RA2800A

Omniace III

INSTRUCTION MANUAL

A&D Company, Limited

1AV7001756R01

Omniace Ⅲ
RA2800A
Instruction Manual

A&D Company, Limited

Introduction

We thank you for your purchase of our product Thermal-Dot Recorder Omniace Ⅲ RA2800A
Please read this manual before operating this instrument.

This manual provides the information necessary to operate the RA2800A recorder safely. Place this manual within reach of the RA2800A. This manual covers basic functions and operations of the RA2800A and handling precautions. For operation of other functions, please refer to the separate-volume manuals listed below. If you encounter any problems in the manuals, please contact our company.

<Separate-volume manuals>

Manual	Contents
Instruction Manual Amplifier Units For RA2000A/DL2800A/DF1000A	This manual explains how to use and install amp units.

■ Before Using

- **When Opening Package**
  If 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. Depending on the number of AP amplifier implementations, the unit weigh may exceed 16.4 kg. When you take out from box, please handle with more than two people to prevent any drop off or to take accidental strained back.

- **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.

Notice

- For carrying RA2800A, please hold its bottom firmly as shown right.
  Incorrect holding and carrying may cause injury or damage on display or breakage of printer slot.
- 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. In this case, let us know in what way the unit was operating incorrectly and what the environmental conditions are.

■ Safety Measures - Warning and Cautions

To safely use products

The RA2800A is a product conforming to the IEC standard safety class I. The recorder 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 interface and remote control functions. To safely use the input units, the following statements are used in this manual to call the readers' attention.

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.

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.

Be sure to observe the following instructions when using this recorder. 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".

- **Power Supply**

  Make sure that the power supply is within the rating indicated on the rating plate attached to this recorder. If any voltage exceeding the rated voltage were supplied, there would be risk of damage to this recorder, 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 recorder.

- **Protective Grounding**

  Be sure to ground this recorder before supplying power. Grounding is necessary to use this recorder safely, as well as to protect the user and peripheral equipment from injury or damage. Be sure to observe the following instructions:

1) This recorder uses a 3-conductor AC power supply cable containing a ground lead and a 3-prong AC power plug. By plugging the power supply cable into a 3-pole AC outlet with a ground pole, grounding will be done automatically.
2) 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.
3) While the power is supplied to the recorder, do not cut or remove the protective grounding line. Otherwise, safety of the recorder is not guaranteed.

⚠ WARNING

- **Connection of Input Signals**
  Be sure to ground the grounding terminal of this recorder before connecting to the measurement target. Also, when connecting this recorder 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 recorder.

- **Use in Gaseous Atmosphere**
  Never use this recorder in a flammable or explosive atmosphere, or atmosphere of steam. Use in such atmosphere will result in danger to users and the recorder.

- **Disassembling the Frame**
  It is dangerous to remove the frame due to high-voltage parts inside. Do not remove the frame from the recorder other than by our service engineers.

- **Fuse at AC Power Supply Block**
  The fuse for this unit cannot be replaced with the customer because this fuse is placed inside the main unit. Please contact our branches or sales offices if the fuse may be blown.

- **Handling of Back-up Battery (Cautions when Disposing)**
  This recorder includes a lithium secondary battery (Lithium-ion secondary battery). When disposing this recorder, remove the lithium secondary battery in advance.
  Do not dispose of it in fire or disassemble. The lithium secondary battery may explode when it is heated and organic electrolyte that may exude from it is harmful to human skin. When disposing the lithium secondary battery, isolate terminals by covering with tape and abide by your local community waste-disposal policy.

- **Disposing of your used our product**

In the European Union

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

CAUTION

- **Caution in Handling**

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

1) Users who are not familiar with the operation of this recorder should avoid using it.
2) Storage environment

   The storage temperature of the input units is –10 to 60°C (except for chart recording paper). 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.
3) Use this recorder at locations that satisfy the installation requirement, the category II (CAT II) of the safety standard for electrical measurement instruments in IEC61010-1 (JIS-C-1001-1).
4) This recorder is a product with a pollution degree of 2.
5) Do not use this recorder at the following locations. In addition, carefully check the environment when using this recorder.
   1. Locations where the temperature and humidity rise due to direct sunlight or heaters. (The operating environment of the recorder; temperature: 5 to 40 °C, humidity: 35 to 80%)
   2. Wet locations
   3. Locations where salt, oil, or corrosive gases exist
   4. Damp or dusty locations
   5. Locations subject to strong vibrations
   6. Locations with a strong electromagnetic field
   7. This recorder 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 recorder rises, causing malfunctions.
6) Be careful of power voltage fluctuations. Do not use the recorder when these are likely to exceed the rated voltage.
7) This product employs the designs that ensure the safety of users. However, there is a risk of electrical shock if you accidentally touch the object to be measured, probe, output terminal, or other parts when measuring high voltages.
8) If the power supply includes a lot of noise or high-voltage inductive noise, use noise filters to avoid operation errors.
9) A hard disk drive (HDD) is installed in this product.
   1. Please don’t power off during normal operation of HDD, due to the risk of data destruction.
   2. Please have strong impact and shaking on this product, due to the risk of HDD destruction.
   3. Please use it under 5 to 40°C conditions according to the danger of HDD destruction.
10) This recorder uses a touch panel. When touching the panel, do not use a sharp object or push with high-pressure other than necessary. Press the panel gently with the fingertip. In addition, do not press more than one button/key at once. Be sure to press only one button/key at a time. Pressing two or more buttons/keys at once may cause misoperations.
11) 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.
12) If the recorder is not used for a long period of time, the internal backup battery (Lithium secondary battery) may completely discharge, causing the battery life to shorten. When the recorder is not used for a long period time, supply the recorder with power two or three times a month to charge the battery. (12 hours power-up allows battery to become fully charged.)
13) Do not insert a pointed or sharp object into the ventilation openings of this recorder.

14) To clean this recorder, first turn off the power, place it in a well-ventilated location, and wipe the recorder with soft cloth moistened with ethanol. Do not use benzene, petroleum solvents, or chemically treated cloths, as they can cause deformation or discoloration.

15) When transporting the recorder, use the package and packaging material supplied at factory shipment, or use a package and packaging material more shock-resistance than those supplied.

16) For carrying RA2800A, Do not hold plastic panel of the front Put your hand from sides and hold its bottom firmly. Incorrect way of carrying may cause injury or damage on display or breakage of printer slot.

17) 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).

■ 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 (RA2800A), serial number, and problematic points. The following is our warranty.

■ Limited Warranty

1. Warranty period
One year from our shipment.

2. Warranty period
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.
(1) Damage or faults caused by incorrect use.
(2) Damage or faults caused by fire, earthquake, traffic accident, or other natural disasters.
(3) Damage or faults caused by a repair or modification that is carried out by someone other than a service representative of A&D.
(4) Damage or faults caused by use or storage in environmental conditions that should be avoided.
(5) Periodical calibration.
(6) Damage or faults caused during transportation.

3. Liability
We do not assume any liabilities for equipment other than A&D.

■ Terms and Symbols in This Manual

Terms and symbols used in this manual denote as follows.

Terms and Symbols	Description
⚠ 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 damages in data if this equipment is misused due to neglect of Note.
TIPS	This symbol gives setting restrictions and additional descriptions.
☞	Reference page
This recorder	RA2800A
[ ]	Characters enclosed by brackets represent a key name in the operation panel.
Memory	Internal memory of RA2800A When measuring with memory recorder or transient recorder, measured data is recorded in this memory.
k (lower case) K (upper case)	A unit of numerical value "k" is used to represent 1000 such as "10 kg". "K" is used to represent 1024 such as "4 K data"

■ Liquid Crystal Display

This recorder 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.

◆ Handling of back-up batteries (Cautions for disposition)

This product uses manganese dioxide lithium batteries (primary battery). **Please take the batteries out when disposing this product.**

Please do not put batteries into fire or disassemble. Heating up batteries may cause explosion. Also it is extremely dangerous to disassemble batteries; organic electrolyte contained inside may spill out and cause damages to your skin or other parts of your body. When disposing batteries, please put tapes around end terminals to insulate and dispose as unburnable trash.

■ Overview of Windows XP Embedded

This product employs Windows XP Embedded as the OS. Please read and understand the following instructions carefully before use.

(1) License

The Windows XP Embedded is provided as built-in only license. This product cannot function as general purpose PC, it is limited exclusively for RA2800A use. Duplication of installed system of this product is not allowed be used.

(2) Power ON/OFF

Please make sure that HDD is not being accessed before turning the power off. If the power is turned off while HDD is being accessed, not only it may cause damage to data recorded on the HDD but also it may fatally damage the HDD machine itself to unusable condition. To confirm that HDD access has been stopped before turning the power off, please press EXIT on System button to stop the system, then turn off the power. When exit command is being processed, it does not leave record of starting or set ups in registry. OS will always start up in the condition set at the time of factory shipment. (Set values are saved under separate file and will not be lost.)

(3) Virus

We take following measures in order to lower the possibilities of virus infections.

- **Mailing function is not provided.**
- **System protect with light filter.**
  System drive, which contains OS and other applications, cannot be overwritten; normally those will not be affected under any condition, however, if internal HDD has been accessed as a shared file on network system, it is possible that files saved in HDD will be infected by viruses. In case there are possibilities that virus-infected files are saved in HDD, please eliminate the virus by going through the following procedures. If other PCs connected to the same network access the subject file, the PC could become the source of infection. Please set up one to one network environment and run anti-virus software from a PC targeting the HDD of this product in order to check and eliminate viruses. Anti-virus software cannot be installed directly to this product.

(4) Network use

When connecting this product with network, please consider not interrupting any device or PC through the network by consulting network administrator. (Transmit ion of higher volume of data would cause slow data transfer due to higher network traffic)

(5) USB compatible devices

Devices that are compatible for this product are limited by default setting. It works differently than Windows on PCs, and it is not possible to install additional device drivers. Compatible devices for this product are limited to the devices listed below. Please do not connect other devices. Other devices are not subject of our guarantees.

-USB memory (The USB memory with a security function cannot be used.)

(6) Maintenance

Please use these application program files provided by our company for version-ups and run those programs from system menu.

(7) Others

We do not assumes any responsibility or provide support for malfunctions if programs that are not provided by us are installed into the system or compulsory termination command is used through external keyboard and such.

CONTENTS

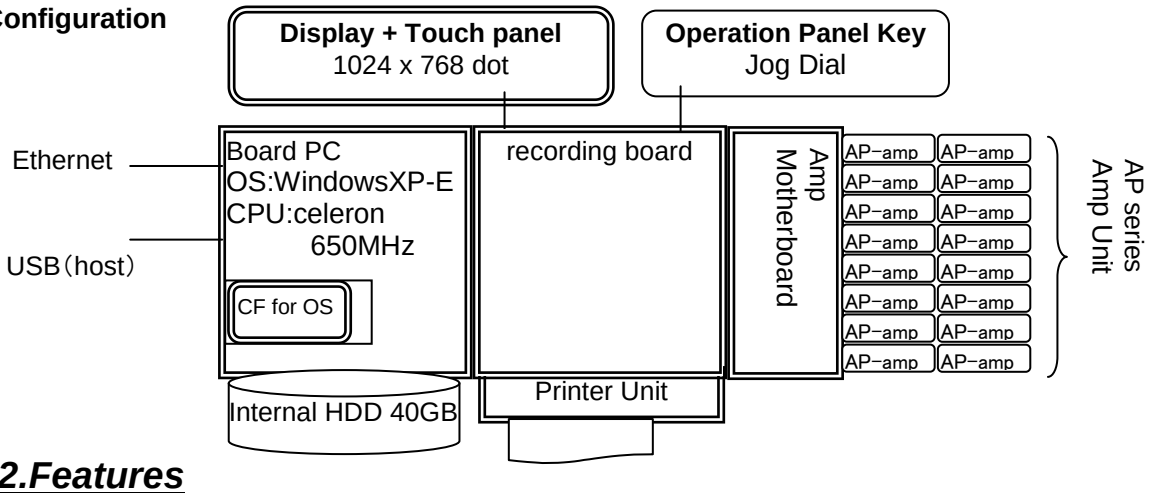
1. RA2800A Overview

1.1. Basic Specifications

1.1.1.Overview and features

A2800A is the product based on the concept of Simple Measurement for anyone at anywhere. New features such as the dynamic waveform view on a large display and the visualized amp setting screen provide simple operation for Pen Recorder users to make quick measurement In addition; built-in large-capacity HD and memory enable a long continuous recording with multi channels.

● **Configuration**



1.1.2.Features

● **Simple Pen Recorder mode**

Visualized amp setting screen and touch panel provide simple operation like Pen Recorder. This mode allows you to make a measurement as easily as Pen Recorder without complicated settings.

● **Long-time HD recording**

Built-in HDD (40GB) enables long-time recording of data at a high speed.
This HDD has enough space for 120 days recording at 10ms speed with 32 input channels.

● **Waveform display on a large display**

The 12.1 inches LCD display is adopted for better visibility of measuring data. The 32 ch waveforms can be dynamically displayed.

● **Various choices for measurement mode**

Five measurement modes are provided such as Pen Recorder enabling a pen recorder-like operation, HD Recorder enabling long time recording, and X-Y Recorder displaying input signals with 1ch in the X-axis direction and 3ch in the Y-axis direction. This allows you to choose an appropriate function according to your purpose.

● **Standard Ethernet and UEB interface**

Ethernet (100BASE-T) for data communication and USB for storage devices (USB memory are equipped.)

● **Auto functions**

Pushing the Auto button on the operation panel automatically adjusts recording/recording speeds and amp sensitivity for measurement of input signal under optimum conditions.

● **Compatibility with AP amp series**

Compatibility with AP amp series of RA1000 and DL2000 is supported. This allows RA1000 and DL2000 users to concurrently use their AP amp series to make a measurement at low cost.

● **AP amp unit**

Eight units from 11 types of amp units can be selected according to measurements. Each amp unit supports an isolation input so that a unit can be easily replaced with another unit.

1.2. Configuration

1.2.1. Model

The recorder comprises the main recorder unit, amp units, optional units, and standard accessories.

Product name	Model	Remark
OmniaceⅢ	RA2800A	Command displays can be chosen to be English or Japanese when placing an order.

1.2.2. Recorder and Amp Unit

Name		Configuration	Remark
Main body	Recorder body (Operation block, display block, amp insertion block, control block)	1	・USB port x 2 ・Ethernet port x 1
	Built-in printer	1	
	Power supply（90 to 240 VAC）	1	
	Remote unit	Optional	RA23-144
	RS-232C unit	Optional	RA23-142
	AC bridge power supply unit	Optional	RA23-143
Amp unit			

Unit name	Type No.	Abbreviated name
2CH High-Resolution DC Amp Unit	AP11-101	HRDC
2CH FFT Amp Unit	AP11-102	FFT
2CH High-Speed DC Amp Unit	AP11-103	HSDC
2CH AC Strain Amp Unit	AP11-104A	ACST
Event Amp Unit	AP11-105	EV
2CH TC/DC Amp Unit	AP11-106A	TCDC
TC/DC Amp Unit	AP11-107	TDC
F/V Converter Unit	AP11-108	FV
2CH Vibration/RMS Amp Unit	AP11-109	RMS
2CH DC Strain Amp Unit	AP11-110	DCST
2CH Zero Suppression	AP11-111	HRZS

1.2.3. Standard Accessories (Display in Japanese and 100VAC)

Name	Type No.	Rating	Quantity
AC power supply	0311-5044	100VAC, 2.5m	1
Users manual	7001756-R01	For recorder	1
Users manual	7006462-R01	For amp unit	1
Recording chart paper holder	8247-4310	1 piece for each of roll chart	2
Recording chart paper	0511-3167	Roll chart 219.5 mm x 30 m	1
Blank panel for amp	37137-7002-0000		16 (Attached blank panels to body is also included)
Blank panel for interface	38410-2416-0000	2 screws per blank panel	3 (Attached blank panels to body is also included)
Empty for AC strain OSC	38410-2417-0000	2 screws per blank panel	1 (Attached a blank panel to body is also included)

1.2.4. Other Accessories and Consumables

(1) Accessories for event unit (AP11-105)

Name	Type No.	Remark
Logic IC cable	0311-5007	2 cables per unit
IC clip cable	0311-5008	4 cables per bag, 2 bags per unit
Alligator clip cable	0311-5009	4 cables per bag, 2 bags per unit

(2) Accessories for remote unit (RA23-144)

Name	Type No.	Remark
Remote cable	00311-5251-0000	1 cable per unit

(3) Consumables

Name	Type No.	Rating
Recording chart paper	YPS106	Roll chart paper, 219.5 mm x30 m, 5 volumes per box
Recording chart paper	YPS108	Roll chart paper, 219.5 mm x30 m, 5 volumes per box With 300-mm pitch perforated line Remaining length indication print pitch: 300mm 99 to 01
Recording chart paper	YPS112	Z-fold paper, 219.5 mm x 200 m, fold width: 300 mm Remaining length indication print pitch (pages): 669 to 000 Note: Supply case (RA12-103) is required for Z-fold paper
Recording chart paper	YPS114	Roll chart paper, 219.5 mm x100 m, 2 volumes per box

1.2.5. Other Optional Equipment

Name	Type No.	Remark
Carrying box	RA28-113	With caster
Dust cover	RA28-114	Dustproof vinyl cover
Cart (push car)	RA28-116	
Paper take-up	RA28-119	External rewinder
Storage case	RA28-115	
Fixing bracket for racks	RA28-117	JIS rack
Fixing bracket for racks	RA28-118	EIJ rack

1.2.6.Special Software

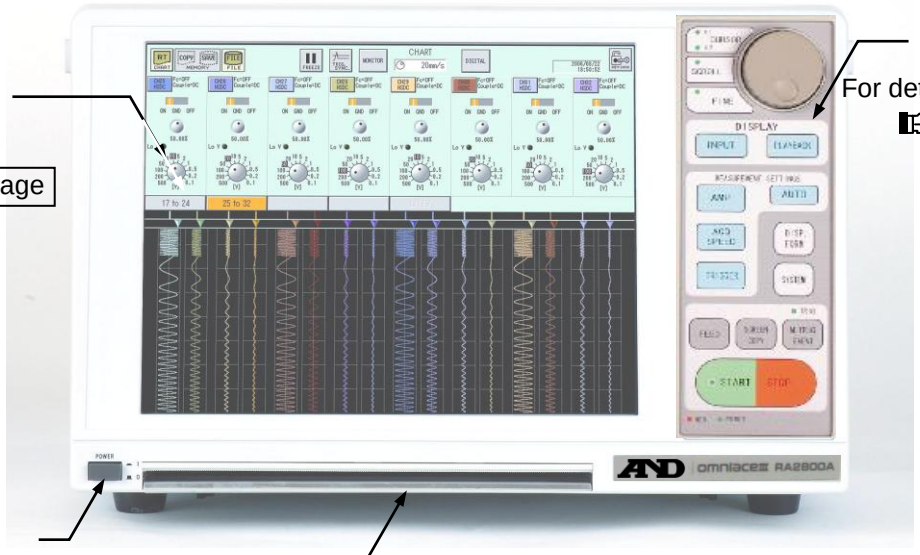
Name	Model	Note
Unifizer	NS3100-P01	This software enables connecting a PC to RA2800A via Ethernet cable for remote control such as data acquisition, various setups, and record starting.

2. Name and Function of Each Block

2.1. Overview of Blocks

The RA2800A consists of the following blocks.

Front view



Display block

For details

2-3 page

Operation panel

For details

2-4 page

Power switch

Printer block
Paper output

Rear view

Interface block (Optional)

For details

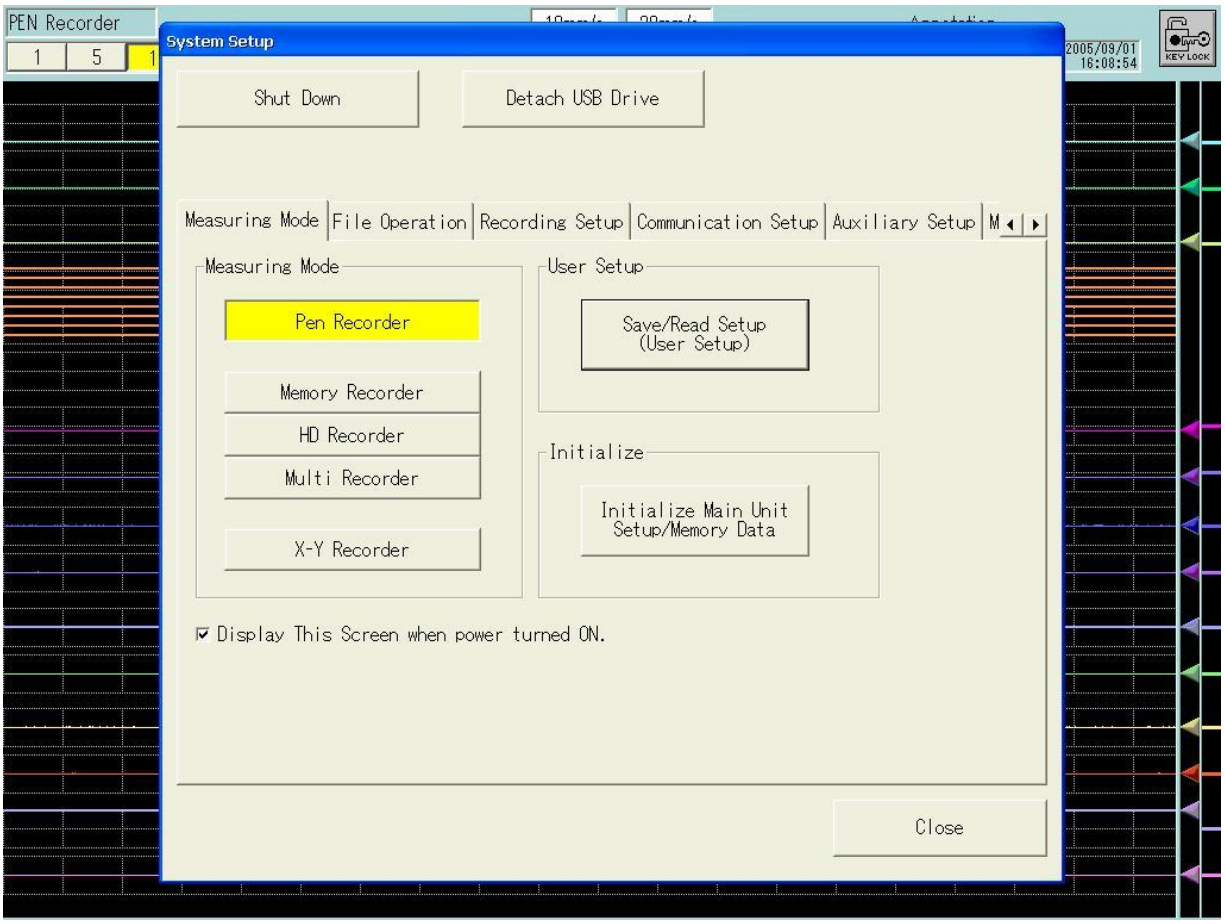
2-6 page

Input block

2.2.Display Block

The RA2800A has TFT color LCD with touch panel. This LCD displays screen for setup and user can make settings by touching the setting items that is displayed on the LCD.

Turn on the recorder that has the factory default settings. The following screen appears. The contents for amplifiers differ depending on the amplifiers that are installed.



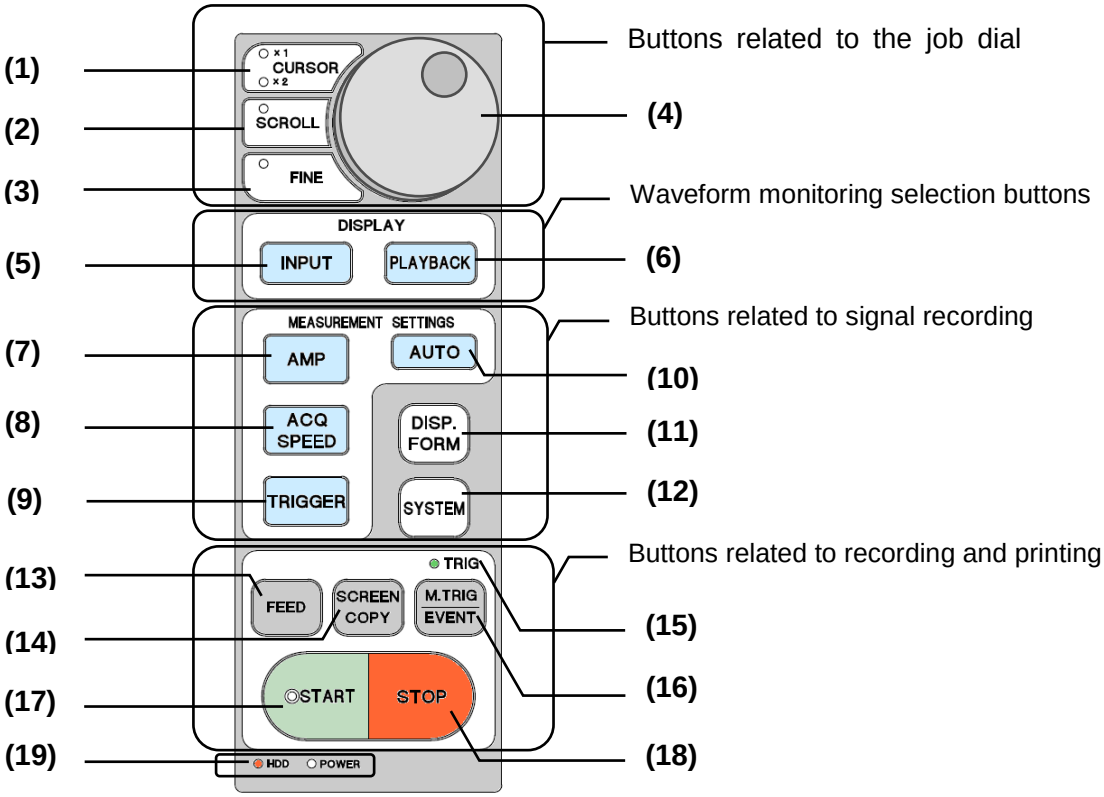
The buttons on the operation panel switches the screen display; the touch panel buttons on a displayed panel makes settings for input units, recording conditions, acquisition, and triggers. The conditions of the signals that are input can be observed on the display.

NOTE

There may be few dots that always illuminate or do not illuminate on the display or slight brightness unevenness on the display. These phenomena are not defects.

2.3. Operation Panel

This section explains button functions on the operation panel block.



◆ **Buttons related to jog dial**

(1) Cursor X1/X2: Switching between cursors X1 and X2

This button is used to switch between cursors X1 and X2. The cursor whose LED comes on can be moved through the touch panel or jog dial.

(2) Scroll: Scrolling displayed waveform

This button used to scroll the waveform. After this button is pressed, LED above comes on, and then scrolling can be made with scroll bar on the touch panel and jog dial.

(3) Fine Tuning: Controlling movement speed of cursor and scroll

This button is used to change the scrolling speed for cursor or waveform. This change is ma de by changing values on the screen.

(4) Jog dial: Continuous value changes, cursor movement on the monitor, and waveform scrolling

Value can be continuously changed by rotating the jog dial. On the replay monitor, smooth c ursor movement and waveform scrolling can be made.

◆ **Waveform selection button**

(5) Input Signal: Displaying input signal on the monitor

The input monitor screen, which has blue background, offers real-time observation of input si gnals in the form of digital value or waveform.

(6) Replay: Replay of recorded data

The replay monitor screen, which has gray background, offers replay and observation of the data stored in memory, internal HDD, and external media. Replay format can be selected from among waveform, value, and X-Y.

◆ Buttons related to recording

(7) Amp: Displaying the amp screen

Setting for amp units such as range and input ON/OFF can be made.

(8) Recording conditions: Setting recording speed

Settings for recording such as sampling speed, chart feed speed, pre-trigger settings are made.

(9) Trigger: Displaying trigger screen

Settings for trigger conditions such as trigger level selection, trigger level setup, and trigger conditions.

(10) Auto: Automatic operation settings

Auto makes automatic settings for analog amp range and recording speed.

(11) Display/Printing: Settings for data display on the monitor and printing on the chart paper

Printing and display format can be set.

(12) System: Displaying system screen

The following settings are available: Measurement mode that decides measurement method, Maintenance that sets date, RS-232C, LAN, and Communication that sets remote.

◆ Buttons related to recording and printing

(13) Chart Feed: Feeding chart recording paper

While this button is pressed, chart recording paper is fed.

(14) Screen Copy: Hard copy for screen

Pressing this button makes hard copy for the current screen. The output media (paper or bitmap file) can be designated in the system settings.

(15) Trigger: Trigger LED

LED comes on when the trigger is generated.

(16) Marking/Manual Trigger: Adding mark indication on printing or manually triggering

Mark indication such as time can be added to printing. Measurement can be started by manual trigger.

(17) Start: Starting measurement

Pressing this button starts measuring. The LED of the button blinks during the measurement.

(18) Stop: Halting operation

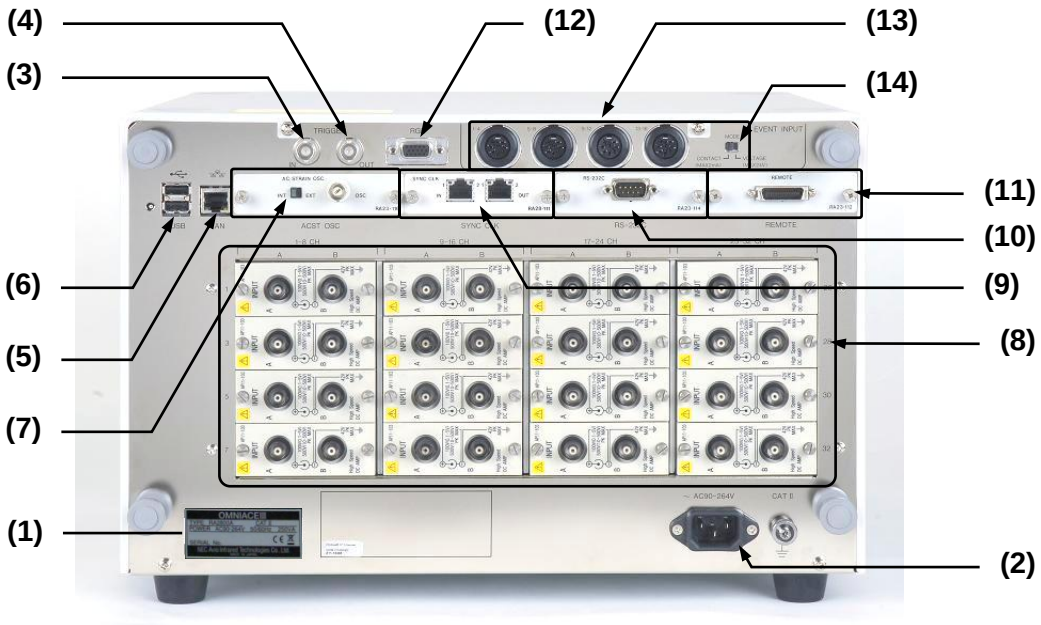
Pressing this button halts the measurement or operations such as screen hardcopy.

(19) HDD/POWER: LED

HDD: LED blinks when the internal HDD is accessed.
POWER: LED blinks immediately after power-on.

2.4. Rear Block

Up to eight optional amps can be installed in this block.



(This is an example that installs sixteen 2CH High-Speed DC Amp Units)

(1) Faceplate

Power voltage input range and power dissipation is indicated.

(2) AC socket

AC power cable is connected to the socket.
The Main Power Switch is the push button at the bottom left of the front panel.
Push down for power ON (button dented), and push again for power OFF (button protruding).

(3) TRIG IN

This terminal is used to enter an external trigger signal when input signal level is not used as a trigger source.

(4) TRIG OUT

This terminal is used to synchronously operate other instruments by outputting trigger signal. Additionally, signal from this terminal is used to monitor the status of the trigger.

(5) LAN

This is a connector for LAN connection.. This connector is useful when a communication bet ween personal computers is made.

(6) USB

This is a USB connector. Memory devices such as USB memory or external drives can be connected.

(7) AC bridge power switch (INT/EXT)/OSC terminal

This is INT/EXT switch for AC bridge power unit (RA23-143, optional) and OSC terminal.

This is needed when you use AC strain amplifier (AP11-104A).

NOTE

When you setup EXI, AC bridge synchronous power signal should be connected to OSC terminal. When you setup INT, all other instruments connected to OSC terminal should be set to EXT. In either the case, wrong settings may prevent the recorder from correct measurement and cause failure.

(8) Input block

Up to optional eight amps can be installed.

(9) SYNC UNIT

Use the Synchronization Unit (RA28-132: optional)
for parallel and synchronized sampling with multiple RA2800As.

(10) RS-232C

RS-232C unit (RA23-142, optional) is inserted in this portion. Connection to external machines such as the host computer is made.

(11) REMOTE

Remote unit (RA23-144, optional) can be inserted in this portion. Stat or stop for recording/ printing, feed, marking, or synchronous operation can be made.

(12) XGA Monitor Output

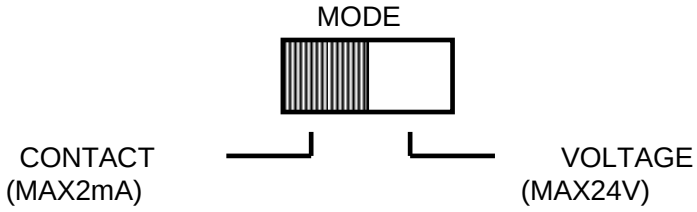
This function outputs the screen same as that rendered on the display to the XGA monitor (Analog RGB, 1024 x 768 dots).

(13) Main Unit Event Input

This block is 16-input event. The input connector is divided into four segments (1-4, 5-8, 9-12, 13-16).

(14) Main Unit Event Input Level Switch

Using this slide switch the judgment switches between contact input level and voltage input l evel for 16 input collectively.



3. Pre-measurement Procedures

3.1. Before Switching on the Power

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

3.1.1. Usage Environment

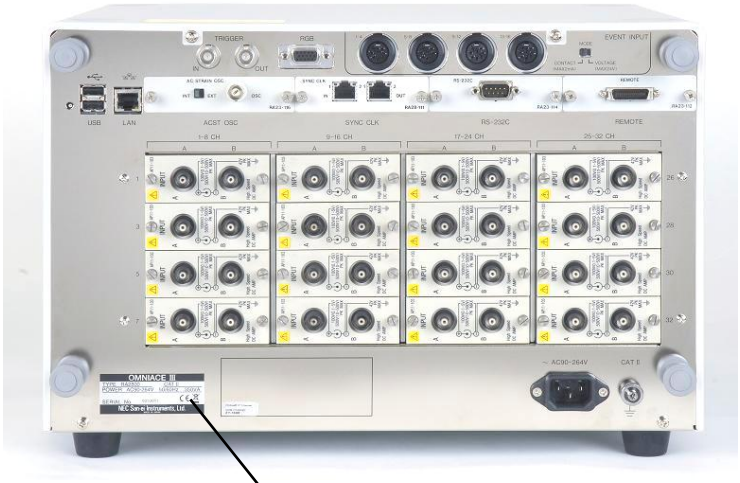
CAUTION Cautions regarding the installation site.

- Use this recorder on a flat surface.
- Use this recorder in a place that meets the requirements of Installation Category II (CAT II) of the Safety Standards for Electrical Measurement Instrument, JIS-C-1010-1(IEC61010-1).
- Use this recorder in a place with **an ambient temperature between 5 and 40°C and humidity between 35 and 80% RH)**
- This recorder has a pollution factor of 2
- Use this recorder in a sufficiently safe environment, taking care to avoid use in the following places.
  - **(1) Places with excessive humidity due to exposure to direct sunlight or proximity to heating fixtures**
  - **(2) Damp or wet place**
  - **(3) Places with salty, oily or gaseous atmosphere**
  - **(4) Humid or dusty place**
  - **(5) Places subject to strong vibration or shock**
  - **(6) Places subject to voltage surges due to an electromagnetic field**
  - **(7) To protect from an excessive internal temperature, this recorder is provided with ventilation holes. These holes must under no circumstances be obstructed by surrounding objects, as an excessive internal temperature may cause damage to the recorder.**
  - **(8) Do not place paper or other flammable materials near this recorder.**

3.1.2. Before Connecting AC Power Cable

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

- **The power supply switch (POWER) of this recorder must be OFF.**
- **The power supply must comfort to the rating specified on the rating plate.**
- **Ensure amp or interface units are inserted.**



CAUTION

This recorder must be grounded before power is applied.
This grounding protection is for the safety of this recorder, as well as for that of the user and peripheral equipment.

- If AC power cable that comes with this recorder is connected to a 3-pin power outlet equipped with a protective conductor pin, the recorder is automatically grounded.

3.1.3. AC Power Cable

The AC power cable that is included in this recorder (0311-5044: 100-VAC system, 2.5 m) is a 3-pin type which has the round pin at the center for protective grounding.

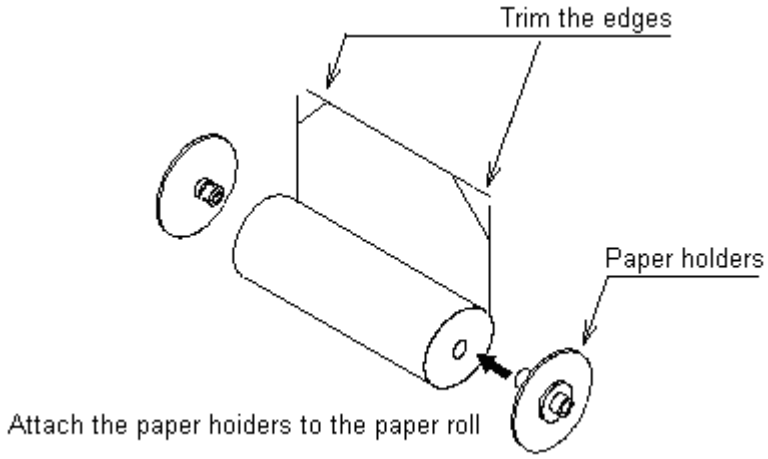
3.2. Paper Loading

Load either a paper roll or z-fold paper into this recorder.

3.2.1. Paper Roll

(1) Attach the paper holders to the paper roll.

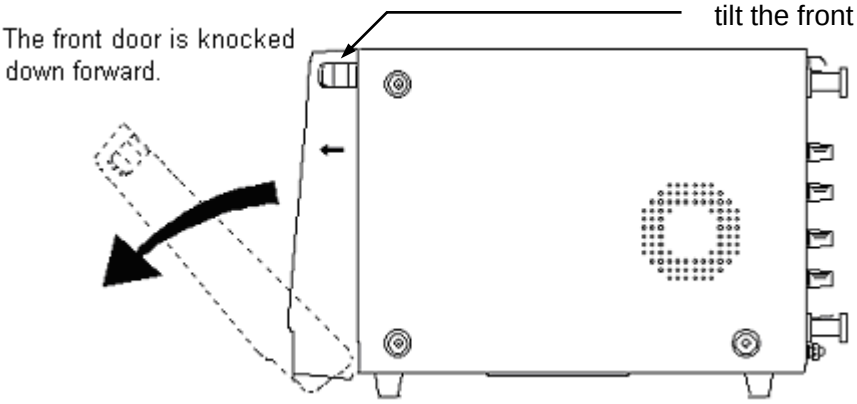
Attach a paper holder to both ends of the paper roll. If loading a partially used roll, trim the edges for ease of loading, as shown in the figure below.



NOTE Use only the paper roll prepared exclusively for this recorder by our company (YPS106 and YPS108 and YPS114). If other types are used, the recording quality cannot be guaranteed, and the normal operation of the paper feed may be affected.
Do not use the portion of the new roll that is covered with tape, as colors may not be printed normally on this area.

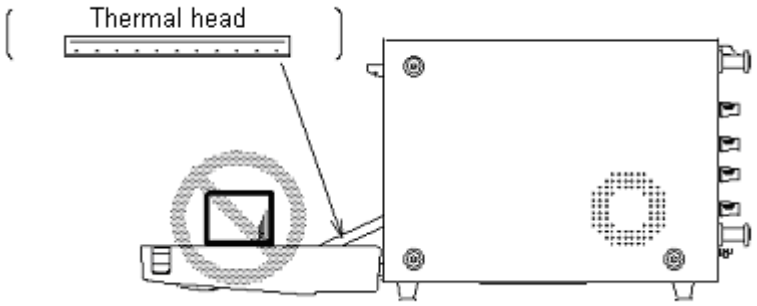
(2) Pull the levers at the both sides of the front door and open the printing block.

Pull the levers at the both sides and gently tilt the front door.



NOTE

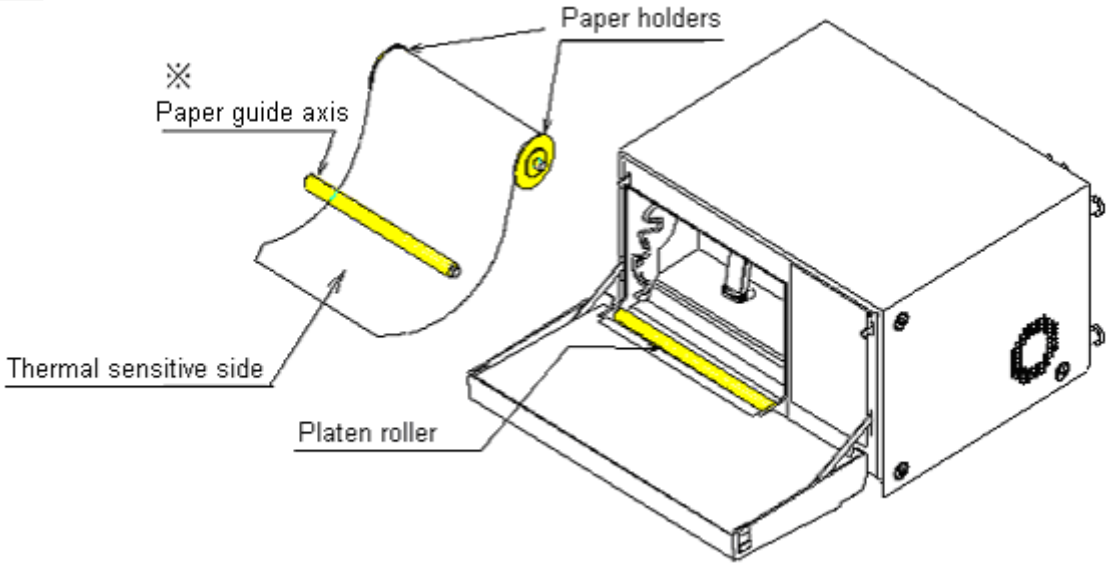
Do not place any object on the front door that is tilted.
If the thermal head is damaged, correct printing cannot be made.



(3) Loading the recording paper in the stock section in the RA2800A with the paper guide axis

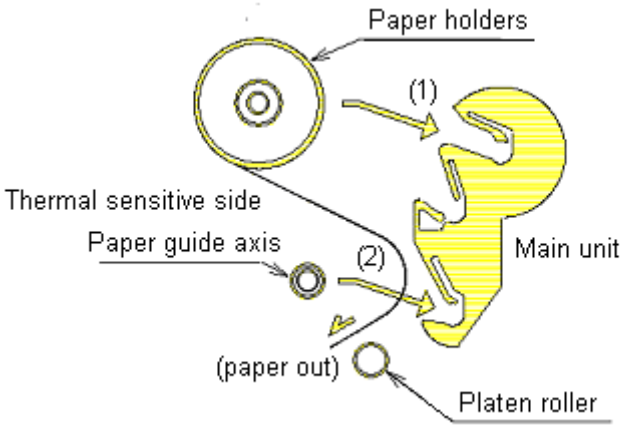
Load the recording paper with paper holders in the stock section in the RA2800A mainframe and push them until they click into place.

NOTE Check the recording paper so that the thermal sensitive face is to be the front face. If the recording paper is loaded inversely, printing cannot be made.



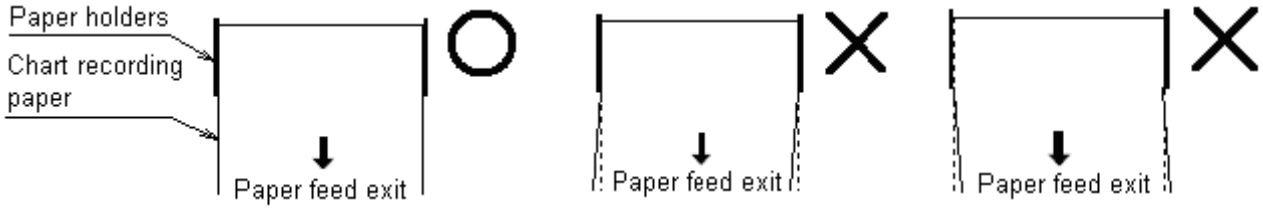
NOTE

Push the printing paper holders into the paper holder in the mainframe (1) on the drawing on the right) until a click is heard.
The paper guide axis is included in this paper holder when the unit is shipped.
Take out the axis to install the printing paper holder, and after installing, fix the axis.



(4) Pull out the paper

Put in the end of printing paper above the platen roller and pull the paper about 10 cm. Check the printing paper coming out of the paper feed exit.
Pull the paper straight and tight. Correct paper feed cannot be made if the paper is not pulled straight.



(5) Close the cover

After pulling the printing paper, close the cover holding the both sides with hands until the cover click into place. Pull the printing paper straight. Confirm the both sides of the upper part of the cover are closed. Otherwise correct printing cannot be made.

3.2.2. Loading z-fold paper

To use z-fold paper (YPS112), a z-fold paper case (RA28-115, sold separately) is required.

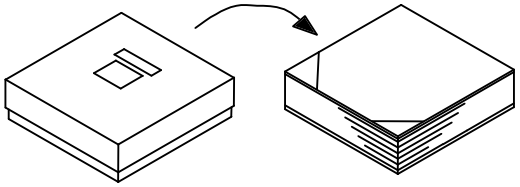
《Z-fold paper》

YPS112

・Length: 200 m

・Folded width: 30 cm

・To indicate how much paper is remaining, a page number (669 to 000) is printed on each page.



NOTE Use only the z-fold paper prepared exclusively for this recorder by our company. If other types are used, the recording quality cannot be guaranteed, and the normal operation of the paper feed may be affected.

《Z-fold paper case》

・Z-fold paper case: RA28-115

・Z-fold paper case: About 3 kg

・A z-fold stock box (about 300 g) comes with the z-fold paper case

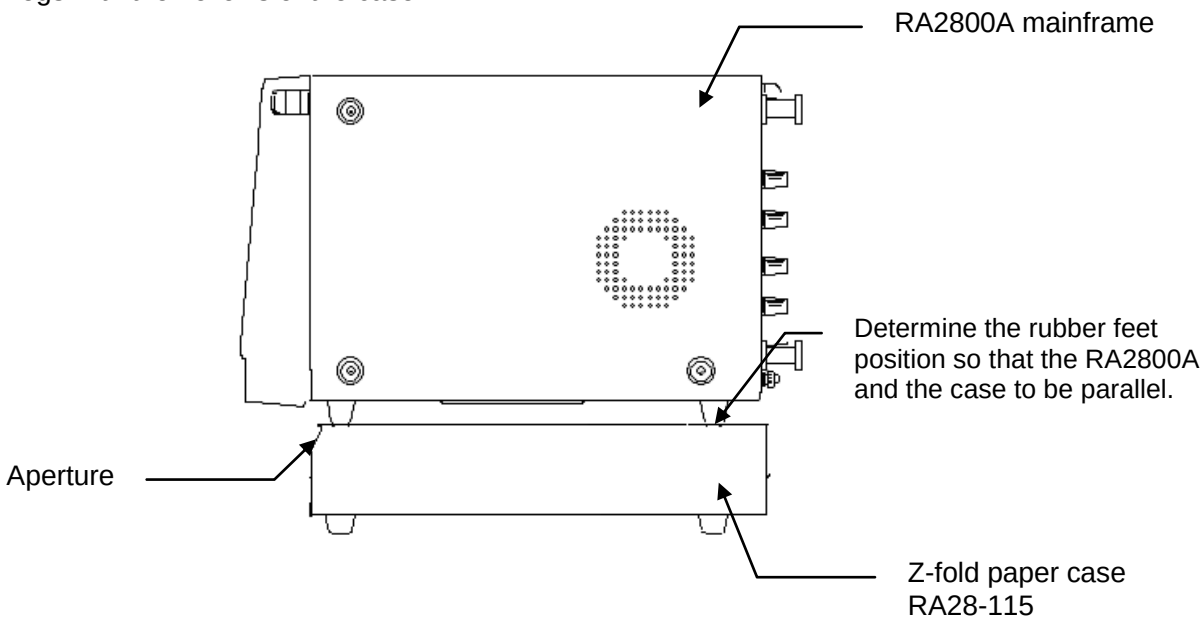
・A z-fold paper case adaptor: About 200 g

《External dimensions of z-fold paper case》

See the drawing in 18.15. 6.

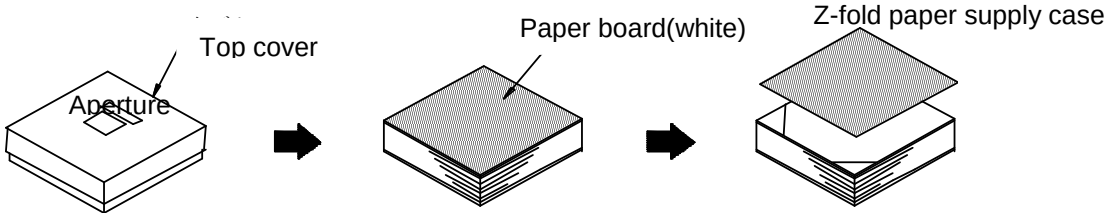
(1) Placing RA2800A on the Z-fold paper case

Place the Z-fold paper case on a flat place. Then place this recorder on top of the case, aligning the rubber legs with the hollows of the case.

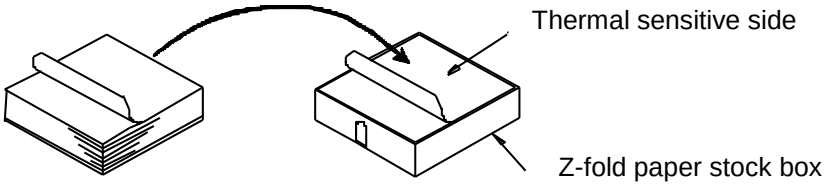


(2) Put the paper in the case

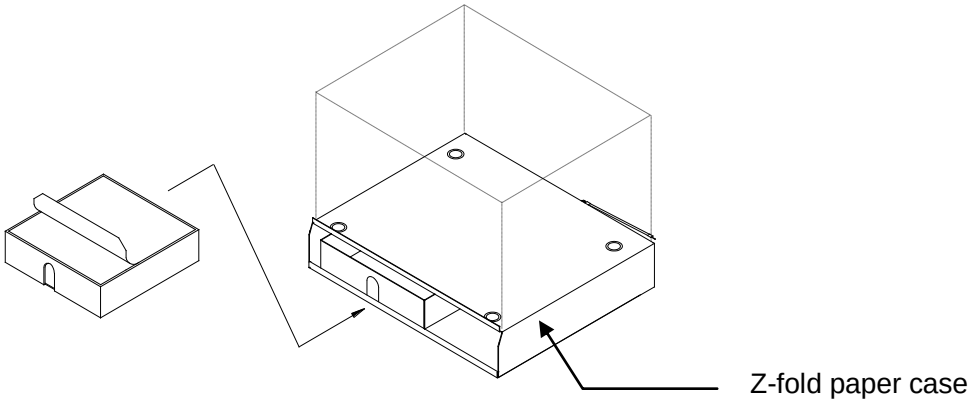
(1) Remove the contents from the case, open the plastic bag and take out the piece of cardboard covering the paper. Use the top cover of the case as a receptacle for the recorded paper.



(2) Place the paper in the stock box with the thermally sensitive side (the side with blue numbers printed on the edges) facing up.

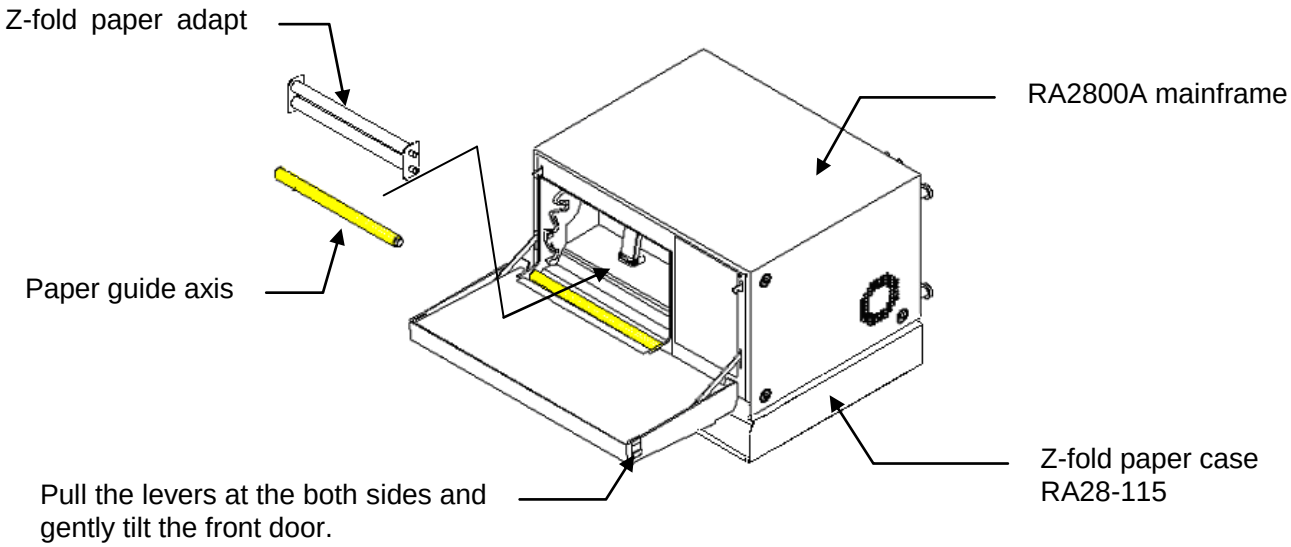


(3) Position the stock box so the paper flap edge (non-folded edge) is facing toward you and insert the box into the case opening.



