, are the entire agreement for the software and any such supplements, updates, and services (unless the manufacturer or installer, or Microsoft, provides other terms with such supplements, updates, or services). You can review this agreement after your software is running by going to https://aka.ms/useterms or going to Settings - System - About within the software. You can also review the terms at any of the links in this agreement by typing the URLs into a browser address bar, and you agree to do so. You agree that you will read the terms before using the software or services, including any linked terms. You understand that by using the software and services, you ratify this agreement and the linked terms. There are also informational links in this agreement. The links containing notices and binding terms are:

- Windows Privacy Statement https://aka.ms/privacy
- Microsoft Services Agreement https://aka.ms/msa

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**NO WARRANTY**

THE SOFTWARE ON YOUR DEVICE (INCLUDING THE APPS) IS LICENSED “AS IS.” TO THE MAXIMUM EXTENT PERMITTED BY YOUR LOCAL LAWS, YOU BEAR THE ENTIRE RISK AS TO THE SOFTWARE’S QUALITY AND PERFORMANCE. SHOULD IT PROVE DEFECTIVE, YOU ASSUME THE ENTIRE COST OF ALL SERVICING OR REPAIR. NEITHER THE DEVICE MANUFACTURER NOR MICROSOFT GIVES ANY EXPRESS WARRANTIES, GUARANTEES, OR CONDITIONS FOR THE SOFTWARE. TO THE EXTENT PERMITTED UNDER YOUR LOCAL LAWS, THE MANUFACTURER AND MICROSOFT EXCLUDE ALL IMPLIED WARRANTIES AND CONDITIONS, INCLUDING THOSE OF MERCHANTABILITY, QUALITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT. YOU MAY HAVE ADDITIONAL CONSUMER RIGHTS OR STATUTORY GUARANTEES UNDER LOCAL LAWS THAT THESE TERMS CANNOT CHANGE.

IF YOUR LOCAL LAWS IMPOSE A WARRANTY, GUARANTEE, OR CONDITION EVEN THOUGH THIS AGREEMENT DOES NOT, ITS TERM IS LIMITED TO 90 DAYS FROM WHEN THE FIRST USER ACQUIRES THE SOFTWARE. IF THE MANUFACTURER OR MICROSOFT BREACHES SUCH A WARRANTY, GUARANTEE, OR CONDITION, YOUR SOLE REMEDY, AT THE MANUFACTURER’S OR MICROSOFT’S ELECTION, IS (I) REPAIR OR REPLACEMENT OF THE SOFTWARE AT NO CHARGE, OR (II) RETURN OF THE SOFTWARE (OR AT ITS ELECTION THE DEVICE ON WHICH THE SOFTWARE WAS INSTALLED) FOR A REFUND OF THE AMOUNT PAID, IF ANY. THESE ARE YOUR ONLY REMEDIES FOR BREACH OF A WARRANTY, GUARANTEE, OR CONDITION YOUR LOCAL LAWS IMPOSE.

TO THE EXTENT NOT PROHIBITED BY YOUR LOCAL LAWS, IF YOU HAVE ANY BASIS FOR RECOVERING DAMAGES, YOU CAN RECOVER FROM THE MANUFACTURER OR MICROSOFT ONLY DIRECT DAMAGES UP TO THE AMOUNT YOU PAID FOR THE SOFTWARE (OR UP TO $50 USD IF YOU ACQUIRED THE SOFTWARE FOR NO CHARGE). YOU WILL NOT, AND WAIVE ANY RIGHT TO, SEEK TO RECOVER ANY OTHER DAMAGES OR REMEDY, INCLUDING LOST PROFITS AND DIRECT, CONSEQUENTIAL, SPECIAL, INDIRECT, OR INCIDENTAL DAMAGES, UNDER ANY PART OF THIS AGREEMENT OR UNDER ANY THEORY. THIS LIMITATION APPLIES TO (I) ANYTHING RELATED TO THIS AGREEMENT, THE SOFTWARE (INCLUDING THE APPS), THE DEVICE, SERVICES, CORRUPTION

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THE DAMAGE EXCLUSIONS AND REMEDY LIMITATIONS IN THIS AGREEMENT APPLY EVEN IF YOU HAVE NO REMEDY (THE SOFTWARE IS LICENSED “AS IS”), IF REPAIR, REPLACEMENT, OR A REFUND (IF REQUIRED BY YOUR LOCAL LAW) DOES NOT FULLY COMPENSATE YOU FOR ANY LOSSES, IF THE MANUFACTURER OR MICROSOFT KNEW OR SHOULD HAVE KNOWN ABOUT THE POSSIBILITY OF THE DAMAGES, OR IF THE REMEDY FAILS OF ITS ESSENTIAL PURPOSE.

Check with your device manufacturer to determine if your device is covered by a warranty.

Omniace
RA3100

Simplified Instruction Manual 1WMPD4004445C 4th Edition


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