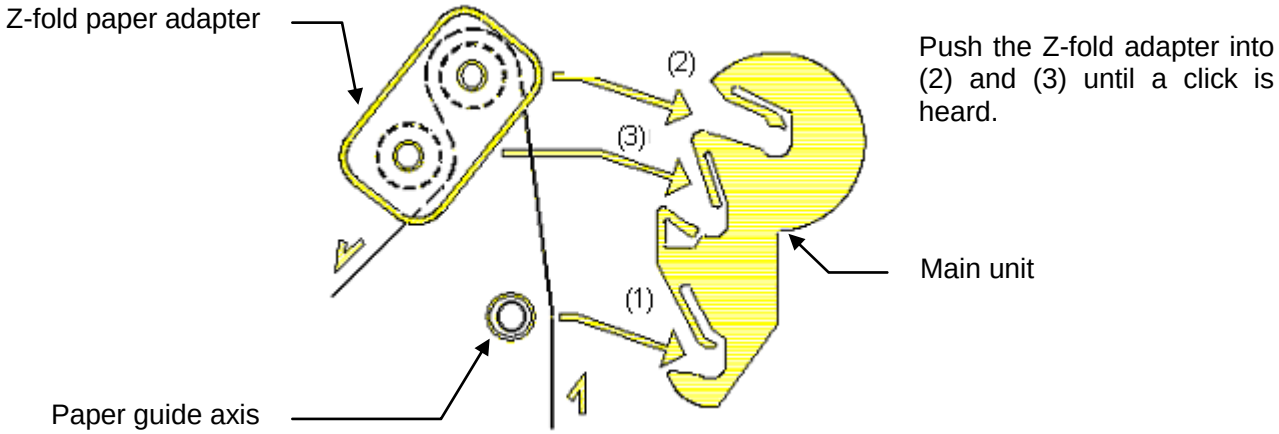
(3) Attaching the Z-fold paper adapter

Pull the lever on both sides of the front door and gently tilt the door. Push the Z-fold paper adapter and paper guide axis into the recording paper loading section in the RA2800A unit until they click into place.



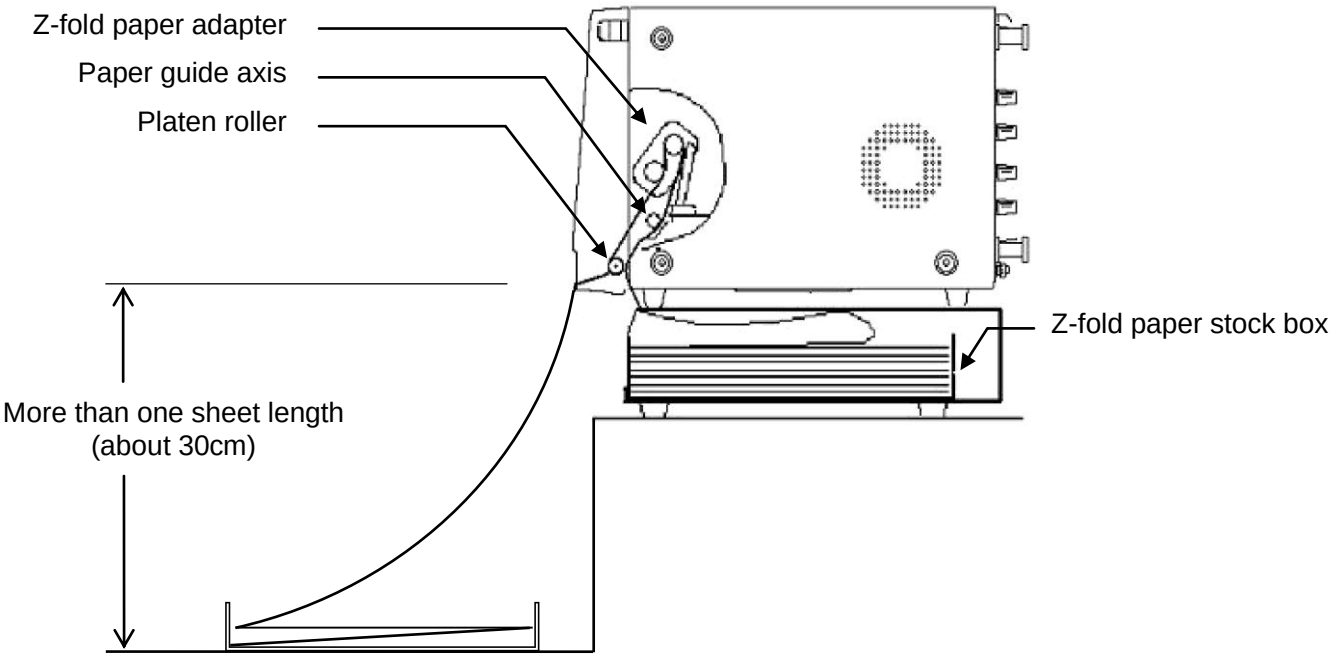
(4) Thread the paper through the z-fold paper adapter

Wind the recording paper from the Z-fold paper case around the Z-fold paper adapter as below.



(5) Insert the paper adapter in the slots of the cover

Press the paper adapter with the paper wound on it into the slots until a click is heard. Insert the paper wound on the adapter in the opening under the platen roller (black roller) of the recording section and pull it out about 10 cm from under.



(6) Close the cover

After pulling out the paper, making sure it is straight, close firmly pressing with both hands on the both sides of the cover.

TIPS

Place the cover of the box containing the paper in front of the recording section cover to use as a paper receptacle. In order to keep stable paper output, please set the height of the unit more than one sheet length (about 30cm), so that paper may automatically be pulled out by own weight. To ensure smooth paper output, fold one or two sheets into the receptacle before use.

Note that although z-fold paper usually folds automatically as it is output, some environmental conditions, such as a humid atmosphere or the setting location, may cause the paper not to fold normally.

3.3. Insert the Amp Unit

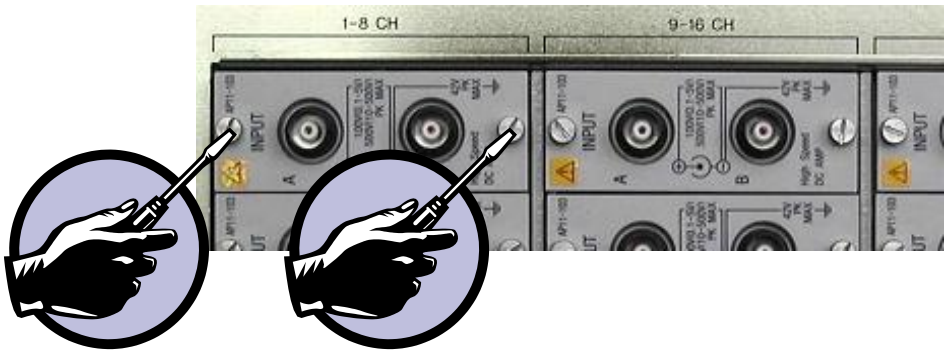
CAUTION

◆ Caution in handling

When replacing an amp unit, disconnect the power cable and the signal input cable from the recorder after turning off the power. Replacement of the unit while the power switch is on causes a damage of the unit and the recorder.

During the replacement, avoid touching the internal parts. If a user having static electricity touches internal parts, the parts may be damaged. As touching the parts may cause a failure, never touch the parts other than panels during the replacement.

(1) Turn off the power
(2) Remove the power cable.
(3) Remove input cables connected each amp unit.
(4) Check if the power switch is off.
Tighten each amp-fixed screw on the upper and the lower using a screwdriver to fix the unit. (Screwdriver: edge width, 0.65 mm or less) Loose the screws until removing the connection of this recorder. (Take care over-loosing of the screw not to remove the unit.)



(5) Pull out the amp unit by pulling two screws at the upper and lower part of the unit. By doing so, you can remove the unit smoothly. To insert a unit, perform the reverse procedure. Tighten screws firmly using a screwdriver. Perform this procedure while the power is off.

CAUTION To prevent an electric shock and damage due to an entry of obstacles, always attach a blank panel for the slot without amp unit.

3.4. Turning on the Power

◆ When all the preparations are complete, turn on the recorder.

＜Points to be checked before applying power＞

- **Has this recorder been set on a safe place?**
- **Has this recorder been set under a proper environment?**
- **Is the power switch currently off?**
- **Is this recorder grounded?**

After confirming that these points above are all yes, turn on the recorder following to the steps below.

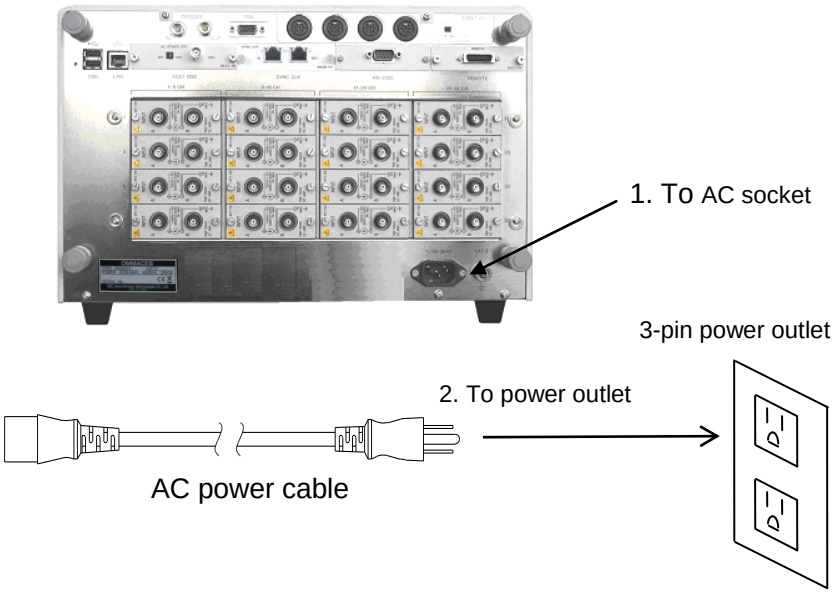
(1) Connect the inlet side of the AC power cable to the AC socket of this recorder

Connect the inlet side of the accessory AC power cable to the AC socket on the power supply panel of this recorder.

(2) Connect the plug of the AC power cable to the power outlet

(3) Turn on the recorder power

Turn on the POWER switch on the lower left of the RA2800A mainframe.



◆ After power application

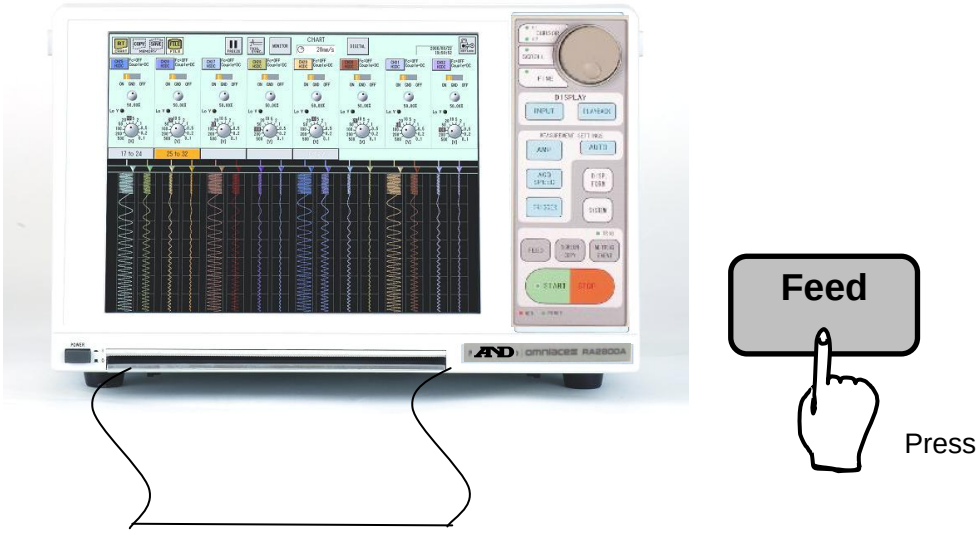
After applying power, check the following.

(1) Confirm that the image is properly displayed on the screen

The [Input Monitor] screen will be displayed immediately after power application.

(2) Confirm that the paper is fed correctly

This can be confirmed by pressing the [Feed] key on the operation panel. If no paper is fed, check whether the cover is closed properly or not.



(3) The pre-measurement procedures are completed.

4. Operation Flow
Flow of Measurement, Basic Settings and Operations

4.1. Operation Flow

This recorder records, stores, and replays input signals, following the procedures described below.

(1) Before power application

Confirm that this recorder has been set in a safe place, and that all the accessories are properly attached.

☞ Refer to Chapter 3 for details.

(2) Applying power

- **Inputting signals to the amp units.**
  Note that applying a voltage greater than the maximum allowable input voltage specified by the sensitivity setting of each amplifier unit may cause damage to the main unit or internal components.
  ☞Refer to AMP Unit Instruction Manual for details.

- **Confirming the status of the signals**
  Input signals can be monitored in real-time.
  ☞ Refer to Chapter 5 for details.

(3) Settings

- **Amplifier unit settings**
  Set the conditions for the data to be recorded.
  ☞ Refer to Chapter 7 for details.

- **Trigger settings**
  Set the trigger for activating to be recorded.
  ☞ Refer to Chapter 13 for details.

- **Measurement mode settings**
  Select the mode appropriate for the kind of object desired from the 5 available measurement modes.
  - ・To print the recording chart paper **Pen recorder mode**
    ☞ Refer to Chapter 8 for details.
  - ・To store high-speed events in memory **Memory recorder mode**
    ☞ Refer to Chapter 9 for details.
  - ・To store and record events over a long time in HDD **HD recorder mode**
    ☞ Refer to Chapter 10 for details.
  - ・To store events quickly during low-speed signal recording **Multi-recorder mode**
    ☞ Refer to Chapter 11 for details.
  - ・To use as X-Y recorder **X-Y recorder mode**
    ☞ Refer to Chapter 12 for details.

(4) Measurement

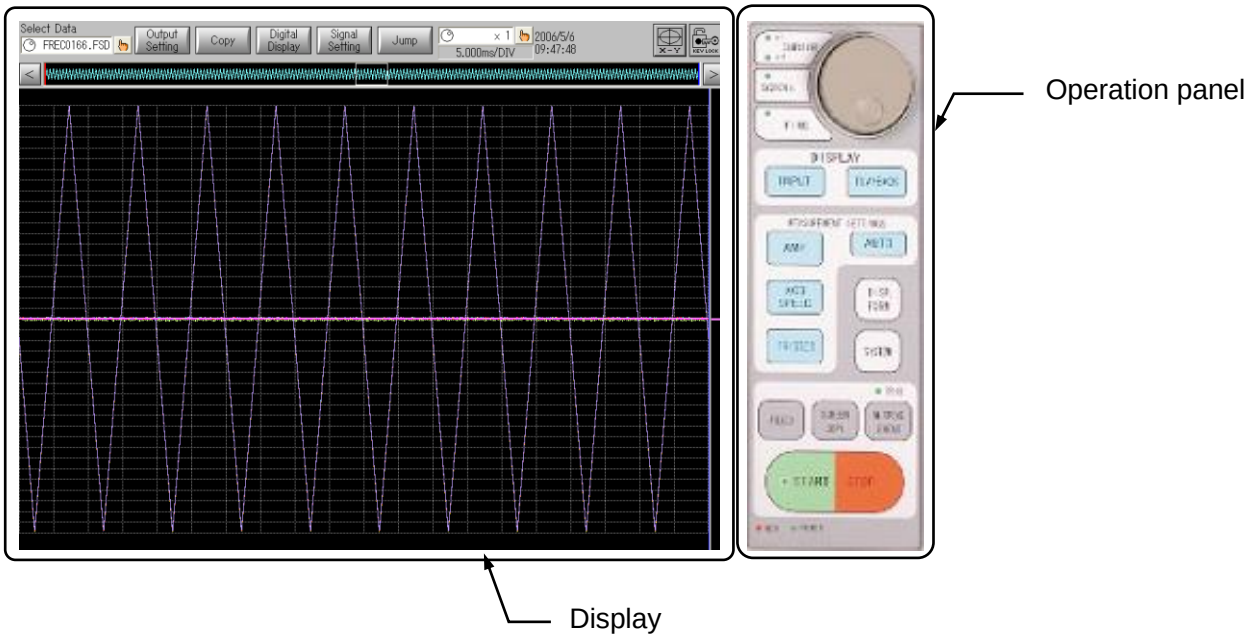
Start measurement with the [START] key on the operation panel.
Stop measurement with the [STOP] key on the operation panel.

(5) Replay

Display stored data **Replay settings**
☞ Refer to Chapter 14 for details.
Copy stored data on the recording paper or save a file of the data **Output selection**
☞ Refer to Chapter 14 for details.

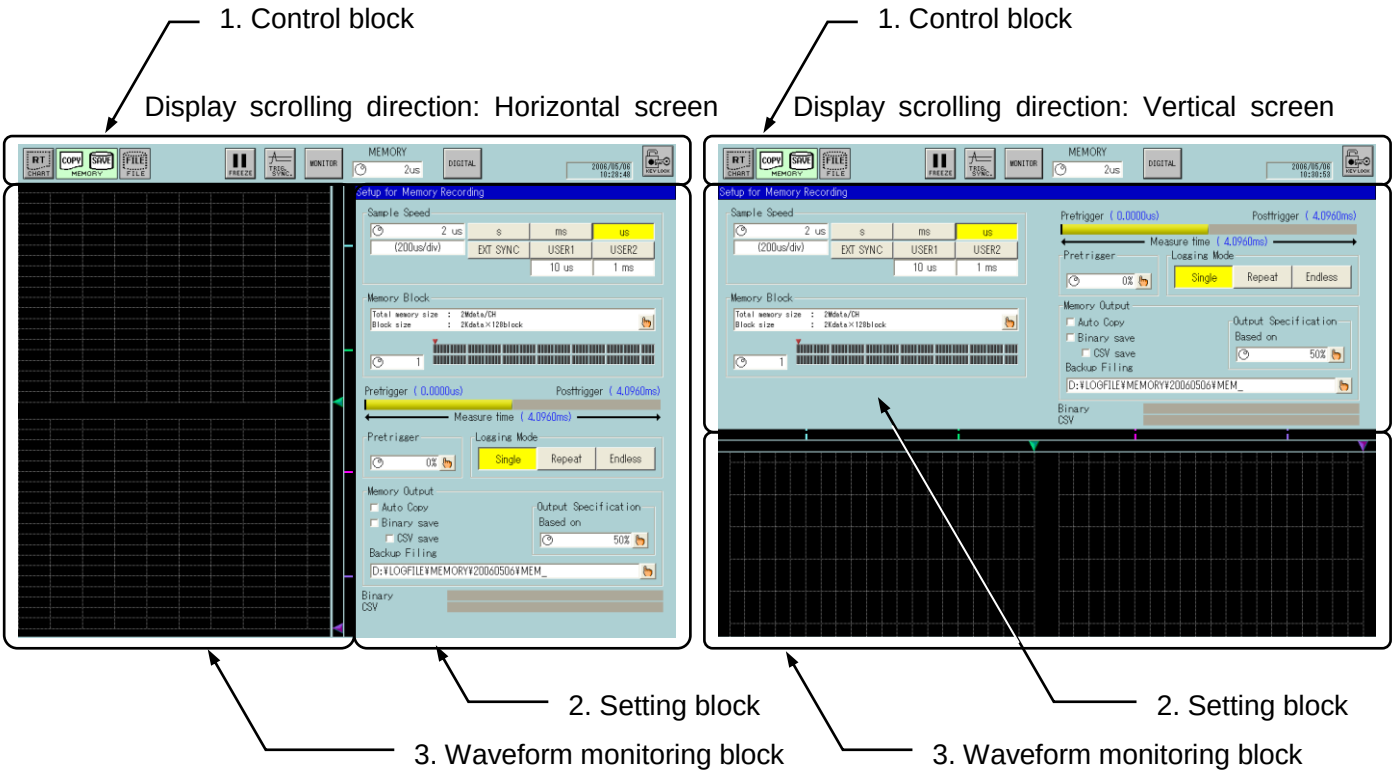
4.2. Making Basic Settings

This section explains various setting items and icons on the screen. As the display is of a touch panel, settings can be made by directly touching the keys on the display screen.



4.2.1. Explanation of Basic Screen Settings

The setting screen is broadly divided into the control, waveform monitoring, and setting blocks.



(1) Control block

This block is always displayed on the top of the screen and is used for setting function and switching the screen. The contents of the control block change in accordance with a measurement mode and a setting item being selected. Refer to various measurement modes of Chapters 8-12 for details about control block.

(2) Setting block

To display a setting screen on this block, press the [Amp], [Store condition], and [Trigger] button on the operation panel. Refer to description of various measurement modes of [Chapter 8 Amp Unit], [Chapter 13 Trigger Settings], and [Chapters 8-12] for details about operation on a setting screen.

(3) Waveform monitor block

Because the input waveform monitor is always displayed on the normal setting screen, settings can be made while observing the input signals.

4.2.2. Explanation of setting keys

Each setting item displays a different image depending on the input method to be used. The various input methods are explained below.

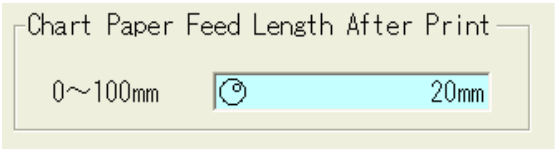
- **Jog key**

  When the jog dial image is displayed in the setting block, the jog dial on the operation panel can make settings. Use the jog dial to change the setting value of the item that is highlighted (active).

  Normal

  Active (settable)

- **Window key**

  "Hand" icon displayed on the key indicates that a window will open upon selection. Settings can be made in this newly opened window.

- **Jog key + "HAND" icon**

  In this case, the operation is a combination of the above two items. When the blank of the setting block is selected, the key operates as the jog dial (item highlighted), and when the icon is selected, a setting window will open.

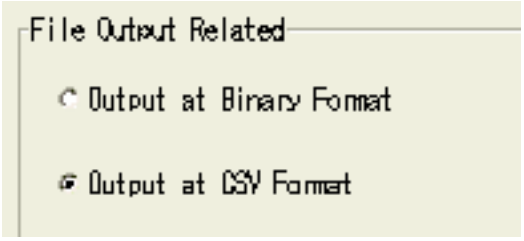
  

- **Check boxes**

  When a check box is pressed, a check will alternatively appear and disappear.
  Several selections are available.

- **Radio button**

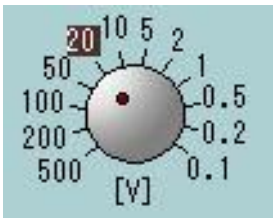
  When a radio button is pressed, a check will alternatively appear and disappear. Select only one among two or more items.（Setting by which two or more selections are prohibited）



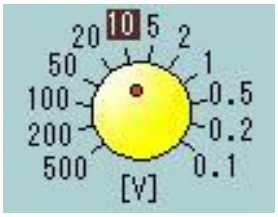
- **Rotary knob**

  Rotary knob is a knob-type key used for the range setting for input amplifiers. Value changes by rotating the jog dial after the color of the key changes by touching the key (entry state of the jog dial). The highlighted value is the current value to be set.

Normal



Active (settable)



- **Adjustment knob**

  This knob is used to change the base line position for an input amplifier. Value changes by rotating the jog dial after the color of the key changes by touching the key (entry state of the jog dial). The set value is displayed under the key.

Normal

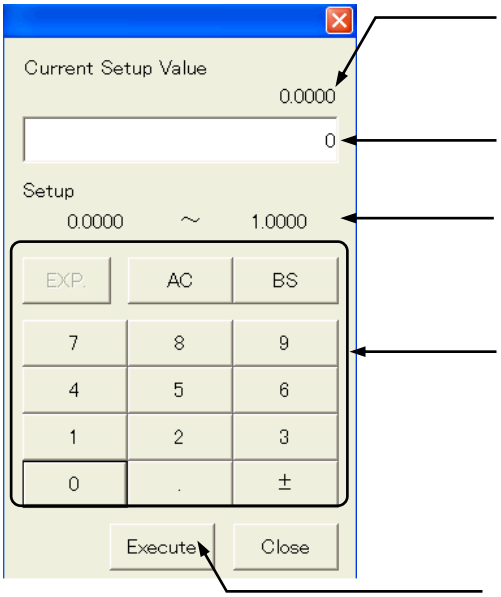
Active (settable)

4.2.3. Explanation of standard setting windows

This recorder uses common setting windows to set values that are commonly used.

● **Numeral input window**

Use this window to enter numerical values.



Current setting

Current input value

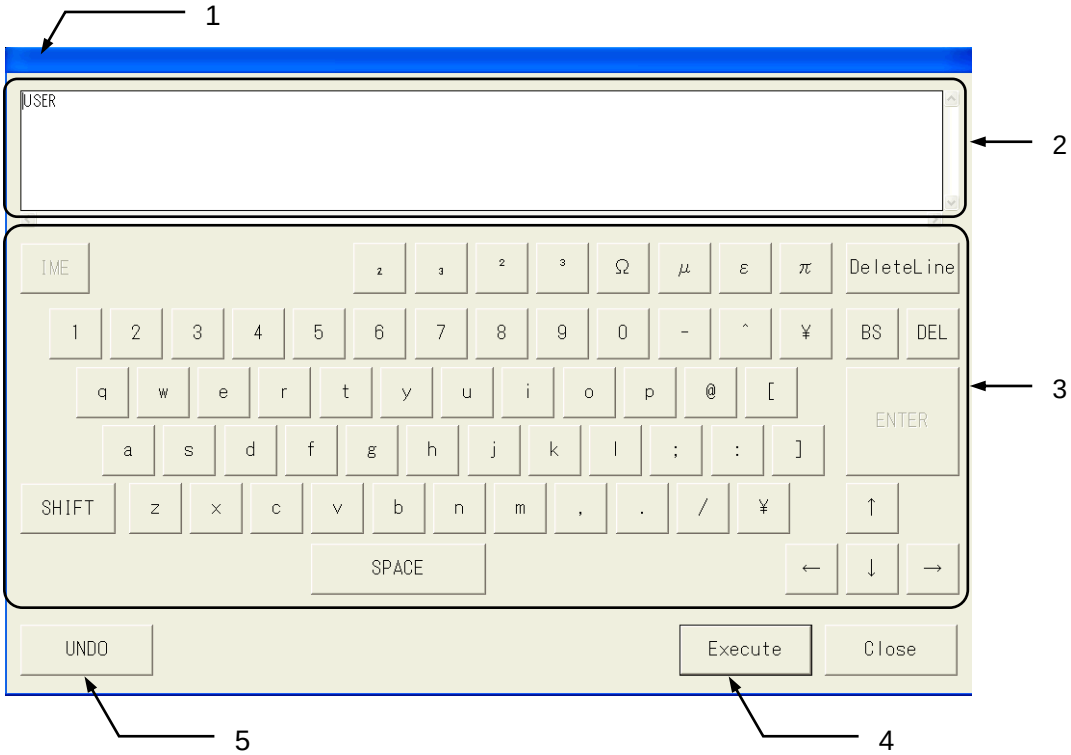
Allowable setting range

Numeric input key

To register the setting, press the [EXEC] key. The window then closes.

● **Character input window**

Use this window to input character strings.



1: Window title

This displays contents of the setting item.

2: Input display section

This section displays input character strings and cursor position.

3: Input operation section

This section operates input character strings from various keys.

[Delete line]

Erases only the line indicated by the cursor

Capital letters and symbols can be input by pressing the [SHIFT] key

When the key is pressed, images displayed on the keyboard are changed after the key is highlighted, thereby capital letters and symbols can be input.

Character strings to convert into kanji can be input by pressing the [IME] key.

When the key is pressed, kana input mode using Roman character is changed after the key is highlighted.

To convert kana into kanji, press the [Blank/Conversion] key.

To select among kanji list, press the [Arrow] key or [Blank/Conversion] key. (To select among kanji list on the panel, touch the panel directly.)

To confirm the selection, press the [Return] key.

Avoid inputting special characters (the upper key on input operation section such as Ω , μ , ε) during IME mode.

4. [EXEC] key

To register character strings to input, press this key. The window will then close.

5: [Undo] key

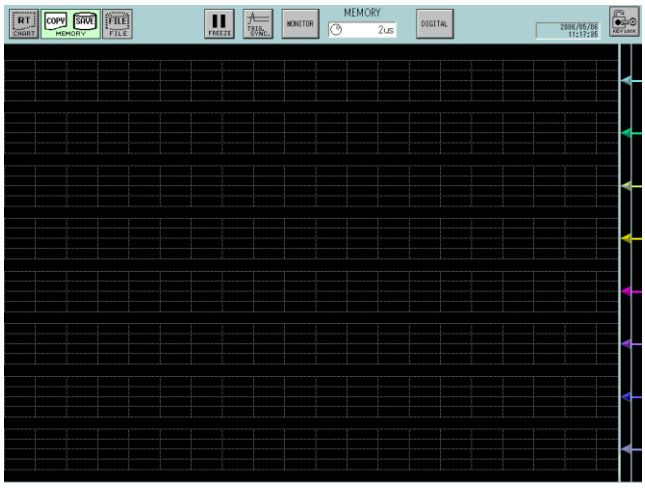
To restore the previous entry, press this key.

5. Input Signal Monitor Observing Input Signals

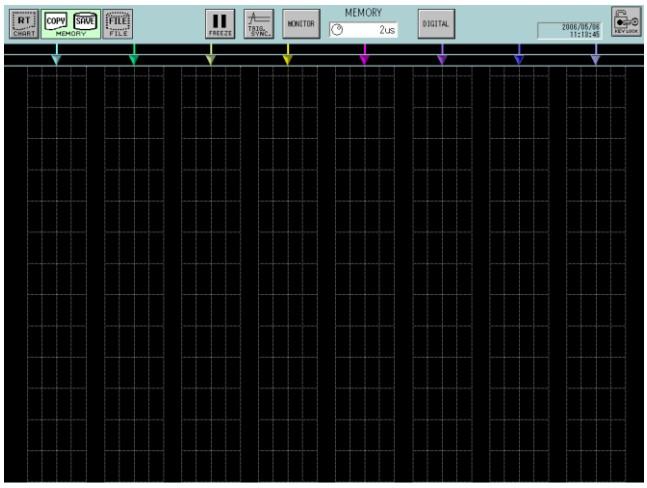
5.1. Observing Input Signals

To observe the signals that are input, use the Input Signal screen. This screen displays the signals that are input in real time. The waveforms can be frozen as necessary.

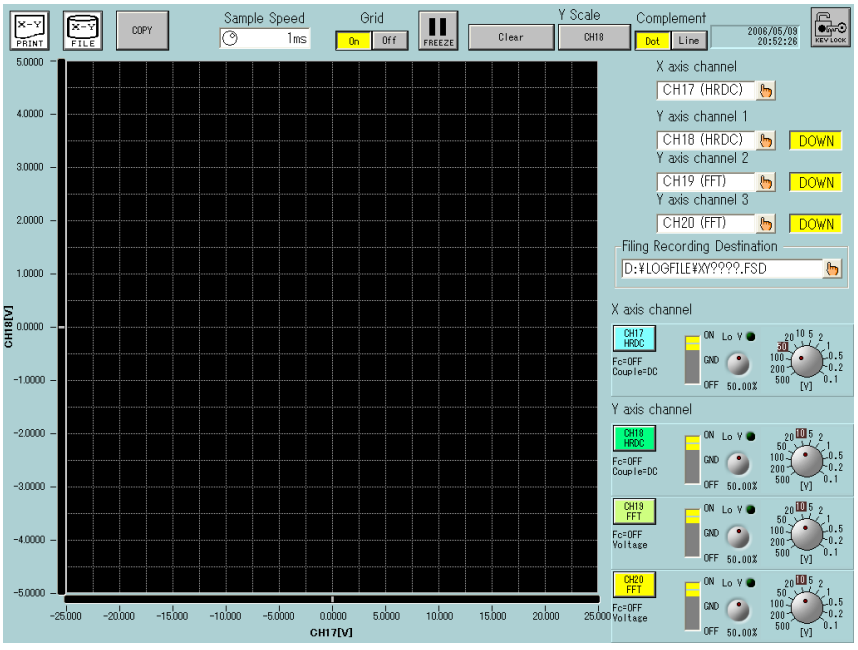
Display scrolling direction: Horizontal screen



Display scrolling direction: Vertical screen



T I P S When measuring mode is set as X-Y recorder, the display is set as below.

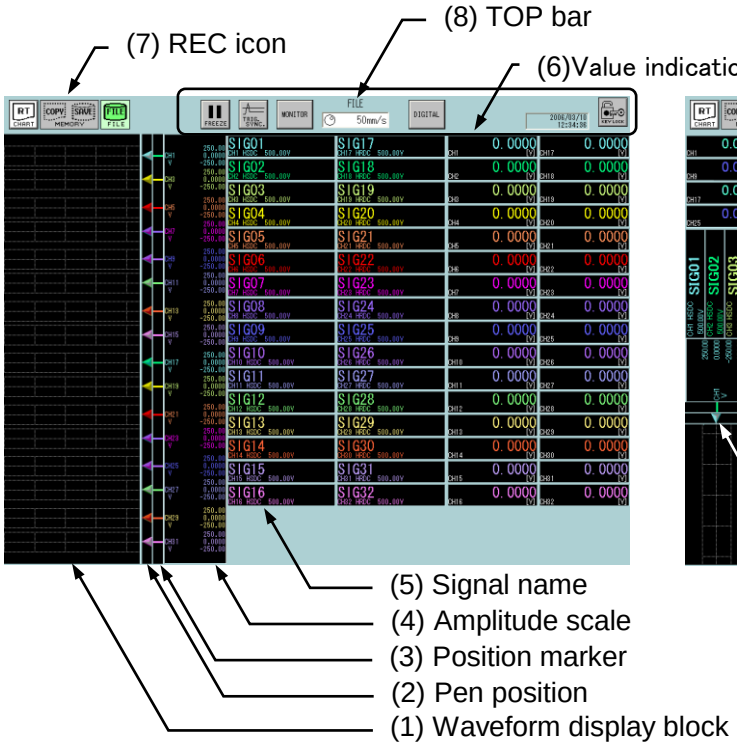


∗ Display scrolling directions are invalid in this screen

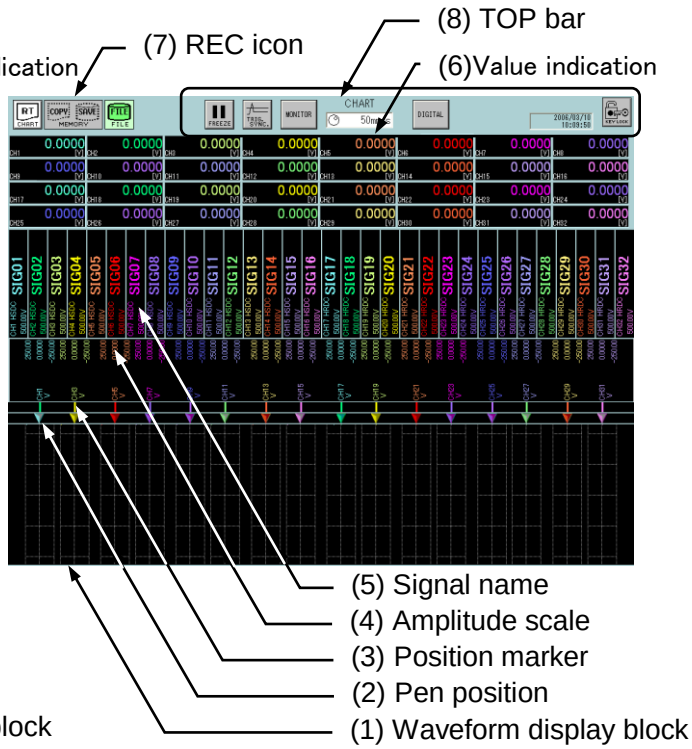
5.2. Displaying Input Waveform Monitor

The screen below is a screen appears when the Input Signal button is pressed in the Memory Recorder Mode.

Display scrolling direction: Horizontal screen



Display scrolling direction: Vertical screen



(1) Waveform display block

Waveform display format can be set. With this setting, waveform segmentation for display and printing can be made.

☞ Chapter 15 Display and Printing

(2) Pen position

Current values for analog amps are indicated with the pen position.

(3) Position marker

This is zero position for all analog amps.

(4) Amplitude scale

This is amplitude scale for analog amps. This scale can be hidden depending on the setup.

☞ Chapter 15 Display and Printing

(5) Signal name

Indication of signal name that are entered by user can be made. The signal name can be hidden depending on the setup.

☞ Chapter 15 Display and Printing

☞ Chapter 16 System Setup

(6) Value indication

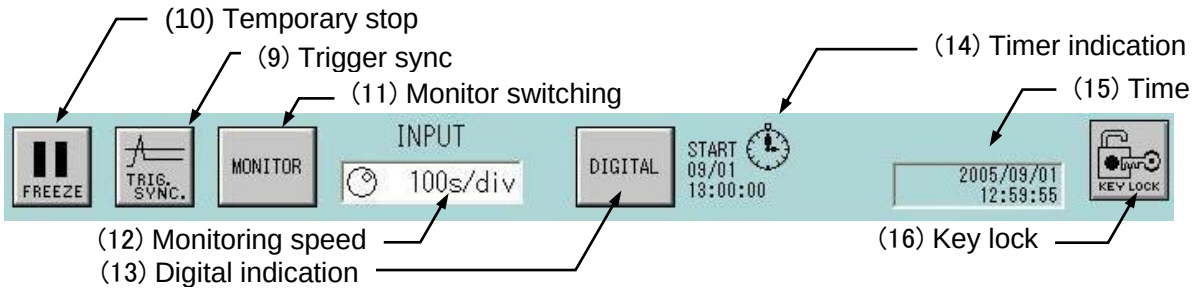
Numerical values of currently input signals are indicated. The values can be hidden depending on the setup.

☞ Chapter 16 System Setup

(7) REC icon

Status of printing and recording is shown. The contents differ depending on the measurement mode. For more information, see descriptions of measurement modes in Chapters 8 to 12.

(8) TOP bar



(9) Trigger sync

This button sets whether updating for input waveform monitoring is made through the trigger detection or not. To monitor high-speed and periodic signals, this function is effective.

(10) Temporary stop

This button halts monitoring. Pressing the button again resumes monitoring.

(11) Monitor switching

This button switches input waveform monitoring mode. The monitor mode changes with button. The mode for monitoring varies depending on the measurement mode. See the table below.

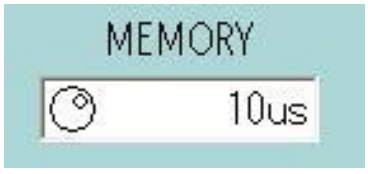
Monitor mode	Description	Recorder mode		
		Memory	HD	Multi
Input Monitor	Fixed-speed for input monitor	Enabled	Enabled	Enabled
Chart Feed Speed	Monitor displaying same speed as the chart feed speed.	Disabled	Enabled	Enabled
Memory Sampling Speed	Monitor displaying same speed as the memory sampling speed	Enabled	Disabled	Enabled
HD Recording Speed	Monitor display same speed as the HD recording speed	Disabled	Enabled	Enabled

※Monitor speed setting becomes disabled when settings other than the Input Monitor mode is set.
※This button does not appear in the Pen Recorder and X-Y Recorder modes.
※A left edge of the monitor screen is a starting point of trigger in the memory recorder mode.

(12) Monitoring speed

When the monitor mode is set to Input Monitor, monitoring speed can be selected. Use the jog dial or the window to set.

If the monitoring mode is set to other than the Input Monitor, the monitoring speed indicates a fixed-recording speed. If the setting is changed, the fixed speed is changed.



(13) Digital indication

Input signal values are indicated in the form of digital value. Pressing this button switches between No and Digital Value.

(14) Timer indication

f the timer printing is set, the recording time for the next session. If it is not set, nothing is indicated.

☞ 16 System Settings

(15) Time

This portion indicates the current time.

(16) Key lock

By setting this function, key entries on the operation panel are blocked. Pressing this button switches key lock on and off.

Key lock OFF

Key lock ON

☞ 16 System Settings

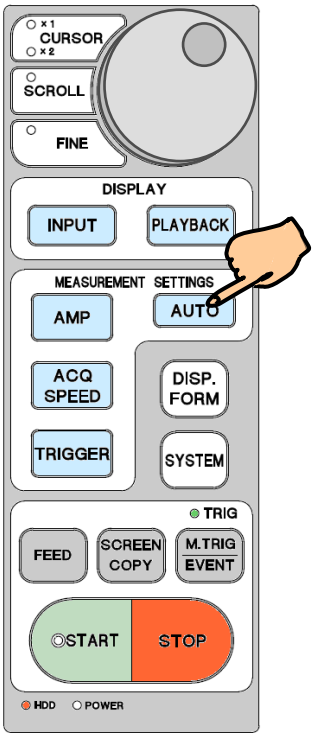
6. Auto Setup Automatically Setting Recording Conditions

6.1. Function Overview

The auto setup function automatically sets recording conditions by referencing the signals currently input. The following parameters are automatically set.

- **Auto range (for analog amps only)**
- **Auto sample**

To execute this function, press the Auto button.



TIPS

While recording is made, the auto setup function is not available. The time needed to validate the auto setup varies depending on the signals that are input. As the auto setup function sets recording conditions roughly, set conditions manually if precise setup is required.

6.2. Auto Range

This function automatically sets the range of analog amps. The auto range function is available in the following amps.

Unit Name	Model	Abbreviation
2CH High-Resolution DC Amp Unit	AP11-101	HRDC
2CH FFT Amp Unit	AP11-102	HSDC
2CH High-Speed DC Amp Unit	AP11-103	FFT
2CH AC Strain Amp Unit	AP11-104A	ACST
Event Amp Unit	AP11-105	EV
2CH TC/DC Amp Unit	AP11-106A	TCDC
TC/DC Amp Unit	AP11-107	TDC
F/V Converter Unit	AP11-108	FV
2CH Vibration and RMS Amp Unit	AP11-109	RMS
2CH DC Strain Amp Unit	AP11-110	DCST
2CH Zero Suppression Amp Unit	AP11-111	HRZS

The auto range is executed from an amp screen detailed windows.

See ☞ Chapter 7 Amp Unit

TIPS

If there is no signals, the reference measurement value will the zero level, the adjusted value will be the highest sensitivity. If the high-sensitivity disabled setting in a DC amp is effective, the range is adjusted within the low-sensitivity range.

6.3. Auto Sampling

The auto sampling function sets the monitor displaying speed, chart paper feed speed, memory sampling rate, and file recording rate based on the signals currently input.

6.3.1. Target Setup Conditions

The relation between settable conditions and mode are as follows. The monitor displaying speed is always settable.

	Measurement Mode				
	Pen Recorder	Memory	HD	Multi	X-Y
Monitor displaying speed	Available	Available	Available	Available	-
Chart feed speed	Available	-	-	-	-
Memory sampling rate	-	Available	-	Available	-
File recording rate	-	-	Available	-	-
X-Y sampling rate	-	-	-	-	-

Available: Adjusted, -: Not adjusted

TIPS

In the X-Y Recorder mode, the auto sampling does not function. (For X-Y data sampling rate, make adjustment with seeing the monitor.)

6.3.2. Adjustment Range

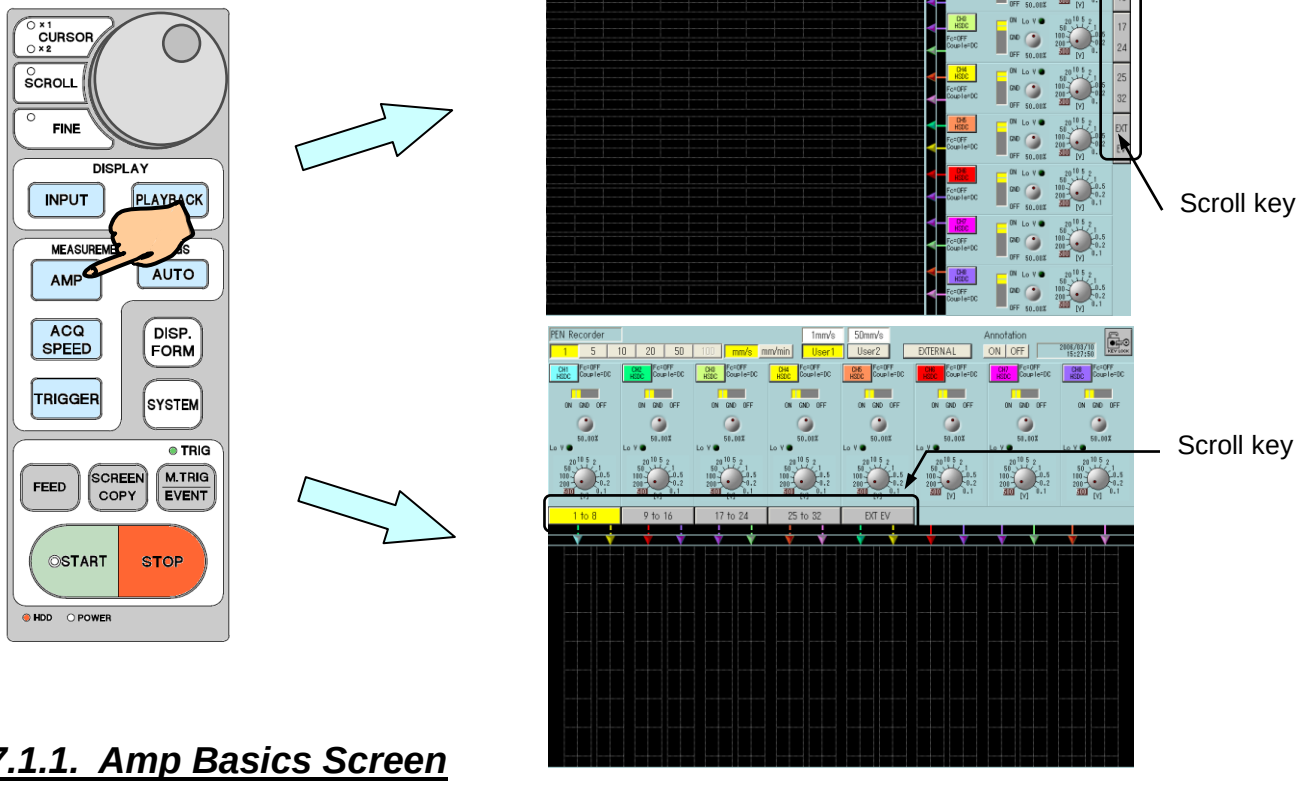
Chart feed speed	Memory sampling speed	File recording speed
50 mm/s (2 ms)	2 µs	20 µs
20 mm/s (5 ms)	5 µs	100 µs
10 mm/s (10 ms)	10 µs	200 µs
5 mm/s (20 ms)	20 µs	500 µs
1 mm/s (100 ms)	50 µs	1 ms
100 mm/min (60 ms)	100 µs	2 ms
50 mm/min (120 ms)	200 µs	5 ms
20 mm/min (300 ms)	500 µs	10 ms
10 mm/min (600 ms)	1 ms	20 ms
5 mm/min (1.2 s)	2 ms	50 ms
1 mm/min (6 s)	5 ms	100 ms

- The values in parentheses in chart feed speed corresponds to the data sampling speed.
- The file acquisition speeds above are speeds while all 32 channel are used

7. Amp Units

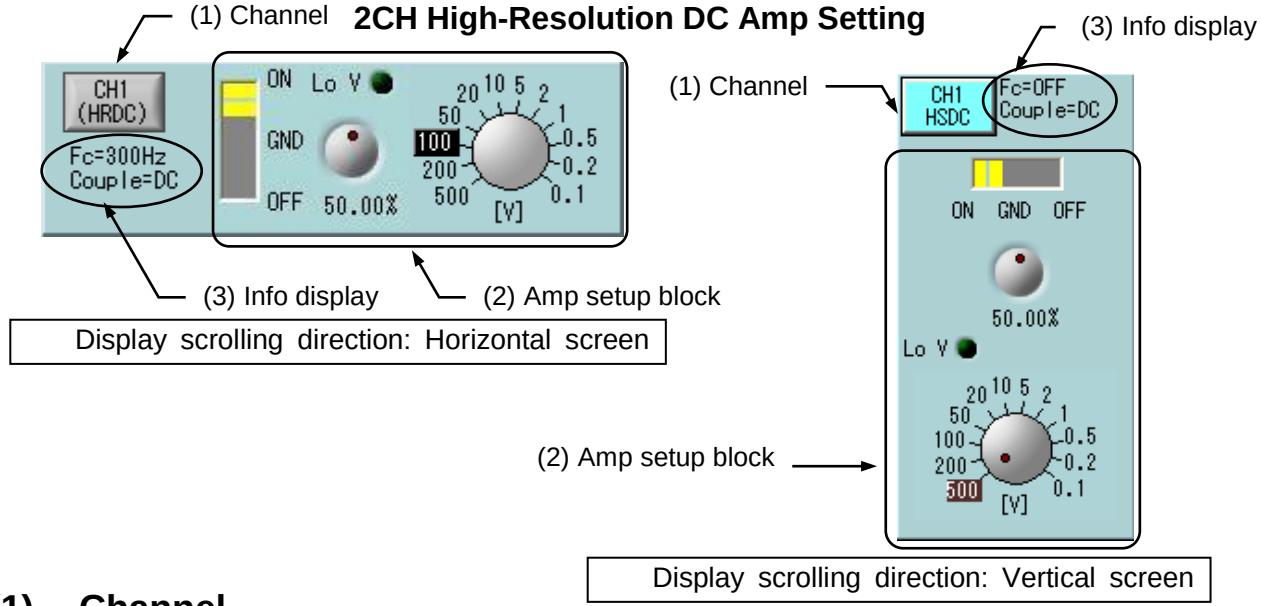
7.1. Settings for Input Units

This section covers how to make settings on the Amp Basics and Amp Details screens. For detailed settings for amps, (RA2000 Series Amp Units User's Manual – Integrated Version)
To set range and waveform printing for input unit, the Amp screen is used. The following screen appears after pressing the Amp button.



7.1.1. Amp Basics Screen

In the Amp Basics screen, input unit setup condition can be checked by channel. To change the channel, use the Scroll button.



(1) Channel

Channel number, amp type, and waveform color are indicated on this button. Pressing this button displays the Amp Details screen, making more detailed setup.

(2) Amp setup block

This block is used to set basic settings for amp. As contents differ depending on the amp type, refer to the descriptions of each amp.

NOTE

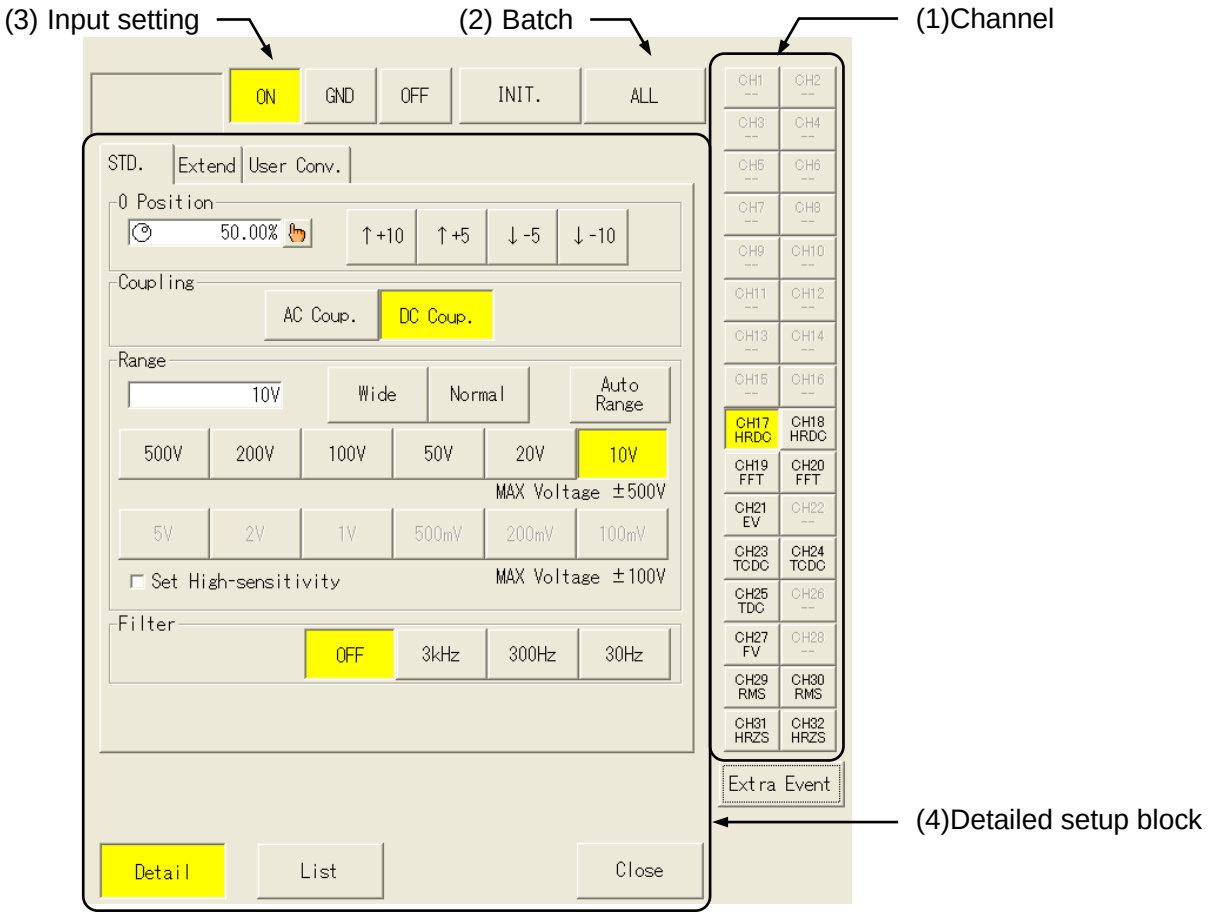
Even if the case using FFT Amp (AP11-102) or frequency RMS Amp (AP11-109) to setup a sensor's sensitivity m/s^2 or G, the Amplifier display automatically shows voltages in high sensitivity setting.

(3) Information display

Setup information that is not indicated in the Amp Basic screen is displayed. The detailed settings are made in the Amp Details screen. As contents differ depending on the amp type, refer to the descriptions of each amp.

7.1.2. Amp Details Screen

The Amp Details screen appears when the Channel button is pressed on the Amp Basic screen. Detailed channel settings can be made. The following screen is a screen for 2CH High-Resolution DC Amp (AP11-101).



(1) Channel

Channel to be set up is selected. Pressing a button changes the contents of (4) Detailed setup block..

(2) Batch

Batch setting for the same type of amp can be made. Pressing the button highlights this button, indicating the batch setup is effective. In addition, the Channel buttons of target channels of batch setup highlight, too. If specific channels should setup through batch setup, cancel the highlight of the channels by pressing the Channel button that will not be set. To set through the batch setup, highlight the target channels again.

NOTE

Only the same type of units can be set through the batch setup.

(3) Input setup

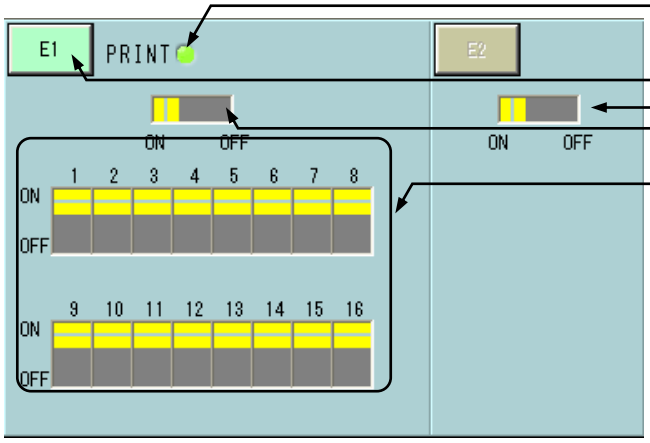
ON, OFF, and GND for input is set. GND may not be provided depending on the amp. If the input is set to OFF, neither waveform nor digital values are displayed.

(4) Detailed settings

Contents differ depending on the amp type. Refer to the description of each amp type.

7.1.3. Recorder Event Detailed Screen

Changes can be made for the Event Unit of the RA2800A unit by pressing EXT EV on the [Tab] key.



(4) Printing display

(3) Detailed Settings

(1) Recording and Display

(2) Detailed Printing Settings

The marking information switch can be set when E2 in Memory Size in Recording Conditions in System is set to ON.
After ON, the marking information is added to the recorded data by pressing the Manual Trigger Marking Print switch.
Marking jump is available in the replayed screen.
☞14.6.5 Event Jump

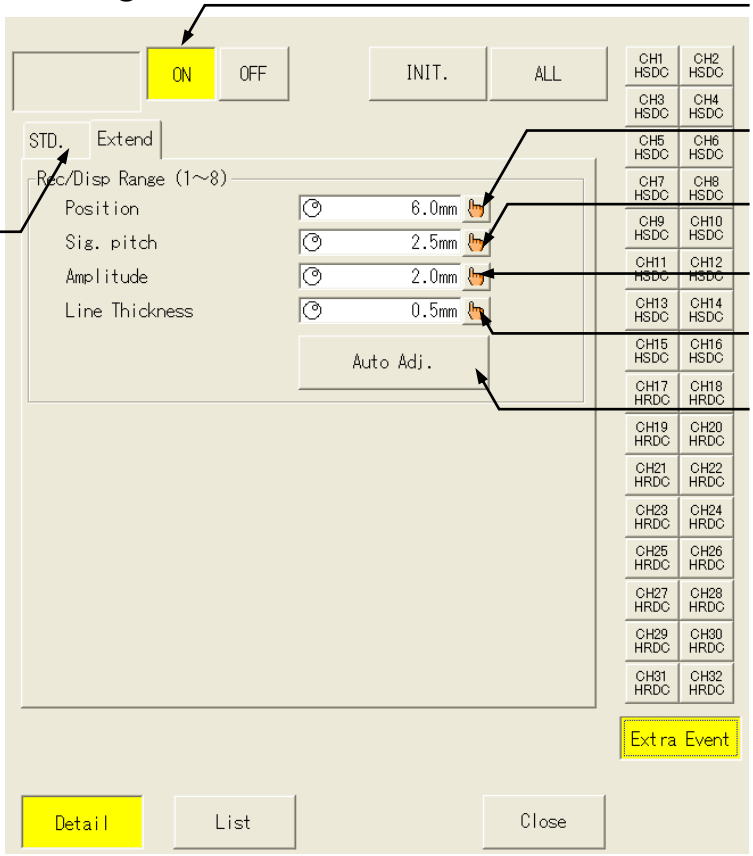
(1) Recording and Display

Recording and display ON/OFF can be set for all 16 event signals

(2) Detailed Printing Settings

Display ON/OFF for all 16 event signals can be set. (4) Only ON is effective for Printing.

(3) Detailed Settings



(1) Recording and Display

(6) Recording position

(7) Pitch between signals

(5) Standard

(8) Signal amplitude

(9) Baseline

(10) Automatic alignment

(4) Printing display

ON/OFF status is displayed in the event waveform printing channel setup. Setting cannot be made. ☞ See 15. Display and Printing

(5) Standard

ON/OFF for event waveform recording for each channel among 16 signals can be set.
The ON/OFF setup result is reflected on the Event Detailed Screen.

(6) Recording position

Waveform position for events 1 to 16 can be specified.
The position for each event is the interval specified by the pitch between signals and allocated to the upper side or left side.

(7) Pitch between signals

Waveform interval for event 16 is specified.

(8) Signal amplitude

Waveform amplitude (waveform amplitude at H/L change) for event 16 is specified.

(9) Baseline

Waveform width at H is specified.

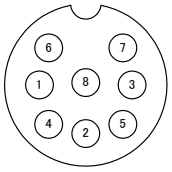
(10) Automatic alignment

Event waveform recording is automatically aligned so that it matches with the grid.

NOTE If the recording position and pitch between signals are set to be too large, event waveform printing cannot be made as the effective recording width is exceeded.

7.1.4. Connector/Pin Alignment

8-Pins DIN Connector (as seen from the inserting side of the plug)



Specification

Voltage input	range of input voltage	0 - +24 V
	detection levels	H-level: more than 2.5Vapproximately L-level: less than 0.5 V approximately
	input current	no more than 1uA
Contact input	detection levels	open: no less than 2 kΩ short: no more than 250 Ω
	load current	2 mA (MAX)

Pin assignment

Connector 1 - 4

Pin No	Signal assignment
1	ch 1 input
2	ch 2 input
3	ch 3 input
4	ch 4 input
5	ground
6	+15 V output
7	not connected
8	not connected

Connector 5 - 8

Pin No	Signal assignment
1	ch 5 input
2	ch 6 input
3	ch 7 input
4	ch 8 input
5	ground
6	+15 V output
7	not connected
8	not connected

Connector 9 - 12

Pin No	Signal assignment
1	ch 9 input
2	ch 10 input
3	ch 11 input
4	ch 12 input
5	ground
6	+15 V output
7	not connected
8	not connected

Connector 13 - 16

Pin No	Signal assignment
1	ch 13 input
2	ch 14 input
3	ch 15 input
4	ch 16 input
5	ground
6	+15 V output
7	not connected
8	not connected

NOTE The slide switch on the rear panel is used to select VOLTAGE event or CONTACT event.

7.1.5. Restriction of Printing in Event Amp

Up to 16 units of Event Amp AP11-105 can be installed in the RA2800A but the display and printing can be made for only 8 units.
Refer to the combination below.

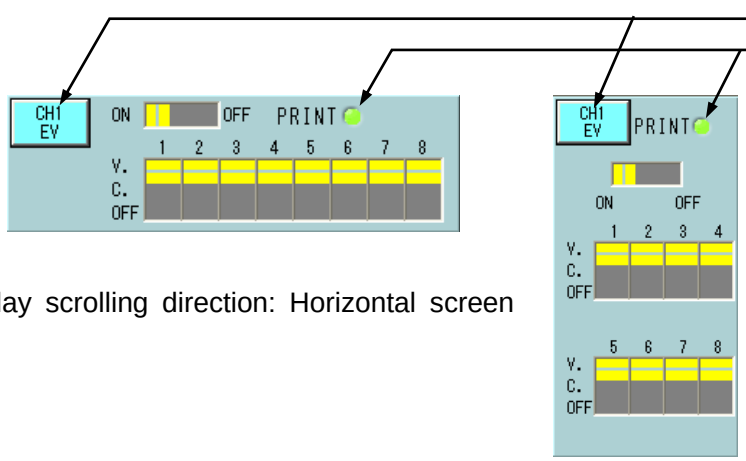
Event Amp Installation Slot																	Printable Event							
1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	E1								
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	1	3	5	7	9	11	13	15
○		○		○		○		○		○		○		○		○	1	5	9	13	17	21	25	29
	○		○				○		○	○	○	○				○	3	7	15	19	21	23	25	—
○	○	○	○	○	○											○	1	3	5	7	9	11	E_H	E_L

E1 indicates the recorder event.
E_H indicates upper eight events of the recorder event.
E_L indicates lower eight events of the recorder event.

To change the unit for printing with eight or more event amps installed, follow the steps below.

(1) Event amp basic screen

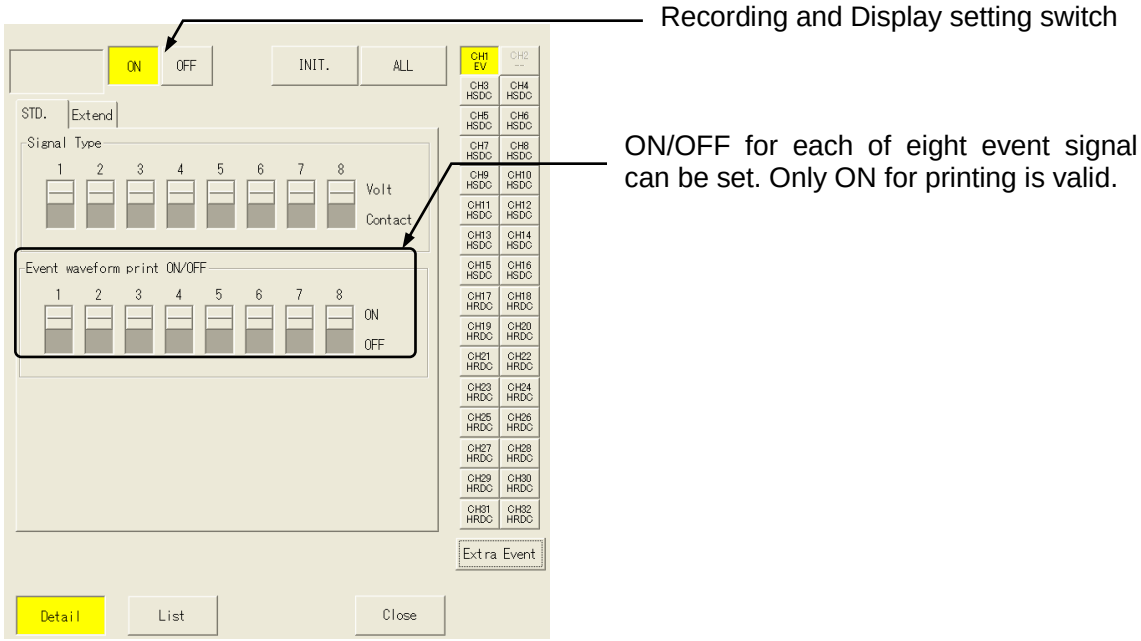
After displaying the [Amp] screen by pressing the Amp button on the Operation Panel, press Detailed Settings of the unit whose settings are to be changed.



Display scrolling direction: Horizontal screen

Display scrolling direction: Vertical screen

(2) Event Amp Detailed Screen

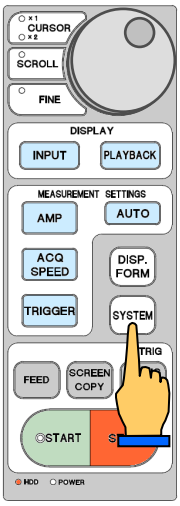


8. Pen Recorder Recording Low-speed Signal for Long Time

8.1 Overview of Pen Recorder Mode

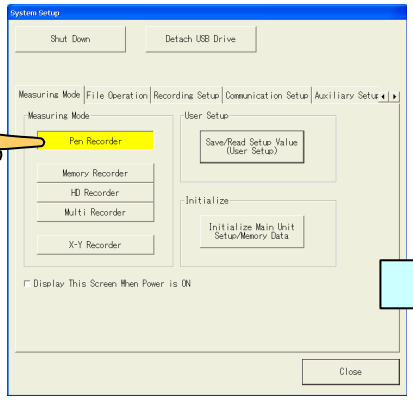
The Pen Recorder mode offers a pen recorder function, which is dedicated to waveform printing. Chart feed speed and amp settings are made on a screen, which are exactly equivalent to the operability of a pen recorder.

To set the recorder main unit to the Pen Recorder mode, use Measurement Mode tab in the System screen. Measurement mode setting is made on the Startup screen that is displayed upon the startup. (Depending on the startup screen, the Startup screen may not be displayed.)

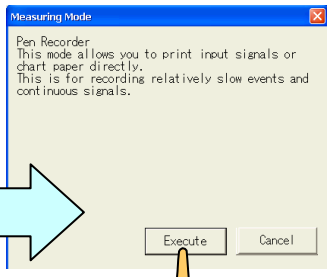


Operation panel

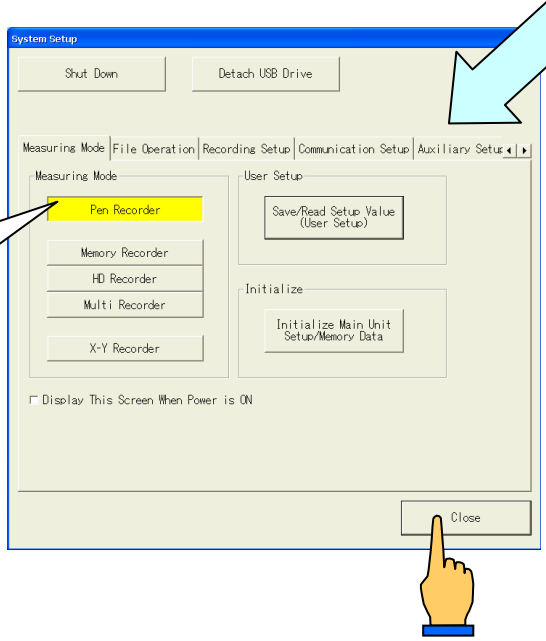
Measurement mode selection



System screen



Press Execute.



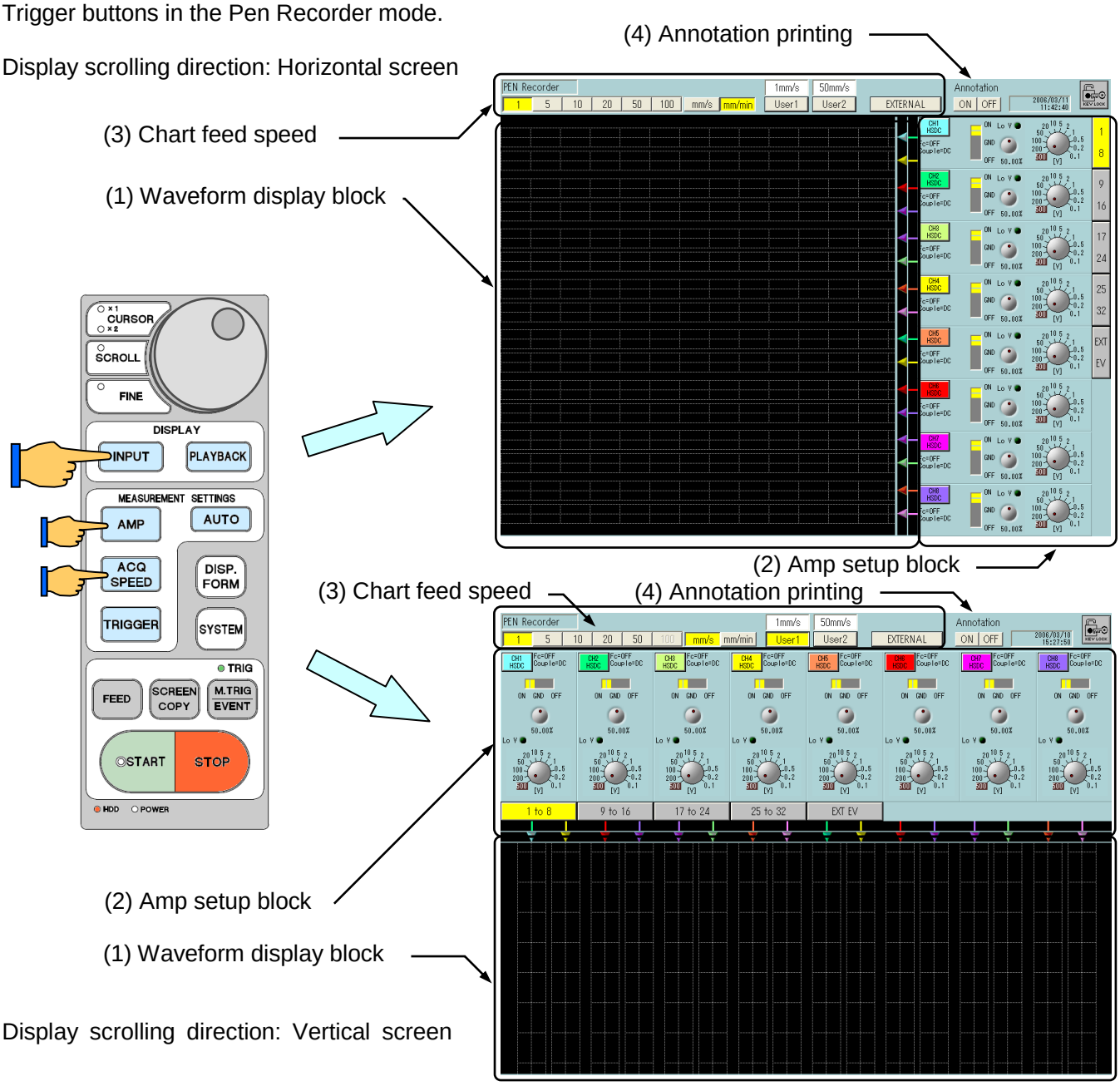
Setup completes after the mode turns to yellow after execution.

Pressing Close closes the Setup screen. The mode setting completes after the screen is switched.

NOTE As the Pen Recorder mode only performs waveform printing on a chart recording paper, Even the Input Signal, Amp, Recording Condition, and Trigger buttons are pressed, the screen display does not change.

8.2 Screen Operation

Open the following screen by pressing one button among Input Signal, Amp, Recording Condition, and Trigger buttons in the Pen Recorder mode.



(1) Waveform display block

Input signals are displayed in this block. The basic functions are almost same as the Input Monitor. The signal monitoring speed in this block is the same as the chart feed speed.
For more details, ☞ see Chapter 5. Observing Input Signal.

(2) Amp setup block

This block is used to set amp unit. For more details, ☞ see Chapter 7. Amp Units

(3) Chart feed speed

These buttons are used to set chart recording paper feed speed. Value is set by pressing a button. The maximum chart feed speed is 50 mm/s.
Through User 1 and User 2 buttons, user can set arbitrary feed speeds.
For more details, ☞ Chapter 16 System Setup

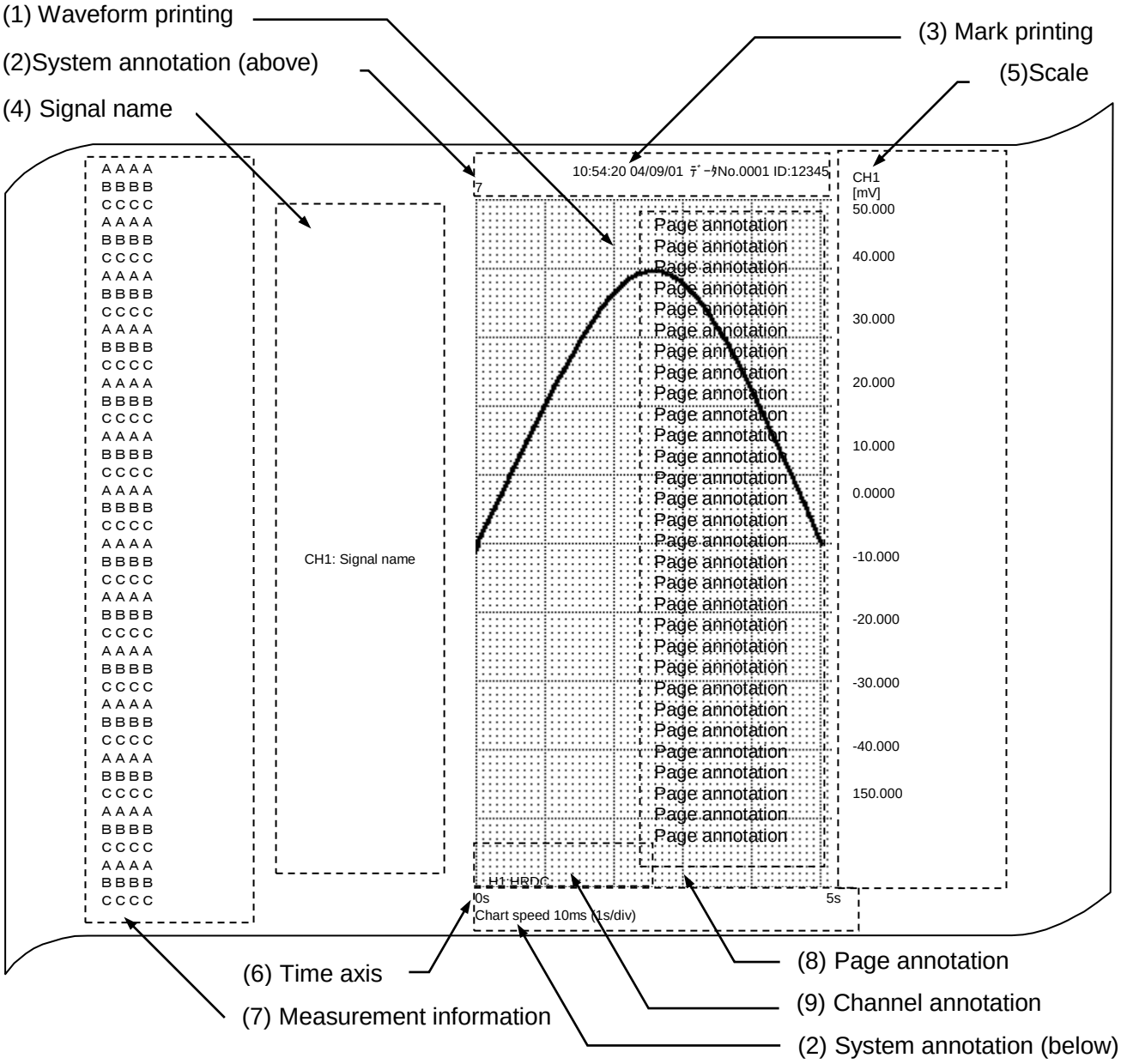
(4) Annotation printing

ON/OFF for annotation printing can be set.
For more details, see ☞ 16. System Setup.

8.3 Printing Operation

Pressing the Start button on the Operation Panel starts printing. Pressing the Stop button stops printing.

Sample printing



(1) Waveform printing

Input signals are printed in a form of waveform. The same waveforms as those displayed in the monitor are printed. Waveform segmentation and grid pattern can be set.
For more details, ☞ see Chapter 15. Display and Printing

(2) System annotation (above/below)

System information related to printing is printed. Print start time is indicated on the top of the recording paper and print speed is indicated on the bottom of the recording paper.
Data No.: Automatically added number by printing is printed.
ID number: Recorder serial number is printed.

(3) Marking

Marking is printed by pressing the Marking button on the Operation Panel during recording.. Marking time is also printed after ↓M.

Example: ↓M17:06:20 2004/11/29

(4) Signal name

Character strings set by user by channel are printed. The position of printing is near the zero level of each signal. If the annotation printing position overlaps with a signal waveform, the annotation is printed at above or below the waveform. If annotation cannot be printed within in the waveform printing range, the annotation printing is omitted.
For printing ON/OFF for signal name and character string settings, ☞ see Chapter 16. System Setup.

(5) Scale

Analog waveform amplitude scale is printed. Printing OFF and scale printing format can be changed with settings.
For details of scale settings, ☞see Chapter 16. System Setup.

(6) Time axis

Time axis scale is printed below the waveform printing grid. Printing ON, OFF, and format (e.g. value and time) can be set.
For more details on settings, ☞ see Chapter 16. System Setup.

(7) Measurement information

Character strings specified by user are printed before waveforms are printed.
To set printing ON, OFF, or character strings, ☞ see Chapter 16. System Setup.

(8) Page annotation

Following system annotation, character strings defined by user are printed over waveform printing. To set printing ON, OFF, or character strings, ☞ see Chapter 16. System Setup.

(9) Channel annotation

Recording condition by signal is printed.

8.3.1 Stop Due to Error

Printing stops in the following cases.

- **Chart paper-out**
  In the case where chart paper run out, printing cannot be made. In this case, printing is terminated. When red marks at the both sides of the chart recording paper, prepare new chart recording paper as they signifies paper-out.

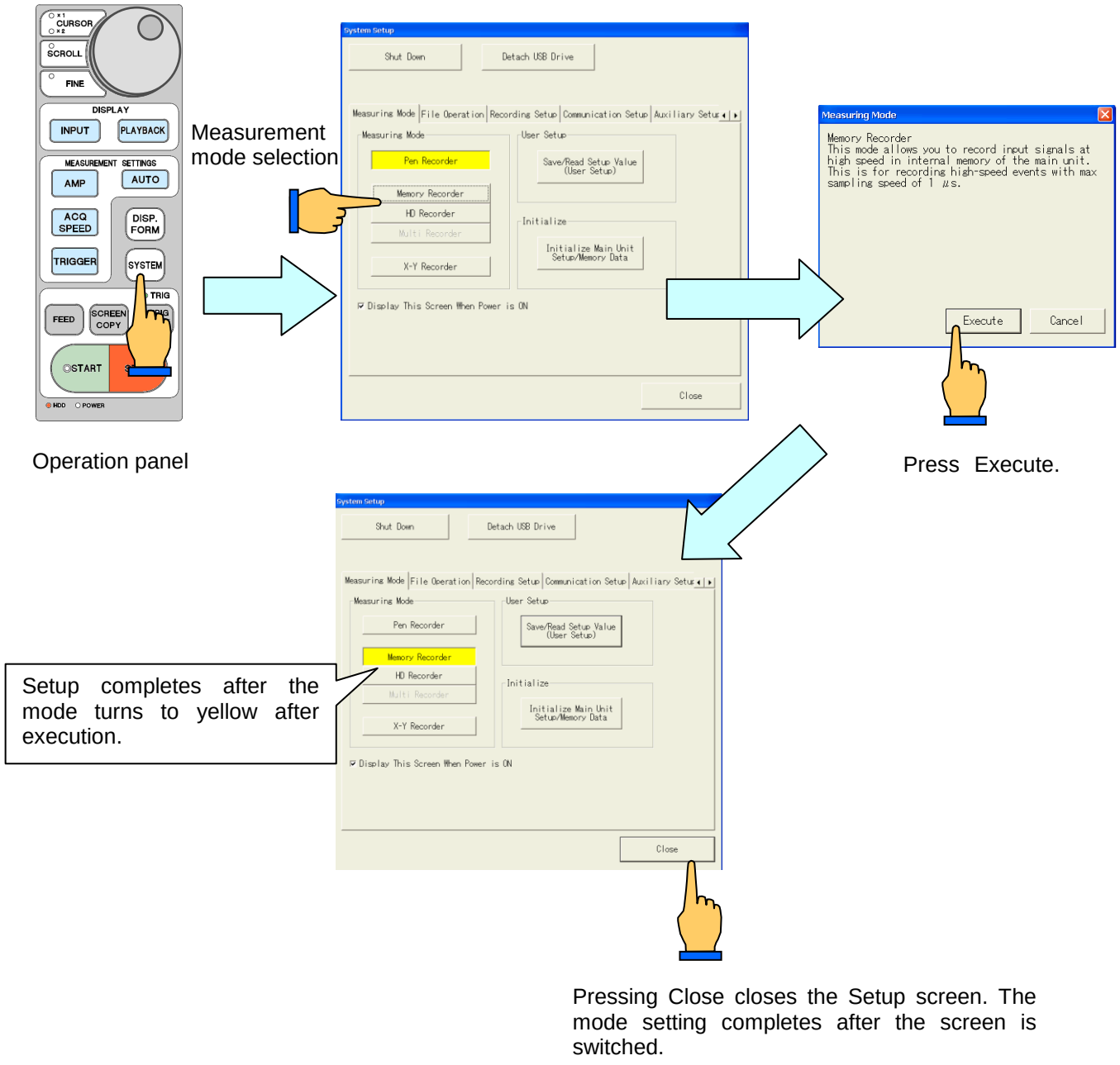
- **Thermal head over-heating**
  If the thermal head for printing is heated too much, operation stops due to error. If printing of entire screen is repeatedly made, the temperature of the thermal head at printing block rises. In this case, the recorder automatically controls the print density, thereby prohibiting temperature rise. However, if the ambient temperature is so high or heat release is not made smoothly, thermal head temperature excessively rises. In such case, printing is terminated due to error so as to prevent fire breakout.

9. Memory Recorder Recording High-speed Signals

9.1. Overview of Memory Recorder Mode

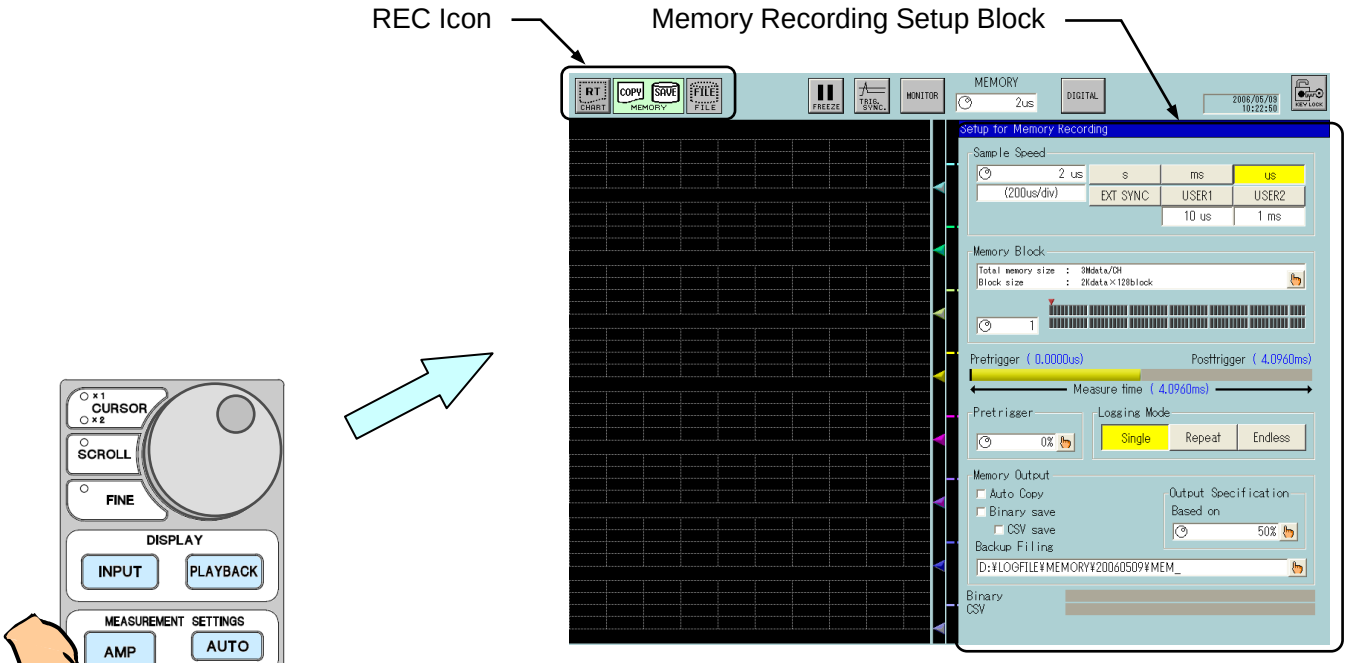
The Memory Recorder mode is useful for recording high-speed signals (Maximum recording speed of 2µs) since the this mode features a highest sampling rate of 1 µs. Data recording of a certain period of time before trigger is available. Automatic printing of data on chart recording paper (Auto Copy) or file saving (Backup Filing) is also available. In addition, replay of waveforms on the monitor is possible.

To set the RA2300 to the Memory Recorder mode, use the Measurement Mode tab on the System screen. Mode setting is can also be made on the Startup screen that is displayed upon the startup. (Depending on the startup screen, the Startup screen may not be displayed.)

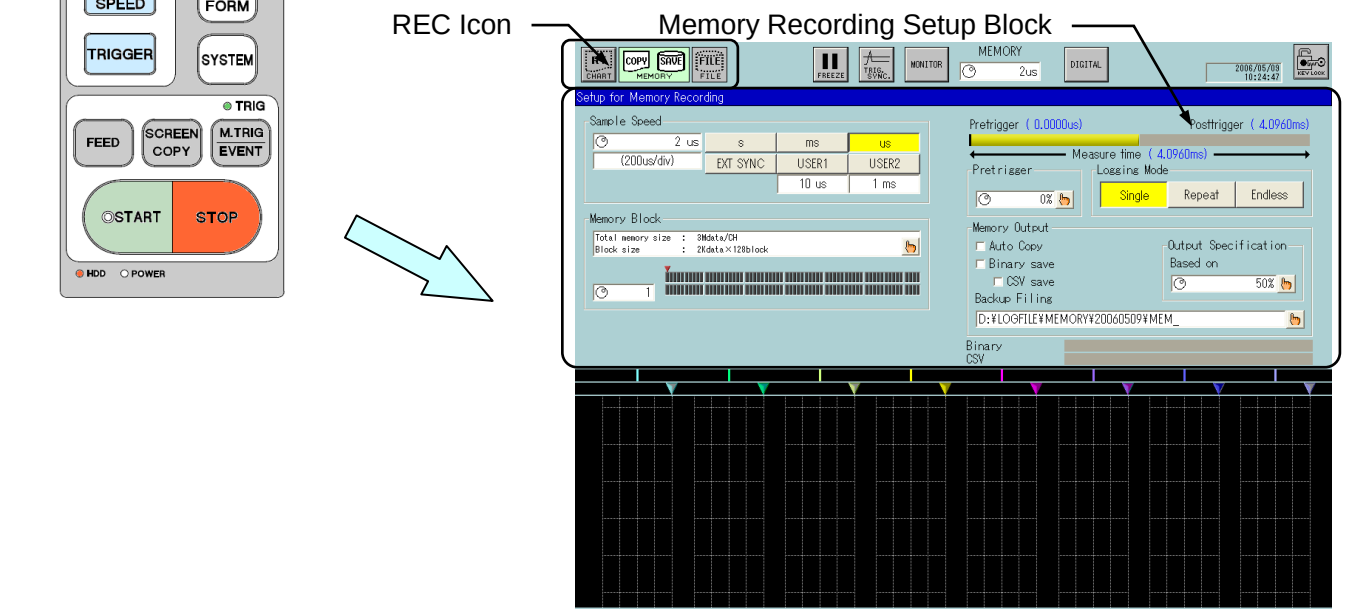


9.2. Recording Condition Setup

Open the following screen by pressing the Recording Condition button on the Operation Panel to set the recording conditions for Memory Recorder. The recording condition setup should be made while the recorder stops its operation. Setup can be made during recording.



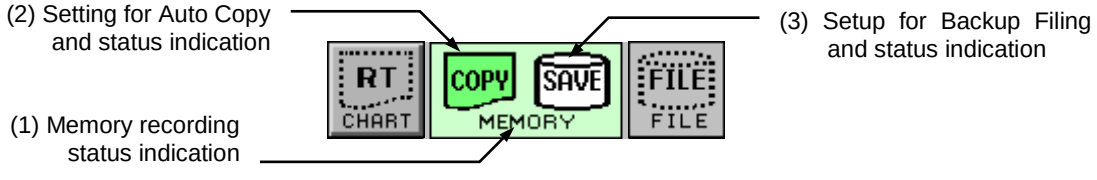
Display scrolling direction: Horizontal screen



Display scrolling direction: Vertical screen

9.2.1. Description of Icons

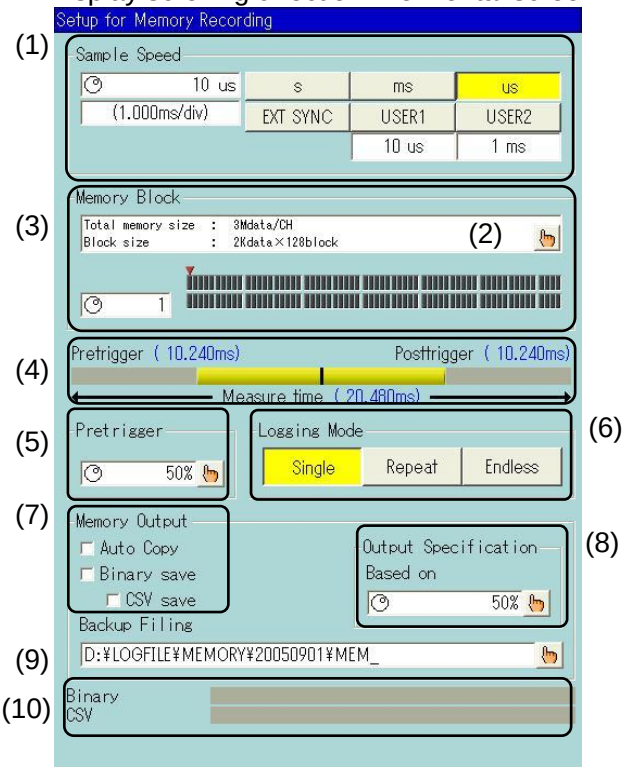
The icons signify recording settings and status.



	(1) Memory Recording	(2) Auto Copy	(3) Backup Filing	(4) Others
Stop OFF (White)	MEMORY	COPY	SAVE	As waveform chart printing, HD recording does not operate, no indication is made.
Stop ON (Green)	MEMORY	COPY	SAVE	
Trigger wait (Yellow)	T.WAIT	None	None	
Measuring (Amber)	MEMORY	COPY	SAVE	
Error (Red)	ERROR	COPY	SAVE	

9.2.2. Memory Recording Condition Setup Block

Display scrolling direction: Horizontal screen



(1) Sampling rate

(2) Memory Block Size

(3) Memory Block & Status Indication

(4) Sample recording image

(5) Pre-trigger

(6) Memory Recording Operation

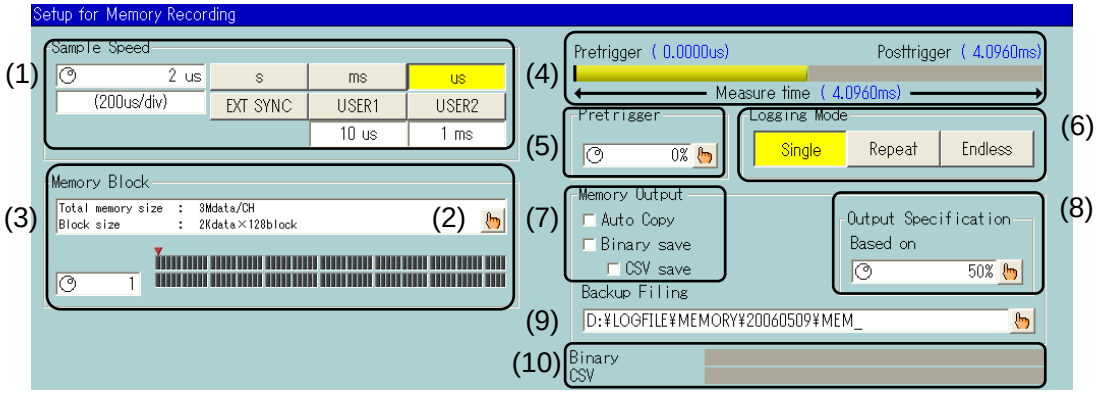
(7) Auto data output

(8) Output range

(9) File output path

(10) Indicator for file saving situation.

Display scrolling direction: Vertical screen

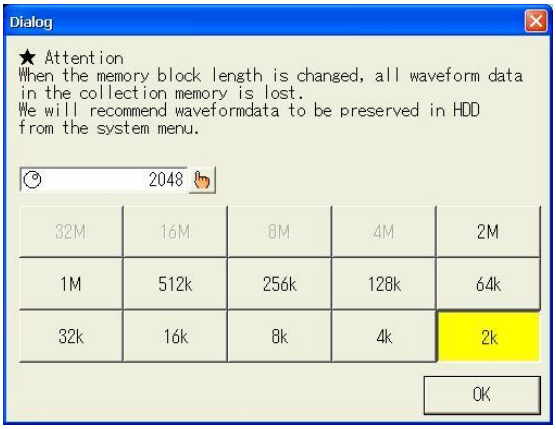


(1) Sampling rate

Sampling rate for memory recording is set.

(2) Memory block size

Memory recording block size is displayed.
Pressing a setup button opens a setup dialog box.
Select a memory size



NOTE

Memory block size can be expanded to more than 4 MW by limiting the number of channel for recording..
To limit the number of channel for recording ☞ see 16. System Setup.

(3) Memory block and status indication

Block number to be recorded and data existence is indicated. Block number can be changed using the jog dial.

Reference for Memory Block color:

Black: Data is not recorded in Memory.
Orange: Data is being recorded in Memory
Yellow: Data recording in Memory is completed

(4) Recording sample

Trigger position for entire recording and sample for output range is displayed. Recording time: Pre-trigger and post-trigger and total recording time is displayed.

(5) Pre-trigger

Recording size before trigger can be set in percentage. Changing this setting renews the sample recording image, which enables a user to confirm recording time allocation.

NOTE

If a trigger is detected immediately after the start of recording, the data length satisfying the specified data size cannot be recorded.
Example: Under pre-trigger setup of 30 ms, a trigger is detected 10 ms after the start of recording. The pre-trigger recording data length is 10 ms, resulting in shorter data length than pre-set length.

If the Stop button is pressed shortly after a trigger is detected, only the data having the length shorter than recording time is displayed in the sample recording image is recorded.
Example: Under post-trigger setup of 50 ms, if the Stop button is pressed 30 ms after the trigger detection, the recording length after the trigger is 30 ms, resulting in shorter data length than pre-set length.

(6) Memory recording operation

These buttons are used to specify the memory recording operation.

Recording operation	Description
Once	Operation closes after recording of one block is finished.
Repeated	Recording operation repeats for the number of blocks. It finishes when all blocks are recorded.
Endless	Recording operation repeats for the number of blocks. After recording of all blocks, overwriting from the top is repeated. Recording stops when the Stop button on the Operation Panel is pressed.

(7) Auto data output

This portion specifies data output after memory recording.

Output format	Description
Auto Copy	This function prints out the waveforms area, which is specified by output range.
Binary Save	All data region is saved as a file with the FSD extension.
CSV Save	Area that is specified through output range is saved in the CSV format.

NOTE

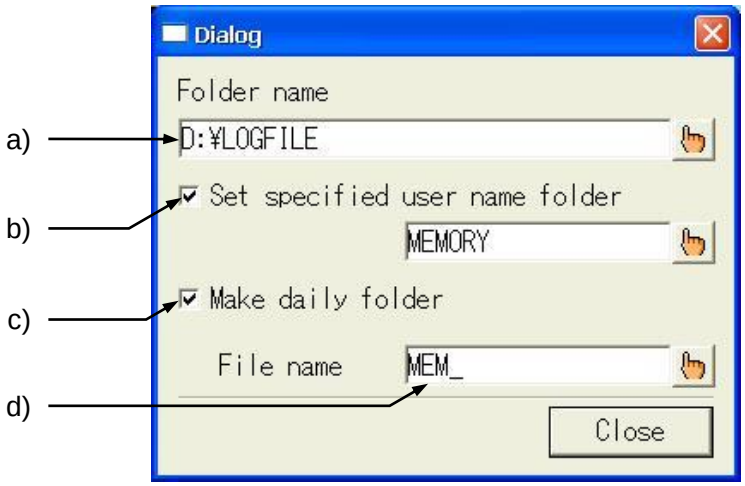
The binary save performs saving of entire part of file regardless of output range settings.
When performing the CSV save, always execute the binary save.
For more details on the CSV save, ☞see Chapter 14. Replay Display.

(8) Output range

Data output range for Auto Copy and CSV save is specified. Auto copy is affected by the scale factor of time axis on display monitor. The setting is made in % in reference to the trigger detection point.

(9) File output path

The file save target path can be specified. Pressing the button opens the following dialog box.



a) Save target path

Save target path is specified. As well as internal HDD, USB storage drive can be specified.

b) ON/OFF for folder made by user

When the check box is ticked, a folder can be made by user. The data save destination will be under the folder.

c) ON/OFF for creating folder everyday

When the check box is ticked, starting time is referenced and folder is created everyday. The data save destination will be under the folder.

d) Arbitrary file name (Limited to the top four letters)

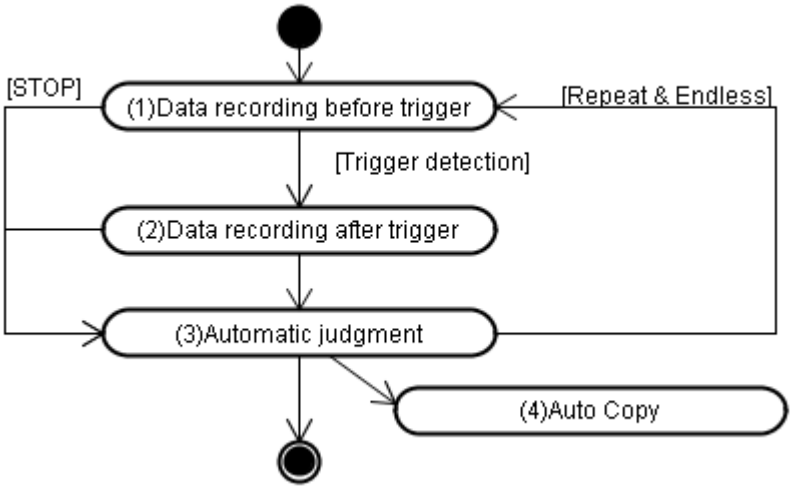
Top four letters for the save file is designated. The file name will have designated top four letters and four-digit serial number. The extension has “fsd” for the binary save and “csv” for the CSV save.

(10) Indicator for file saving situation.

Data saving situation for both Binary and CSV formats is displayed.

9.3. Recording Operation

Pressing the Start button on the Operation Panel starts the Memory Recording. After the recording start, the recorder is in the wait status for trigger detection. Pressing the Stop button stops the operation forcibly. The following diagram explains the flow of operation.



(1) Data recording before trigger

After the memory recording start, trigger detection wait status starts. Memory block recording continues until the trigger detection is made or the Stop button is pressed. When the trigger is detected, data recording operation starts after the trigger. When the Stop button is pressed and operation is forcibly terminated, the trigger recording is not made but the operation judgment processing starts.

NOTE Other then trigger detection by an input signal, trigger detection can be made through the Manual Trigger or External Trigger signal. For details on trigger condition settings, see 13. Trigger Setup.

NOTE If the Stop button is pressed and forcible termination is made before the trigger detection, data recording is made up to the size set by the pre-trigger. Example: Under pre-trigger of 20 ms, if the recording is forcibly terminated before the trigger detection, the recording length is up to 20 ms.

(2) Data recording after trigger

The amount of data specified by the pre-trigger is retained and recording for remaining amount of data is made. The recording automatically ends but forcible termination is also made through the Stop button. In this case, the data length will be shorter than the data length displayed as recording time.

(3) Automatic judgment

When Auto Copy and Backup Filing are selected to be effective, automatic data output of recording data is made. Memory block recording is repeated depending on the recording operation.

NOTE If forcible termination is made with the Stop button, memory recording finishes without repeated endless operations.

NOTE If the block for overwriting is outputting data in endless manner, recording starts after the outputting is completed.

(4) Auto Copy

Auto Copy and Backup Filing are executed.

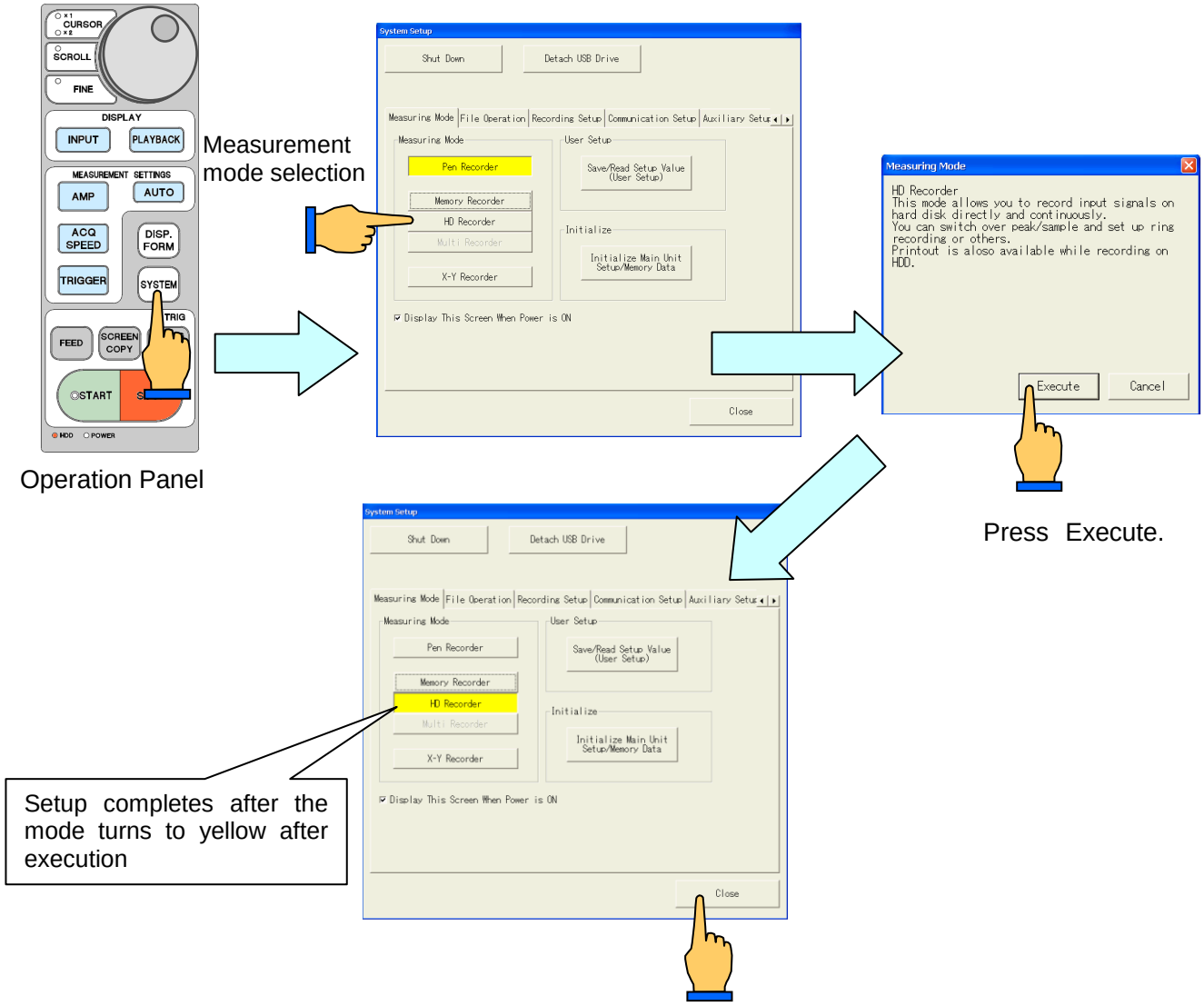
10. HD Recorder

Recording Data in Internal HDD

10.1. Overview of HD Recorder Mode

The HD Recorder mode can record data in the internal hard disk, which is suitable for a long-time measurement. In addition, waveform chart paper printing can be made with the HD recording at the same time. The data recorded in the HD can be replayed on the monitor screen in the form of waveforms.

To set the recorder in the HD Recorder mode, use the Measurement Mode tab in the System screen. Settings of measurement mode can be made on the Startup screen displayed upon the startup. (*The startup screen does not appear depending on the setup.)

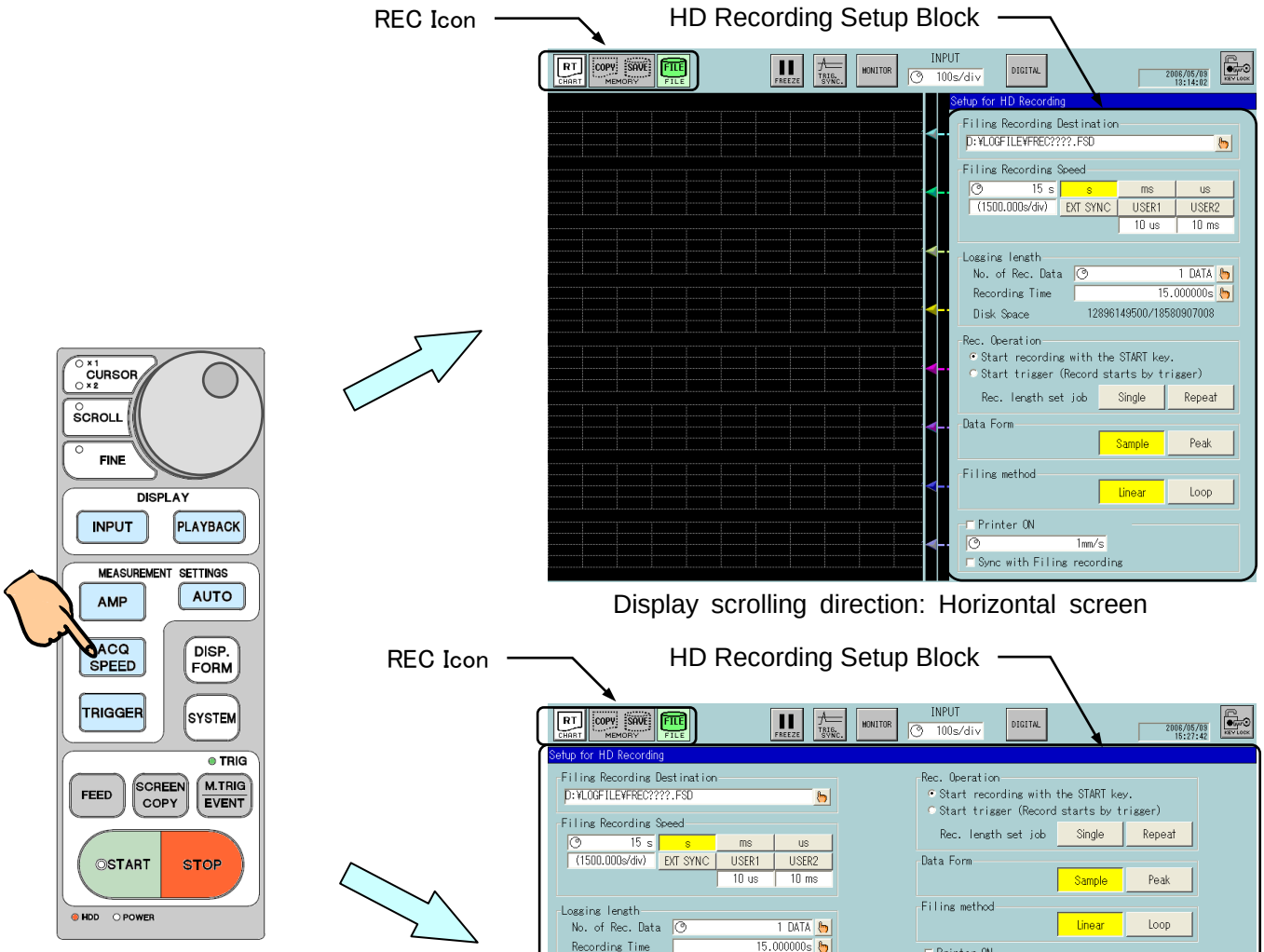


NOTE

The drive for data recording is fixed to the internal HDD only. For details on data output to the USB storage, see Replay Screen - Data Output or System - File Operation.

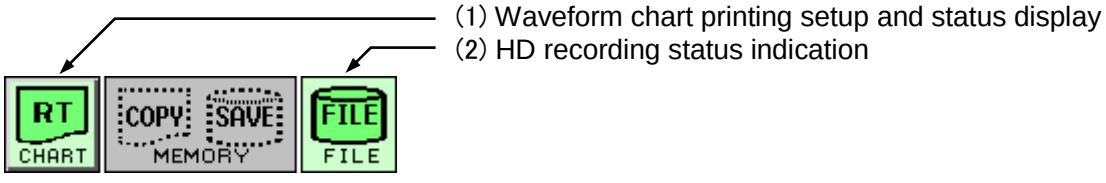
10.2. Recording Condition Setup

Open the following screen by pressing the Recording Condition button on the Operation Panel to set the recording conditions for HD Recorder. The recording condition setup should be made while the recorder stops its operation. Setup can be made during recording.



10.2.1. REC Icon

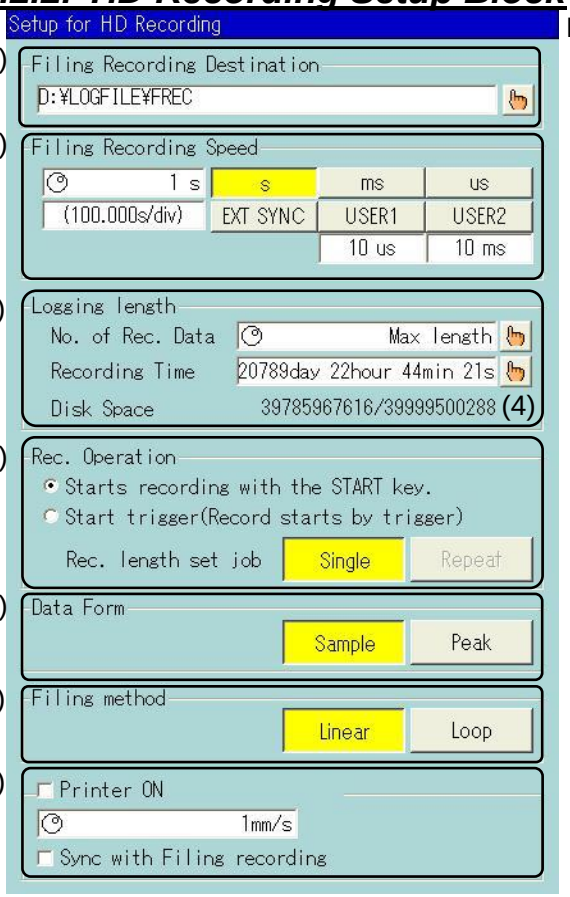
The icons signify recording status.



	(1) Chart Printing	(2) HD Recording	(3) Others
Recorder stop OFF (White)			As memory recording does not operate, indication is invalid.
Recorder stop ON (Green)			
Trigger wait (Yellow)	None		
Operating (Amber)			
Error (Red)			
Remark	The setup is possible only while the recording is recording data.		

10.2.2. HD Recording Setup Block

Display scrolling direction: Horizontal screen



(1) File save path

(2) Recording rate

(3) Logging length

(4) Free space in internal HDD

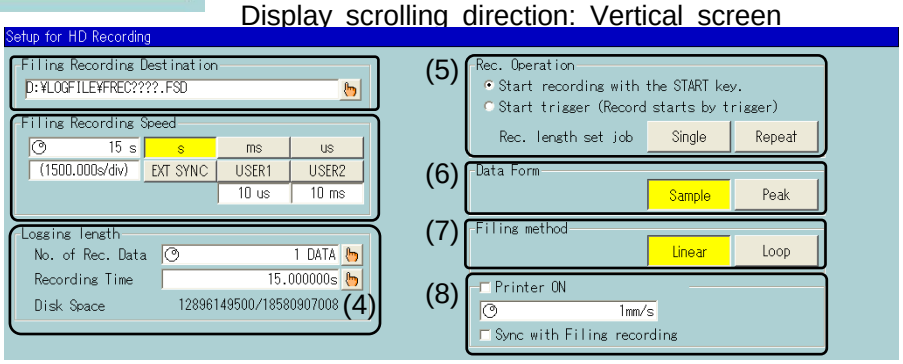
(5) Rec. Operation

(6) Data format

(7) Filing format

(8) Waveform chart printing

Display scrolling direction: Vertical screen



(1) File save path

Save target path for HD recording is indicated. Pressing the button opens the next dialog box and the path can be set.

a) Save target folder

The save target folder is specified.

b) User name entry folder

When this box is ticked, a folder is created and the save target will become inside of this folder.

c) Make daily folder

When this box is ticked, a daily folder is made, and data is saved in the folder.

d) File name

Arbitrary file name (Limited to the top four letters)

Top four letters for the save file is specified. The file name will include designated top four letters and four-digit serial number. The extension has FSP for the sample format file, and FPP for the peak format file.

(2) Recording rate

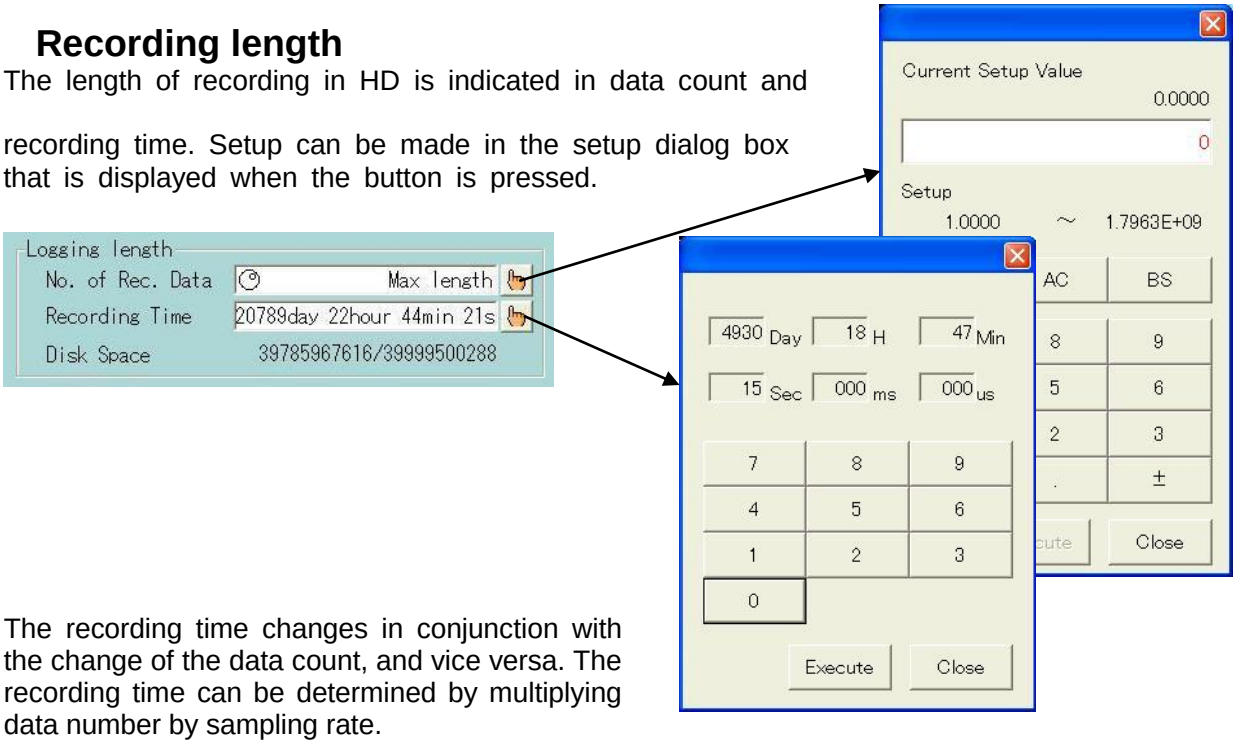
Recording rate can be set.

Recording rate is restricted depending on both data format and number of channels, as shown in the table. below.

NOTE Recording time changes if the recording speed is changed. Check before recording start.

(3) Recording length

The length of recording in HD is indicated in data count and recording time. Setup can be made in the setup dialog box that is displayed when the button is pressed.



The recording time changes in conjunction with the change of the data count, and vice versa. The recording time can be determined by multiplying data number by sampling rate.

File size = Acquisition information + Data type x Acquisition channel

When the recording time is set to Maximum, recording is made up to the size of free space of HD. As a user does not need to take care of recording length, the Maximum is best choice when recording is made with Start and Stop.

NOTE If free space is shortened during HD recording, operation stops with an error. In this case, shorter recording time than specified recording length of time will result. If recording data amount is set more than 2GB, stored, A, B, and C is added to the end of the file name.

(4) Indication of free space in internal HDD

It displays the number of the bytes with HDD free disk space and all capacity.

(5) Recording operation

HD recording operation can be made with trigger detection.

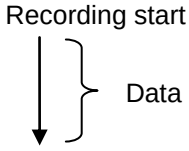
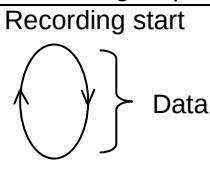
Setup item	Contents
Recording start with start button	When the Start button is pressed, recording begins.
Start trigger	After the Start button is pressed, recording starts upon trigger activation.
Marking upon trigger detection	While E2 is ON, up to newest 128 trigger points can be memorized. The marking points can be checked on the replay monitor.
Once	Recording operation completes after one recording action.
Repeated	HD recording repeats until the Stop button is pressed. However in the following cases, operation will be invalid because one recording automatically finishes. The recording mode is “Ring.” The recording length is “Up to the size of free space.”

NOTE When a start trigger is set, there is a trigger mark at the beginning of file, because recording starts just after trigger detection.

(6) Data format

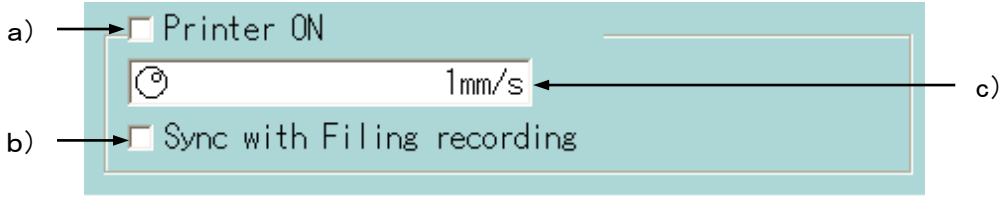
Setup item	Description
Peak	One data consist of two values: maximum and minimum values. Regardless of recording speed, peak data is stored with the highest A/D conversion speed of amp. It is possible to observe waveform having high-frequency element for long period of time.
Sampling	One data consist of one instantaneous value. The data number per one piece of data is half. Consequently, the recording speed and recording length will double.

(7) Filing mode

Setup item	Description
linear	Operation stops when specified number of data is recorded. 
Loop	Overwriting for specified number of data is made. (Overwriting is made from old data.) The operation stops when the Stop button is pressed. 

(8) Waveform chart printing

Settings related to waveform chart printing are made.



a) Waveform ON/OFF

ON/OFF for waveform chart printing is made. Changes during operation cannot be made.

b) Same printing speed as recording speed

When the check box is ticked, the waveform chart printing speed is automatically set to the speed the same as current recording speed. To separate the recording speed from the chart feed speed, do not check this box.

NOTE

The highest chart feed speed is 50 mm/s. If the recording speed is higher than this speed, the printing is made in the highest printing speed.

c) Chart feed speed setup

When the check box for “Same printing speed as recording speed” is not ticked, the chart feed speed is separated from the data recording speed.

10.3. Recording Operation

Pressing the Start button on the operation panel starts HD recording. While recording is made, pressing the Stop button forcibly stops the recording.

10.3.1. Start of Measurement

Pressing the Start button on the operation panel starts HD recording. If the setup in which the start of recording is initiated with a trigger signal, the start of recording is made with a trigger detection.

NOTE

If the combination of recording speed, recording length, data type, and recording channel count is not covered by recorder specifications, recording cannot be made and operation finishes with an error.

For HD recording, see 10.4 **HD Recording Specifications**.

10.3.2. To Finish Measurement (Forced Termination)

Pressing the Stop button on the Operation Panel executes forced termination. If recording length is specified, operation completes when specified number is recorded.

10.3.3. Waveform Chart Printing

During HD recording, waveform chart printing is started and stopped as necessary. Moreover, chart feed speed can be changed.

For operation, see 10.2**Recording Condition Setup**.

10.3.4. Upon Error Generation

Errors may be generated and operation during HD recording

Generated error	Operation
File error	HD recording finishes with an error. If waveform chart printing operates, operation continues.
Paper-out error	HD recording continues. Waveform chart printing finishes with an error. Printing is restarted after the chart paper is filled.

10.3.5.Display of recording data

The Replay screen is used to display the data recorded in memory or file. For more det ails, please refer to “14. Replay Display”.

10.4. HD Recording Specifications

10.4.1. Recording File Size Calculation

This section covers how to calculate file capacity in HD recording. The file size can be c alculated using the following parameters.

Parameter	Remark
Recording length	Recording data count
Data type	One data is saved in two bytes. Peak: 4 bytes due to two values (max. and min.) Sampling: 2 bytes due to instantaneous value
Recording channel count	Number of channels whose recording operation is set to ON (or GND). If event inputs are targeted, two channels is available in each channel.
Recording information	Recording information save size: 8,192 bytes * Size may be increased in future as the design is based on the assumption of future expansion.

File size = Acquisition information + (Data type x Acquisition channel)

Example: Recording length = 100,000, Data format = peak, Number of recording channel: 32
Size = 8,192 + (100,000 x 4 x 32) = 12,808,192 (bytes)

10.4.2. Recording Speed Execution Restriction

The following restriction may be subjected in settable range in HD recording rate depending on the data format and the number of recording channels

For mat	Recording rate	Number of recording channel										
		1	2	3	4	5	6	7	8	9−16	17−32	34
Sampling	22µs	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
	20µs	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	**NG**
	10µs	OK	OK	OK	OK	OK	OK	OK	OK	OK	**NG**	**NG**
	5µs	OK	OK	OK	OK	OK	OK	OK	OK	**NG**	**NG**	**NG**
	4µs	OK	OK	OK	OK	OK	OK	**NG**	**NG**	**NG**	**NG**	**NG**
	2µs	OK	OK	OK	**NG**	**NG**	**NG**	**NG**	**NG**	**NG**	**NG**	**NG**
Peak	42µs	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
	40µs	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	**NG**
	20µs	OK	OK	OK	OK	OK	OK	OK	OK	OK	**NG**	**NG**
	10µs	OK	OK	OK	OK	OK	OK	OK	OK	**NG**	**NG**	**NG**
	4µs	OK	OK	OK	**NG**	**NG**	**NG**	**NG**	**NG**	**NG**	**NG**	**NG**
	2µs	OK	**NG**	**NG**	**NG**	**NG**	**NG**	**NG**	**NG**	**NG**	**NG**	**NG**

OK: Settable, NG: Not settable

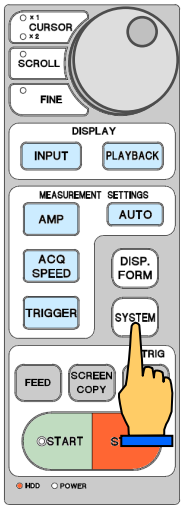
11. Multi Recorder – Separately Executing Waveform Printing, Memory Recording and HD Recording

11.1.Overview of Multi Recorder Mode

Multi Recorder enables operations of Memory Recorder, HD Recorder, and waveform printing at the same time. This Recorder is suitable to the measurement such that data before or after the trigger is precisely recorded while long-time recording is made.

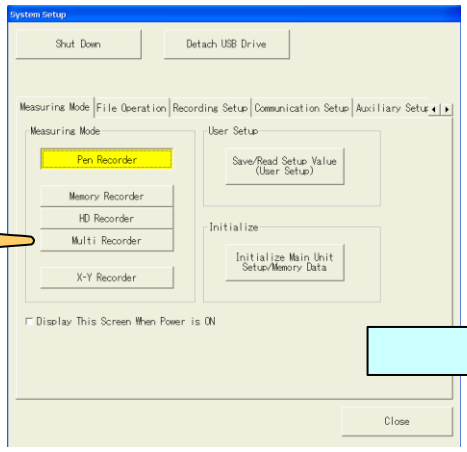
The waveforms of recorded data file are displayed on the replay monitor screen. Data format in multi data mode is "FPP". With the event jump function of replay monitor, switching between HD recording data and memory recording data can be switched to confirm the data being recorded. For the event jump function, see 14. Replay Display.

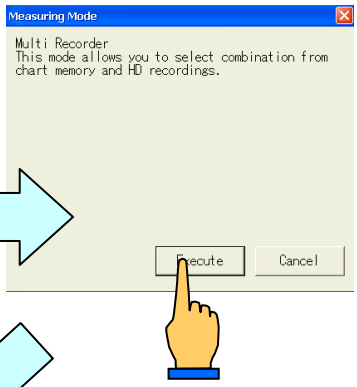
In order to set the recorder to the Multi-Recorder mode, use the Measurement Mode tab in the System screen. Besides, setting of measurement mode can be made in the Startup screen displayed upon the recorder startup. (* The Startup screen may not be displayed depending on the settings.)



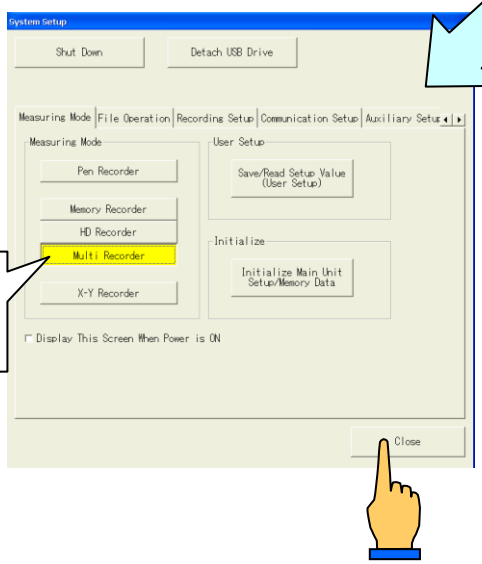
Operation panel

Measurement mode selection





Press Execute.

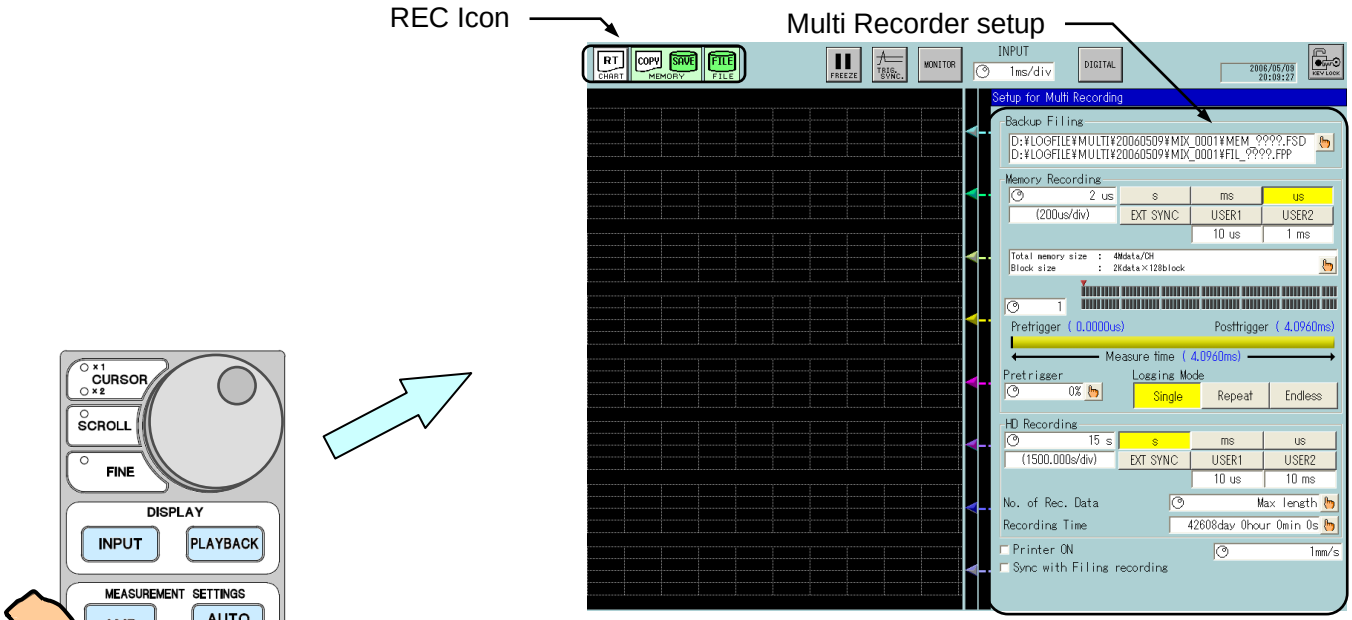


Setup completes after the mode turns to yellow after execution.

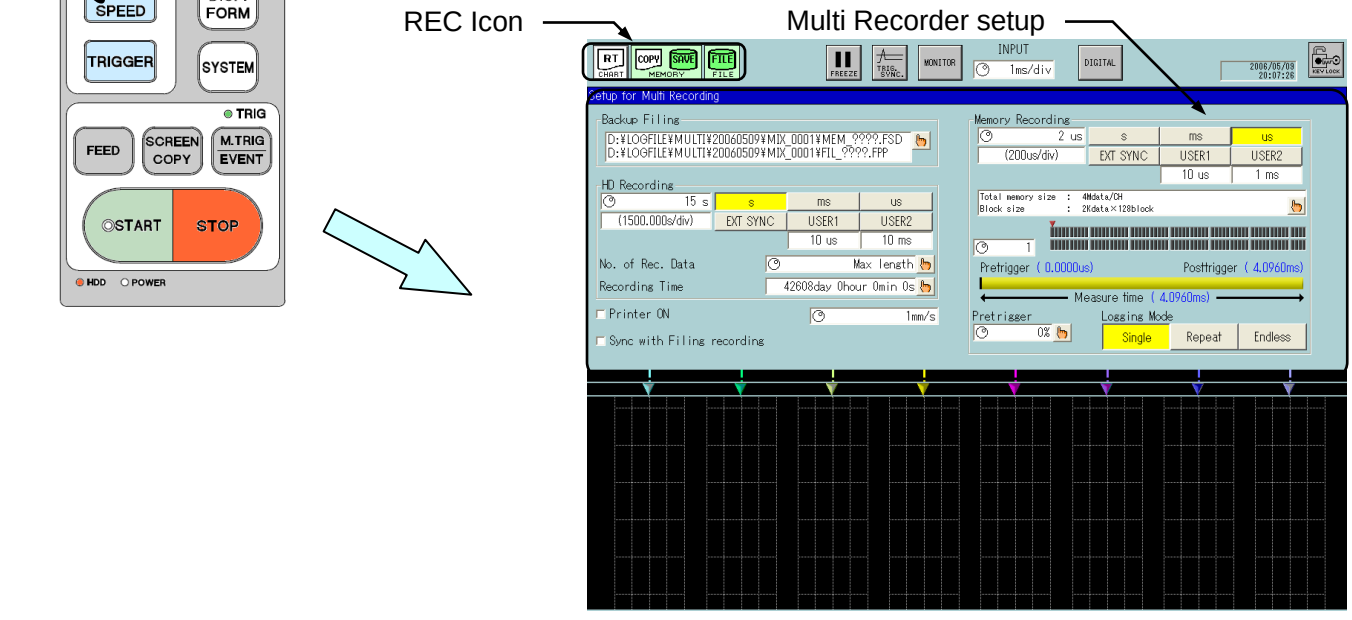
Pressing Close closes the Setup screen. The mode setting completes after the screen is switched.

11.2. Recording Condition Setup

Open the following screen by pressing the Recording Condition button on the Operation Panel to set the recording conditions for HD Recorder. The recording condition setup should be made while the recorder stops its operation. Setup can be made during recording.



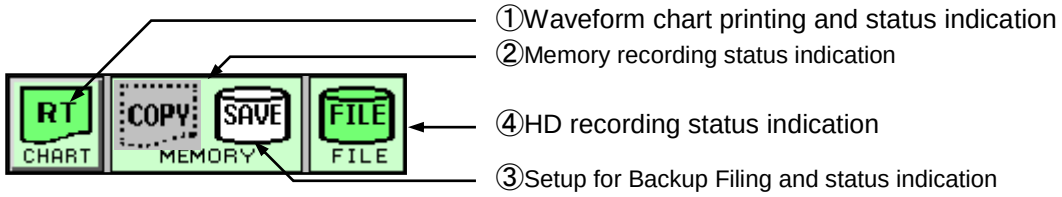
Display scrolling direction: Horizontal screen



Display scrolling direction: Vertical screen

11.2.1.REC Icon

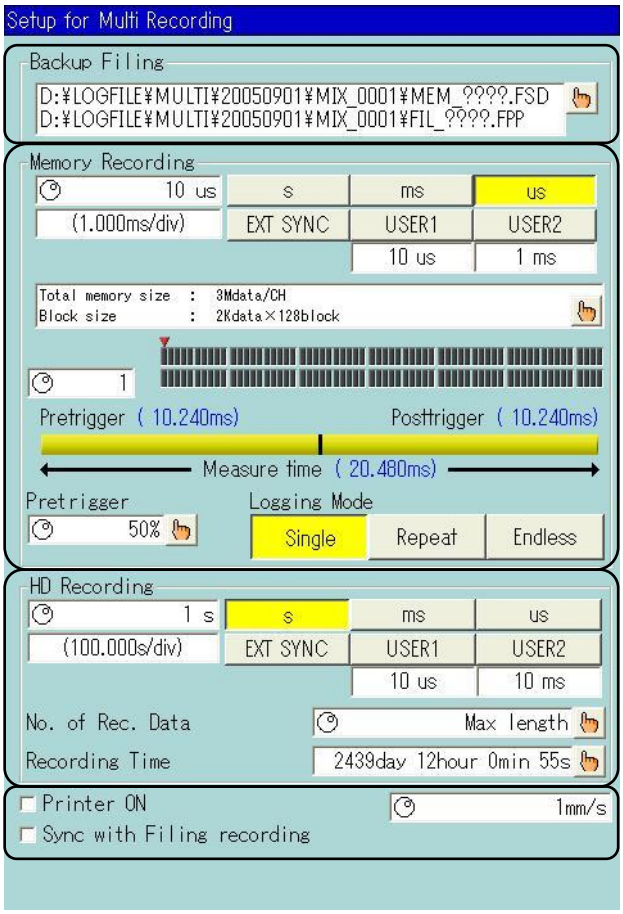
The icons signify recording status.



	① Chart Printing	② Memory Recording	③ Backup Filing	④ HD Recording	⑤ Others
Stop OFF (White)	RT CHART	NA	SAVE	FILE FILE	Auto copy does not operate. Icons are invalid.
Stop ON (Green)	RT CHART	MEMORY	SAVE	FILE FILE	
Measuring (Amber)	RT CHART	MEMORY	SAVE	FILE FILE ⇔ FILE FILE	
Error (Red)	RT ERROR	ERROR	SAVE	FILE ERROR	

* Pressing chart printing button can switch ON/OFF for chart printing while recording.

11.2.2. Multi Recorder - Setup for Recording Condition



Display scrolling direction: Horizontal screen

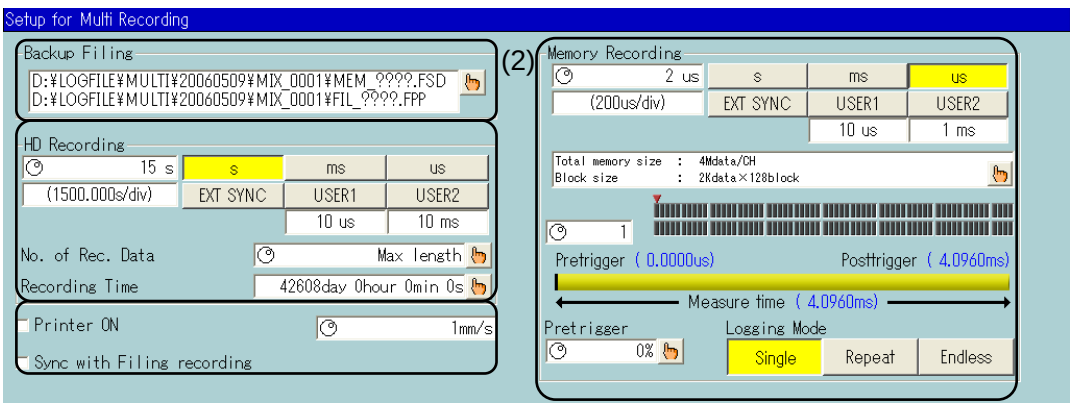
(1) File output path

(2) Memory recording setup block
The setup steps are the same as in 9. Memory Recorder.

(3) HD recording setup block
The setup steps are the same as in 10. HD Recorder.

(4) Waveform recording

Display scrolling direction: Vertical screen



NOTE Setting procedure in the screen above is the same as that in 9. Memory Recorder. Ho wever, the following settings are not available due to the recorder mode difference.

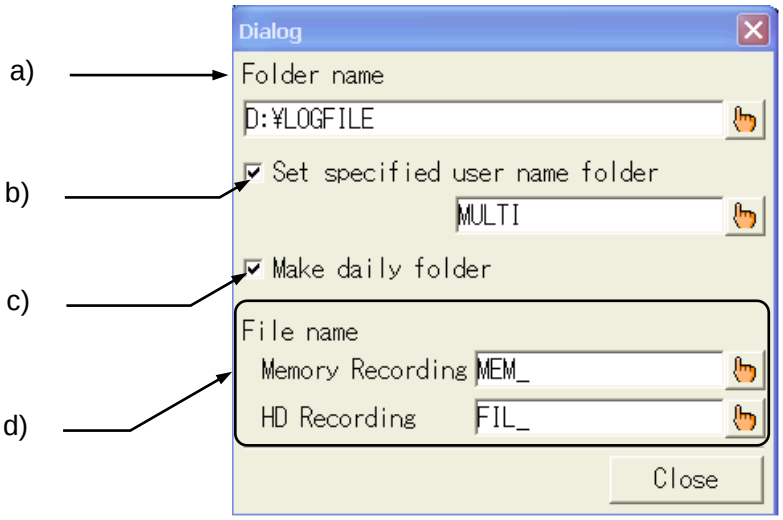
- Data output related settings

NOTE Setting procedure in the screen above is the same as that in 10. HD Recorder. However, the following settings are not available due to the recorder mode difference.

- Recording procedure is to use "Start" key only and for the point of trigger detection there is not setting for "Once" or "repeat" setting.
- Data format is only for peak

① File save

The path for file save can be specified. Pressing the key opens the following dialog box.



a) Path for file save
Specify the path for file save. You can choose a USB storage drive other than internal HDD.

b) ON/OFF for user-specified folder
Setting to ON creates a folder that are specified by user. The place under this folder becomes the place for file save.

c) ON/OFF for folder by day
Pressing ON creates the file by day referencing the starting time. The place under this folder becomes the place for file save.

d) Arbitrary file name (Top four letters)
An individual file name can be set in memory recording and file recording. The file name consists of eight letters: specified four letters for the first half and automatically assigned four letters for the latter half. File extension "FSD" is for memory recording, while "FPP"(binary save) is for file recording.

② Memory recoding setup block

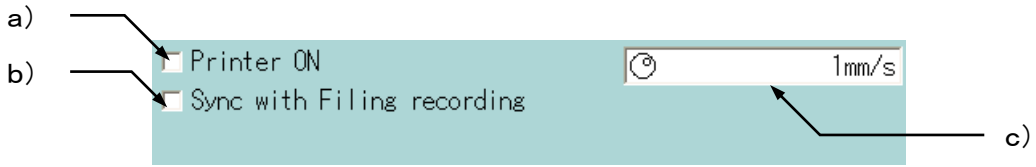
Settings for memory recording can be made.

③ HD recording setup block

Settings for HD recording can be made.

④ Waveform chart recording

Settings for waveform chart printing can be made.



a) ON/OFF for printing

ON/OFF for waveform chart printing can be set.

b) Operations synchronized to recording speed

Ticking the checkbox permits a synchronized operation between waveform chart printing speed and recording speed. To maintain both recording speed and chart printing speed, remove the tick.

NOTE The fastest chart feed speed is 50 mm/s. If the value equivalent to recording speed exceeds this value, printing with fastest speed will be made.

c) Chart feed speed setup

Setting of the chart feed speed that is separated from the recording speed can be made.

11.3. Recording Operation

The multi-recording begins when the Start button on the Operation Panel is pressed. Recording set through waveform printing, Memory Recording, or HD Recording can be made simultaneously.

For memory recording, see 9. Memory Recorder. For HD recording, see 10. HD Recorder.

11.3.1. Error Generation

Error that may occur during multi recording and operations are described as follows.

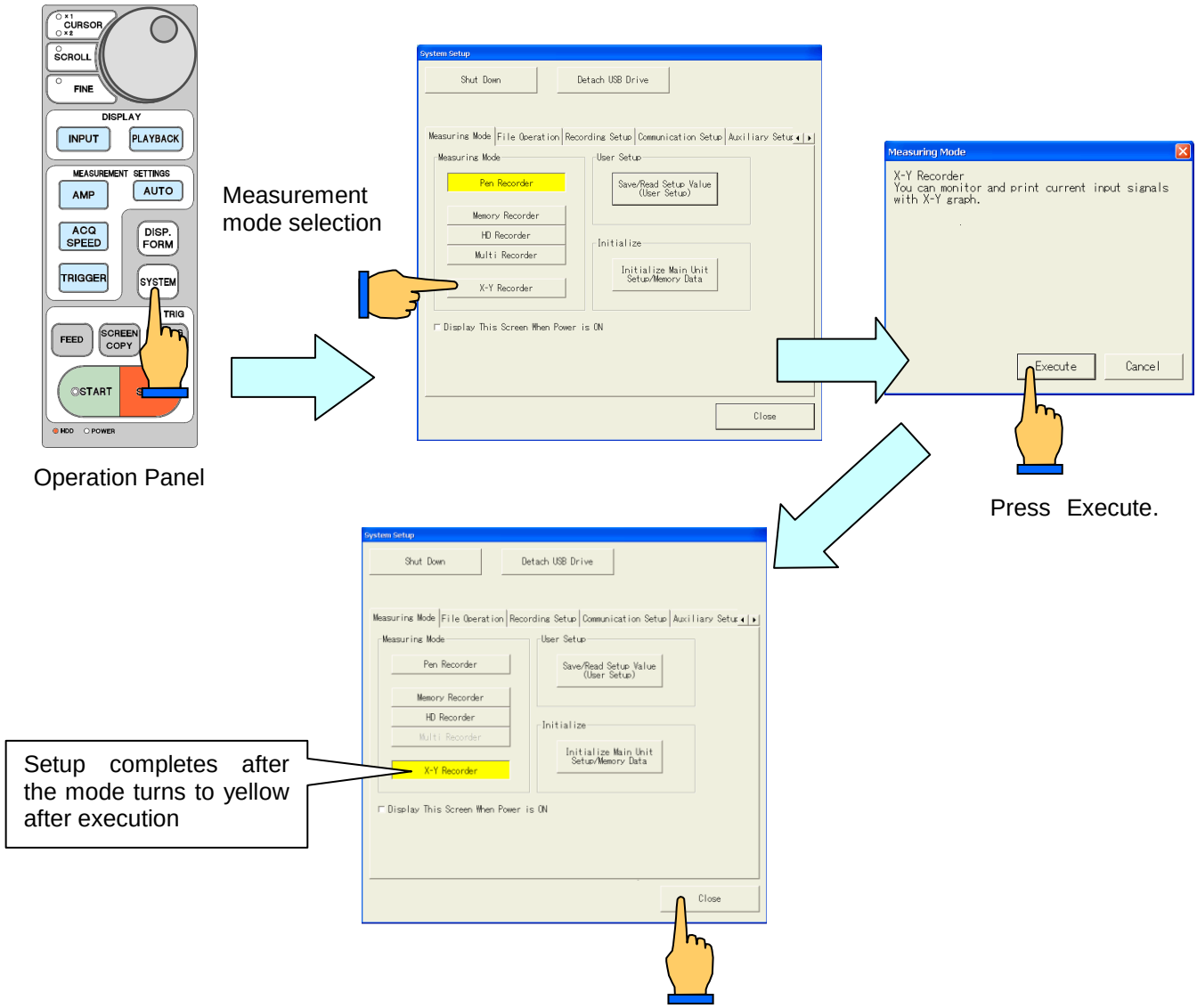
Error	Operation
File error	HD recording will stop with an error. If waveform chart printing and memory recording or memory recording are operating, the operation continues.
Paper-out error	Memory recording and HD recording continues. The waveform chart printing will stop with an error. After the chart paper is filled, recording resumes.

12. X-Y Recorder

12.1. Overview of X-Y Recorder Mode

The X-Y Recorder mode is a mode that is specialized to real-time X-Y printing, which outputs X-Y waveforms on chart paper. Data sample speed and amp settings are available on a screen.

To set the recorder to the X-Y recorder mode, use the Measurement Mode tab on the System screen. In addition, the measurement mode settings can be made on the Startup screen that is displayed when the recorder is started up. (* The Startup screen may not be displayed depending on the settings.)

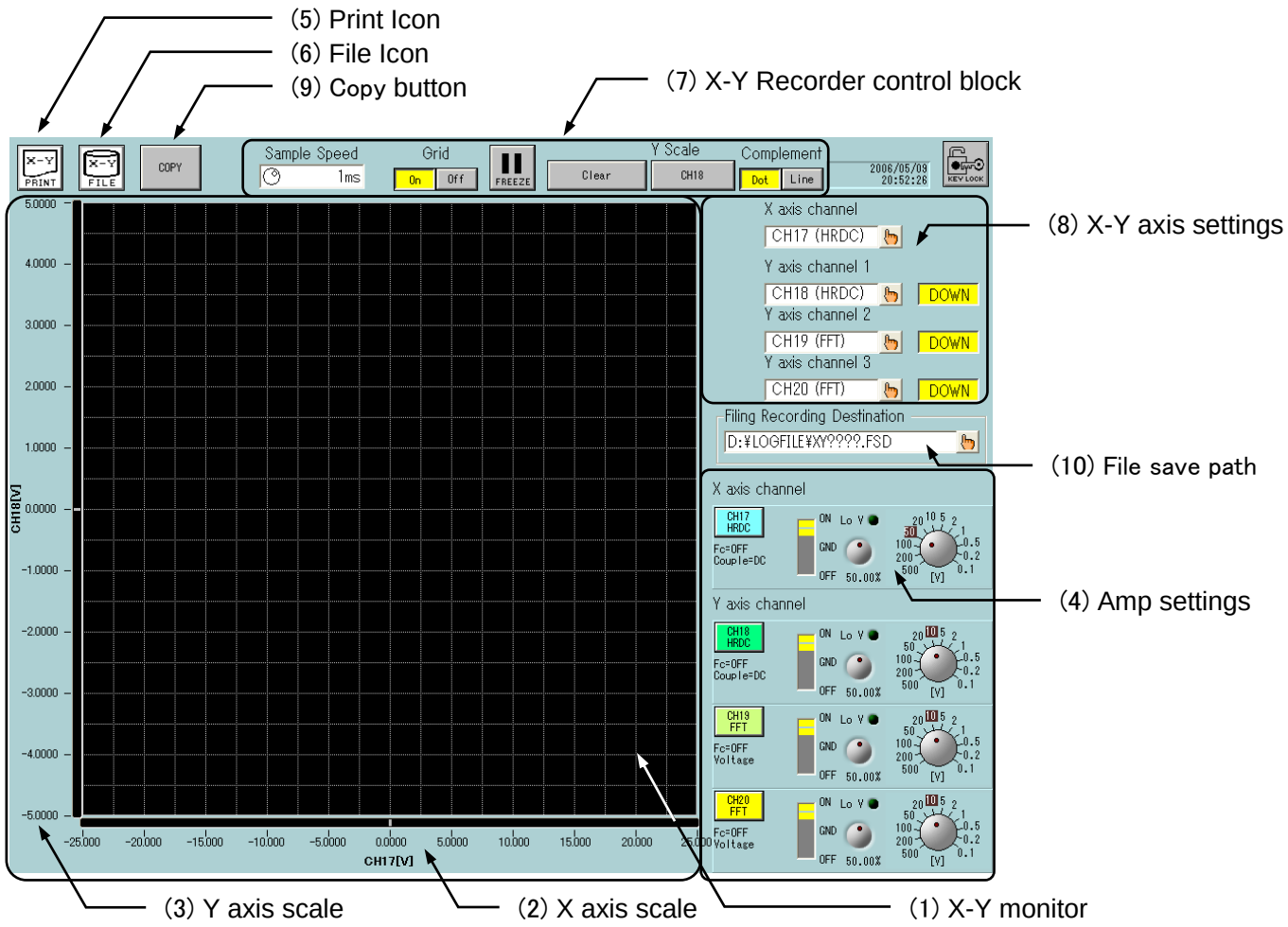


NOTE

Since the X-Y Recorder is a mode that is specialized to the X-Y printing, the same screen is displayed even screen buttons of Input Signal, Amp, Recording Condition, and Trigger.

12.2. Screen Operation

Press any button among Input Signal, Amp, Recording Condition, and Trigger buttons. The following screen appears.



(1) X-Y monitor

X-Y display for input signals is made.
signifies current input signal position (hereafter called “pen mark.”)

(2) X-axis scale

Measurement scale specified to the X axis is displayed.

(3) Y-axis scale

Only one measurement scale specified to the Y axis is displayed. The scale to be displayed can be changed using Y scale button.

(4) Amp setup

The setup for the channel specified to X and Y axes can be made. For how to use amp units, see 7. Amp Unit.

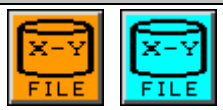
(5) Print Icon

Pressing this icon button sets printout ON or OFF for the X-Y recording. The following table illustrates the X-Y printing status during X-Y recording.

Normal	To execute	Error
		

(6) File Icon

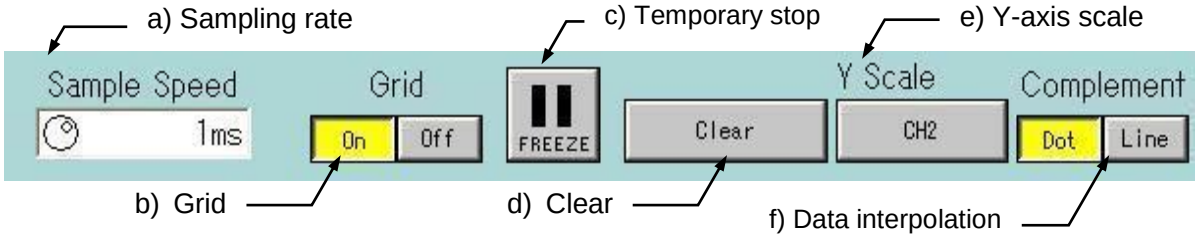
Pressing this icon button sets file recording to ON or OFF. Setting to ON saves data of X-Y recording in internal HDD file. The data saved can be displayed in the X-Y graph on the replay monitor. Moreover, operating status is indicated during X-Y recording. The File icons that appear are as follows.

ON	OFF	To execute	Error
			

NOTE

File save destination during X-Y recording is a folder in the internal HDD.

(7) X-Y Recorder Control Block



a) Sampling rate
This button is used to set data sampling rate for X-Y recording.

b) Grid
This button is used to set grid to ON or OFF in the X-Y monitoring and X-Y printing. For grid pattern for the X-Y printing, see 16. System Setup.

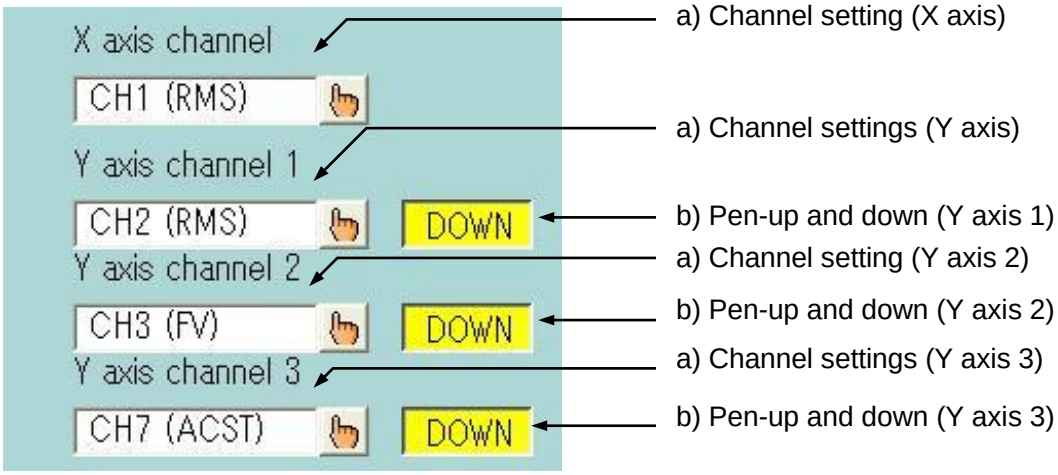
c) Temporary stop
The X-Y monitoring can be stopped temporarily. Pressing this button again cancel this temporarily stop.

d) Clear
This button is used to clear the waveforms on the X-Y monitor.

e) Y-axis scale
This button is used to switch the Y-axis scale representation.

f) Data interpolation
X-Y waveform data interpolation can be set.

(8) XY-axis setting



a) Channel settings

One channel for X axis and three channels for Y axes can be made. The amp types that can be registered are only analog amps.

b) Pen-up and down

X-Y waveform display ON or OFF can be set for three Y-axis channels. Pen-down draws waveforms; Pen-up does not draw waveforms. Pen mark always appears regardless of the up/down setting. However, the pen mark appears on the X-Y monitor only and does not appear on the X-Y printing.

NOTE In the case of X-Y mode, printing line width is constant as 0.125mm.

(9) Copy button

When the button of copy is ticked, data is printed out on chart paper.

(10) File save path

Save target path for XY recording is indicated. Pressing the button opens the dialog box and the path can be set.

a) Save target folder

The save target folder is specified.
Both embedded HDD and recommended USB devise can be used as storage devises

b) User name entry folder

When this box is ticked, a folder is created and the save target will become inside of this folde

c) Make daily folder

When this box is ticked, a daily folder is made, and data is saved in the folder.

d) File name(Only first 4 characters)

Only first 4 characters can be specified as file name. File name consists of the first 4 characters, and second 4 characters that are automatically assigned number. The file name will include designated top four letters and four-digit serial number. The file extension is “FSD” for binary file respectively.

12.3. Printing Operation

Pressing the Start button on the operation panel clears X-Y data display from the X-Y monitor and, shortly after that, re-displays the X-Y data display again. Pressing the Stop button stops the X-Y monitor and if the printout is set to valid, prints the X-Y waveforms on chart paper. If the file saving is set to be valid during this period, recording data can be saved in a file.

NOTE

Pressing the Stop buttons two times cancels the output to chart paper. Avoid pressing the button more than two times.

12.3.1. Restrictions during X-Y Printing

There are following restrictions in X-Y printing.

- **Setup changes cannot be made.**
- **X-Y monitor clear and stop cannot be made.**
- **Screen movement cannot be made.**

Press the STOP button and finish the X-Y printing to execute the operations above.

12.3.2. Exception (Error)

An error may be generated during X-Y printing due to the following reasons.

- **Paper-out**
  This error is generated when the chart paper is run out. Fill in a chart recording paper.

NOTE

After X-Y printing, the monitor stops display temporarily. After filling a chart recording paper, pressing the Print icon button performs the display same as the X-Y printing.

- **File error**
  This error occurs when file recording cannot be made due to internal HDD free space shortage or other causes. After reducing data in the internal HDD, execute recording. Even a file error occurs, the X-Y printing continues.

13. Trigger Settings Capturing Target Data to be Recorded

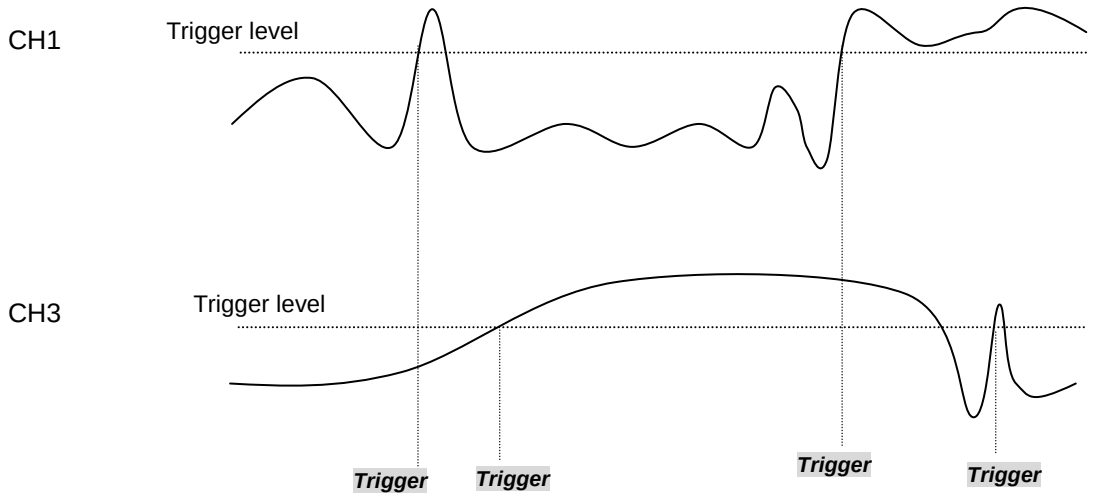
13.1. Trigger Mode Description

This recorder provides with four trigger modes: OR, AND, WINDOW, and OFF. Other than these modes, there are manual trigger and external triggers, which are valid regardless of the input signal.

13.1.1. Trigger Mode - Operation at OR

A trigger is generated either of two channels that are set for trigger source satisfies the trigger condition. The OR setting for all channels are also available.

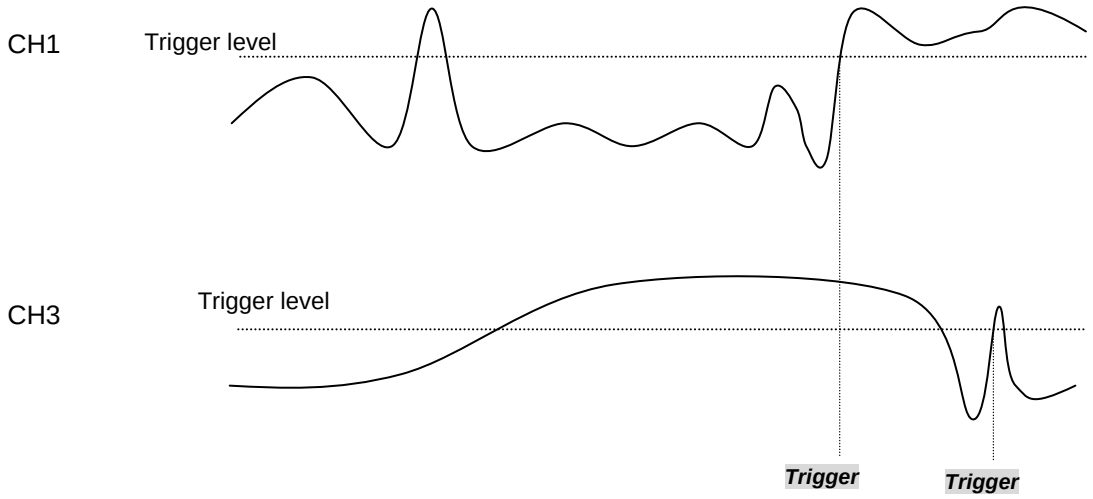
Example: Both of slopes for CH1 and CH3 are set to “rising edge.”



13.1.2. Trigger Mode - Operation at AND

Trigger is generated all channels that are set for trigger source satisfied the trigger condition. The AND setting for all channels are also available.

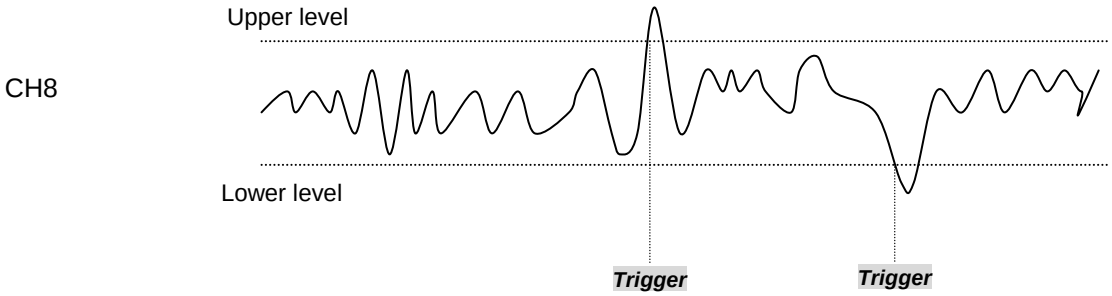
Example: Both of slopes for CH1 and CH3 are set to “rising edge.”



13.1.3. Trigger Mode – Operation at WINDOW

When the signal level enters into the pre-set range of the trigger source channel (i.e. IN) or goes out of the range of the trigger source channel (i.e. OUT), a trigger is generated. The trigger setup can be made for all analog channels. A trigger is generated upon satisfying of either of the trigger settings.

Example: When CH8 is set to OUT



13.1.4. Trigger Mode – Operation at OFF

Trigger caused by a signal input into amp is not made. Only the manual and external triggers are effective.

NOTE

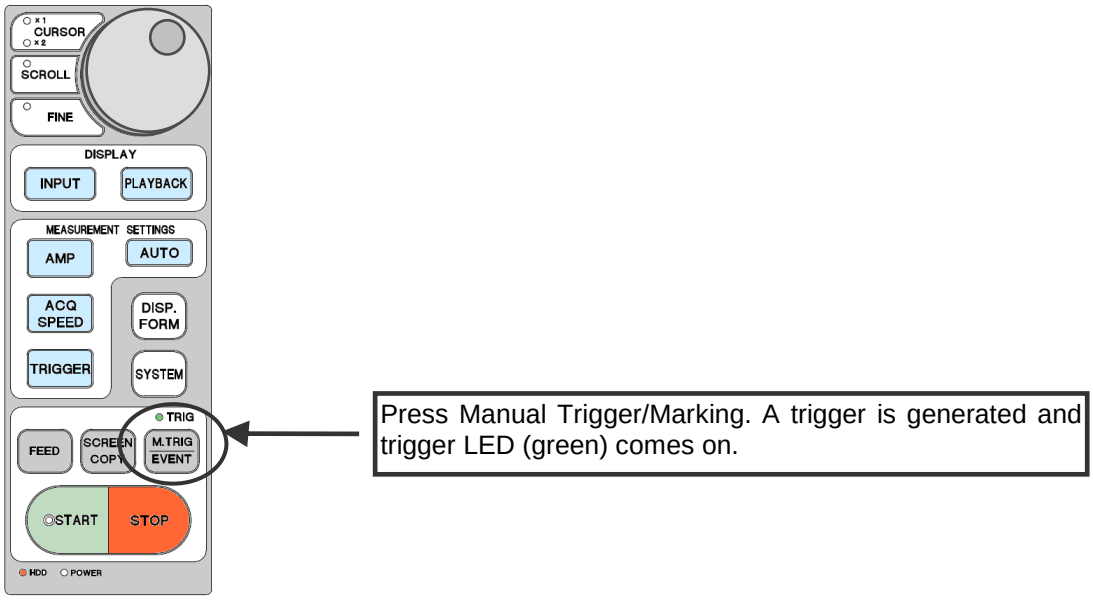
When printing is made, only the trigger made after the startup is effective. If the trigger condition is satisfied before the start of recording, the status enters into the wait for next trigger condition.

13.2. Manual Trigger/External Trigger

Regardless of trigger modes, trigger is activated manually or externally, thereby initiating the recording.

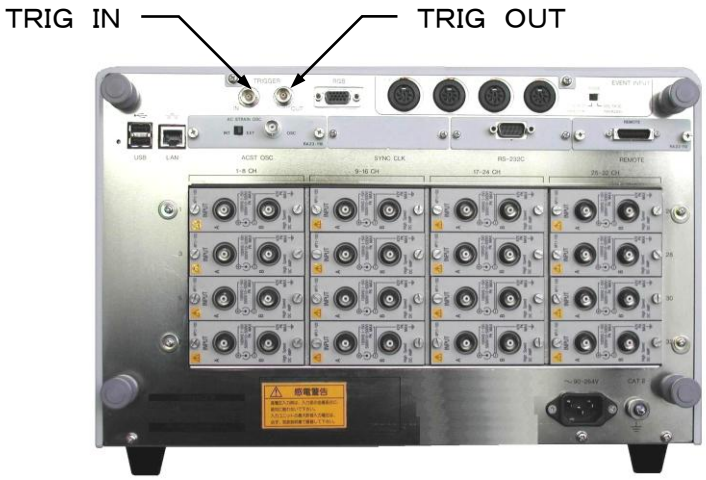
13.2.1. Manual Trigger

Pressing the Manual/Marking button on the operation panel generates a trigger irrespective of other trigger settings.



13.2.2. External Trigger (TRIG IN)

Trigger is generated by the falling edge of a 0 to 5-V signal. To use, enter a signal into TRIG IN in the re

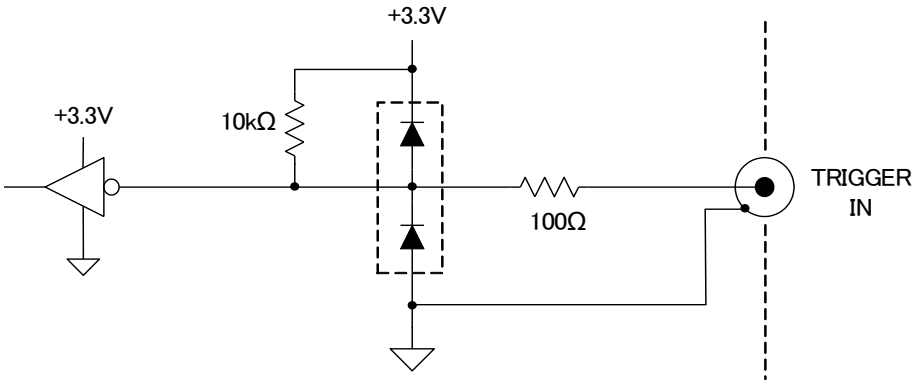


13.2.3. External Trigger Output (TRIG OUT)

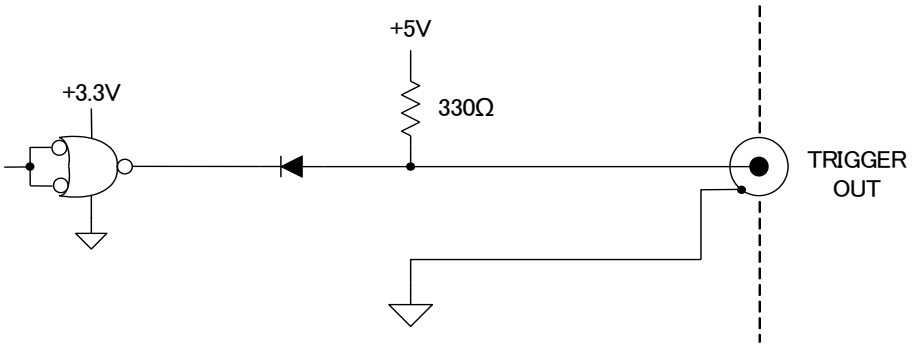
When a trigger is generated, the L level of the signal, which has TTL level and approximate10-ms pulse width, is output from the TRIG OUT terminal.

13.2.4. External Trigger Input/Output Circuit

- **External trigger input circuit**
  Input signal: 0 to 5-V voltage signal (falling edge)

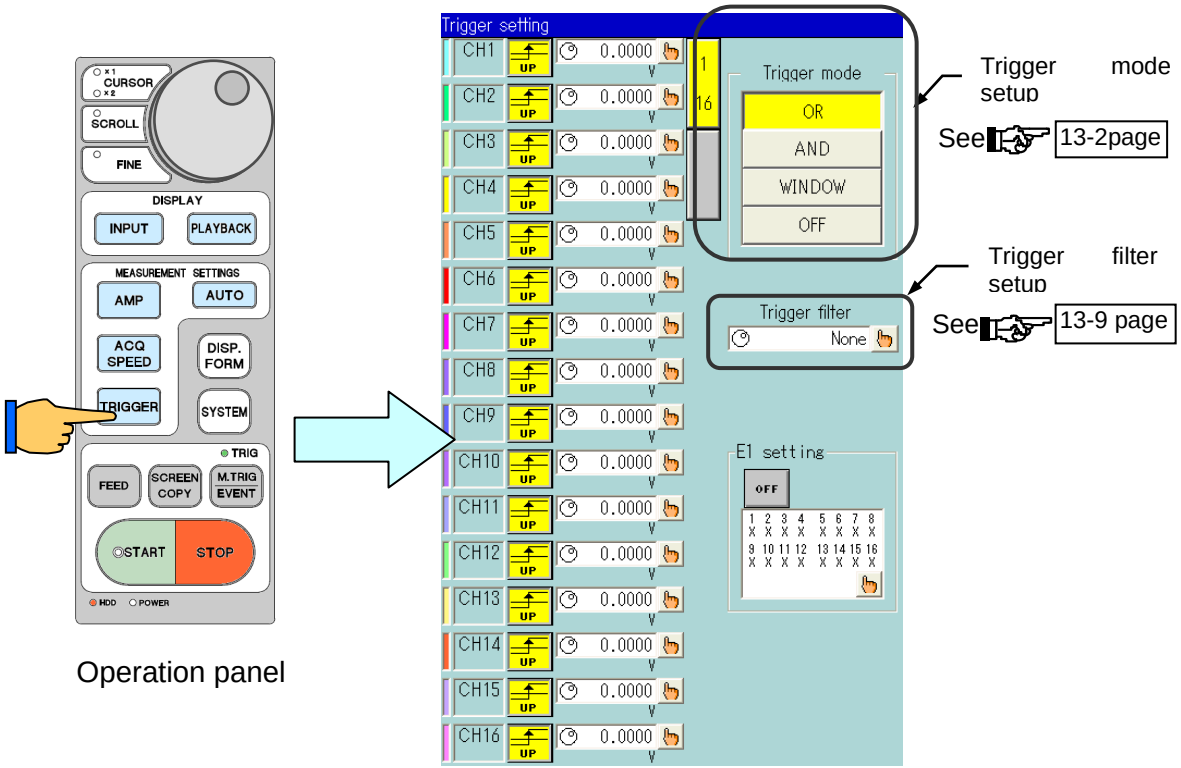


- **External trigger output circuit**
  Output signal: TTL level active LOW
  Pulse width: Approx. 10 ms

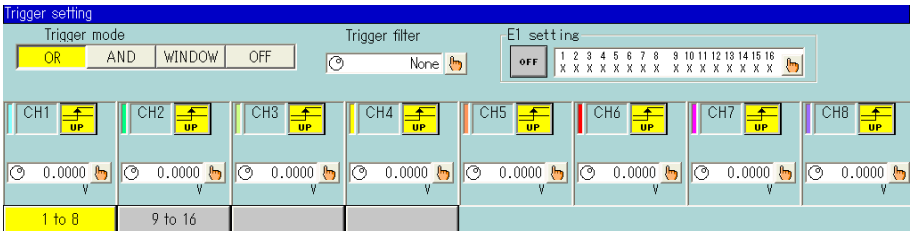


13.3. Method of Trigger Settings

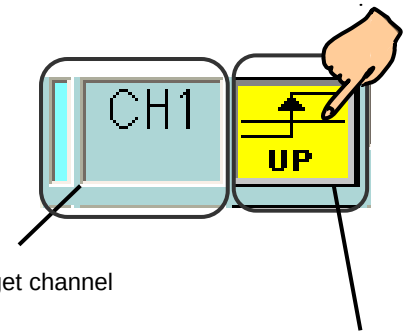
Trigger is a timing signal to start recording. The RA2800A has a variety of trigger function, thus enabling efficient data recording and printing. Pressing the Trigger button on the Operation Panel, opens the Trigger Settings screen.



Operation panel



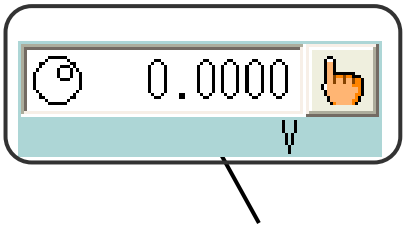
Trigger settings screen



Target channel

Pressing this portion switches the slope.

- Trigger detection at rising edge of a signal.
- Trigger detection at falling edge of a signal
- OFF

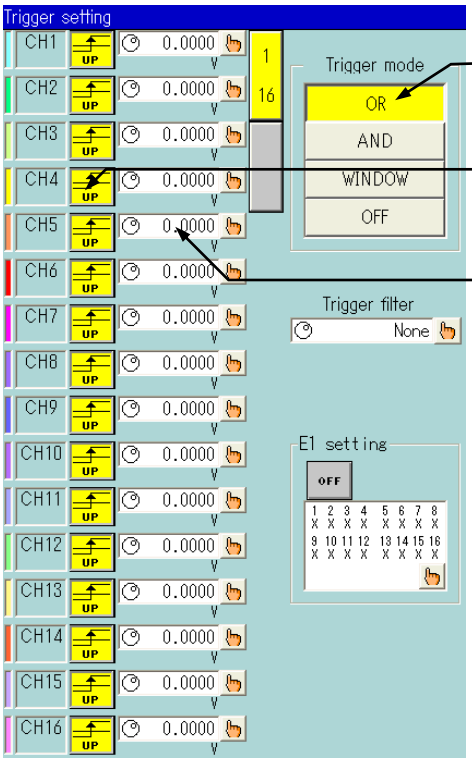


The color of this portion changes its color by touching. Then, signal level can be set by dialing the jog dial

13.4. Settings by Trigger Mode

13.4.1. Trigger Mode OR

Trigger is generated upon the satisfaction of either of the trigger conditions set as the trigger source. The OR setting for all channels are available.



Setting the trigger mode to OR.

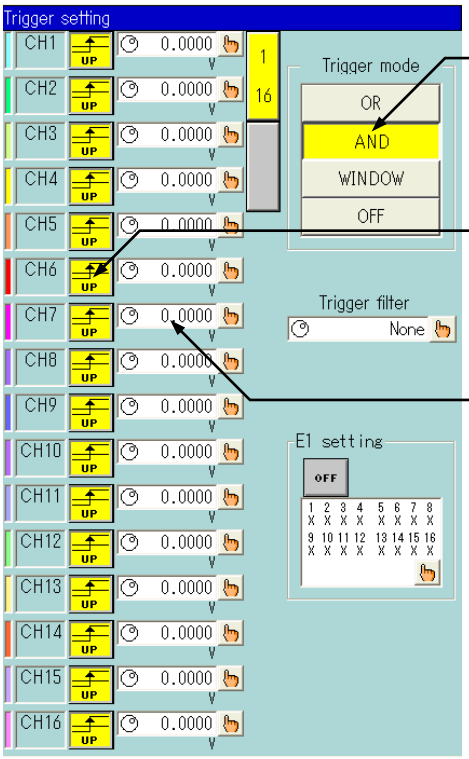
Selection of the trigger source channels to be set and settings of rising or falling edge for the signal is made.

Setting the trigger generation level

* Even if the screen scrolling is set to the vertical direction, all operations and functions are the same.

13.4.2. Trigger Mode AND

Trigger is generated upon the satisfaction of the trigger condition for all channels that are set as the trigger source.



Setting the trigger mode to AND.

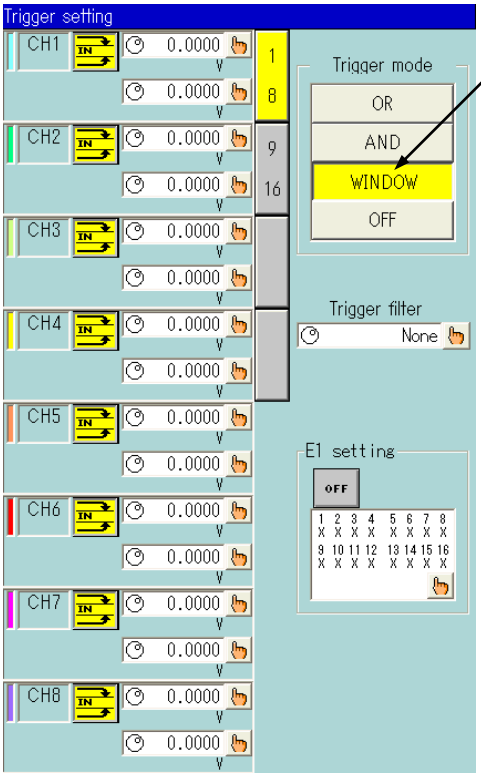
Selection of the trigger source channels to be set and settings of rising or falling edge for the signal is made.

Setting the trigger generation level

* Even if the screen scrolling is set to the vertical direction, all operations and functions are the same.

13.4.3. Trigger Mode WINDOW

When the signal level enters into the pre-set range of the trigger source channel (i.e. IN) or goes out of the range of the trigger source channel (i.e. OUT), a trigger is generated. The trigger setup can be made for all analog channels. A trigger is generated upon satisfying of either of the trigger settings.

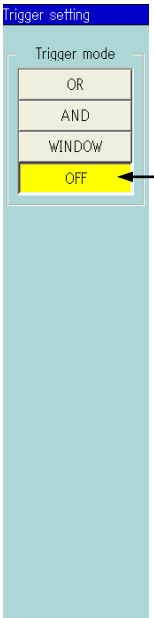


Setting the trigger mode to WINDOW

* Even if the screen scrolling is set to the vertical direction, all operations and functions are the same.

13.4.4. Trigger Mode OFF

Trigger caused by a signal input into amp is not made. Only the manual and external triggers are effective.



Setting the trigger mode to OFF

* Even if the screen scrolling is set to the vertical direction, all operations and functions are the same.

NOTE

When printing is made, only the trigger made after the startup is effective. If the trigger condition is satisfied before the start of recording, the status enters into the wait for next trigger condition.

13.5. Trigger Filter

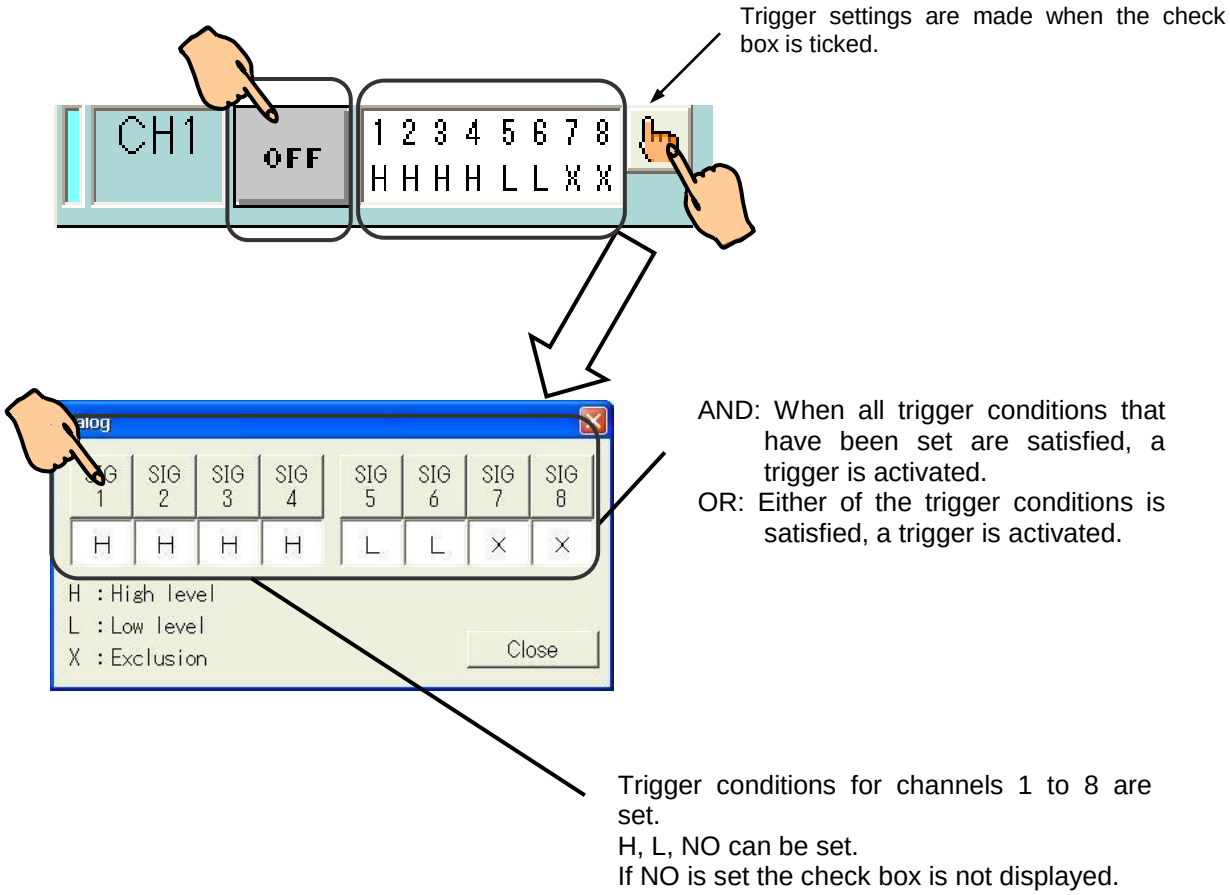
13.5.1. Trigger Filter

After the trigger condition that is set is satisfied, the trigger is activated after this satisfied condition continues for a specified period of time. This function is effective to eliminate noises whose pulse length is relatively short.

NOTE For a peak recording in HD recorder mode, please calculate based on Recording Sampling Rate = 2 μs.

13.6. Trigger Settings for Event Amp

Trigger settings for event amp differs from those of other amps. The settings are made in the following screen.



● **Trigger condition settings**

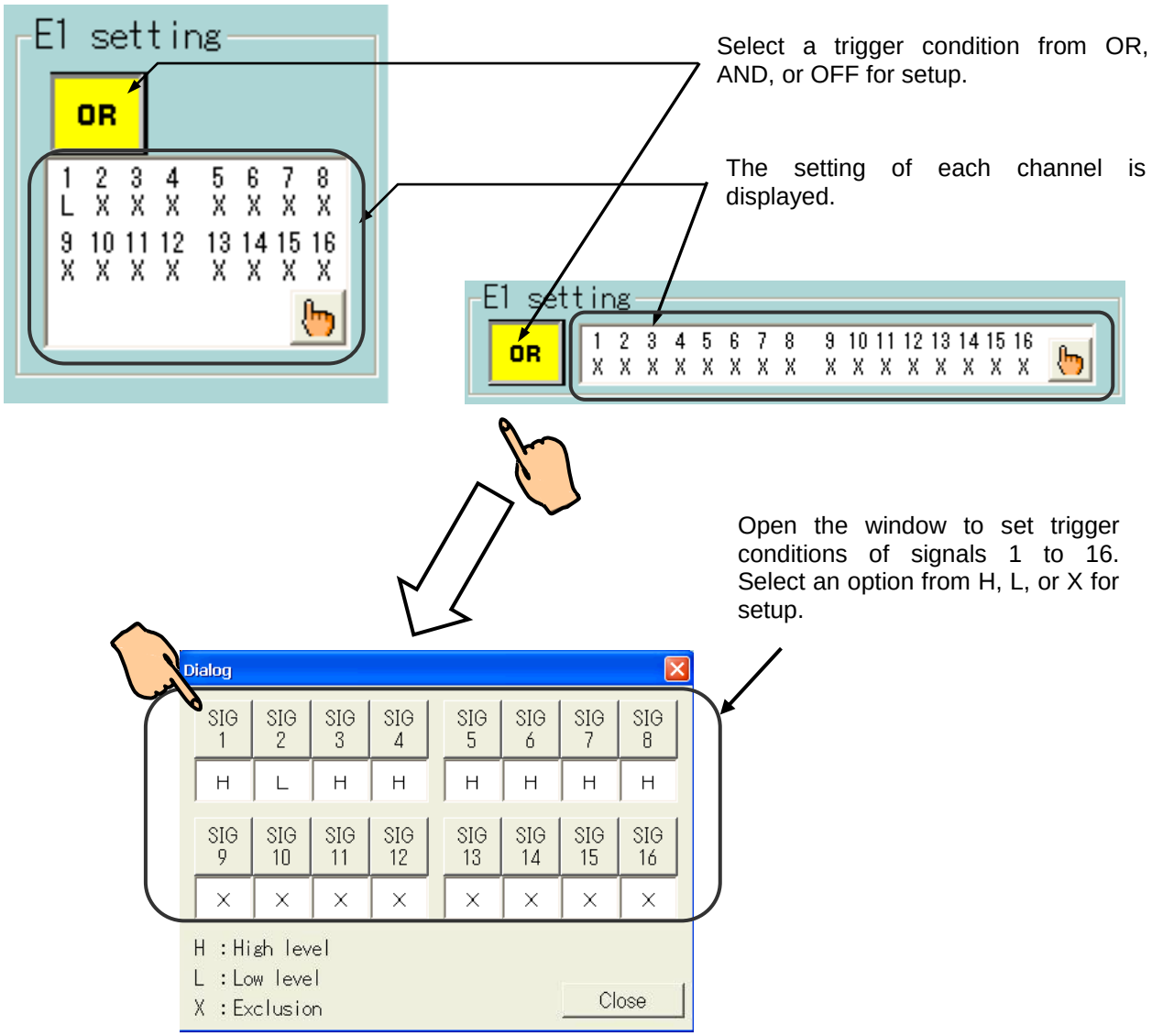
Trigger condition	Volt (Voltage input)
H	The H condition is satisfied when the input voltage reaches +2.5V or higher.
L	The L condition is satisfied when the input voltage becomes +0.5 V or lower.
NO	Exempting from trigger conditions

NOTE

In the event amp, a trigger is activated when first trigger condition is satisfied. If the trigger condition has been satisfied, a trigger will be not be activated. Especially, for example, one channel has already been satisfying the trigger condition in the OR mode, the trigger will be activated even when other channel's trigger condition is satisfied.

13.7. Trigger Settings for Event unit

When using the recorder event, please use the (RT31-163) or (0311-5001) input cable for event of cables described in the chapter 21 Cables and Probes.



Trigger condition	Voltage input
H	The H condition is established when the input voltage is approximately +2.5V or more.
L	The L condition is established when the input voltage is approximately +0.5V or less.
X	The signal is excluded from a trigger condition.

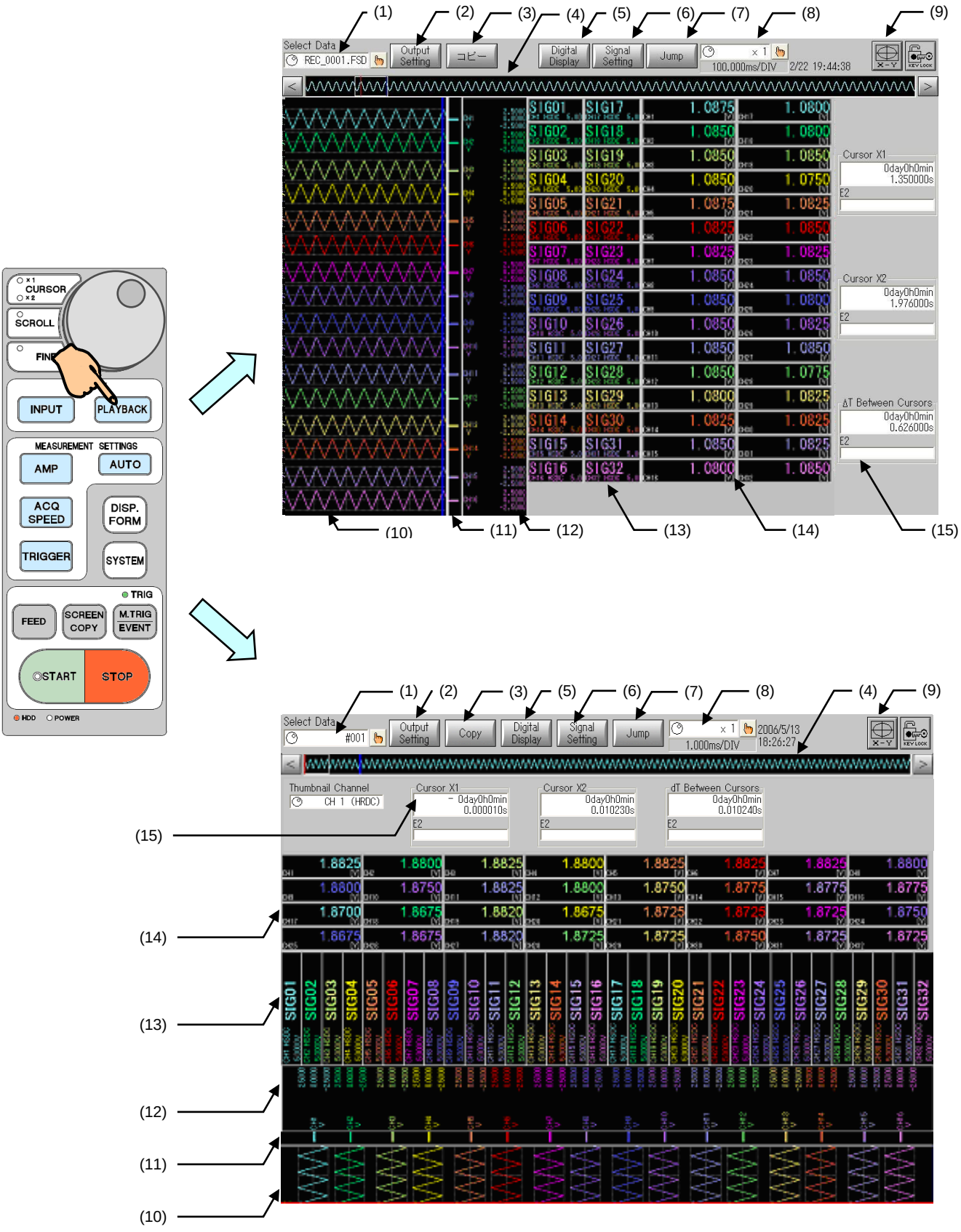
Trigger condition	Contact input
H	The H condition is established while the input is in the OPEN state.
L	The L condition is established when the input is in the CLOSE state.
X	The signal is excluded from a trigger condition.

NOTE The VOLTAGE and CONTACT events are selected by the MODE slide switch on the back side of the recorder.

14. Replay Display
Displaying Recording Data

14.1. Overview of Replay Monitor

The Replay screen is used to display the data recorded in memory or file. Waveform display for recorded data is available after the data is selected in the list.



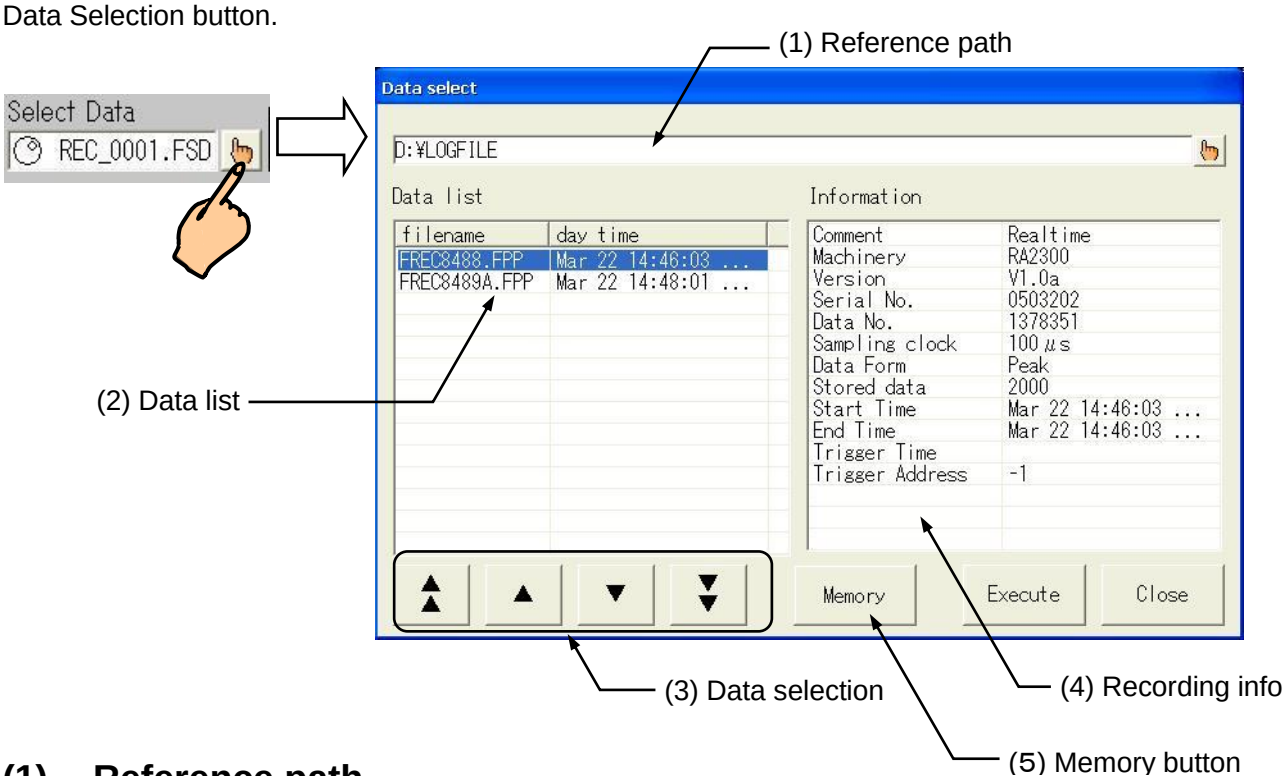
(1)	Data Selection	Selects referencing data	☞14.2**Replay Data Selection**
(2)	Output Selection	Outputs to chart or file	☞14.8 **Output Setup**
(3)	Copy	Copy the waveform to chart paper	☞14.8 **Output Setup**
(4)	Thumbnail	Displays Y-T waveform display area	☞14.3 **Waveform Display Region**
(5)	Digital Indication	Switches digital indication	☞14.4 **Digital Indication**
(6)	Signal Setup	Sets each signal channel	☞14.5 **Signal Settings**
(7)	Jump	Executes time axis jump	☞14.6 **Jump**
(8)	Time Axis Scaling	Enlarges or compresses time axis	☞14.7 **Time Axis Magnification**
(9)	X-Y Display	Switches X-Y waveform display	☞14.10 **X-Y Waveform Display**
(10)	Y-T Display	Switches Y-T waveform display	
(11)	Position	Indicates zero position for each signal	
(12)	Scale	Displays scale for amplitude axis	☞15. Display and Print
(13)	Signal Name	Signal name indication	☞15. Display and Print
(14)	Digital Indication	Indicates value at cursor position	☞14.4 **Digital Indication**
(15)	Cursor position info	Indicates cursor position info	☞14.4 **Digital Indication**

TIPS

Display can be set to OFF for scale, signal name, digital indication, and cursor position info. To keep the waveform display area as large as possible, set these settings to OFF. For more information, see 15. Display and Printing.

14.2. Replay Data Selection

To select the screen to be displayed on the Replay monitor, open the following screen by pressing the Data Selection button.



(1) Reference path

This indicates data reference target path. Moreover, it is possible to change the path with the dialog box opened by 

(2) Data list sorting

Sorting by file names or data can be made. Pressing once sorts data in ascending order: pressing again a again sorts data descending order.

(3) Data selection

This changes selected data file.

(4) Recording information

This portion lists the information of recorded data that is selected in the data list. This information may be used as a reference for data selection.

TIPS

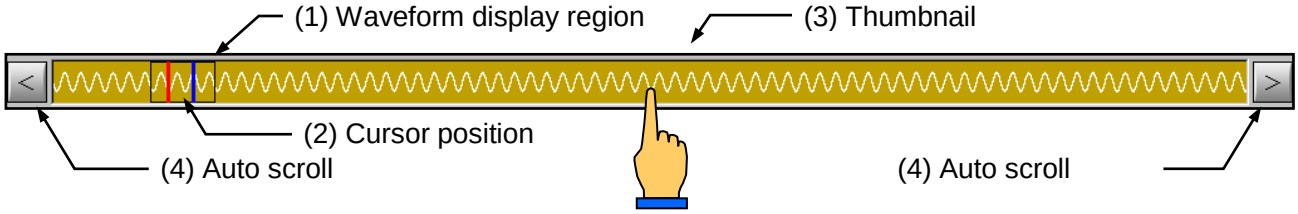
Trigger address value
Some pre-trigger values are displayed on recording data after trigger recording. However, "-1" is displayed in the case of forced termination of recording.

(5) Memory button

The "Memory" block is used to change into "memory data selection mode".
It is possible to change into "file data selection mode", with pushing this block again,

14.3. Waveform Display Region

The thumbnail that indicates waveform display region is displayed on the Replay Monitor screen and the Y-T waveform.



(1) Waveform Display Region

This is the time axis domain currently being displayed.

(2) Cursor position

Cursor positions X1 and X2 are indicated.

(3) Thumbnail

Full data for a channel is displayed in a compressed form. Also, touching the thumbnail portion can move the display position of the Y-T waveform.

TIPS

Channel that can be displayed on the thumbnail can be specified. For more information, see 15. Display and Printing.

(4) Auto scroll

The displayed region can be scrolled automatically. By touching a thumbnail display portion, auto-scrolling stops.

14.3.1. Shift of Waveform Display Region

To shift the waveform display region, refer to the following methods.

- **Operation with thumbnail**
  By touching the thumbnail display portion, the waveform display region can be shifted. The auto-scroll buttons at both sides allows one-direction scrolling.
- **Shift through operation panel**
  Press the Scroll button on the operation panel to make scrolling effective. When scrolling becomes usable, the LED of the Scroll button comes on. Turning the job dial shifts the display region.
- **Shift through jump faction**
  Jump to the trigger detection point or making point is available. Moreover, jump to the maximum or minimum point for each channel is available. For more details, see [14.6**Jump**]

14.3.2. Shift of Cursor Position

To shift the cursor position, refer to the following methods.

- **Shift through operation panel**
  Press the Cursor button on the Operation Panel to make the cursor effective. When the cursor becomes usable, the LED of X1 or X2 of the Cursor button comes on. Turning the jog dial can move the cursor. Smaller-step shift is available using the Fine button on the Operation Panel.

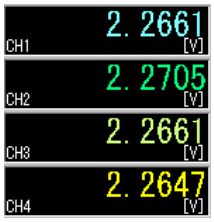
- **Shift through screen touch**
  Direct cursor shift is possible by touching the waveform display portion when the cursor shift is effective on the Operation Panel.

14.4. Digital Indication

Indications for digital values and cursor position information for measurement values can be made.

14.4.1. Digital Indication

Measurement values are indicated in digital values. Time-axis position to be displayed changes depending on the LED status.



- **X1 LED On**
  Measurement values of the cursor 1 position are indicated while cursor X1 is moving.

- **X2 LED On**
  Measurement values for cursor 2 are indicated while cursor X2 is moving.

- **Others**
  Measurement values at the top of the waveform display region are displayed during the time excepting when the cursor is moving as well as when waveform display position is moving.

TIPS

If the recording data is the peak format, one data consists of two values: maximum and minimum value. To specify the digital value in either of maximum and minimum values, open the Display/Printing screen. For more details, 15. Display and Printing.

14.4.2. Cursor Display Information

This portion indicates the position information of cursors X1 and X2 and the time difference between cursors (ΔT).

Time axis display format changes to Duration, Time, and Value in this order with depending on the setting. For more details, see 15. Display and Printing.

14.4.3. Digital Indication Switching

Pressing the Digital Indication button on the upper part of the Replay monitor, contents of indication can be switched.

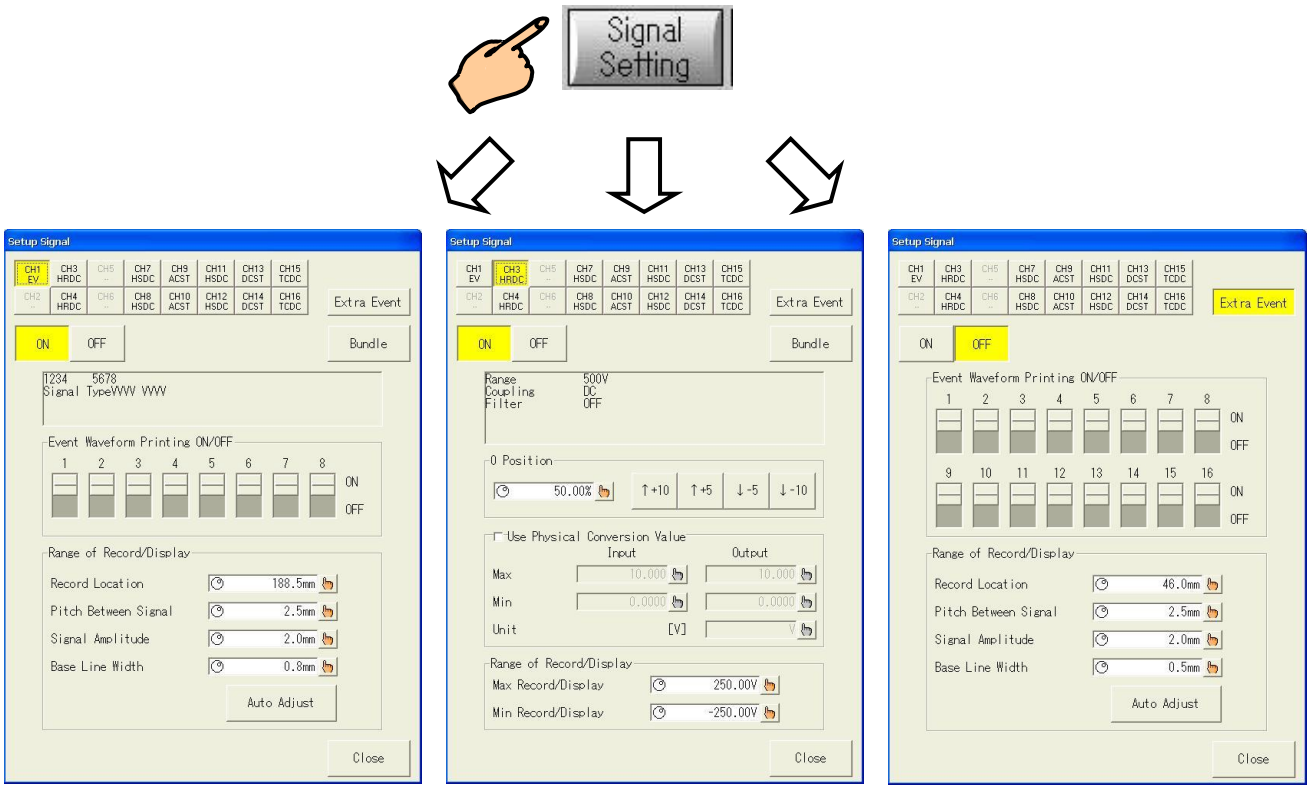
The indication changes to No Indication, Digital Value, Cursor Value, Digital Value + Cursor Value, and No Indication, in this order.

TIPS

Digital indication switching can be set in the Display and Printing screen. For more details, see 15. Display and Printing.

14.5. Signal Settings

It is possible to confirm the recording conditions for channel of the signal that are recorded as data and change the setup for waveform display. Press the Signal Setting button on the upper part of the Replay screen. The Setup Screen appears. The contents differ depending on the amp type.



Analog amp setup screen
- Waveform ON/OFF setting
- Zero position setting
- Physical unit conversion setting
- Other recording condition display

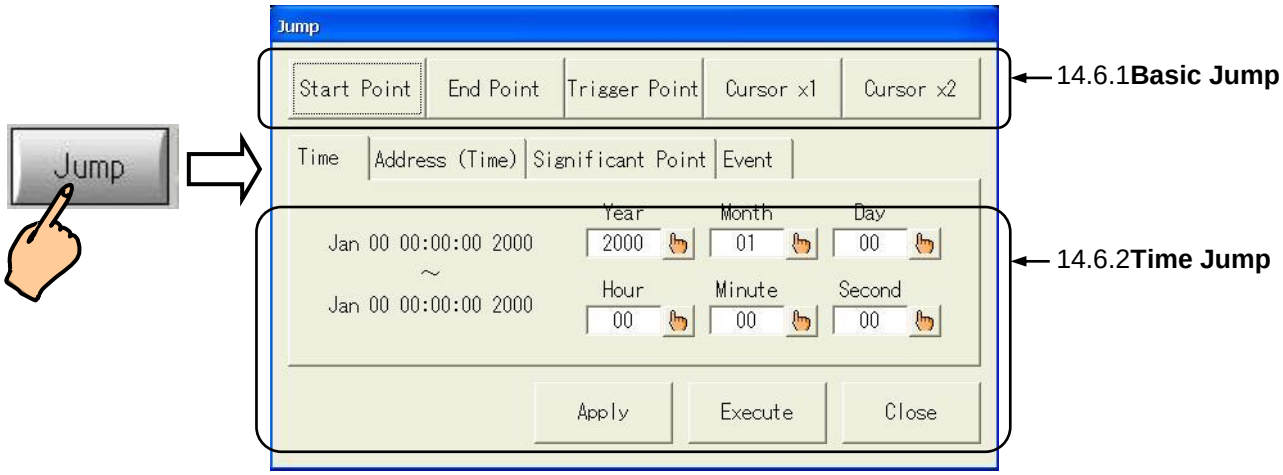
Event amp setup screen
- Waveform ON/OFF setting
- ON/OFF setting by signal
- Event waveform adjustment
- Signal type display

Recorder event setup screen
- Waveform ON/OFF setting
- ON/OFF setting by signal
- Event waveform adjustment

TIPS Operations of Signal Setup screen is the same as those of the Amp screen. For more details, see 7. Amp Units

14.6. Jump

Jump of Y-T waveform display position can be made after the time axis position is specified. Pressing the Jump button on the upper part of the Replay screen displays the following screen.



14.6.1. Basic Jump

Basic jump operation is made.

Start point:	Jump to recording data start point
End point:	Jump to the end point of the recording data
Trigger detection point:	Jump to the trigger detection point for recording data If there is no trigger detection point, jump is made to the start point.
Cursor X1/X2:	Jump to current cursor position

TIPS Jump is made when the button is pressed.

14.6.2. Time Jump

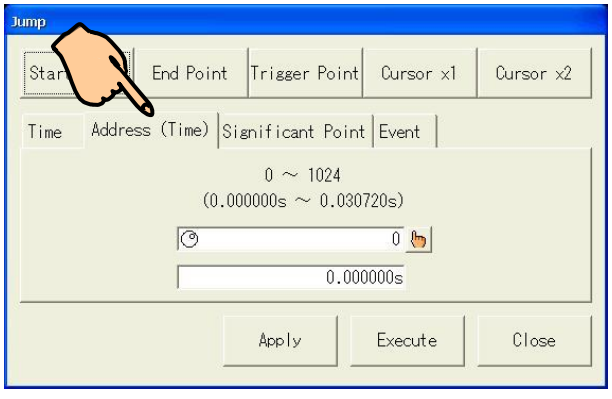
Jump is made after the waveform display position is specified. Specify the time using the Time tab on the Jump screen. Pressing the Apply and OK buttons execute a jump.

TIPS When the Apply button is pressed, the jump screen does not close the Jump screen even after the jump execution. To execute jump continuously, this button is usable.

NOTE If the recording rate of the recording data is external sync, time jump cannot be made because the time axis cannot represent as time. Use [14.6.3**Address Jump**]

14.6.3. Address Jump

Jump can be made after waveform position is designated in address. Open the Address tab on the Jump screen, and then specify the address. Press the Apply button and OK button to execute a jump.



14.6.4. Maximum/Minimum Search & Jump

Searching for maximum and minimum values for all analog channels is available. Jump to the searched position is possible after listing the result.

Operation steps for the maximum and minimum values search are as follows.

(1) Use the Max and Min tab on the jump screen.

(2) Specify the search range.

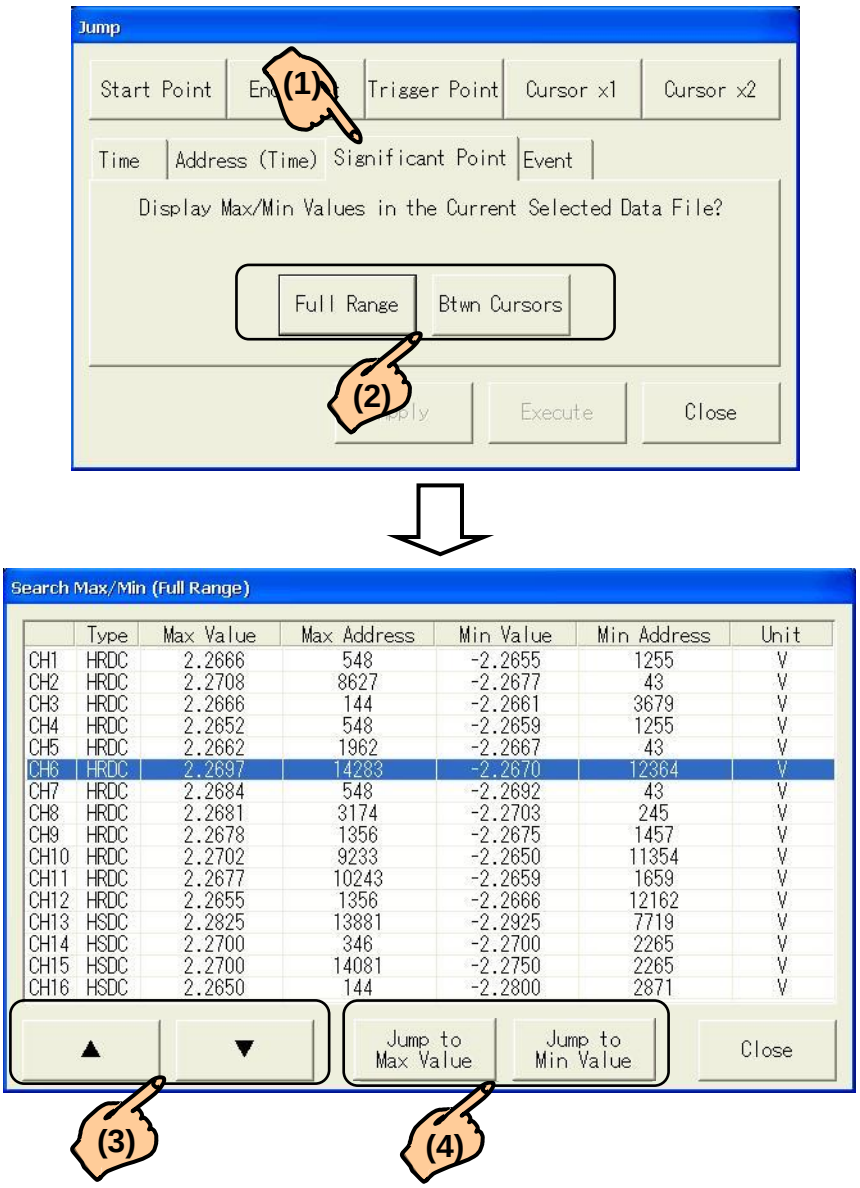
Choose All or Between Cursors. Press a button begins searching, and after the search, a list appears.

(3) Select a channel

Select a target channel. Selection can be made through a direct touch of listed portion.

(4) Jump to maximum value or minimum value is made.

Pressing a button executes a jump.



14.6.5. Event Jump

Marking information that is recorded in the recorded data is searched and jump is made.

(1) The Event tab on the Jump screen is displayed.

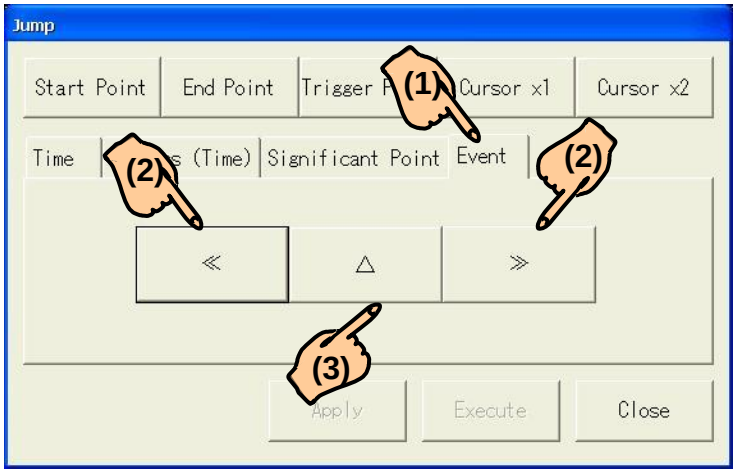
(2) Marking jump is executed when a search direction button is pressed.

NOTE

The event jump needs the data which it included E2 in.
To include E2 in the recording data, the following setting is necessary.
・System- Recording Setup- Recording Channels: E2 ON
・Amp Basics Screen : E2 ON

NOTE

Marking jump is a jump to the mark address that is closest to the direction that is specified by jump target address (Waveform, x1, x2). Also, a trigger point is regarded as a mark. If the mark is not found, jump to the start/end point is made.

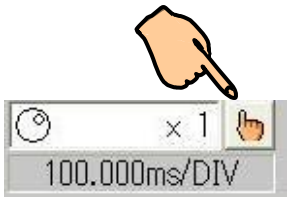


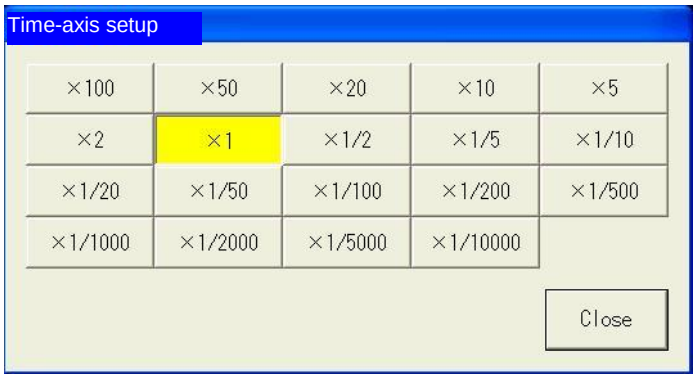
(3) Jump to link data is made.

When this button is pressed after the making jump is made while the data file (Extension of FPP) recorded in the Multi Recorder mode is displayed. a jump to the link data (memory recording data) is made.

14.7. Time Axis Magnification

To enlarge or compress the time axis, press [Time Axis] button. The following screen appears.





Press the Close button. After the screen is closed, the selected time axis scaling factor will be effective.

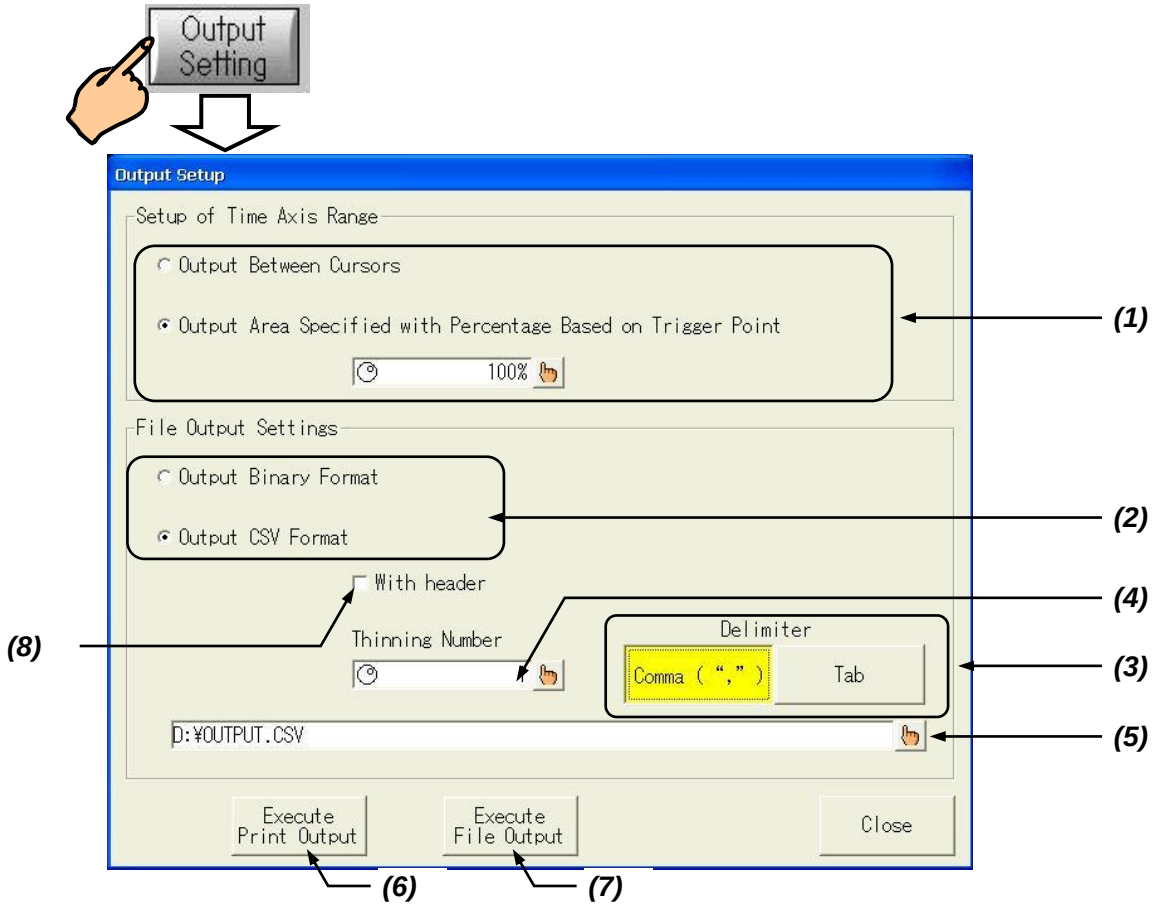
TIPS

Scaling factor can be changed without seeing the screen through the following steps.

1) Press the left side of the time axis scaling button, and then make jog dial change effective. Scaling factor will be highlighted.
2) Change the value by turning the jog dial.
   Time axis for waveform display will be enlarged or compressed according to the scaling factor.
3) Peak data cannot be expanded.

14.8.Output Setup

Displayed data can be printed out or exported into a file. To execute data output, press the Output Setup button on the upper part of the Replay screen. Then the following screen opens. To output the waveform to chart paper immediately, press the Copy button.



14.8.1. Specifying Output Time Range

Use the (1) button to specify the data output time-axis range. Select from among “Between cursors” or “Specifying in percentage in reference to the trigger point” If “Specifying in percentage in reference to the trigger point” is selected, specify percentage.

TIPS To output all, select “Specifying in percentage in reference to the trigger point” and choose 100 for percentage.

14.8.2. Specifying File Save Format

Use the (2) button to specify the format at file save. Select Binary or CSV. If CSV is selected, the number of skip and delimiter can be specified. When data is saved is the CSV format, you can select (8) Use Header. Then, the header information such as amp setup as well as data can be saved.

NOTE The file extension will be DRT that is output in the binary format. The binary save file can be referenced in the Replay screen.

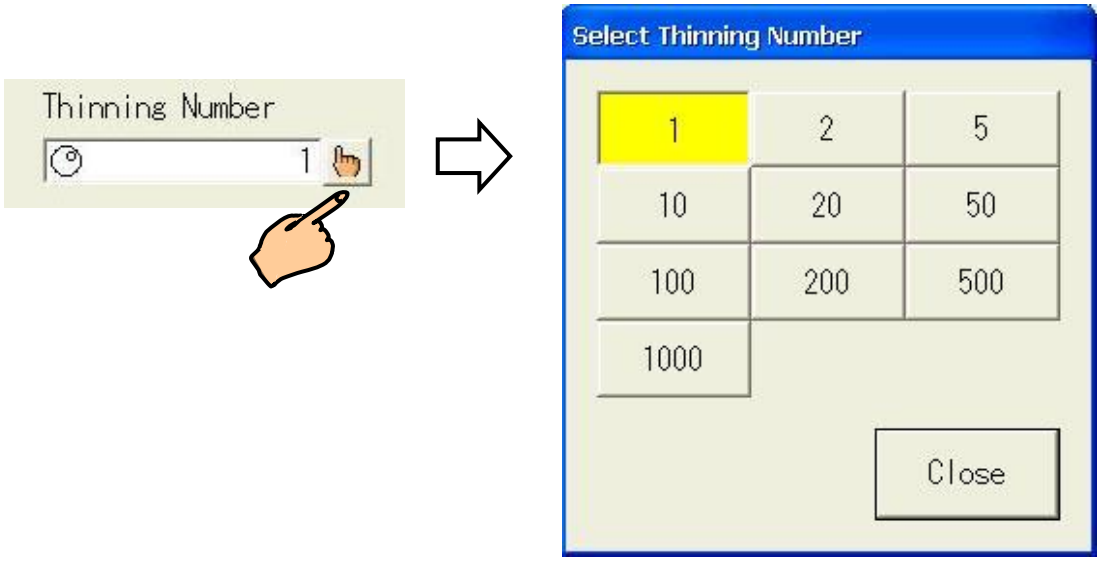
NOTE The file extension that is output in the CSV format will be CSV. The CVS save file size becomes 5 times as big as binary save file size. The CSV save file cannot be referenced in the Replay screen.

14.8.3. Specifying CSV Delimiter

Use the (3) button to specify the delimiter upon the CSV save. Select comma or tab.

14.8.4. Specifying Number of Skip in CSV

Use the (4) button to specify the number of skip in CSV save.



TIPS Data will be rough if skipping is specified but it is possible to make file size small.

14.8.5. Specifying File Save Destination

Use the (5) button to specify the file save destination.

TIPS The output file extension will be fixed. (Binary save = DRT, CSV save = CSV)

14.8.6. Execution of Data Output

Output to chart paper is made with the (6) button. File save is made with the (7) button.

TIPS Output can be stopped with the Stop button on the Operation Panel. If the file save operation is terminated, the file being saved will be discarded.

NOTE During the data output, the other operations do not start. Do not disconnect the connection to a drive during file save.

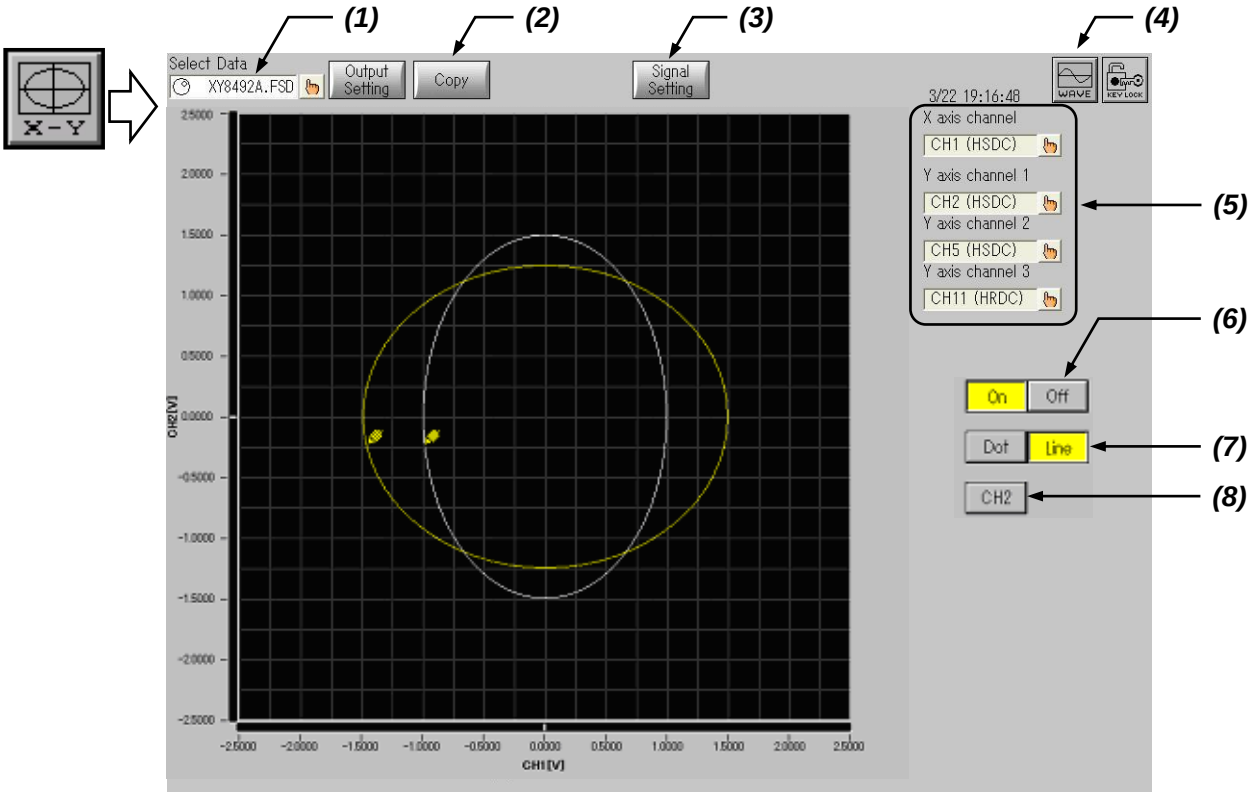
TIPS To output two or more data correctively, use the File Operation on the System screen. For more details, see 16. System Setup.

14.9.Copy

Copy of selected file or folder is made. The following screen appears when the Copy button is pressed after selecting copy source items in the File Operation tab in the System screen.

14.10. X-Y Waveform Display

To display replay data in the X-Y graph, press the X-Y icon on the top of the screen. If the recorded data is the Sample format, X-Y display is made; if the data is the Peak format, X-Y display is not made.



(1) Data selection

This portion displays the data file name whose data is being displayed. Pressing this button selects the data file to be referenced. The operations are the same as those for Y-T waveform display. For more details, see [14.2**Replay Data Selection**].

NOTE The X-Y display is available only in the Sample format data. Choose the Sample format data, accordingly.

(2) X-Y Waveform Printout

The X-Y waveform being displayed will be output to the chart printing paper. Operations during outputting are disabled but forcible stop can be made with the Stop button on the Operation Panel.

(3) Signal setting

Signal setting information is displayed. The zero position and physical unit conversion settings are available.

(4) Switching to Y-T waveform display

Display is returned to the Y-T waveform display.

(5) Specifying X-Y axis channel

Specification of the X-Y axis channel is made.

(6) Switching to Gliding monitor display

It turns On and Off for Gliding display.

(7) Specifying data interpolation

Specifying data interpolation type of X-Y waveform either Dot or Line.

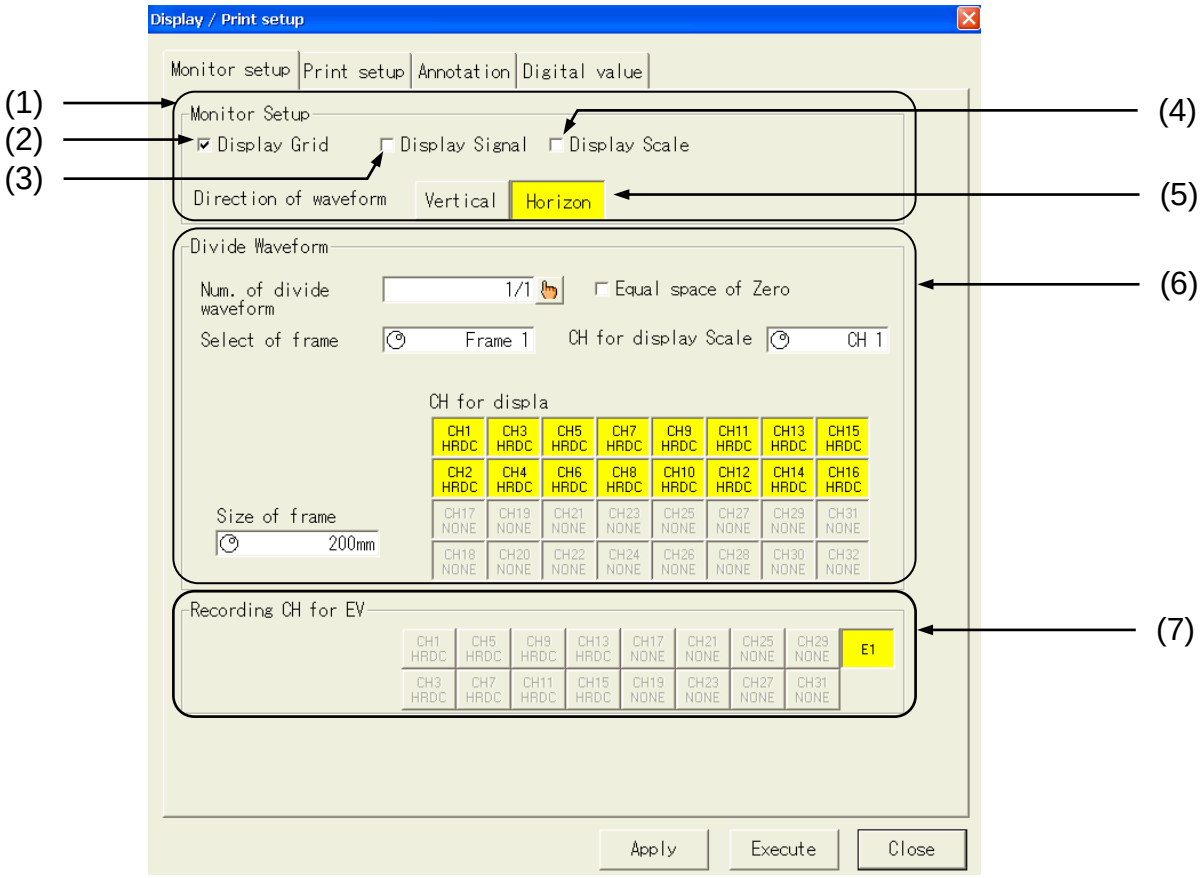
(8) Specifying Y scale

Y-axis scale is specified among selected channels. When multiple channels are selected, by pressing the button, each time channel number changes.

15. Display and Printing Settings for Monitor Display and Printing

15.1. Settings for Display and Printing

Display and Printing is used to set X-Y display of waveforms or printing format for waveform. Pressing the Display and Printing button on the Operation Panel opens the screen for settings.



15.1.1. Monitor Display

(1) Monitor Display Setup

This section is used to set monitor display screen for Pen Recorder, Memory Recorder, HD Recorder, or Multi-Recorder.

(2) Grid Display

This check box is used to set the grid indication for the waveform display area to ON or OFF. Grid display is effective through ☑ (tick).

(3) Signal name indication

This check box is used to set the signal name indication for the waveform display area to ON or OFF. Signal name indication is effective through ☑ (tick).

TIPS Signal name can be set in 15.3 Annotation Setting

(4) Scale Display

This check box is used to set the scale indication for the waveform display area to ON or OFF. Scale indication is effective through ☑ (tick).

NOTE The scale is indicated in one line. If there are several channels in one waveform frame, the scale of the channel is indicated for the selected frame set in the waveform segmentation setting..

(5) Scrolling Direction

Selection of Vertical or Horizontal for the scrolling direction in the waveform display area can be made.

(6) Divide Waveform Setup

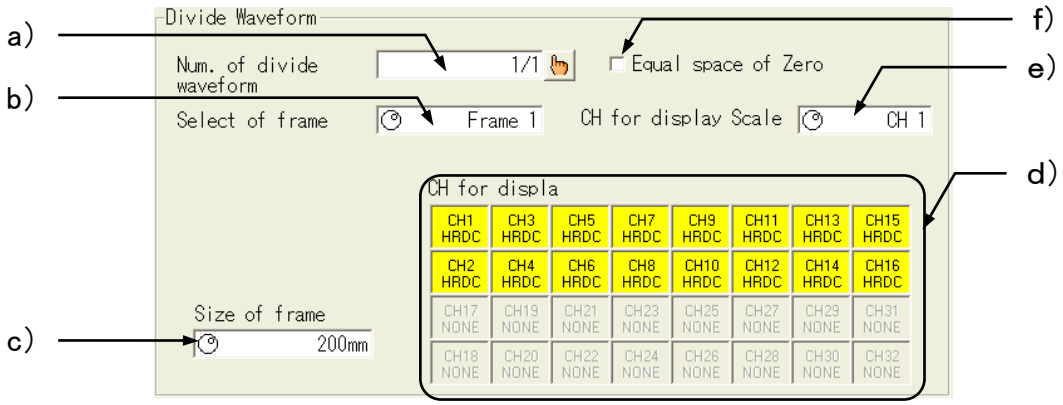
It is possible to set the number of segmentation of waveforms that are displayed on the waveform display area. In addition, segmented frame size and channel to be displayed can be set.

(7) Event Waveform Record Setup

Channels whose event waveforms are recorded. Up to eight channels can be used for recording The recorder event is regarded as the size equivalent to two channels.

15.1.2. Display

It is possible to set the number of segmentation of waveforms that are displayed on the waveform display area. In addition, segmented frame size and channel to be displayed can be set.



a) Number of segmentation for recorded waveform

Number of segmentation for recorded waveforms can be made. Any number from 1 through 16 can be set.

b) Frame selection

Frame created through the segmentation of recorded waveform can be selected. The 1st frame is assigned to the top in the horizontal direction and to the left in the vertical direction.

c) Frame size

Frame amplitude direction size can be set.

d) Channels to be displayed

Channels displayed in the frame can be selected.

e) Scale indication channel

Specify the channel to be displayed when the scale indication for monitor display setting is set to ON.

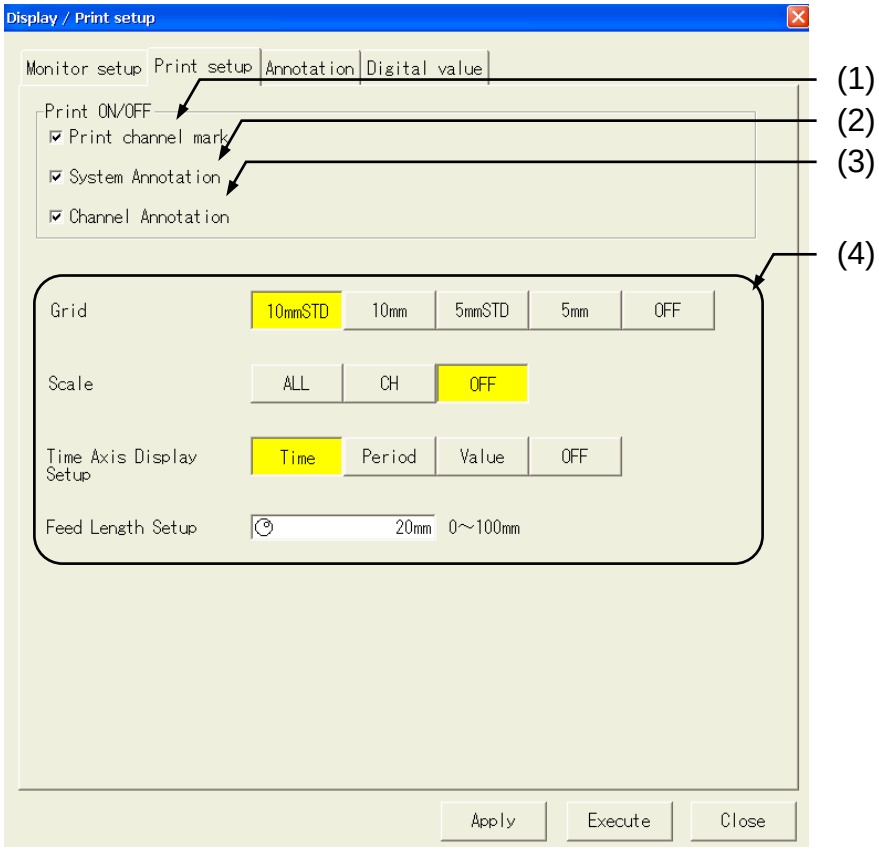
f) Equal positioning

The 0 position for the channel indicated in the frame selection is equally allocated. After the equal positioning is selected, pressing the [Execute] button execute the positioning.

NOTE The frame size is limited so that the entire frame size plus margin is to be within the effective recording range (216 mm).

15.2.Print Setting

Display the Print Setting screen by pressing the Display and Recording button when setting the printing format for waveforms.



15.2.1.Print to ON or OFF

(1) channel mark

Set the channel mark (channel number) print to ON or OFF. The channel mark print is ON with ☑ (tick).

(2) system annotation

Set the system information print related to printing to ON or OFF. The system annotation pri nt is ON with ☑ (tick).

Examp☞ 8.3 Recording Operations

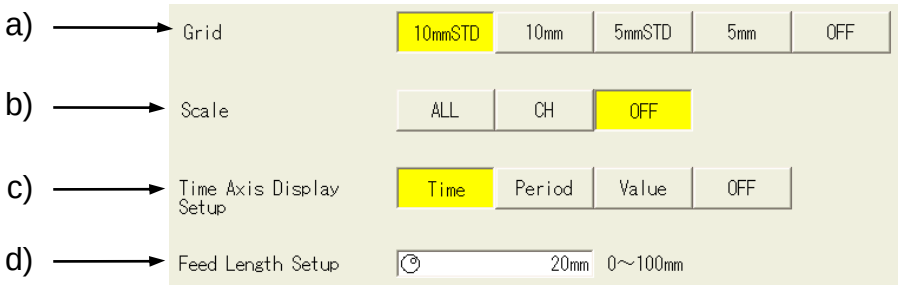
(3) channel annotation

Set the acquisition condition print to ON or OFF. The channel annotation print is ON with ☑ (tick).

Examp☞ 8.3 Recording Operations

15.2.2.Print Setting

Settings for grid interval, amplitude axis scale, time axis representation, and other settings for waveforms can be made.



a) Grid

Grid pattern for waveforms and X-Y recording can be made.

Grid	Graduation mark	Auxiliary grid
10 mm STD	Every 10 mm	1 mm auxiliary grid
10 mm	Every 10 mm	NA
5 mm STD	Every 5 mm	1 mm auxiliary grid
5 mm	Every 5 mm	NA
OFF	NA	NA

b) Amplitude axis scale

The amplitude axis scale print can be set.
Only the max. and min. values are printed in one line when Batch is selected . (Scales between max. and min. are not printed)
Not only the max. and min. values but also in-between scales are printed on one line. Since one line is needed for printing one channel, more chart paper will be consumed.
The amplitude scale is not printed during OFF.

TIPS To save the chart paper, it is recommended to select Batch.

c) Time axis representation

The unit for waveforms can be selected from among Recording time, Date and time, Number of data, and OFF.

TIPS If the acquisition speed is set to be external synchronization, the representation in Recording time and Date and time cannot be made.

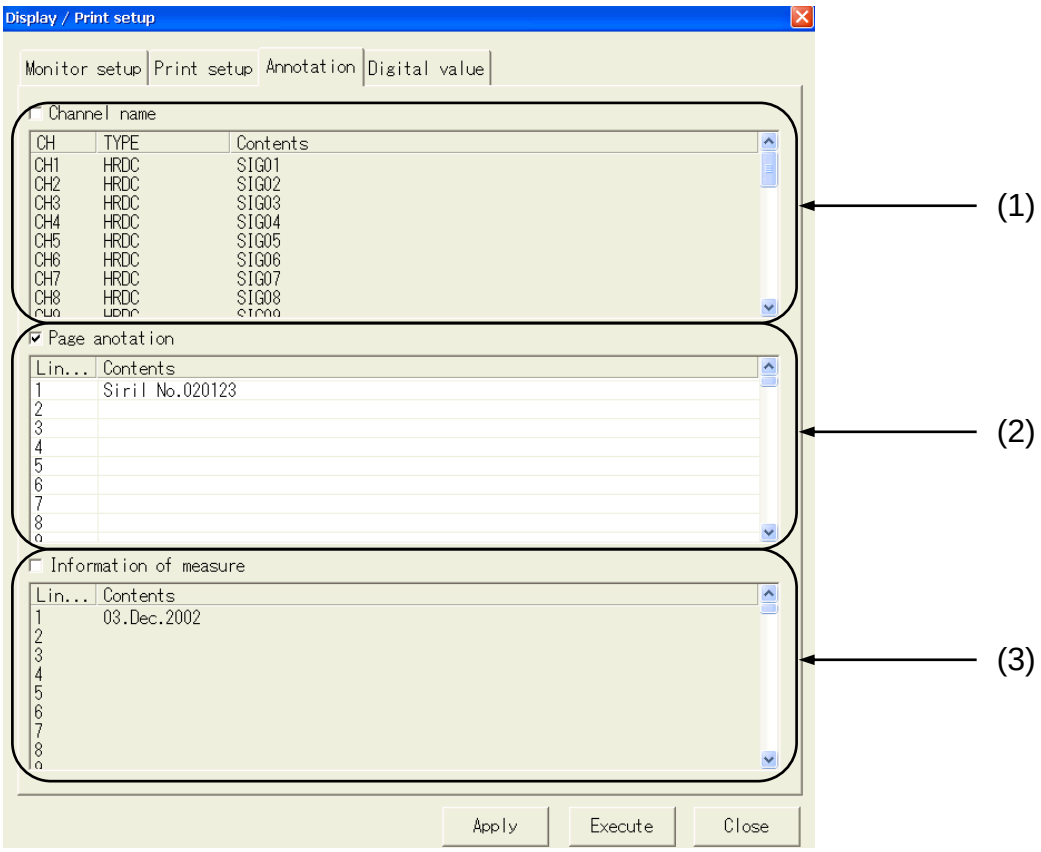
- "Recording time" is data acquisition time. The trigger point is the reference point (0) in the Memory Mode.
- "Date and time" prints the date and time of recording and trigger point (year, month, day, hour, minute, and second).
- "Number of data" is the data count. The trigger is the reference (0) in the Memory Mode.

d) Field length setting

This setting sets the length of the feed that is executed after the printing,
When making continuous printing or minimize the chart paper consumption, set the value as small as possible. Conversely, to show the last portion of data that have been recorde set the value as large as possible.

15.3.Annotation Setting

This screen is used to set signal name, user annotation, and measurement information.



(1) Signal name

Signal name for the waveform display area can be set

TIPS Monitor display is made when the signal name indication is ON in 15.1 Monitor Setting

(2) Page annotation

It is possible to set the character strings following the system annotation that overlaps the waveform and its printing ON or OFF.

Page annotation is ON with ☑ (tick).

TIPS Example ☞ 8.3 Print Operations

(3) Measurement information

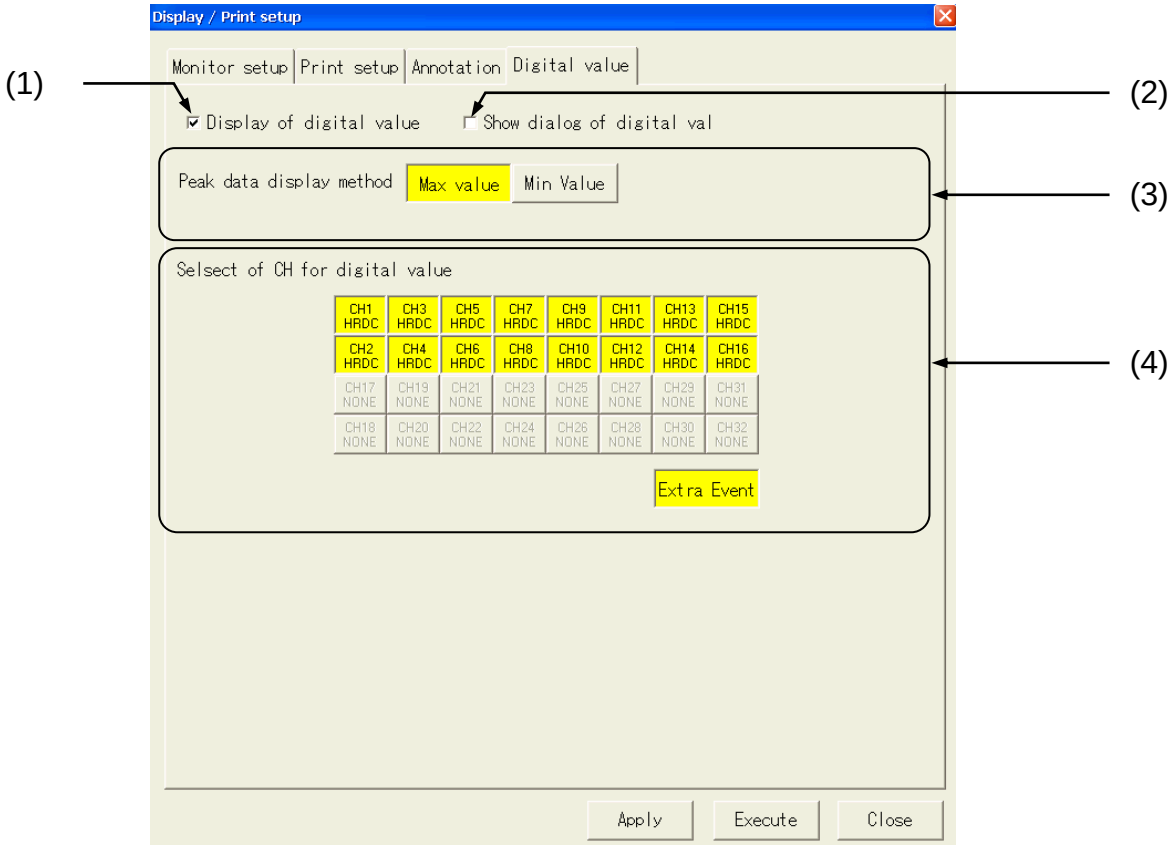
Set the setup and printing for measurement information the top of the chart paper to ON or OFF.

The measurement information is ON with ☑ (tick).

TIPS Example ☞ 8.3 Print Operations

15.4.Digital value representation Setting

This screen is used to set signal name, user annotation, and measurement information.

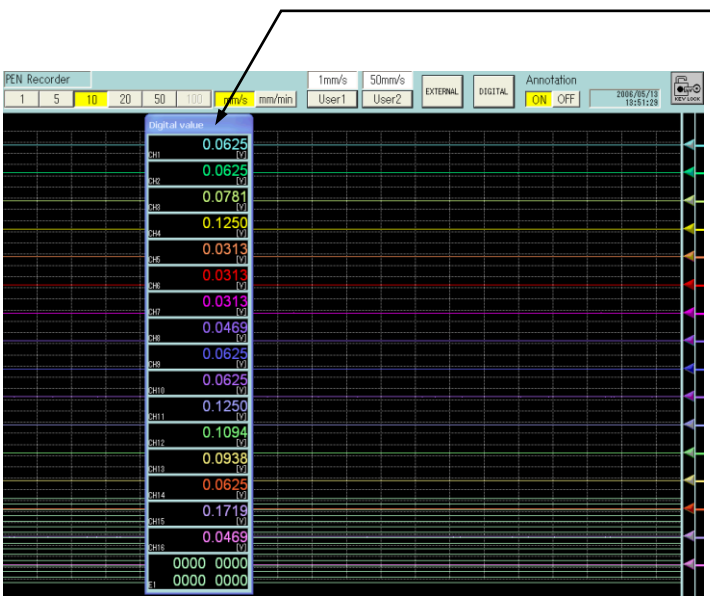


(1) Digital value representation

Digital value representation in the waveform display area is set to ON or OFF. The digital representation is ON with ☑ (tick)

(2) Digital value representation

The digital value representation is made in the dialog box. The digital value representation in the dialog box is ON with ☑ (tick).



Digital value representation

The dialog box can be moved to any place on the screen. To move it, touch the upper portion of the box, and then move it.

(3) Digital value representation

While the Peak data is referenced on the replay monitor, representation in the maximum value or minimum value can be set.

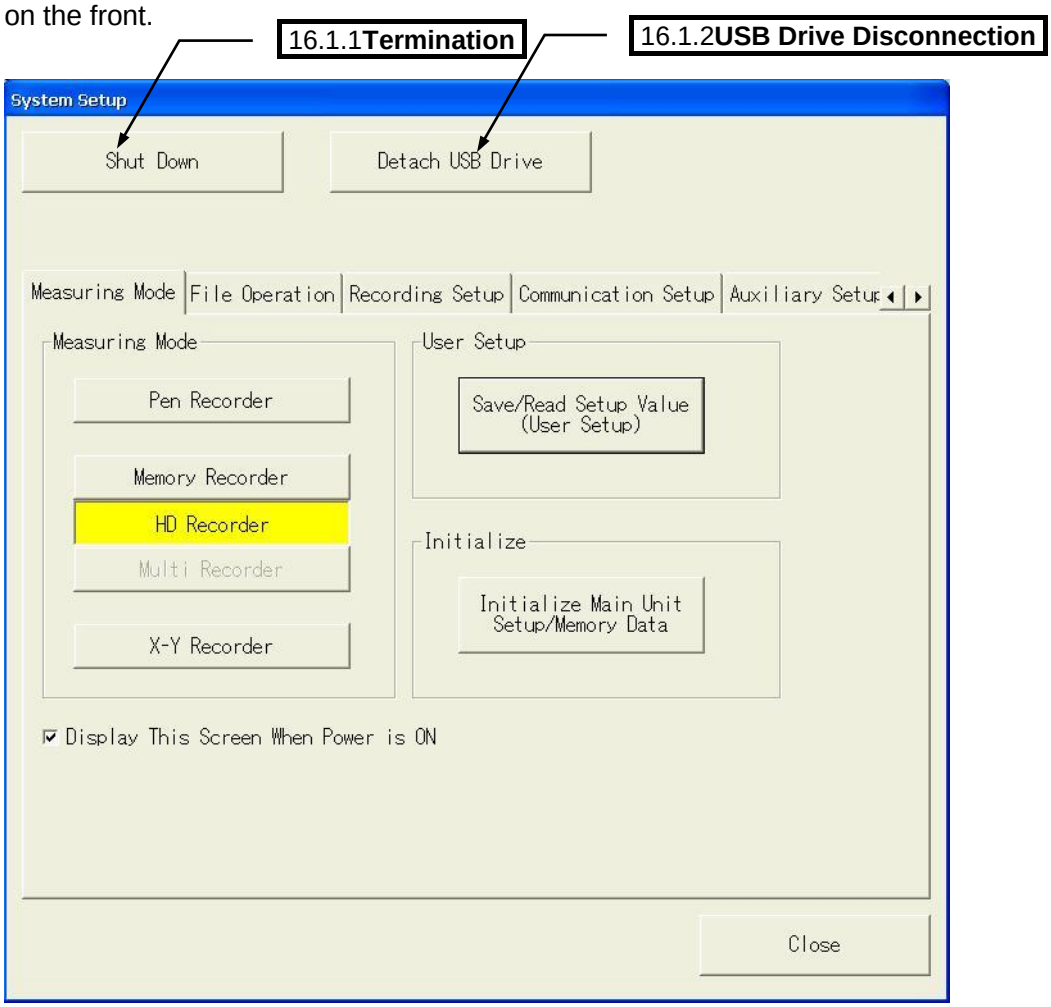
(4) Channels for which digital value representation

Channels for which digital value representation is made can be set.

16. System Setup Other Functions

16.1.Commonly Used System Screen

Termination and USB Storage Disconnection, which are frequently used in the System screen, are placed on the front.



16.1.1. Termination

This button initiates the termination processing of the recorder. After message of “You can shut off the power” appears, turn off the power of this recorder.

Block data that is stored in a memory is saved. The data that is saved resumes at the next startup of the recorder.

TIPS When the block of “Don’t save wave memory” is ticked after ticking of the box of “Shit Down”, it is possible to do much rapider termination processing

16.1.2. USB Drive Disconnection

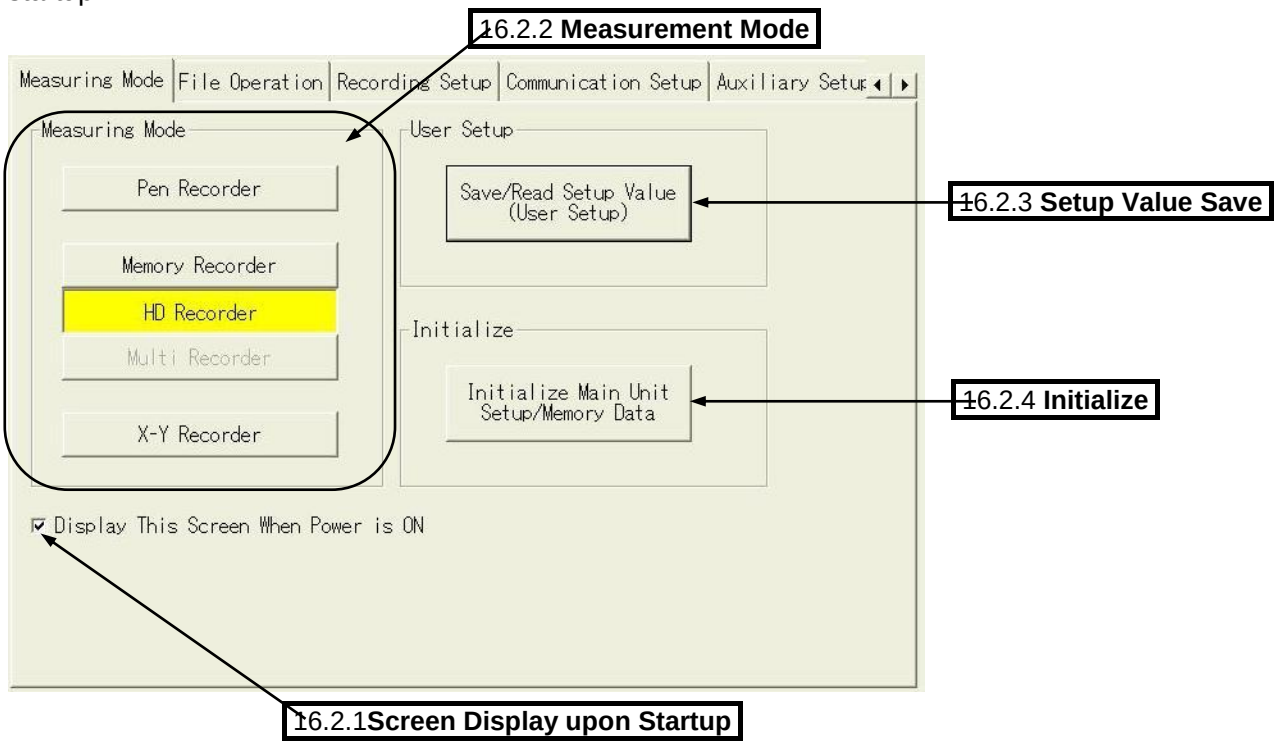
This button is used to disconnect the USB storage devices that are connected to this recorder. After this button is pressed, message of “You can disconnect USB devices” appears. Then, disconnect the USB device.

NOTE USB storage device disconnection should be made while recording is not made. If the disconnection is made during recording, an error may occur. Use the USB storage device that is recommended by NPPON AVIONICS.

16.2. Measurement Mode

In the Measurement Mode screen of the System screen, measurement mode settings for this recorder as well as saving, readout, and initialization of all setup information can be made.

Pressing the System button and the Measurement Mode tab on the operation panel displays the following screen. The same setup can be made in the Startup Screen that is displayed upon the startup.

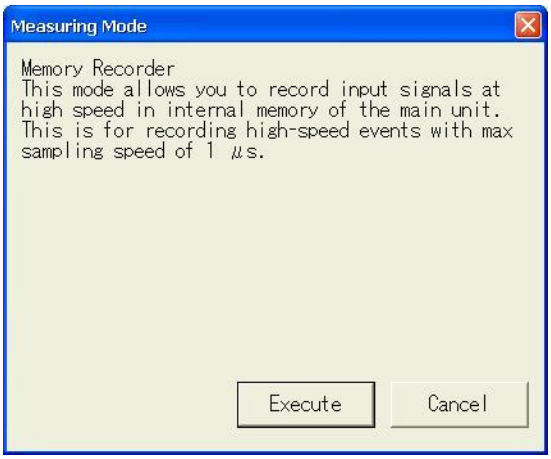


16.2.1. Screen Display upon Startup

This screen can be opened upon startup when the check box is ticked. If this recorder is used under the condition whose measurement mode is fixed, recording can be made immediately after the recorder is turned on when this check box is not ticked.

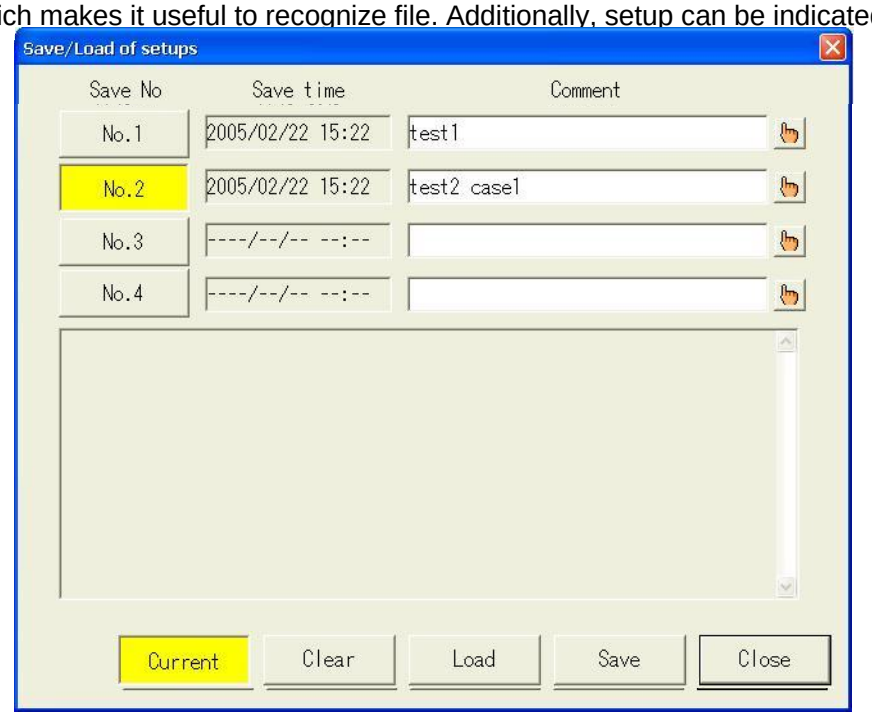
16.2.2. Measurement Mode

Measurement mode can be changed. Pressing the measurement mode button displays the Window for confirmation. To execute, press the OK button. The Input Monitor screen appears. The following screen appears when the Memory Recorder button is pressed. The same screen appears for other measurement mode.



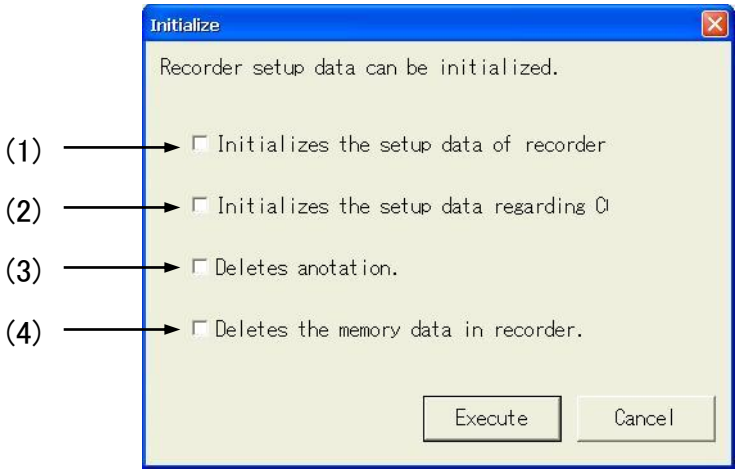
16.2.3. Setup Value Save and Readout

The settings of this recorder can be saved in or read from the internal memory. Comments can be entered, which makes it useful to recognize file. Additionally, setup can be indicated as a list.



16.2.4. Initialize

The setup of this recorder can be resumed to the factory default. Also, the item to be initialized can be set.



(1) Recorder setup data

The setup status can be resumed to the factory default.

(2) Setup data related to communication

Communication setup can be initialized to the factory default.

(3) Annotation

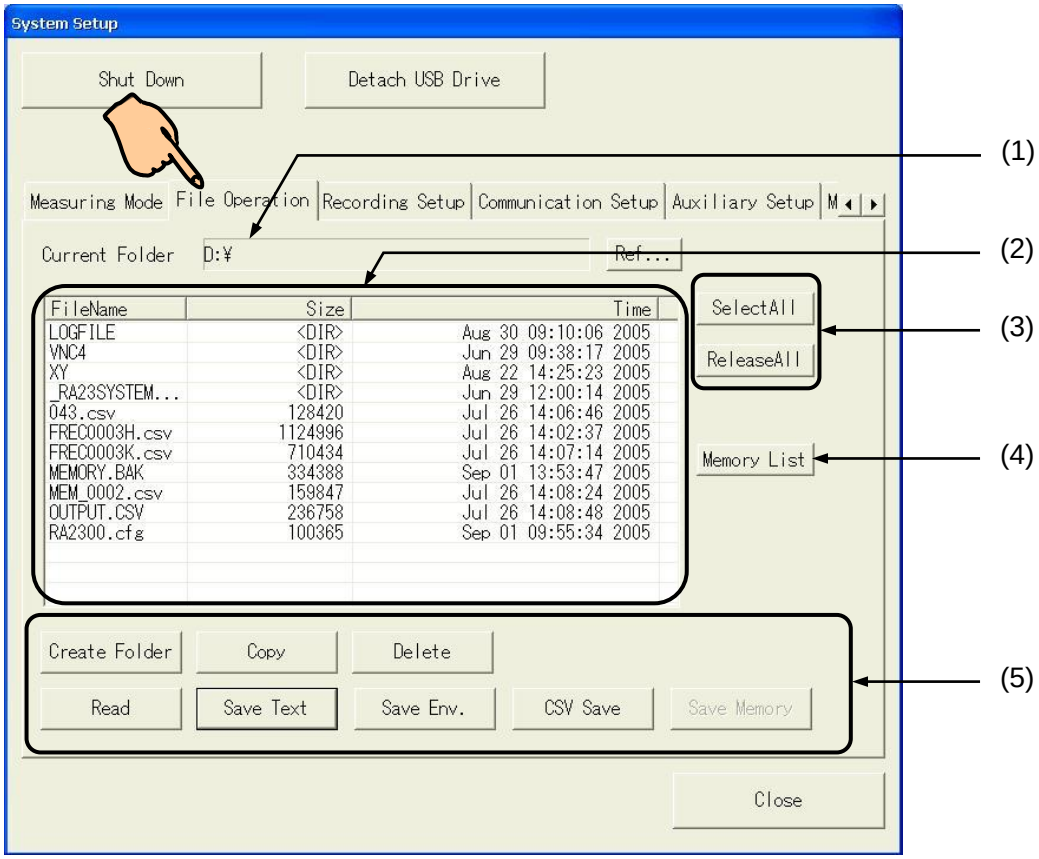
Deletion of user page annotation, measurement information, and signal name are made.

(4) Internal memory data

Data in memory blocks are all deleted.

16.3. File Operations

File operations are made for the drives through the File Operation tab on the System screen. Press the System button on the operation panel and the File Operation tab to show the following screen.



(1) Path for referencing or saving target

Path for referencing or saving target is displayed. Pressing a button opens a dialog box, and then can change the path.

(2) List

Target reference file folder list is displayed. The selected item is highlighted. Change can be made through direct touching.

(3) Batch selection

Select two or more files in a folder. Copy or Delete is available for batch selection file.
In case of "Bulk-Delete",data is very important for Recorder.So system shows on the screen, "Delete" or "keep" for comfermation individually.

(4) Memory List button

The status of the memory on the inside is displayed in the list part.

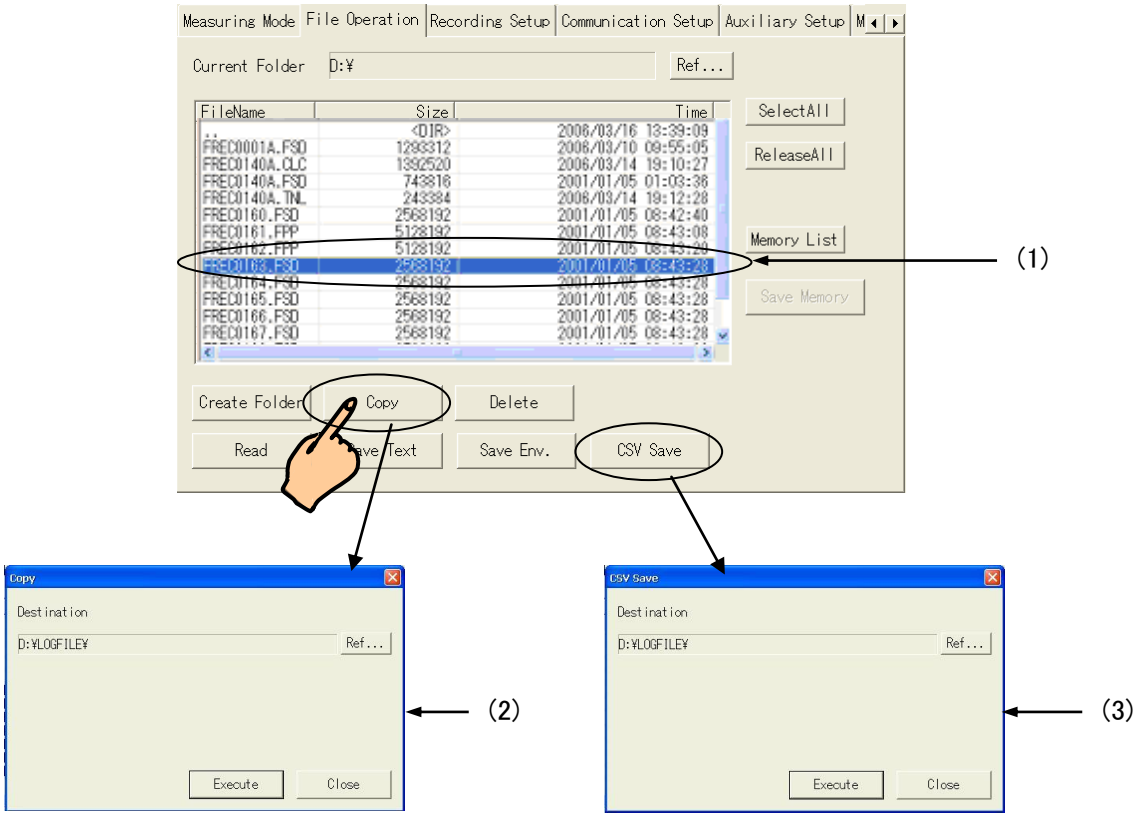
(5) Other file processing

Several file processing is made for the file in the target reference path. For more information, see the description after the next page.

NOTE To protect the recorder system, writing into the boot drive (C) is prohibited. Thus, file creation and deletion in the C drive cannot be made.

16.3.1. Copy

Copy of selected file or folder is made. The following screen appears when the Copy button is pressed after selecting copy source items in the File Operation tab in the System screen.



(1) File folder for copy source items

You can specify source files for copying in file operation screen by touching these files.

Please use this function for assuring copying files.

TIPS Copy for several files is available when batch selection is made in the File Operation screen.

(2) Destination file for copying

It is specifying destination file for copying. By pressing key buttons, a dialog is opened and you can change your destination file.

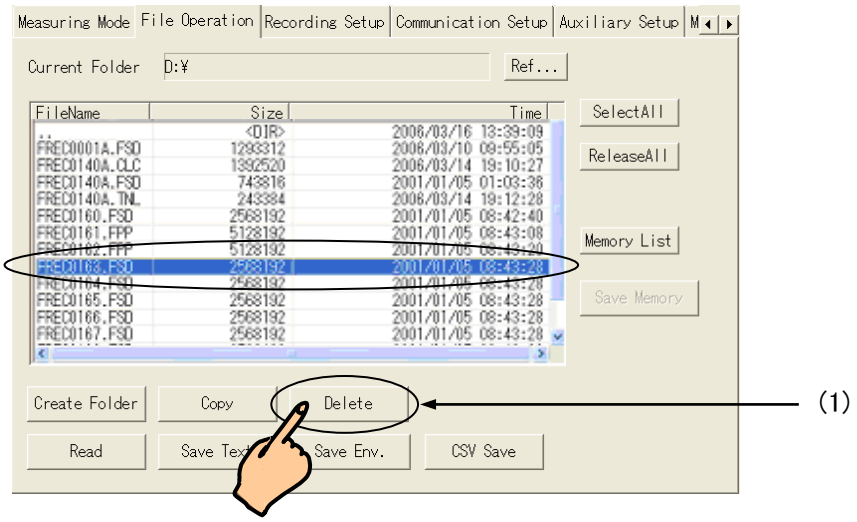
(3) CSV save

If these copy source items saved as "FSD""FPP" and "DRT" extensions, these files can be modified and saved their format as CSV files.

TIPS “Time axis range”, “Thinning-out”, “Header”, and “Delimiter code” can be specified in Output Settings in the Replay screen. For more details, see Chapter 14 Replay Display.

16.3.2. Delete

Selected files or folders are deleted. The following screen appears by pressing the Delete button after selecting the deleting files or folders in the File Operation tab in the System screen.



(1)Delete

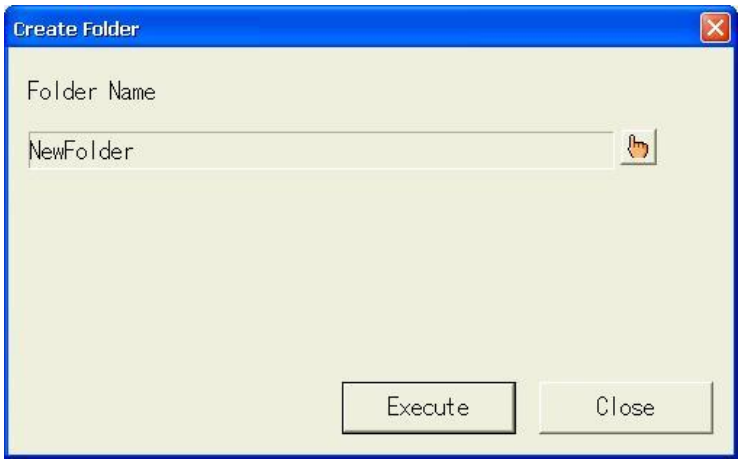
Selected files or folders are deleted. The following screen appears by pressing the Delete button after selecting the deleting files or folders in the File Operation tab in the System screen.

NOTE

The deleted files and folders cannot be recovered. Take due care before deleting.
When the file in the folder is displayed on the
Replay screen, it is not possible to delete it.

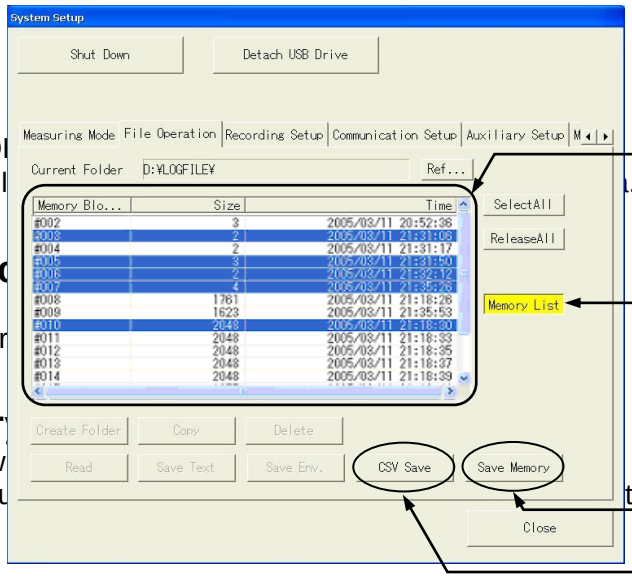
16.3.3. Create Folder

New folder can be created under the current target reference folder. Pressing the Create Folder key after moving to the path where a folder is created in the File Operation tab in the System screen. Enter a folder name and press the OK key to make folder.



16.3.4. Save Memory

The block data stored in memory can be saved. The following screen appears by pressing the Memory List button and Save Memory button after moving to the folder where data will be saved in the File Operation tab in the System screen.



(1) Glace Memo

Pressing Memory l .

(2) Memory Bloc

It shows the list of
You can select par

(3) Save Memor

It indicates path w
By pressing the bu target pa

(4) CSV save

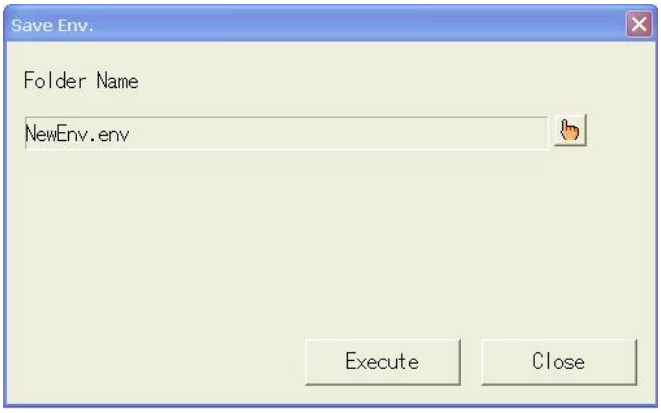
In the case extension of source files are "FSD""FPP"or "DRT", you can save their format as "CSV".

TIPS

In regard to CSV save, "Time Axis Range" "Thinning Number" and "CVS Delimiter" are able to be setup in the Replay screen in Output setting views. For more detail, please see "Replay display", Chapter 14-8.

16.3.5. Save Env.

Setup information can be saved in a file. It is useful to save the setup information in external media or read out it from another RA2300 recorder. The following screen appears by pressing the Save Env. button after moving to the folder where saving is made using the File Operation tab in the System screen. Save Env. Data includes all the setting information as a binary format. In addition to that, if you save annotation of this text information only, push "Save Text" button.



After specifying the information to be saved, press the OK button to save file. The extension of file to be saved is ENV for environment information and TXT for text information.

TIPS The file made by character strings only has an extension of “txt”. A text editor can read this file, accordingly. Conversely, a text file edited by a personal computer can also be read by the RA2800A.

NOTE If an environment file is read by another RA2800A, the setup in which hardware configuration is different is displayed to be default.

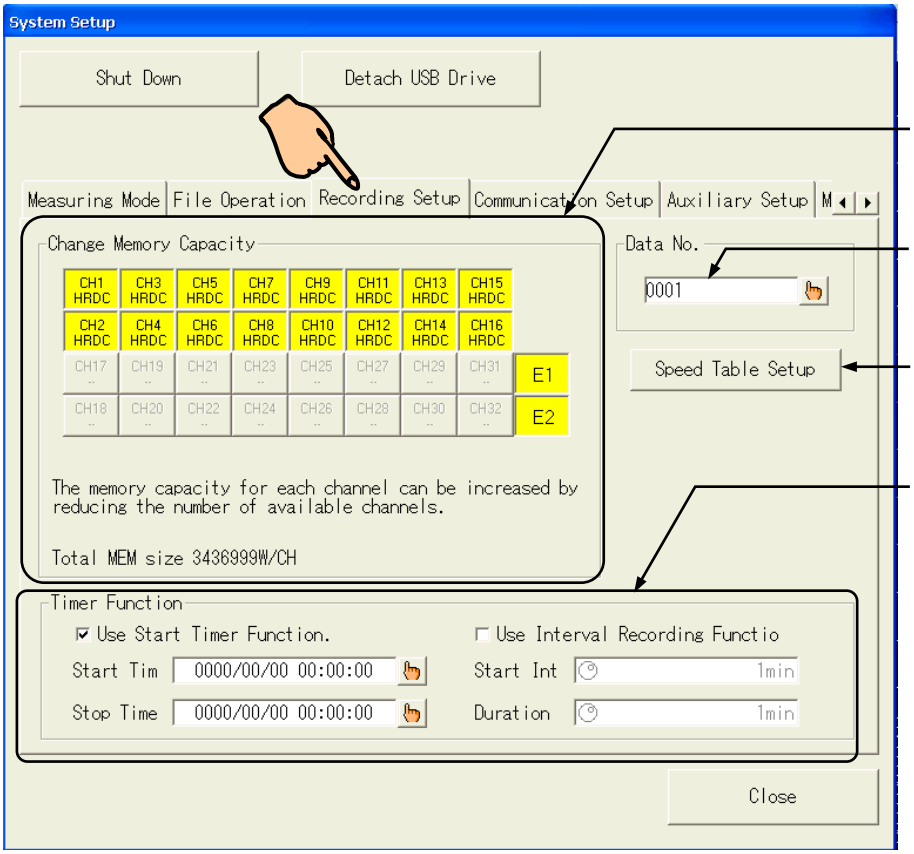
.

16.3.6. Read

The selected environment and text files can be read in this recorder. The following screen appears by pressing the Read button after selecting a readout file using the File Operation tab in the System screen

16.4. Recording Settings

Press the System button, and then press the Recording Settings tab. The following screen appears.



16.5.1 Recording Channels

16.5.2 Data No. Setting

16.5.3 Recording Speed Table

16.5.4 Timer Recording Settings

16.4.1. Recording Channels

By restricting the number of recording channel, memory capacity per channel for memory recording can be increased. In the System screen, use the Recording Settings. Pressing Recording Channel displays the following table.

TIPS

Channels excluded from the recording target are neglected. Even a unit is installed, nothing is displayed. If recording channel settings are changed, the memory size changes, thereby deleting the memory block data.

TIPS

E2 denotes the marking information of the internal function of the RA2800A.
By setting E2 to ON, (☞ 7.1.3 Recorder Event Detailed Setting), Marking is made on the recorded data by pressing the Manual Trigger Marking switch on the operation panel.
Event jump can be made after the trigger detection point (marking information) is researched.
For details of Event Jump, ☞ Refer to 14.6 Jump.

16.4.2. Data No. Setting

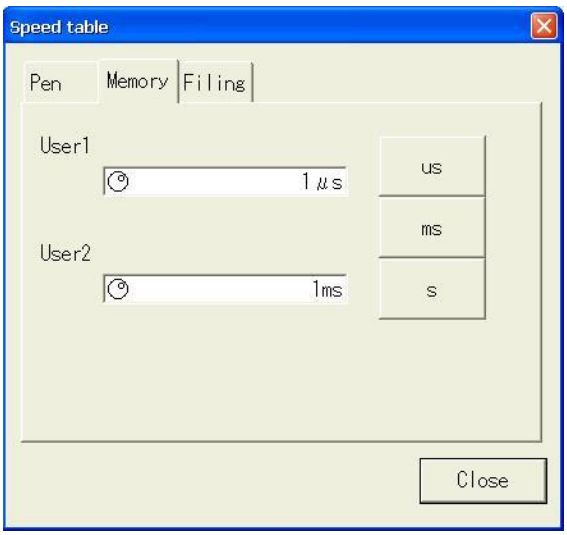
The number that is assigned to the measurement data can be changed. In the System screen use the Recording Settings screen. Pressing the button of Data No., displays numeric pad, enabling value data entry.

TIPS

The data number increments automatically after recording. This function is useful to identify the recording data order. The data number can be confirmed on the upper portion of the waveform printing and replay monitor.

16.4.3. Recording Speed Table

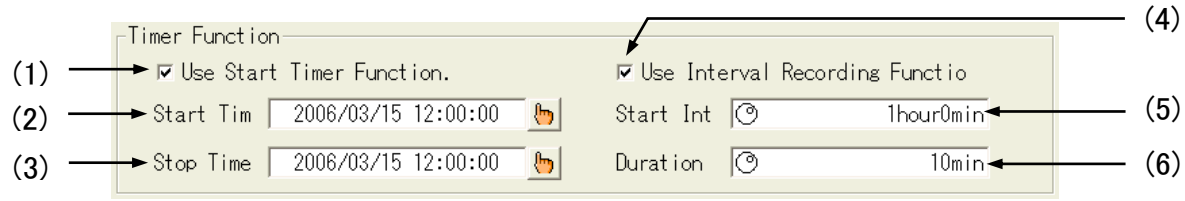
User can sets the speed for waveform chart printing, memory recording, and HD recording. Press the System screen, and then press the Recording Settings screen. Pressing the Speed Table button, displays the following screen.



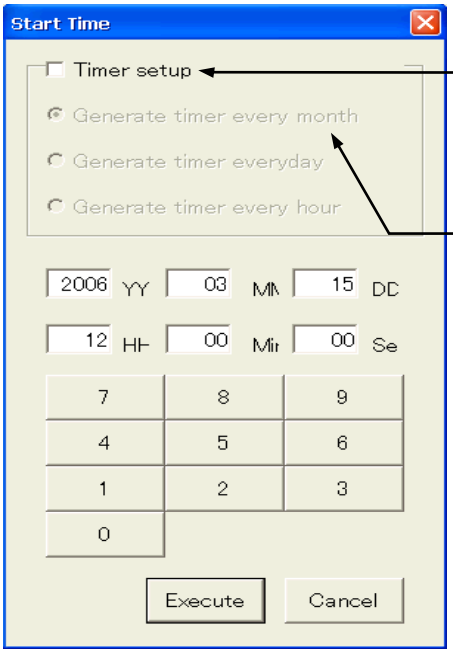
16.4.4. Timer Recording Settings

Recording start and finish is controlled by time.

Recording start and finish can be set to the time whose timer function can be validated. Recording operation in constant interval and constant time is available. Press the System screen, and then press the Recording Setting screen. opens the following screen. (Please input the Stop time when you use the start timer and Interval function)



Select “start time” or “start timer function” setting and then make setting for “Start time” or “Finish time”.



By removing a check in interval function, you can specify year, month, day, time, minute and second to be activate, whereas remove the check you cannot specify all these.

E.G. If you specify “Every month”, year and month becomes unnecessary to setup. Day, time, minute and second are only to be able to be specified.

TIPS Besides the setting of “Every month”, “Every day” and “Once an hour”, a combination of “interval setting” makes more varies setting possible.

Combine with “Start timer function”, using the “interval function” makes possible to repeat Start/Stop in certain interval regardless of Standard time.

Example: To make 20-minute recording every hour from 0:00 a.m. on December 24, 2004 to 0:00 a.m. on the next day.

(1) Tick the box for “Using Start Timer Function.”

To use timer function, add a check mark.

(2) Select the starting time (2004/12/24 0:00)

(3) Select the finish time (2004/12/25 0:00)

(4) Tick the box for “Use the interval function.”

TIPS

Add a check mark only when repeated recording is made.
Do not tick if the measurement is only once.

(5) Specify the start interval of time (1 H)

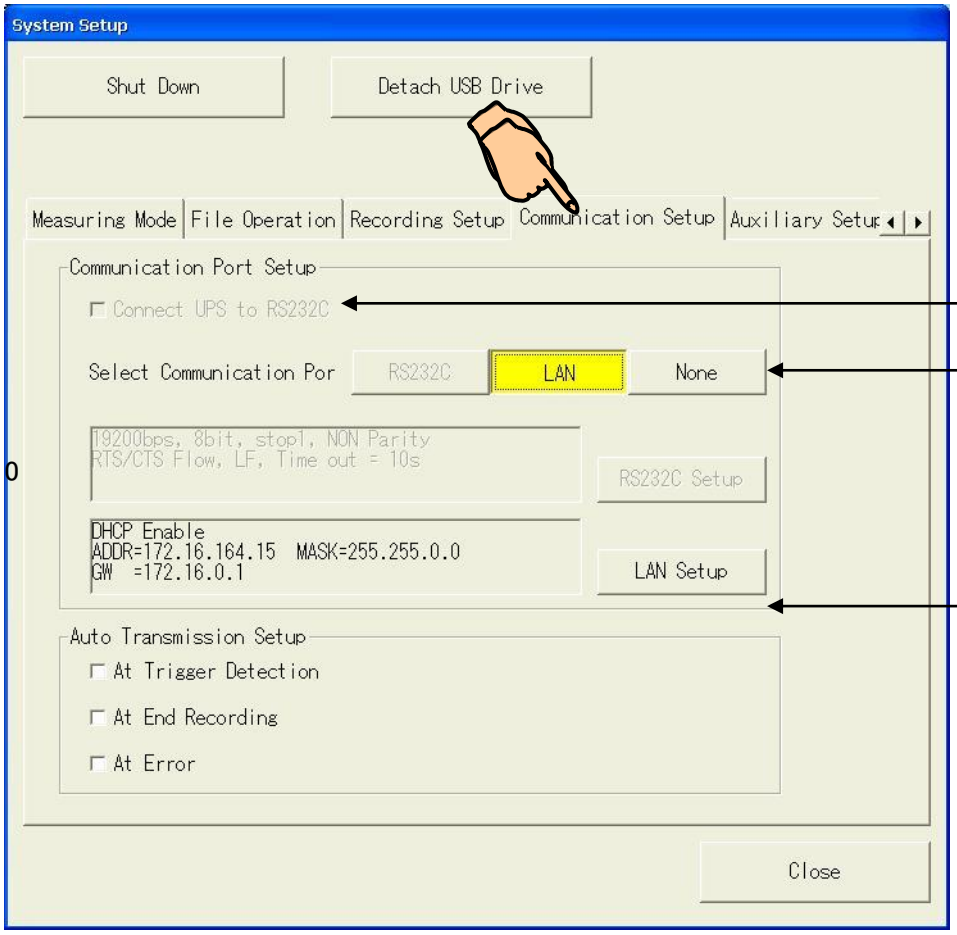
(6) Specify the operation time. (20min)

TIPS

The actual recording operation time may be shortened depending on the recording length settings. When the timer function is set, a symbol of clock is displayed upper part of the screen. (It is not displayed in the pen recorder and the X-Y recorder mode.)
The next recording start time is indicated near the clock. See below.

16.5. Communication Settings

Press the Communication Settings tab on the System button on the Operation Panel. The following screen appears.



NOTE To use the USP or RS-232C function, RS-232C Unit (RA23-142, optional) is necessary.

(1) UPS Connection

Connection to uninterruptible power supply (UPS) can be made by ticking the check box. The UPS avoid sudden shutdown of the recorder upon the electric power outage, enabling safe shutdown of the recorder.

(2) Communication Function

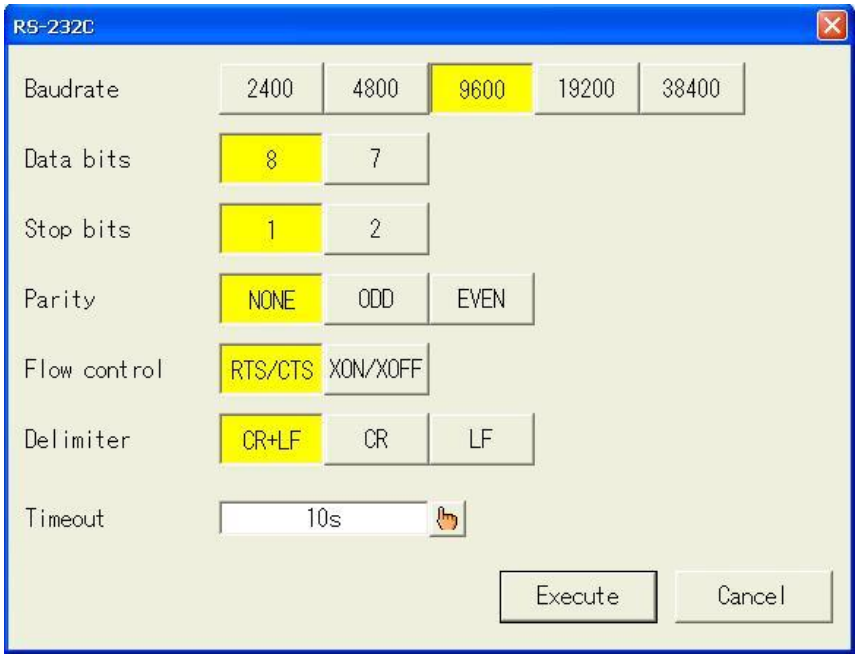
The control of RA2300 through a communication port is possible through this function

Setup	Description
RS-232C	Control of this recorder through RS-232C can be made. (Cannot be used with the UPS connection)
LAN	Control of this recorder can be made through TCP/IP port No.2300.
None	Control of the recorder through a communication port is disabled.

NOTE Communication control for this recorder uses dedicated communication commands. For more detail, refer to separate volume instructional manual, "RA2000 series communication User's manual (Integrated Version)". This charge-free manual, PDF file is available by downloading though our home page with your user registration.

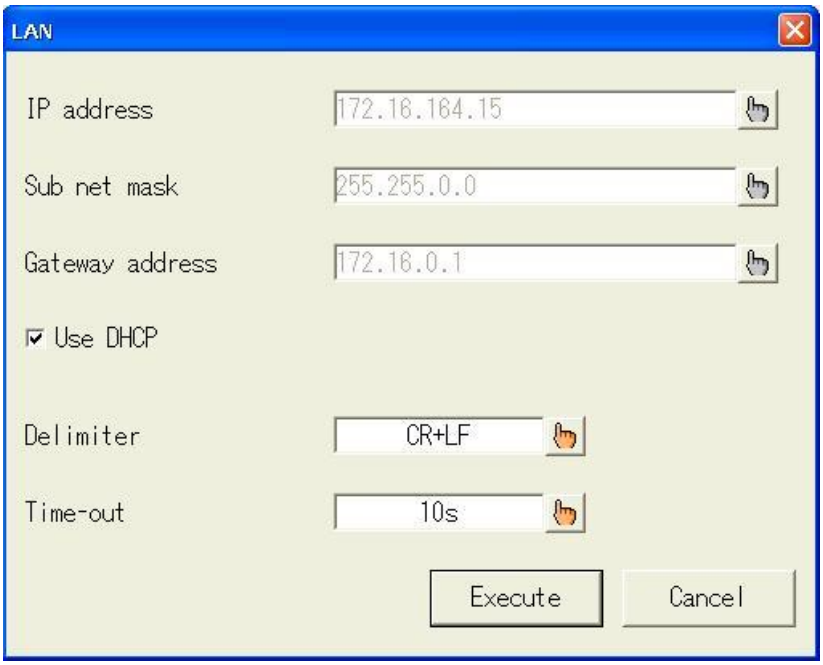
(3) RS-232C Settings

RS-232C communication protocol can be set. Pressing this button displays the screen below. Set the RS-232C conditions in this screen.



(4) LAN Settings

Communication protocol setup for the LAN connection is made. Pressing this button displays the screen below. Set the LAN conditions through this screen.



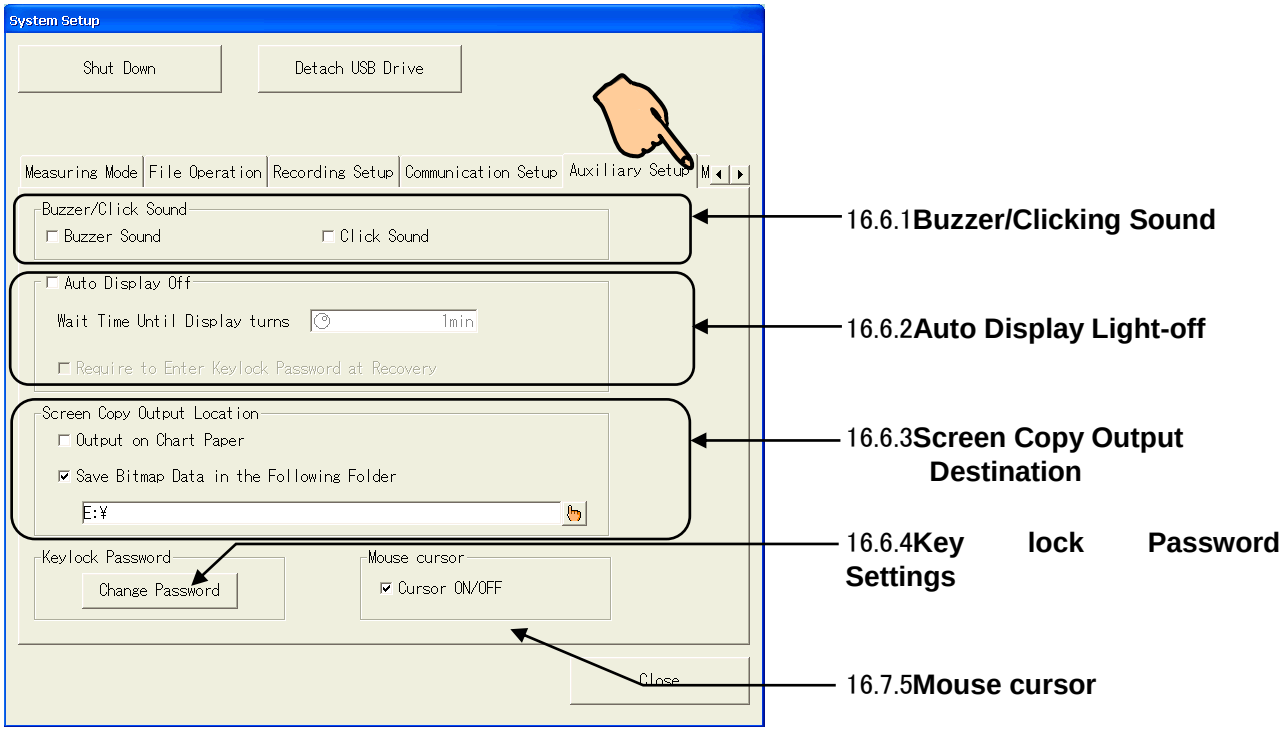
(5) Automatic Message Output

Character code “1” is output when one of the conditions “Trigger detection”, “Recording finish”, “Error generation” is generated in RS-232 or LAN connection.

This function may be used in the case where an operation enters into the next step when the connection target supports this character code. For details, refer to separate volume “RA2000 Series Communication Command User’s Manual (Integrated Version)”. This charge-free manual, PDF file is available by downloading though our home page with your user registration.

16.6. Auxiliary Settings

Press the System button on the Operation Panel, and then press the Auxiliary Settings tab. The following screen appears.



16.6.1. Buzzer/Clicking Sound

Buzzer and clicking sound can be set to ON or OFF in the check box (1) on the Auxiliary Settings screen. Buzzer sound upon error generation and clicking sound upon pressing on a touch button can be turned OFF its sound.

16.6.2. Auto Display Light-off

Back light-off can be set using the keys (2) on the Auxiliary Settings screen. This function turns off the back light if no entry from a button is made for a specified time period. Upon an entry through a button, the back light turns on.

TIPS

When check box for “Enter key lock password at resume,” the password must be entered when back light is resumed from display back light off. The password is set using button (4).

16.6.3. Screen Copy Output Destination

Output destination for screen copy that is executed in the Screen Copy on the Operation Panel can be set using buttons (2) on the Auxiliary Settings screen.

● Ticking the box for “Print on chart paper.” prints out the contents of the screen in a black and white image.

● Ticking the box for “Save bitmap data in the following folder.” exports the contents of the screen in a color bitmap file.

TIPS

The file name to be saved is made by data and serial number.
Example: If save is made on Jan 11, 2005, the file name will be IMG20050111_0000.bmp. The number following “_” will be serial numbers, e.g. 0000, 0001.

16.6.4. Key lock Password Settings

Pressing button (4) on the Auxiliary Settings screen displays character entry screen and enables registration of key lock password. The key lock password is used to resume from the key lock condition. To lock the screen, press the icon on the upper right.

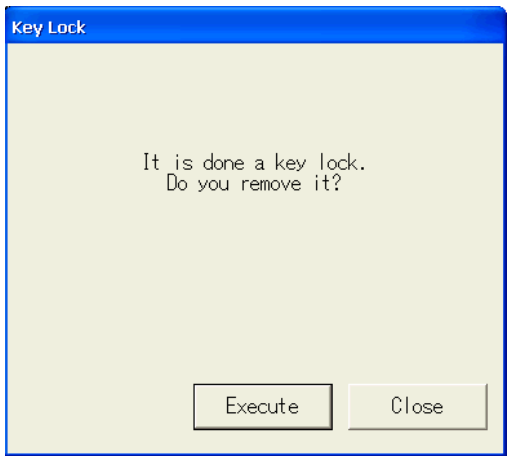
NOTE Please keep and hold your key lock password in secure place. Loss of your key lock passes causes en-unable you to release the lock.

NOTE To unlock, enter the password. If any password has been set, key lock can be unlocked without password.

A button upper right side of screen, by pressing the button you can lock the recorder and another pressing makes the lock release to Normal

Normal

Locked



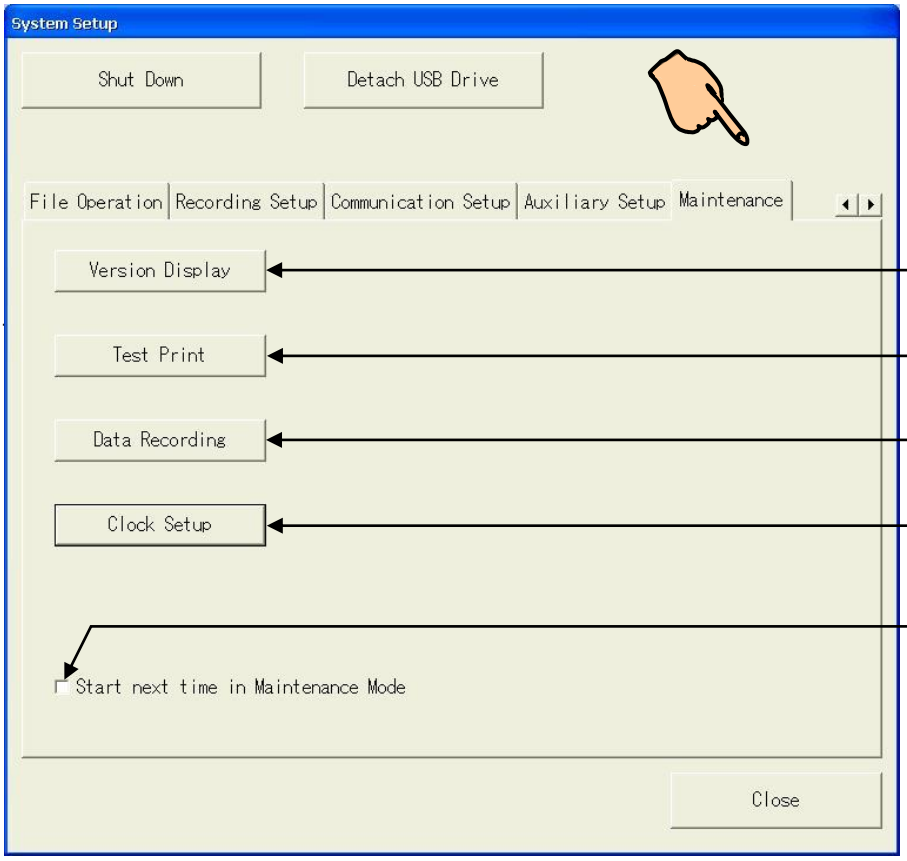
TIPS When you select "Disable Panel Keys", the Keys in operational panel such as "Input signal" "Replay" "Amp" "Recording Condition" "Trigger" "Display/Printing" "System" becomes inactivated.
When you select "Disable Operational Panel Keys", all the Keys in operational panel becomes inactivated.

16.6.5.Mouse cursor

(5) in [Auxiliary Setting] is used to set ON or OFF for whether the mouse cursor is displayed or not.
To make settings in RA2800A using the USB mouse, set to ON to indicate .

16.7. Maintenance

Press the System button on the Operation Panel and Maintenance. The following screen appears.



16.7.1 **Version Indication**

16.7.2 **Test Print**

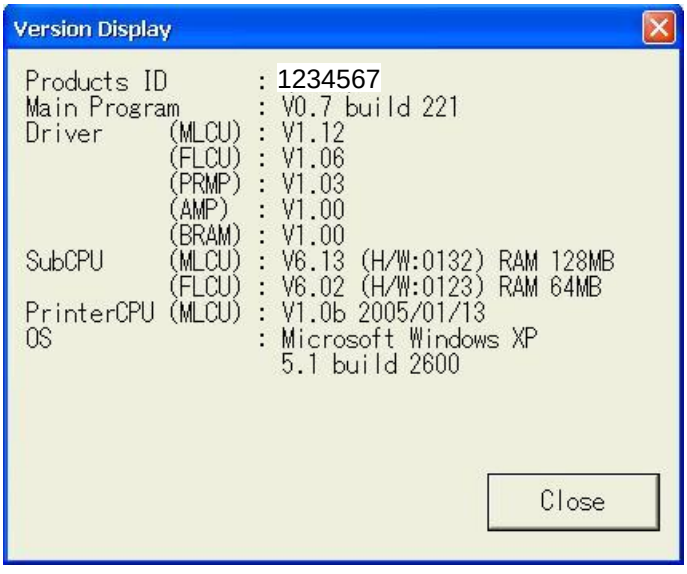
16.7.3 **Data Printing**

16.7.4 **Time Calibration**

16.8.5 **Maintenance mode**

16.7.1. Version Indication

Product serial number and program version are indicated. Press the Version Display button on the Maintenance screen in System. The following screen appears.



NOTE If any accident happens during use, our staff may inquire of the version number.

16.7.2. Test Print

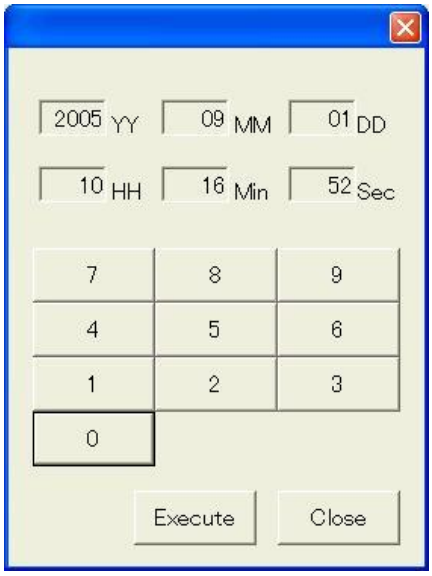
Test printing is made in order to check the printer printing quality. Pressing the Test Print button on the Maintenance screen in System opens the confirmation screen. Pressing “Execute” button starts the test print. To close, press “Cancel” button.

16.7.3. Data Printing

The measurement mode is set to Data Chart Print. In this mode, measured values are printed output in character strings.

16.7.4.Time Calibration

Internal watch is set. Press the Clock Setup button on the Auxiliary Settings screen in System. The following screen appears. Select window whose value should be set among windows of year, month, day, hour, time, minutes, and second. Enter a value and press OK button. Time can be set.



16.7.5.Maintenance mode

To start up with the Maintenances Mode, tick “Start up with the Maintenance Mode at next startup”, and then reboot. Then, the Maintenance Mode screen will appear. This Mode is used to upgrade the software version or perform other maintenance. As this setting may affect the system, use this Mode only when necessary.

17. How to Use Optional Units

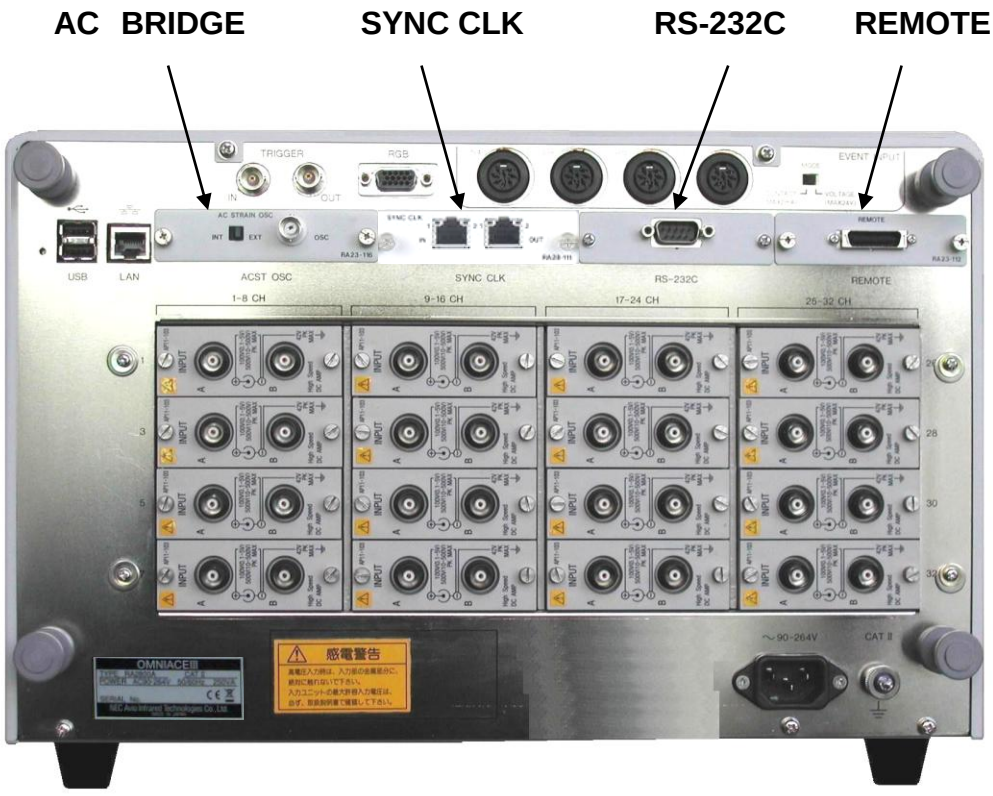
17.1.Connecting optional units

⚠ WARNING Please insert blank panel into empty slots when optional units are not connected in order to avoid electrical shock and to prevent damages to the recorder unit caused by irruptions of extraneous substances

⚠ CAUTION Please turn the power off and unplug power strip from the recorder unit before connecting or disconnecting optional units. If optional units are connected or disconnected while the power of the recorder unit is ON, it may damage the optional unit and/or the recorder unit.

⚠ CAUTION When exchanging units, do not touch internal parts, Internal parts may be damaged if touched by static body. Do not touch anything except for the panel when exchanging units. This may cause damages.

⚠ CAUTION When connecting optional units, please be sure of top and bottom of the units and insert units in accordance with the guideline specified in input slot area. Tighten the screw with flat-head screwdriver after connecting optional units to the recorder unit. Connecting optional units requires a flat head screwdriver (screwdriver's end must be thinner than 0.65 mm).



Above

17.2. Remote Unit (RA23-144)

17.2.1. Overview

Start/Stop of recording/printing, chart feed, marking, input/output for synchronized operations can be controlled by electric signals. Also, waveform printing synchronized to an external pulse signal (chart feed) and memory acquisition are possible. Other features include prevention of data file destructions by electric power failure and output of recorder unit error, etc. by using external input.

17.2.2. Connector/Pin Location

Connector Type : 8850-028-170-LD

Pin No	Signal name		Attached cable		
			Color of cable	Color of marks	Mark indication
A 1	+	SYNC IN	Amber	Red	I
A 2	-			Black	
A 3	+	REC IN	Gray	Red	I
A 4	-			Black	
A 5	+	MARK IN	White	Red	I
A 6	-			Black	
A 7	+	FEED IN	Yellow	Red	I
A 8	-			Black	
A 9	+	UPS DOWN	Pink	Red	I
A 10	-			Black	
A 11	+	RESET IN	Orange	Red	I
A 12	-			Black	I
A 13	+	EXT SAMPLE IN	Gray	Red	I
A 14	-			Black	I
B 1	+	SYNC OUT	White	Red	I
B 2	-			Black	I
B 3	+	REC OUT	Yellow	Red	I
B 4	-			Black	I
B 5	+	MARK OUT	Pink	Red	I
B 6	-			Black	I
B 7	+	FEED OUT	Amber	Red	I
B 8	-			Black	I
B 9	+	ERROR OUT	Gray	Red	I
B 10	-			Black	I
B 11	NO	POWER (Relay contact)	White	Red	I
B 12	COM			Black	I
B 13	N.C	N.C COM	Yellow	Red	I
B 14	-			Black	I

*** 0-5V Input voltage**
LOW Level Less than 0.5 V
HIGH Level more than 4.5 V

*** 0-5V output voltage**
LOW Level less than 1.0 V
(IOL = less than 5 mA)
HIGH Level more than 4.0 V
(IoH = less than 5 mA)

*** Relay contact**
Power Current 25 mA
Power Voltage less than 50 V

17.2.3. To Synchronize to External Pulse and Perform Waveform Chart Printing and Printing

Waveform recording, input monitor, filing acquisitions can be synchronized to external pulse. Instructions on how to connect remote terminals and how to set up the recorder unit are explained in the below.

(1) Connecting external input pulse signal

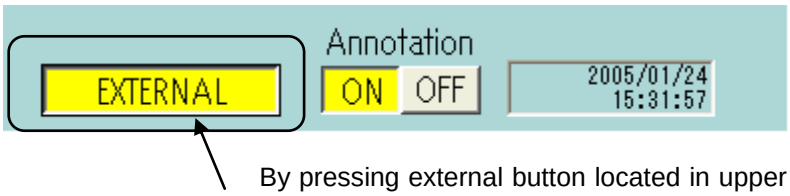
To print waveforms synchronized to external pulse signal, use the A1 pin (SYNC IN) of remote terminals. For input monitor and filing acquisitions, input external signal to synchronize in the A13 pin (EXT IN).

Paper Feeding Pitch Setting	SYNC OUT Pulse Output Frequency	Maximum Input Frequency
0.1 mm/pulse	(Paper feeding speed: mms)/0.1mm(Hz) Example: 50mm/s→500Hz, 1mm/min→approx.0.167Hz	500Hz

(2) Setting the recorder unit for external synchronization

a) Set the measurement mode of the recorder unit to Pen Record mode.

b) In the screen for speed/recording condition setting, set chart speed to External Synchronization.
[Monitor and acquisition speed] will also be set to external synchronization by this setup.
☞ **[8.1. Screen Operation]**



By pressing external button located in upper right of the Pen Recorder screen, the color will change and external synchronization will be set.

(3) Start recording

Once the signal connection of remote terminal is established and the recording speed is setup to external synchronal recording, it is now ready to perform external synchronized recordings. By pressing the Start button, external pulse will be synchronized and acquisitions and recording of waveforms will begin

TIPS

By inputting the same synchronized external signal into the A1 pin (SYN IN) of remote terminal and the A13 pin (EXT IN), waveform printing, display of input monitor, and recording can be performed simultaneously. This is valid under Pen Recorder, Multi, HD Recorder mode.

17.2.4. Memory Acquisition Using External Sampling

Described below are the instructions to perform acquisitions using external samples.

(1) Connect external input sampling signal

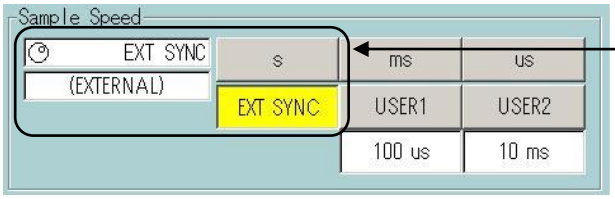
Connect the signal to use into the A13 **(EXT IN)** pin located in the backside of remote terminal. Please use the A14 pin for the common.

Recorder Mode	Maximum Input Frequency
Memory Recorder	10kHz
HDD Recorder	100Hz

(2) Set recorder unit to external synchronous setting

a) Set measuring mode of the recorder unit to Memory Recorder mode.

b) Set the Sampling rate to External Synchronization in detail setting for speed and condition screen.
Monitor/Recording Speed will be set to external synchronization by this setup.
☞ **[9.2.2. Memory Recording Condition Setup Block].**



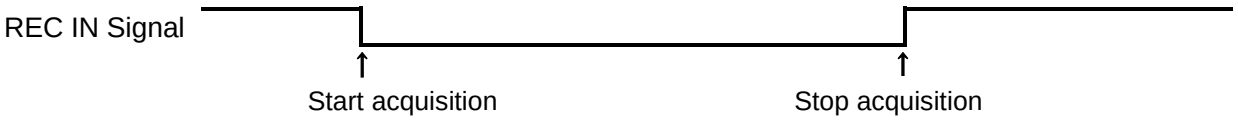
By pressing external synchronization button, the color will change and sample speed will be set as external synchronization.

(3) Start recording

When you setup signal connection for remote terminal and external synchronization in sampling speed setting, the recorder is ready. Pressing the “start” button here will synchronize the external pulse and acquisition to the memory will start.

17.2.5. Start/Stop recording (Start/Stop button)

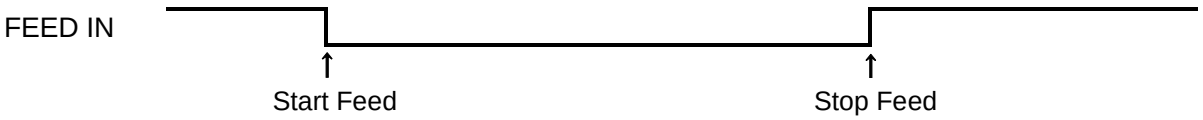
It functions the same way as pressing the Start button on the panel and it starts acquisition. The A3 pin (REC IN) of remote terminal is controlled externally. For the common, use the A4 pin.



Acquisition will start when the falling edge of the signal is detected in the low level, and continues until the rising edge is detected, once rising edge is detected, acquisition will be stopped.

17.2.6. Chart Feed

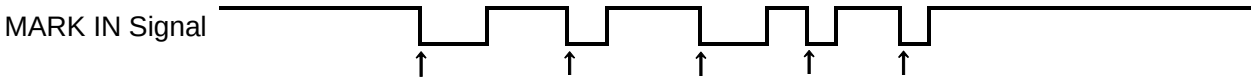
It functions the same way as pressing the Feed button on the panel and it starts to blank feed recording chart paper. The A7 pin (FEED IN) is controlled externally. Please use the A8 pin as the common.



Feed will start when the falling edge of the signal is detected, and continues in low level until the rising edge is detected, one rising edge is detected, feed will be stopped.

17.2.7. Mark Printing

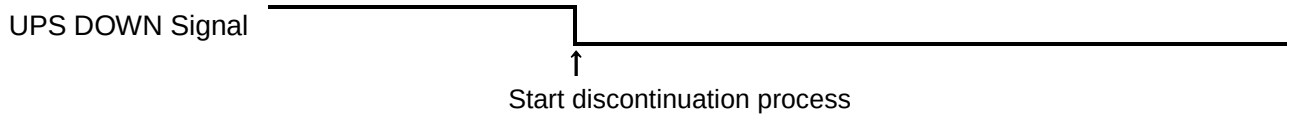
It functions the same way as pressing “mark printing” button on panel key and it prints marks. This becomes valid when the recorder unit is performing real time recording. The A5 pin (MARK IN) of remote terminal is controlled externally. Please use the A6 pin for the common.



Mark is printed when the falling edge of signal is detected during real time recordings.

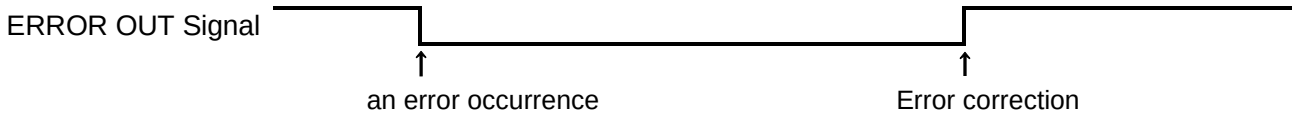
17.2.8. Protecting File Data (UPS DOWN)

This function prevents destructions of files, etc by external protection using uninterruptible power source in case of electrical power failure when accessing files during filing acquisitions of the recorder unit. The A9 pin (UPS DOWN) of remote terminal is controlled externally. Please use the A10 pin for the common.



17.2.9. Monitoring errors on recording areas

Error signal is sent out when an error occurs in printing area (due to out of recording chart paper or thermal head abnormal temperature rise). Signal is sent out to the B9 pin (ERROR.OUT). For the common please use the B10.



Low-level output will continue while an error is occurring. Output occurs independently with no relations to the acquisitions of the recorder unit.

17.2.10. Parallel Operation

This product can perform recording, chart feed, marking functions simultaneously by connecting remote terminals in parallel with multiple recorder units. Instructions below show how to connect (1) as a master recorder unit.

(1) (2)

Name	Pin No.		Name	Pin No.
REC OUT	(B3)	→	REC IN	(A3)
FEED OUT	(B7)	→	FEED IN	(A7)
MARK OUT	(B5)	→	MARK IN	(A5)
SYNC OUT	(B1)	→	SYNC IN	(A1)

Through the connection above, panel operation on (1) controls recorder unit of (2) simultaneously.
※For Input/Output of trigger (TRIG.IN, OUT),please see page ☞ **[13.2.2.External Trigger (TRIG IN).]** ☞ **[13.2.3. External Trigger Output (TRIG OUT)]**

17.3. RS-232C Unit (RA23-142)

17.3.1.Names of each parts and their functions

Function	Connect to host computer and control Omni ace by command.
Specification	JIS X5101（former C6361）compliant

Data Format	Bit Serial
Transfer speed	38400, 19200, 9600, 4800, and 2400[bps]
Transfer format	asynchronous communication, total square transmission method
Start bit	1[bit]
Data bit	7,8[bit]
Stop bit	1,2[bit]
Parity bit	No Parity bit, EVEN, ODD

Mass	Approx. 50g

Pin Alignment

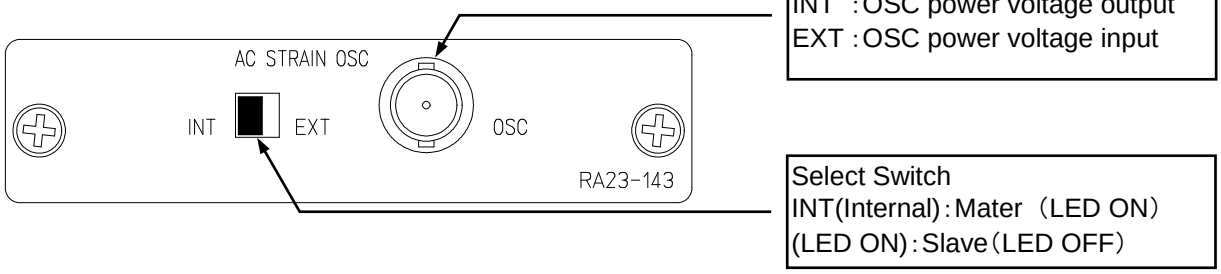
Pin No	Name of signal
1	CD(Carrier Detect)
2	RD (Received Data)
3	SD(Transmitted Data)
4	ER(Data Terminal Ready)
5	SG (Signal GND)

Pin No	Name of signal
6	DR (Data set Ready)
7	RS(Request to Send)
8	CS (Clear to Send)
9	RI(Ring Indicator)

For Event Unit setup, please see page ☞ **[16.14. Communication Settings]**

17.4. AC Bridge Excitation unit (RA23-143)

17.4.1.Names of each parts and their functions

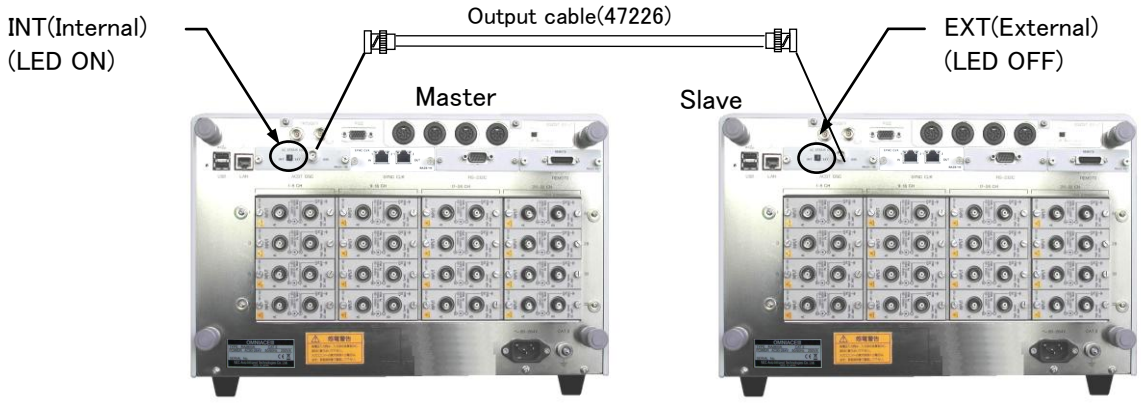


Function	Bridge excitation when 2CH AC Strain Amp Unit (AP11-104) is in use.
Bridge excitation	2 Vrms, sin wave 5kHz
Synchronization	Possible to synchronize with other RA2800A internal AC Bridge Excitation Unit by using synchronization terminals. Master/Slave select switch attached.
Weight	Approx. 60g

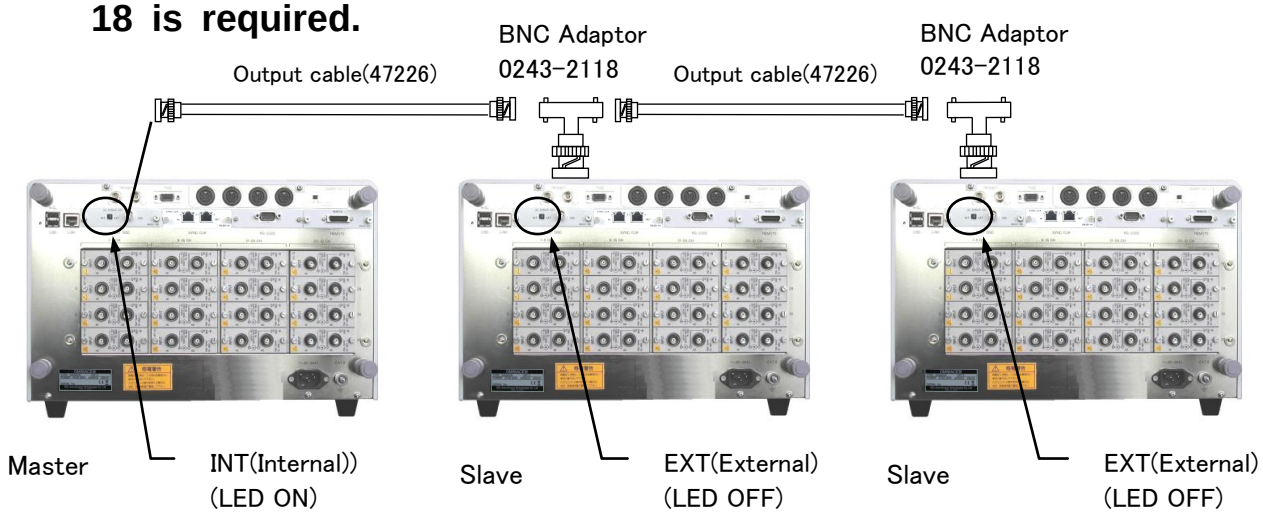
17.4.2. Set up for Synchronization

To use multiple units of this product connected in parallel, please synchronize them with AC Bridge Excitation Unit (RA23-143) by following procedure described below. One unit becomes the master, and put OSC switch on AC Bridge Excitation Unit of master to INT, and put OSC switch of other slave machines to EXT.

◆ To synchronize two units



◆ To synchronize with more than 3 units- BNC Adaptor 0243-21 18 is required.



18. Maintenance and Cleaning

⚠ WARNING This is precision equipment, so do not allow anyone other than a qualified technician from our company to open the main unit case.

18.1.Handling and Storing Recording Paper and Data

NOTE Care is required when handling the thermo-sensitive paper used by this instrument.

The chemical reaction caused by using a thermal head to add heat to the underside of the recording paper used for the RA2800A allows distinct black on white recording. Take care to handle the recording part of this paper so as to avoid color leakage or discoloration of the white sheet through writing materials, chemicals, or the environment (etc.).

18.1.1 Storing the Recording Paper

- Do not store the paper in high temperature and humidity.
- Do not store the paper near heating fixtures.
- Store the paper in an environment with ambient temperature of 40°C or less, and do not store for a long period of time, as this may cause discoloration of the white sheet.
- Do not expose the paper to direct sunlight for long periods of time, especially in an unwrapped state, as this may cause discoloration of the white sheet. Take especial care, therefore, when using this instrument outside.

18.1.2 Caution for Handling and Storage of Recorded Data

- Do not store data in a hot or humid environment.
- Do not expose data to sunlight or strong light for a long period of time.
- Data may suffer from color leakage or white sheet discoloration due to heat, humidity, or light.
- Store data at 40°C and 80% RH or less.
- Data recorded in color will retain its color even if rubbed or exposed to water. However, the color will come off if rubbed strongly, so avoid doing so.
- The color on the recording paper will come off with volatile solvents such as alcohol and ester. It will not come off with oil-based solvents such as gin.
- If non-volatile solvents such as plastics are absorbed the color-recording capability will be reduced, causing color leakage in the recorded section.
- The recorded section may leak color if the thermo-sensitive paper is touched while not sufficiently dry.

18.2.Battery Backup

NOTE
- The setting values, date, and time of the recording are backed up for about three years.
- Recorded data cannot be backed up.
- If【Save/Load of setups】on the System screen is saved, these can be saved and read regardless of the battery. (Refer to Chapter 14 for details).

If not used for one month, the setting values, date, and time must be reset.
- Switch on the power
- Initialize the system
- Set the on-chip clock

Note that the battery is fully charged by applying power continually for about 12 hours.

18.3.Cleaning the Display

If the display screen becomes wet, either wipes it with a soft, dry cloth, or with gauze soaked in ethanol.

18.4.Cleaning and Preserving the Thermal Head

18.4.1. Cleaning

If recording for long periods of time, the heat dissipating part of this instrument's thermal head may become clogged with paper remains, etc. If the head is dirty, the quality of the printing and image reproduction will be reduced, so in this case the head will require cleaning.

1. Pull back stoppers located on both side of monitor and open a recording panel in recording area. ☞ "3.2. Paper Loading".
2. Underneath of front recording panel, there is a thermal head. The actual thermo medium aligned 4.4 mm from tip of the thermal head. This alignment is to be cleaned.
3. Submerge cotton tipped applicator with ethanol.
   As any contact of ethanol on recording paper makes color change, removing a recording paper to clean is recommended.
4. After the thermal head is dried, you can reattach the recording paper.

18.4.2. Life

The life of the thermal head is about 30 km (about 1000 rolls of YPS106 recording paper). The recording quality may drop if the head is used in excess of this amount. In this case the thermal head must be replaced (additional cost), so please contact one of our sales offices or distributors.

18.5.Platen Roller Storage

If the platen roller collects dust or other dirt, the thermal head may incur damage, or the quality of the printing or image reproduction may drop. When the roller shows signs of dirt, therefore, it must be cleaned carefully with gauze soaked in ethanol.

18.6.Dealing with Power Outages, etc.

If a power outage occurs, or the power cable is removed during recording, the status of the system following restoration of power will be as same status as [STOP] key on the operation panel is pressed.
In this case, because the settings at power off are backed up, recording can be started again immediately.
If the auto start function has been set to ON, recording with commence automatically.

18.7.Cautions When Disposing of This Instrument

Be aware of the following when disposing of this instrument.

⚠ WARNING

This instrument employs a lithium secondary cell as the battery for back up.
Be sure to remove the lithium battery before disposing of this instrument.
The lithium battery should not be burned or broken open.
The lithium battery may explode if exposed to excessive heat. Moreover, the acid that may leak out if this battery is broken open is extremely dangerous and could cause serious injury. Tape the two potentials of the battery and dispose of it in the unburnable trash.

This instrument also employs an LCD screen.
Disposal of this battery or LCD may be subject to local regulations.
Be sure to follow the relevant regulations when disposing of this LCD.

19. Troubleshooting

19.1.Troubleshooting and Inspection

NOTE

If the recorder does not operate normally or need to be repaired after following the instructions for abnormal conditions, please contact our sales offices listed at the end of this manual.

Problem	Possible cause	Instruction	Refer to
No power supply. Nothing displayed on the screen	The power switch is turned off.	Turn on the power switch	Chapter 3
	The power cord is not properly connected.	After the power switch is turned off, connect the power cord correctly, and then turn on the switch again.	Chapter 3
	The fuse is blown.	The AC line input fuse for this unit cannot be replaced by the customer because this fuse is placed inside the main unit. Please contact us if the fuse may be blown.	End of this manual
	The screen is automatically turned off.	Touching any button turns it on.	Chapter 16
The screen frozen	Abnormal condition occurs in the system.	Turn off the power switch, and then turn it on again	Chapter 2
No reactions when pushing any button on the touch panel.	A recording operation is in progress in Memory mode or Multi-recorder mode. The start LED or the copy LED is on.	Push the stop button on the operation panel to stop measuring, and then push any button.	Chapter 2
No recording	There is no recording paper.	Insert recording paper.	Chapter 3
	The printer block is opened.	Close the cover of the printer block.	Chapter 3
	The temperature of the thermal head is abnormally high. (The environment temperature is over 40 degrees centigrade.)	Use the main body in a 5 to 40 degrees environment.	Chapter 20
Not start recording when pushing the start button.	The start trigger is on.	Turn off the start trigger.	Chapter 10
	Recording is set as an external synchronization recording	Recording is started only after inputting a pulse signal to a remote terminal. Therefore, input the signal, and then push the start button.	Chapter 17
	There is no chart paper.	Load a chart paper.	Chapter 3
Cannot save data to the selected media.	The media is not formatted.	Format the media.	Chapter 16
	The disk space is insufficient.	Erase unwanted files or use new media.	Chapter 16
	The media is write-protected.	Unprotect the media.	—
Not detected the media.	The media is not correctly formatted.	Format the media correctly.	Chapter 16
	The media is damaged.	-	—
Cannot specify and control operation through a communication interface.	The communication parameters are not specified correctly.	Specify addresses and communication parameters correctly.	Chapter 16

19.2.Frequently Asked Questions (Q&A)

This section covers frequently asked questions.

◆ Question List

Q 1: A copy of a screen can be saved into a file?

Answer	The copy can be saved in bitmap format.
Details	Select the sub setting tab by the System button and specify the folder in Save Screen Copy Destination. After this setting, you can push the Screen Copy button on the operation panel to save the copy to the specified folder in bitmap format.

Q 2: Please inform details of the folder or directory that automatically generated after acquisition.

Answer	The following folders are generated according to settings.
Details	HD recorder mode (DNo.):\LOGFILE\(USERNAME)\(Date Folder)\FREC_???? Memory Recorder mode (DNo.): \LOGFILE \(USERNAME)\(Date Folder)\ MEM_???? Multi Recorder mode (DNo.): \LOGFILE (USERNAME)(Date Folder)\MIX_????\ On this folder, FIL_????.FPP (the file of real-time part. Its data format is peak) and MEM_????.FSD (the files of memory block) are generated These are handled as a series of files and can be played in Zoom-in and Zoom-out replay screen. “LOGFILE” is a folder specified for a writing destination.

Q 3: What is the relation between the available acquisition time and the media (recording medium) space?

Answer	The available time depends on Media space, a Data type, and a Channel Number.
Details	The available time can be roughly estimated by the following formulas. Sample time: Acquisition length = (media space – 4KB) / (used channel numbers x 2) Peak time: Acquisition length = (media space – 4KB) / (used channel numbers x 4) Maximum time of acquisition of 8Ch of 640MB data at sample time (acquisition length 39,999,750 data)

Sampling speed	maximum recording time	[ms]	[s]	[min]	[h]	[day]
200us	Approx. 2 hours	7,999,950	8,000.0	133.3	2.2	
500us	Approx. 5 hours and 30 minutes.	19,999,875	19,999.9	333.3	5.6	
1ms	Approx. 11 hours	39,999,750	39,999.8	666.7	11.1	
2ms	Approx. 22 hours	79,999,500	79,999.5	1,333.3	22.2	
5ms	Approx. 2 days and 7 hours	199,998,750	199,998.8	3,333.3	55.6	2.3
10ms	Approx. 4 days and 15 hours	399,997,500	399,997.5	6,666.6	111.1	4.6
20ms	Approx. 9 days and 15 hours	799,995,000	799,995.0	13,333.3	222.2	9.3
50ms	Approx. 23 days	1,999,987,500	1,999,987.5	33,333.1	555.6	23.1
100ms	Approx. 46 days	3,999,975,000	3,999,975.0	66,666.3	1,111.1	46.3
200ms	Approx. 115 days	7,999,950,000	7,999,950.0	133,332.5	2,222.2	92.6
500ms	Approx. 231 days	19,999,875,000	19,999,875.0	333,331.3	5,555.5	231.5
1s	Approx. 463 days	39,999,750,000	39,999,750.0	666,662.5	11,111.0	463.0

Q 4: A data cannot be saved in CSV format is not available with an insufficient media space message.

Answer	The file size for saving in CSV format is about five times larger than in binary format.
Details	Use the media having enough space.

Q 5: Any waveform on the monitor is not displayed after setting the chart paper feed to external synchronization. Why?

Answer	A memory external synchronization is recorded by a 1μs gating internal clock with an external clock.
Details	A recording operation is available with the sampling rate up to about 1μs, but the 1μs maximum delay from an external clock develops. Therefore, inputting a fast clock may trigger a waveform distortion. The value of this specification is provided the value that can neglect the influence of a waveform distortion (1% or lower.)

Q 6: Display style of input monitor changes after changing the chart paper feed speed or recording speed. Why?

Answer	There are two kinds of display styles in input monitor, Scrolling style and Updating style.
Details	By 400 μs (40 ms/div) sampling speed, it automatically displays scrolling style and over 400 μs sampling speed, it automatically displays update style.

Q 7: Is it possible to replay the data recorded in the RA2800A in another RA2800A unit?

Answer	Another RA2800A can playback the data.
Details	However, if an amp unit for playback includes the old version of program, this unit cannot play the waveform of channels recorded by any additional later release type of unit.

Q 8: Is it possible to use setup environment file (.ENV) in other recorders?

Answer	This file can be used.
Details	It is possible when the version is the same. However, if the type of an implemented amp is different between this recorder ant the other recorder, the other recorder applies its own default setting. Caution: If the environment file is created in a state of Using the communication unit such as RS-232C, this file cannot be used for the main unit without an appropriate unit.

Q 9: After purchased and added an amplifier unit, all these sep up values are initialized.

Answer	Any modification made in hardware calibration on Amplifier unit makes an additional amplifier unit initialized. Note: Any modification made on amplifier slot location, makes the amplifier initialized as well.

Q 10: The extension is different between the data saved in the Memory Auto Save and manually saved data with the Copy button in Specify Output. Why?

Answer	The extension is .FSD when using Memory Save function with file tabs in the System button and auto-save function. On the other hand, the extension is .DRT when saving in Output Specification.
Details	A FSD file is dedicated to memory block and sample filing. A DRT file is used for the data of memory, sample filing and peak filing in a common format. The data such as cursor gap can be saved anytime while viewing a playback screen. This product can play both types of files.

Q 11: Can I add optional units later?

Answer	Except for the units that should be included at factory shipping, all of additional units can be implemented.
Details	Units which can be additionally included Remotes, RS-232Cs, and AC bridge power supply unit (optional)

Q 12: Are there some points to be noted when I use the remote terminal?

Answer	A start ON/OFF input terminal works same as the Start/Stop buttons.
Details	This terminal is available in any recording mode. However, the terminal always works after detecting rising or falling edges when voltage signal is on and off. Therefore, do not use the terminal that produces chattering (signal fluctuations) such as mechanical contacts.

Q 13: Clarify the "Peak"-type data?

Answer	One-point data is composed of both maximum and minimum values.
Details	Maximum and minimum points are detected at the maximum rate（2μ s、10μ s）of amp. This controls the number of data and allows completely catching changes in a signal. The following data is peak format. Extension of .FPP signifies the peak format. *The file, when a peak file is saved once again, with .DRT extension is also peak format. Real-time record to recording paper also uses peak format. No data is lost by changing the paper feeding speed.

Q 14: I'd like to make unmanned date measurement. How to set?

Answer	The Timer function of System allows this measurement.
Details	The following is setting examples. Example 1: Recording from 12:00, Jan 7 to 10:00, Jan 8 in 2005 Example 2: Recording from 9:00 to 10:00 every day Example 3: Recording for 10 minutes every three hours for a month from now on. Case of Example 1 Start Timer Start date 2005/01/07/ 12:00 End date 2005/01/08/ 10:00 (A recording interval is not used) Case of Example 2 Start Timer Start date **/**/**** 9:00 Start date **/**/**** 10:00 (A recording interval is not used) Case of Example 3 Start Timer Start date 2005/01/05/12:00 (specify the time after the current time) End date 2005/02/06/12:00 (specify the time at the finish time of a measurement) Recording interval Recording starting interval: 2 hours. Recording operation interval: 10 minutes The Start button is automatically pushed at the time specified in the start timer, and then a recording operation is initiated. After starting, this operation works according to the specified interval and ending time Comment: In combination with the Trigger button function, Trigger detection can be waited during specified time. - If the Trigger mode is turned off in Memory Recorder mode, the memory auto-save takes effect during Stop. This allows automatically saving memory data based on the Stop time. Caution: Recording is not initiated with only Recording Interval Function ticked. To use interval, make sure to configure the Start Timer and tick.

20. Specifications

20.1.Configuration

20.1.1. Model

This product is configured with the recorder unit, optional units, and a set of standard accessories.

Description	Model	Comment
OMNIACE III	RA2800A	If you wish to purchase the English version, specify this when making an order.

20.1.2. Main Unit/Amp Unit

Description		Configuration	Comment
Main Unit	Main Unit (Operation Unit, Display Unit, Amp insertion Unit, and Control Unit)	1	USB port x 2 LAN port x 1
	Recorder event	1	16 inputs
	Built-in Printer	1	
	Power Supply Unit(100V AC to 240VAC)	1	
	Synchronization unit	Optional	RA28-132
	Remote Unit	Optional	RA23-144
	RS 232C Unit	Optional	RA23-142
	AC Bridge Power Supply Unit	Optional	RA23-143

Amp Unit

Unit Description	Model	Comment
2CH high resolution DC Amp Unit	AP11-101	HRDC
2CH FFT Amp Unit	AP11-102	FFT
2CH High-speed DC Amp Unit	AP11-103	HSDC
2CH AC Strain Amp Unit	AP11-104A	ACST
Event Amp Unit	AP11-105	EV
2CH TC/DC Amp Unit	AP11-106A	TCDC
TC/DC Amp Unit	AP11-107	TDC
F/V Converter Unit	AP11-108	FV
2CH Vibration/RMS Amp Unit	AP11-109	RMS
2CH DC strain Amp Unit	AP11-110	DCST
2CH Zero Suppression Amp Unit	AP11-111	HRZS

20.1.3. Standard options (Japanese version/100VAC system)

Description	Model	Rating	Quantity
AC Power Code	0311-5044	AC100V type 2.5 m	1
User's Manual	7001756-R01	For Mainframe	1
User's Manual	7006462-R01	For Amp Unit	1
Recording Paper Folder	8247-4310	One folder per each end of Recording paper	2
Recording Paper	0511-3167	A roll of paper 219.5 mm x 30 m	1
Amp Blank Panel	37137-7002-0000		16 (with equipped panels)
Interface Blank Panel	38410-2416-0000	*1 blank panel with 2 screws	3 (with equipped panels)
Interface Blank Panel	38410-2417-0000	*1 blank panel with 2 screws	1 (with equipped panels)

20.1.4. Options and Consumables

(1) Options for Event Amp Unit (AP11-105)

Description	Model	Comment
Logic IC Code	0311-5007	2 pieces per unit
IC Clip Code	0311-5008	4 pieces per a bag, 2 bags per unit
Alligator Clip Code	0311-5009	4 pieces per a bag, 2 bags per unit

(2) Accessory for the remote unit (RA23-144)

Description	Model	Comment
Remote Cable	00311-5251-0000	1 piece per unit

(3) Chart printing Paper

Description	Model	Rating
Recording Paper	YPS106	A roll of paper 219.5 mm x 30 m, Five rolls per box
Recording Paper	YPS108	A roll of paper 219.5 mm x 30 m, Five rolls per box Paper with tear-off strip, 150 mm pitch Remaining indicator print 300 mm 99 to 01 pitch
Recording Paper	YPS112	Fold-up paper 219.55 x 200 mm, fold width 300 mm Remaining indicator print (page) 669-000
Chart printing paper	YPS114	Roll paper 219.5 mm × 100 m 2 rolls per box

20.1.5. Other Options

Description	Model	Comment
Dedicated Transport Box	RA28-113	
Dust Cover	RA28-114	Plastic dust cover
Hand Truck	RA28-116	
Take-up Equipment	RA28-119	
Storage case	RA28-115	
Fixing bracket for racks	RA28-117	JIS rack
Fixing bracket for racks	RA28-118	EIJ rack

20.1.6. Special Software

Name	Model	Note
Unifizer	NS3100-P01	This software enables connecting a PC to RA2800A via LAN cable for remote control such as data acquisition, various setups, and record starting.

20.2.Basic Specifications

20.2.1. Recorder Unit Specifications

<table>
<tr><td>Input part</td><td>Slot Number</td><td>16 (mixing different amp units are available)</td></tr>
<tr><td>Recorder event</td><td>Number</td><td>16</td></tr>
<tr><td rowspan="2">Display Part</td><td>Display Equipment</td><td>12.1 inches TFT color LCD</td></tr>
<tr><td>Available Display Area</td><td>245.88mm x 184.3mm (1024 x 768 dots)</td></tr>
<tr><td>Internal memory</td><td></td><td>Acquisition data capacity: 1MW/Ch</td></tr>
<tr><td rowspan="2">Drive</td><td>Internal HDD Drive</td><td>40GB (including approx 5GB of system area)</td></tr>
<tr><td>External Drive
(USB Connection 1/2)</td><td>USB Memory (The USB memory with a security function cannot be used.)</td></tr>
<tr><td rowspan="2">I/O Port</td><td>RS-232C</td><td>Compliant with JIS X5101 (Optional)</td></tr>
<tr><td>LAN</td><td>IEEE802.3U 100/10BASE-T</td></tr>
<tr><td rowspan="4">Recording Part</td><td>Recording Type and Recording width</td><td>Heat-sensitive recording by thermal head, Recording width 216 mm</td></tr>
<tr><td>Recording data</td><td>Waveform records, X-Y records, screenshots and so on</td></tr>
<tr><td>Recording Paper</td><td>Roll paper 219.5mm × 30m (YPS106), 219.5mm×100m (YPS114)
Fold-up paper (219.5 mm x 200 m) is available by using adaptor.</td></tr>
<tr><td>Waveform Recording Density</td><td>[dots/mm]
<table><tr><th></th><th>Voltage Axis</th><th>Time Axis</th></tr><tr><td>Chart Record</td><td>8</td><td>10 to 80</td></tr><tr><td>Playback Copy</td><td>8</td><td>10</td></tr></table></td></tr>
<tr><td rowspan="7">Power Supply</td><td>Rating Line Voltage</td><td>100 to 240 VAC</td></tr>
<tr><td>Line Voltage Fluctuations Tolerance</td><td>90 to 264 VAC</td></tr>
<tr><td>Rating Power Supply Frequency</td><td>50/60 Hz</td></tr>
<tr><td>Power Supply Frequency Tolerance</td><td>47 to 63 Hz</td></tr>
<tr><td>Withstanding Voltage</td><td>Power Supply Input Terminal – between groundings 1.5k VAC one minute</td></tr>
<tr><td>Insulation Resistance</td><td>Power Supply Input Terminal – between groundings 500 VDC more than 100M Ohms</td></tr>
<tr><td>Power Consumption</td><td>Approx. 350 VA max. Approx. 170 VA during standby (When 16 pieces of 2-CH high-speed DC amps are built in.)</td></tr>
<tr><td rowspan="4">Fuse</td><td>Maximum Rating Voltage</td><td>250 V</td></tr>
<tr><td>Maximum Rating Current</td><td>6.3A</td></tr>
<tr><td>Type</td><td>Time-lug</td></tr>
<tr><td colspan="2">*The fuse for this unit cannot be replaced with the customer because this fuse is placed inside the main unit. Please contact our branches or sales offices if the fuse may be blown.</td></tr>
<tr><td>Environment</td><td>Usage Environment</td><td>Temperature: 5 to 40°C
Humidity: 35-80%RH (without condensation)
Location of use: indoor use
Altitude: Not higher than 2000 m
Resistance to vibration:
There is not a malfunction according to the following examination. (excluding when at paper output)
(1) The durability examination at random vibration
Frequency
<table><tr><th>FM</th><th>PSD</th></tr><tr><td>5Hz</td><td>0.00128g^2/Hz</td></tr><tr><td>200Hz</td><td>0.00128g^2/Hz</td></tr></table>Vibration Time 1 hour
Direction Top & Bottom, Front & Rear, Left & Right
(2) The durability examination at sine wave vibration
Frequency 5 to 40 Hz
Level 0.5G
(Examination repeated only for top and bottom 0.25.)
Sweep Time 3 minutes
Vibration Time 0.5 hours
Direction Top to Bottom, Front to Rear, Left to Right</td></tr>
</table>

	Save Environment	Temperature: -10 to 60°C Humidity: 35-85%RH (without condensation)
Apperance/ Weight	Dimension	400 ± 3 (W) × 270 ± 3 (H) × 380 ± 3 (D) mm (including rubber legs) Excluding protrusion (knurl screws in an Amp part and a jog dial)
	Weight	Approx. 16.4 kg Main body only (excluding Amps and options) Approx. 18.8 kg Option and 12 units of AP11−103 Amps are installed.
Others	Built-in Clock	±30 seconds error per month (ambient temperature 25 degrees centigrade
	Backup	A clock and setting information are backed up by built-in battery. (manganese dioxide primary battery) Battery life: approx. 3 years (ambient temperature 25 degrees centigrade)

20.2.2. Recording Function

The followings are common functions of printing on recording papers regardless of a recording mode.

Function	waveform	X-Y	Explanation
Scale Print	√	√	Scales are automatically adjusted based on sensitivity and base line positions, and then printing is available at the end of recording.
Trigger Information	√	-	After printing a trigger point as the arrow mark (↓), the occurrence date and time of trigger can be printed together.
Data Information	√	√	Records can be printed with information such as recording mode, measuring date and starting time, data No. , trigger conditions (trigger points and trigger date and time), sampling speed, paper feeding speed, and time axis.
User Page annotation	√	-	An annotation is printed on records. Maximum 64 characters x 108 rows can be specified.
Channel Annotation	√	√	Channel information is printed on records.
Signal Name	√	-	An annotation per signal is printed before waveform records. Maximum 31 characters can be specified.
Measurement Information	√	-	An annotation is printed before waveform information. Maximum 64 characters x 108 rows can be specified.

20.2.3. Amp Unit Function

The followings are functions of recording and monitoring related to an amp unit.

Function	Record	Monitor	Explanation
Physical Quantity Conversion	√	√	The waveform of an amp unit and full scale of display output can be changed, and Input signals can be configured in physical quantity or an arbitrary unit.
Wide Scale	√	√	Full scale can be changed to display or record the all range possible to be input at standard sensitivity.
Channel Discrimination	√	-	Channel No. can be printed near waveform records.
Signal Name	√	√	Any input character can be printed. Maximum 8 characters x 1 row.
Base Line Setting	√	-	The base line thickness of a waveform record can be specified per channel.
Zero Position	√	√	Zero position can be specified at 5%, 10%, or 0.05% step of full scale
Recording limitation of event amp	√	√	A maximum of 16 units of event amps can be installed. However, recording can be done in up to 8 units at a time. When using 8 or more units, set to OFF on the waveform printing setup in each unit.

20.2.4. Trigger Function

(1) Basic Function

<table>
<tr><td rowspan="3">Trigger Source</td><td>Internal Trigger</td><td>Trigger by input signals from each amp.</td></tr>
<tr><td>Manual Trigger</td><td>Trigger by manual trigger key on the operation panel</td></tr>
<tr><td>External Trigger</td><td>Trigger by trigger inputs</td></tr>
<tr><td>Pre-trigger</td><td colspan="2">From 0 to 100%, 1% step</td></tr>
<tr><td>Trigger Filter</td><td colspan="2">From 1 to 65534 samples</td></tr>
<tr><td>Trigger Operation</td><td colspan="2">Once, Repeat, Endless</td></tr>
<tr><td>Trigger Mode</td><td colspan="2">Four types: OR, AND, Window, and OFF
ON/OFF switching of Monitor synchronize available with TRIG/SYNC key
<table>
<tr><th>Trigger Mode</th><th>Source Channel</th><th>Generating conditions of triggers from input signals</th></tr>
<tr><td>OR</td><td rowspan="3">Any Channel can be selected from all channels</td><td>When a condition is met in any channel.</td></tr>
<tr><td>AND</td><td>When all conditions are met in all selected channels.</td></tr>
<tr><td>WINDOW</td><td>When a signal level changes out of range or into range of maximum / minimum trigger levels.</td></tr>
<tr><td>OFF</td><td>-</td><td>Any Trigger is not used.</td></tr>
</table>
*Manual triggers and External triggers may be generated regardless of a trigger mode.
*An event amp unit cannot be specified as a source channel of Windows trigger.</td></tr>
<tr><td>Trigger Output</td><td colspan="2">When a trigger condition is met, the TTL level of voltage signal (Active Low, Pulse width approx, 10ms) is output.</td></tr>
</table>

(2) Trigger Function of Analog System Amp Unit

<table>
<tr><td>Trigger Detection Accuracy</td><td>±2%/FS</td></tr>
<tr><td>Trigger Level</td><td>This level is specified by a physical value.</td></tr>
<tr><td>Trigger slope</td><td>Different depends on a trigger mode.
<table>
<tr><th>Trigger Mode</th><th>Slope</th></tr>
<tr><td>OR</td><td>Rising, Falling</td></tr>
<tr><td>AND</td><td>Rising, Falling</td></tr>
<tr><td>WINDOW</td><td>IN/OUT to the specified range</td></tr>
</table></td></tr>
</table>

(3) Trigger Function of Event Amp

<table>
<tr><td>State setting</td><td>H, L, or OFF in every input from 1 to 8.</td></tr>
<tr><td>State Mode</td><td>OR, AND
<table>
<tr><th>State Mode</th><th>Achieving conditions of channel triggers</th></tr>
<tr><td>OR</td><td>When any input state equals to a specified trigger state.</td></tr>
<tr><td>AND</td><td>When All input states equal to a specified trigger state.</td></tr>
</table>
*This mode cannot be specified in the source channel of a WINDOW trigger.
*After a condition of channel trigger is achieved, the next trigger is generated until the condition is not achieved again.</td></tr>
</table>

20.2.5. File Function

(1) Available Drive

Drive Name	Drive No.	Available Media (Drive)
Built-in HDD	D fixed	40GB (including approx 5GB of system area)
External (USB) Connecting Drive	From E	USB memory *Only recommended products are available.

*Only recommended drives and media are supported.

(2) Filing Recording Function

Measuring data can be sent to a built-in HDD drive in real-time to be saved as a file.

Common Function Name	Function Details
Automatically creating a folder specified by a user	If multiple users use a recorder body, the folder specified by each user is automatically created at the time of recording to manage user's data.
Automatically creating folder specified per day	The folder per day can be created to manage filing data.
Auto Name	A File or a Folder can be saved with the name of any four characters plus automatically updated four-digit number updated *If multiple files are saved at one recording, a folder is created.

(3) File Operation

operating devices	Built-in HDD drive and External drive (USB connection)
Format	Logical/Physical format in NTFS is available
Saving Environment File	Setting and annotation information can be saved as four files.
Saving Text File	Text information of signal names and user's annotation can be saved. This information can be saved as a file in the start up screen displayed when the power supply is on.
Saving Memory Data	Acquired memory data can be saved in binary or CSV format.
Creating Folder	Any name of folder can be created.
Deleting	Files and folders can be deleted.
Importing File	An environmental file (ENV) and an annotation text (TXT) can be imported.

20.2.6. Monitor displaying and setting function

Use the Operation Panel (including jog dial) and the touch panel to configure various settings

(1) Input Setting Screen

Use this screen to configure the waveform of input signals and input setting.
Digital values and cursor values of an input signal can be displayed.

Operation Panel	Configuration
INPUT SIGNAL	Display waveforms on the whole screen.
Amp	Configure amp settings and physical quantity conversion of an input signal.
Trigger	Configure the settings of trigger modes, trigger conditions, recording operations, pre-triggers, and trigger filters.
RECORD CONDITION	Configure the settings about recording such as speed.
View/Record	Configure the settings such as scale views, signal names, grids, waveform segmentations.

Operation Button	Configuration
FREEZE	Monitor Displaying can be paused.
TRIG SYNC	Monitor Displaying synchronized a trigger detection is available.
MONITOR	Configure the speed of input monitor.
DIGATAL	Display input signals in digital form.
KEY LOCK	Cancel the Key Lock setting.

(2) Playback Setting Screen

Use this screen to select the main unit's memory and the filing data, configure physical quantity conversion setting, display playback waveforms, and so on.

Screen Select Button	Configuration
Selecting Data	Select the data for playback.
Output Specification	Configure where to output and the output condition.
Copy	Copy the range specified by an output setting.
Digital Display	Configure the digital value for displaying.
Signal Setting	Configure the amp setting of a channel of which data is played back.
Jump	Configure an arbitrary position to move the range of monitor displaying.
Time Axis	Configure narrowing/extending of waveform time axis.
X-Y	Display data in X-Y format.
KEY LOCK	Configure ON/OFF of a Key Lock

(3) Scrolling direction

The scrolling directions of input and playback signals can be set to either vertical (top to bottom) or horizontal (right to left) directions.
Screen layouts such as amp, trigger, or record setups vary depending on the scrolling direction.

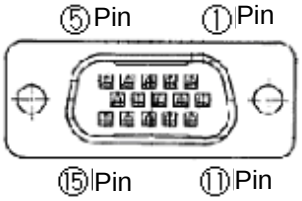
20.2.7. Monitor Output

(1) XGA Monitor Output

The same screen as the display unit is output to the XGA monitor. (Analog RGB, 1024 × 768 dots)

(2) Output connector

Pin No	Signal	Pin No	Signal	Pin No	Signal
1	R	6	0V	11	N. C
2	G	7	0V	12	DDDA−R
3	B	8	0V	13	HSYC
4	N. C	9	N. C	14	VSYC
5	0V	10	0V	15	DDCK−R



20.3.Specifications by each measurement mode

20.3.1. Memory Recorder mode

Use this mode to acquire measuring data of input signals to the main body's memory This mode is mainly used for measuring high-speed phenomenon based on the trigger After the recording, the data can be displayed on a playback monitor and be copied.

(1) Memory Acquisition

<table>
<tr><td>recording speed</td><td>Configure by the sampling speed (period).
2 to 999 μs, 1 to 998 ms, and 1 to 100 s. can
2 to 999 μs, 1 to 999 ms, and 1 to 100 s can be configured for user 1 and user 2.
*Acquisition by external clock synchronization
(Remote Unit: due to the option of an external sample input)</td></tr>
<tr><td>Time Axis</td><td>0.01%</td></tr>
<tr><td>Memory Space</td><td>1 MW/CH</td></tr>
<tr><td>Block division</td><td>1 to 128 Block</td></tr>
<tr><td>Acquisition Operation</td><td>Push the start key on the operation panel to start. (Staring with time trigger is also available)
Once, Repeat, and Endless settings are available.
<table>
<tr><th>Acquisition Method</th><th>Acquisition Operation</th></tr>
<tr><td>Once</td><td>Measurement is made once and is finished.</td></tr>
<tr><td>Repeat</td><td>A measurement is repeated the same times as the number of memory block and is finished.</td></tr>
<tr><td>Endless</td><td>A measurement is repeated until it is stopped.</td></tr>
</table>
*For endless, the existing data is overwritten.</td></tr>
<tr><td>Copy Range</td><td>Specified Range, Based on Trigger
<table>
<tr><th>Copy Range</th><th>Copy Operation</th></tr>
<tr><td>Trigger center</td><td>Data amount from 1 to 100% of the trigger center is copied.</td></tr>
</table></td></tr>
</table>

(2) Auto Copy Printing

After recording of memory data into a main unit, the data is copied or output to a file.
(ON/OFF is available)

Copy Range	Based on Trigger to copy to a recording paper with 1% to 100% of data.
Where to output	Output to a recording paper or a file.
Data Format for File Output	Based on Trigger to output to a file with 1% to 100% of data. *CSV is a comma or tab delimited text format that can be used in spreadsheet software. *File extension FSD (binary), CSV (CSV)
Acquisition Drive	Built-in HDD drive or External Drive (USB supported)

20.3.2. HD Recorder Mode

Use this mode to acquire measuring data of input signals directly to a built-in HDD.
Acquisition method can be configured sample or peak.

Acquisition Operation	Push Start key on the operation panel to start. (Staring with built-in timer is also available)
Acquisition Drive	Built-in HDD drive
recording speed	2 to 999 μs, 1 to 999 ms, and 1 to 100 s ; User1,User2. *The recording speed of over 10μs needs conditions: 2μs at 1Ch and 10μs at 2 to 16 Ch.
Time Axis	0.01%
Acquisition method	Sample (Acquiring data in every recording speed to media) Peak (Acquiring maximum and minimum values in every recording interval during 2μs sampling to media.)
Waveform Recording ON/OFF	While acquiring data, recording waveform on recording papers is available. Recording can be configured aside form recording.
Data Output Format	Only binary

20.3.3.Pen Recorder Mode

Use this mode to record measuring data with the image of a pen recorder.

Paper Feeding Speed	1, 5, 10, 20, 50 mm/s 1, 5, 10, 20, 50, 100 mm/min
	User setting 1, User setting 2: Any speed from 1 to 50 mm/s and 1 to 100 mm/min can be specified. The waveform printing by the external clock synchronization is also possible. (by external pulse input of a remote unit)
Time Axis	Within ±0.01%(Error of time and printed grid, at ordinary temperatures)
Paper Feeding Accuracy	Within ±2%
Time Axis	10 mm/div
Interpolation	Available
Data recording	Peak detection by 2 μs sampling
Time Axis dot pitch	10 dots/mm
Amplitude Axis dot pitch	8 dots/mm

20.3.4. X-Y Recorder Mode

Use this mode to output an X-Y image on a screen/recording paper. HDD recording is also available at the same time.
The recording method can be configured sample.

Setting Channel	Any 1Ch in the X axis and 3Ch in the Y axis can be specified.
Recording Density	At the time of output on recording papers: 1600 x 1600 dots
Interpolation	Available (line)/Not available (dot)
Sample Speed	1 to 1000 ms

*An Even Amp Unit is not available.

20.3.5. Multi Recorder mode

(1) Memory Recording

Recording speed	The speed is set with sampling cycle. 2 to 995 μs, 1 to 999 ms, and 1 to 100 s. 2 to 999 μs, 1 to 999 ms, 1 to 100 s can be set for Users 1 and 2. * Recording started by external clock synchronization (External sampling input from remote unit)
Memory size	1M data/CH
Block segmentation	1, 2, 4, 8, 16, 32, 64, and 128 segmentations
Recording operation	Starting with the Start button on the operation panel. Chose a mode from among Once, Repeat, and Endless. Recording mode / Recording operation Once: Ends after recording once Repeat: Ends after recording the number of times equivalent to the number of memory block Endless: Continuously records until the operation is stopped * The Endless mode overwrites new data over old data.

(2) HD Recording

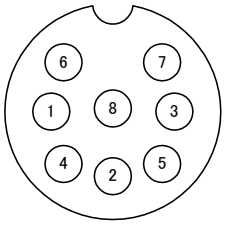
Recording operation	Recording operation starts with the Start button on the operation panel. Starting with a time trigger is also possible.
Recording drive	Internal HDD drive or external drive (USB supported)
Recording speed	2to 995 μs, 1 to 999 ms, and 1 to 100 s ; User1,User2. * High-speed recording may not be available depending on the drive to be recorded and channels to be recorded.
Recording method	Peaks (Recording max. and min. values among sampled values by 2μs in HDD)
Waveform printing ON/OFF	Waveform printing on chart paper with recording data is available. The chart feed speed and the monitor can be either independent or synchronized with recording speed.
Data output format	Only binary Peak filing data

(3) Pen Recording

It is possible to print input signals directly on the chart paper.

Paper Feeding Speed	1 to 50mm/s, 1 to 100mm/min. Waveform printing synchronized with external clock, i.e. external sampling input in the remote unit, is possible.
Time Axis	Within ±0.01%(Error of time and printed grid, at ordinary temperatures)
Paper Feeding Accuracy	Within ±2%
Time Axis	10mm/div
Interpolation	Provided
Data recording	Peak detection by 2μs sampling
Time Axis dot pitch	10 dots/mm
Amplitude Axis dot pitch	8 dots/mm

20.4. Recorder Event

<table>
<tr><td>Function</td><td>In the recorder event, the assessments of voltage input (H and L) and contact input levels (H: short, L: open) are possible. Connection to up to 16 inputs is available.</td></tr>
<tr><td>Appropriate Cable</td><td>Input cable for event (0031-5001): 1.5 m (Cable tips are being cut off)
Input extension cable for event (0311-5005): 1.5 m
Clip cable for logic IC(0311-5007): 1.5 m (EI connector, 4 ch)
Cables for IC clip(0311-5008): (EI connector : IC clip- 4 clips/Pair)
Cables for wiring clip(0311-5009): (EI connector : Wiring clip-4 clips/Pair)
∗ Varieties of event Cables are available for optional order.</td></tr>
<tr><td>Standard</td><td>
<table>
<tr><td rowspan="2">Voltage input</td><td>range of input voltage</td><td>0 - +24 V</td></tr>
<tr><td>detection levels</td><td>H-level: more than 2.5Vapproximately
L-level: less than 0.5 V approximately</td></tr>
<tr><td></td><td>input current</td><td>no more than 1 ΩA</td></tr>
<tr><td rowspan="2">Contact input</td><td>detection levels</td><td>open: no less than 2 kΩ
short: no more than 250 Ω</td></tr>
<tr><td>load current</td><td>2 mA (MAX)</td></tr>
</table>
</td></tr>
<tr><td>Connector</td><td>Round DIN connector 8P (plug view from plug-in side)
 
</td></tr>
<tr><td>Pin alignment</td><td>
Connector 1 - 4
<table>
<tr><th>Pin No</th><th>Signal assignment</th></tr>
<tr><td>1</td><td>ch 1 input</td></tr>
<tr><td>2</td><td>ch 2 input</td></tr>
<tr><td>3</td><td>ch 3 input</td></tr>
<tr><td>4</td><td>ch 4 input</td></tr>
<tr><td>5</td><td>ground</td></tr>
<tr><td>6</td><td>+15 V output</td></tr>
<tr><td>7</td><td>not connected</td></tr>
<tr><td>8</td><td>not connected</td></tr>
</table>
Connector 5 – 8
<table>
<tr><th>Pin No</th><th>Signal assignment</th></tr>
<tr><td>1</td><td>ch 5 input</td></tr>
<tr><td>2</td><td>ch 6 input</td></tr>
<tr><td>3</td><td>ch 7 input</td></tr>
<tr><td>4</td><td>ch 8 input</td></tr>
<tr><td>5</td><td>ground</td></tr>
<tr><td>6</td><td>+15 V output</td></tr>
<tr><td>7</td><td>not connected</td></tr>
<tr><td>8</td><td>not connected</td></tr>
</table>
Connector 9 – 12
<table>
<tr><th>Pin No</th><th>Signal assignment</th></tr>
<tr><td>1</td><td>ch 9 input</td></tr>
<tr><td>2</td><td>ch 10 input</td></tr>
<tr><td>3</td><td>ch 11 input</td></tr>
<tr><td>4</td><td>ch 12 input</td></tr>
<tr><td>5</td><td>ground</td></tr>
<tr><td>6</td><td>+15 V output</td></tr>
<tr><td>7</td><td>not connected</td></tr>
<tr><td>8</td><td>not connected</td></tr>
</table>
Connector 13 - 16
<table>
<tr><th>Pin No</th><th>Signal assignment</th></tr>
<tr><td>1</td><td>ch 13 input</td></tr>
<tr><td>2</td><td>ch 14 input</td></tr>
<tr><td>3</td><td>ch 15 input</td></tr>
<tr><td>4</td><td>ch 16 input</td></tr>
<tr><td>5</td><td>ground</td></tr>
<tr><td>6</td><td>+15 V output</td></tr>
<tr><td>7</td><td>not connected</td></tr>
<tr><td>8</td><td>not connected</td></tr>
</table>
</td></tr>
</table>

20.5.Acquisition Data Output

Record a part of or all recording data. In addition, the data can be saved in a different format.

Where to output	Output Format	Output Method
Recording Part	Waveform Recording	Narrowing and Extending the time axis of a wave form is available. Extending 1/1 (standard), 2, 5, 10, 20, 50, and 100 times Narrowing 1/2, 1/5, 1/10, 1/20, 1/50, 1/100, 1/200, 1/500, 1/1000, 1/2000, 1/5000, and 1/10000 * Standard (one time) = 100data/div
	X-Y Recording	
File	Binary	All specified range of data is saved.
	CSV	Saving data internal 1, 2, 5, 10, 20, 50, 100, 200, 500, and 1000 steps

20.6.Standard Function

Function Name	Function Details
Screen Copy	Hard copy of displayed screen with recording part is available.
Saving Screen Image	Saving to a file in bitmap format is available.
Paper Feeding	While pushing Paper Feeding key, preliminary feeding of a recording paper is available.
Initialization	A main unit can be reset to the default setting.
When Using an Optional RS-232C and Recommended UPS	When recovering from power failure or power interruption, the original state can be automatically restored.
Saving and loading data and setting information	Saving memory recording data and maximum four setting conditions of a main unit can be saved to media.
Test Print	Printing state can be confirmed.
Data No. setting	Any measuring data number can be assigned to each measuring data.
Backlight Auto Off	If no settings and operations are made for a fixed time (from 1 to 60 minutes) with the operation panel key or the touch panel key, the backlight is automatically turned off
Alarm/Error Displaying Function	When an error occurs (recording paper empty, release of thermal head connecting, and abnormal rise of thermal head temperature), an alarm can be raised. An error window is also displayed.
Memory Space Changing Function	Restricting the number of channels used for memory recording enable increasing memory space per channel.

20.7.Interface

20.7.1. LAN (Standard)

Spec	Communication speed: 100－BASE-TX Communication Protocol: TCP/IP *A category 5 LAN cable must be used.

20.7.2. USB (Standard)

Spec	USB port x 2, USB 1.1.

20.7.3. TRIG IN/TRIG OUT (Standard)

Spec	TRIG IN: 0 to 5 voltage input (LOW level: 0.5V or less, HIGH level: 4.5V or more) TRIG OUT: When a trigger condition is met, TTL level voltage signals (Active Low, Pulse width approx, 10ms) is output.

20.8.Remote Unit (RA23-144:Optional)

Function

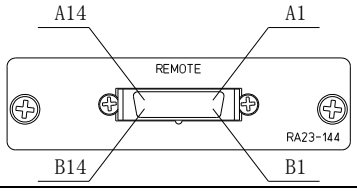
Electric signals controls start or stop of recording/recording, paper feeding, mark input, and input/output for synchronized operation. In addition, recording waveforms and acquiring memory synchronized external pulse signals are available. External input enables preventing the corruption of data files by power failure and the output of a main unit's errors.

Specification

0-5V Voltage Input	0-5 Voltage Output	Relay Connetion
LOW Level less than 0.5 V HIGH Legel more than 4.5 V	LOW Level less than1.0 V (IOL=less than 5 mA) HIGH Level more than 4.0 V (IoH=less than 5 mA)	Current less than 25 mA Voltage more than 50 V

Connector

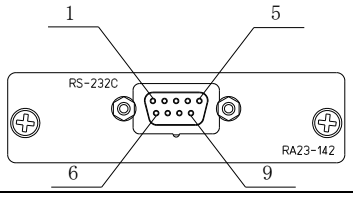
Connector System:8850-028-170-LD



Pin Configuration

Pin No.	Supplied Cable		Signal		Notes
	Wire	Mark			
A1	Amber	Red -	+	SYNC IN	External Pulse Synchronized Signal Input
A2		Black -	-		
A3	Gray	Red -	+	REC IN	Start ON/OFF Signal Input
A4		Black -	-		
A5	White	Red -	+	MARK IN	External Even Mark Signal Input
A6		Black -	-		
A7	Yellow	Red -	+	FEED IN	Paper Feeding Signal Input
A8		Black -	-		
A9	Pink	Red -	+	UPS DOWN	Power Failure Input
A10		Black -	-		
A11	Amber	Red - -	+	RESET IN	Reset Signal Input
A12		Black - -	-		
A13	Gray	Red - -	+	EXT SAMPLE IN	External Sample Signal Input
A14		Black - -	-		
B1	White	Red - -	+	SYNC OUT	External Pulse Synchronized Signal Output
B2		Black - -	-		
B3	Yellow	Red - -	+	REC OUT	Start ON/OFF Signal
B4		Black - -	-		
B5	Pink	Red - -	+	MARK OUT	External Even Mark Signal Output
B6		Black - -	-		
B7	Amber	Red - - -	+	FEED OUT	Paper Feeding Signal Output
B8		Black - - -	-		
B9	Gray	Red - - -	+	ERROR OUT	Error Output
B10		Black - - -	-		
B11	White	Red - - -	+	POWER	Power Supply Status Output (Relay Connetion)
B12		Black - - -	-		
B13	Yellow	Red - - -	+	N.C.	
B14		Black - - -	—	COM	

20.9.RS-232C Unit (RA23-142:Optional)

<table>
<tr><td>Function</td><td>Access host computer, control OMNIACE by commands.</td></tr>
<tr><td>Specification</td><td>JIS X5101 (formerly C6361)compliance
<table>
<tr><td>Data type</td><td>Bit Serial</td></tr>
<tr><td>Transmission Speed</td><td>38400, 19200, 9600, 4800, and 2400[bps]</td></tr>
<tr><td>Transmission Mode</td><td>Start-Stop Transmission, Full-duplex transmission</td></tr>
<tr><td>Start Bit</td><td>1[bit]</td></tr>
<tr><td>Data Bit</td><td>7,8[bit]</td></tr>
<tr><td>Stop Bit</td><td>1,2[bit]</td></tr>
<tr><td>Parity Bit</td><td>Without parity bit, EVEN, ODD</td></tr>
</table></td></tr>
<tr><td>Connector</td><td>D Sub-Connector 9 Pin
 
</td></tr>
<tr><td>Mass</td><td>Approx. 50g</td></tr>
<tr><td>Pin Configuration</td><td>
<table>
<tr><th>Pin No</th><th>Signal</th></tr>
<tr><td>1</td><td>CD(Carrier Detect)</td></tr>
<tr><td>2</td><td>RD (Received Data)</td></tr>
<tr><td>3</td><td>SD(Transmitted Data)</td></tr>
<tr><td>4</td><td>ER(Data Terminal Ready)</td></tr>
<tr><td>5</td><td>SG (Signal GND)</td></tr>
</table>
<table>
<tr><th>Pin No</th><th>Signal</th></tr>
<tr><td>6</td><td>DR (Data set Ready)</td></tr>
<tr><td>7</td><td>RS(Request to Send)</td></tr>
<tr><td>8</td><td>CS (Clear to Send)</td></tr>
<tr><td>9</td><td>RI(Ring Indicator)</td></tr>
<tr><td></td><td></td></tr>
</table>
</td></tr>
</table>

20.10. AC Bridge Power Supply Unit (RA23-143:Optional)

Function	Bridge Power for 2CH AC Strain amp unit (AP11-104)
Birdge Power	2Vrms、Sinusoidal Wave 5kHz
Synchronization	With synchronization ternimals, synchronyzation with RA2300 RA2300A included in other Acbridge power supply units is availeble. With master/slave switch ※Synchronization with RT3424ST is available; Be careful of connector contact..
Mass	Approx. 60g

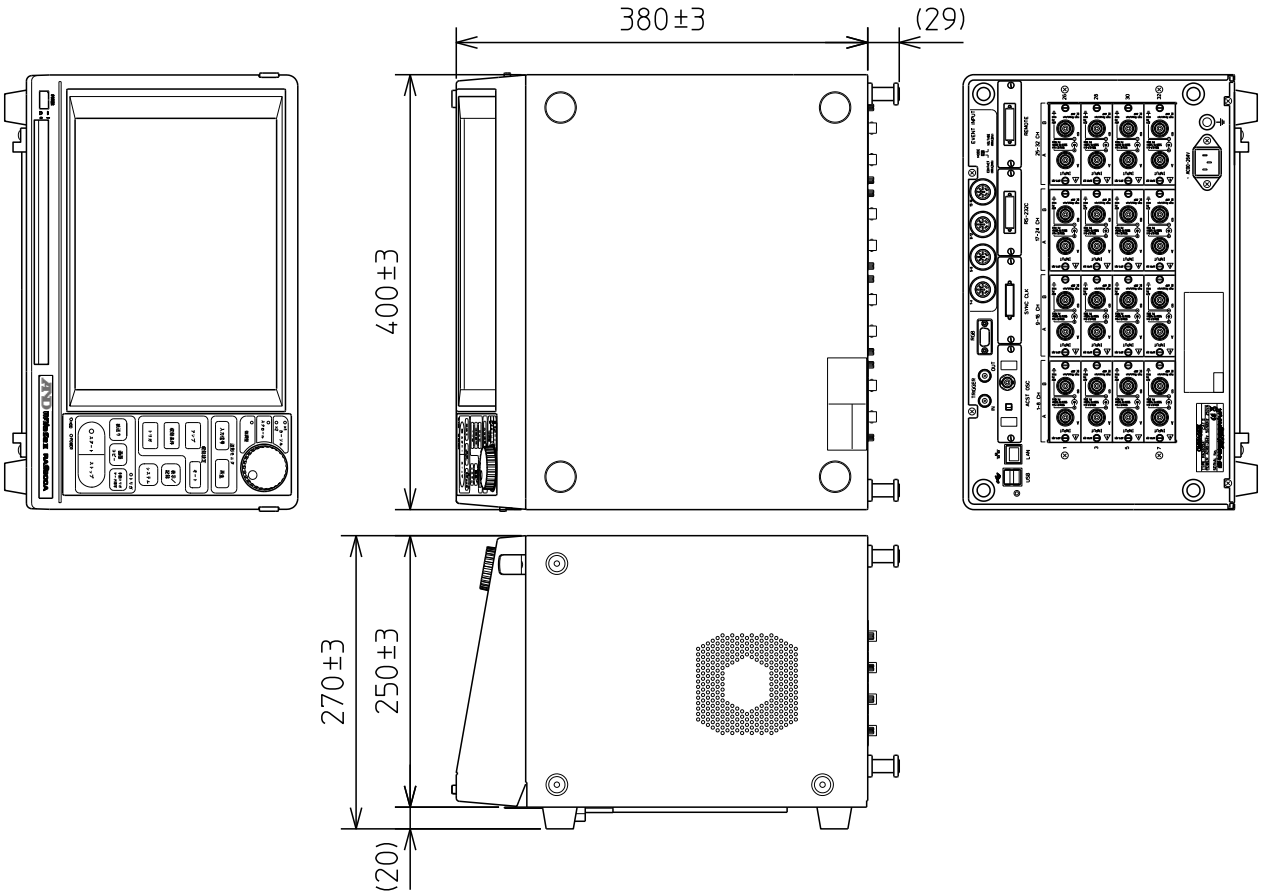
Notes1) 2CH AC strain amp unit (AP11-104) need including into the main unit to use.

20.11.English Display Unit (RA23-106: Optional, specified at ordering)

Function	Operation Panel, display, recorded contents are written in English.
Instruction Manual	Two different instruction manuals are written in English.

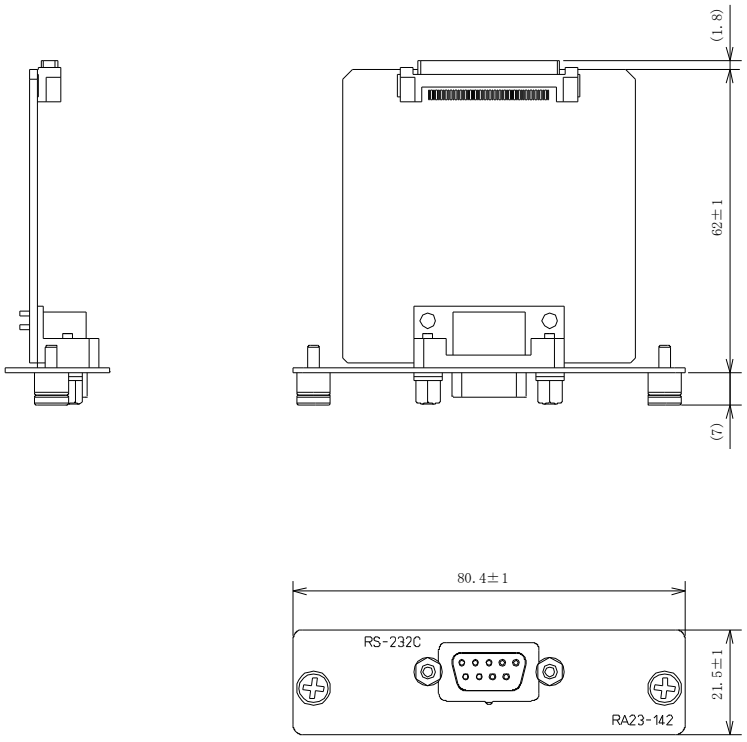
20.12.Dimensions of RA2800A

20.12.1. External Dimensions(Standard Specifications)

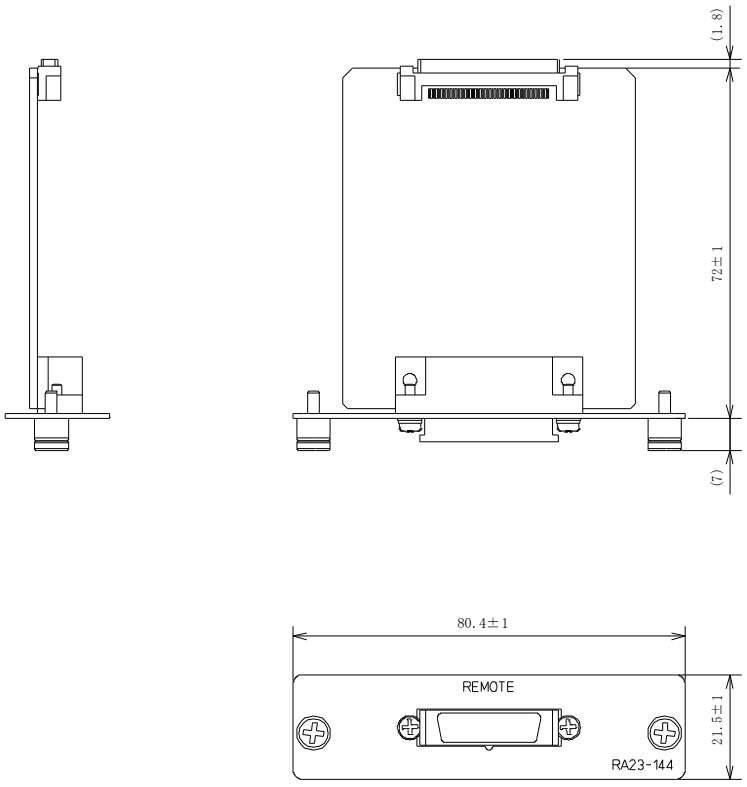


20.12.2. Option Unit Outline Drawing

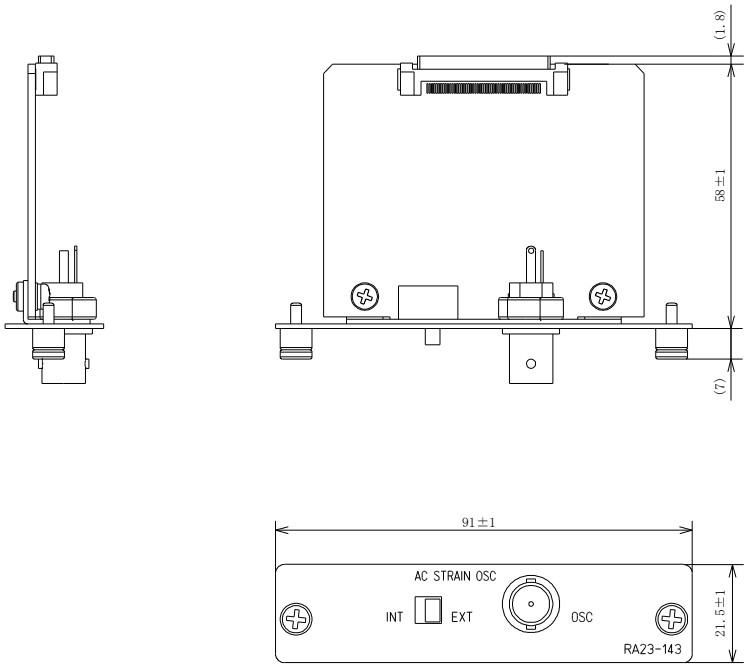
(1) RS-232C Unit



(2) Remote Unit

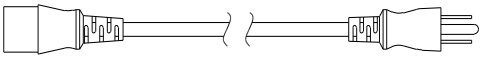
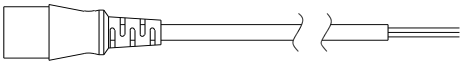
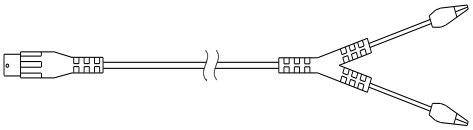
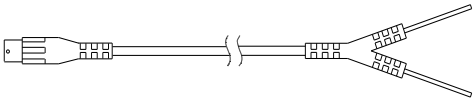
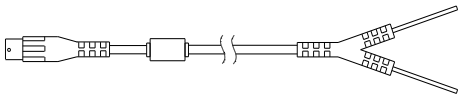
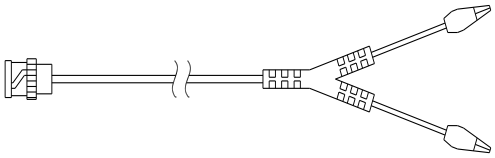
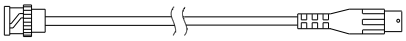


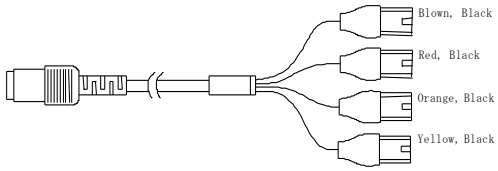
(3) AC Bridge Power Supply Unit



21. Cables ·Probes ·Spare Parts List

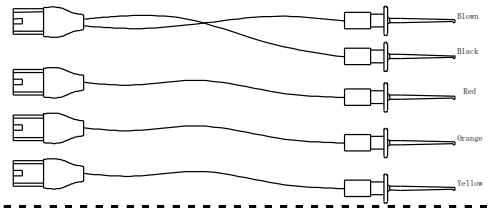
21.1. Cables List

Name(model)	Form		Comment
AC Power Code 100 V (0311-5044)			Length 2.5m
AC Power Code 200 V (0311-5112)			Length 3.5m
Signal input cable (0311-5175)		Safety BNC ←→Alligator Clip Red + Black -	Length 2m
Signal input cable (0311-5177)		Safety BNC ←→Lad Wire Red + Black… -	Length 2m
Signal input cable (0311-5198)		Safety BNC ←→Lead Wire Red + Black - With ferrite core	Length 2m
Trigger input cable (0311-2057)		BNC ←→Alligator Clip Red + Black - Mold color: black	Length 2m
Signal input cable (0311-5200)		BNC ←→Safety BNC	Length 2m

<table>
<tr><th>Name (System)</th><th>Form</th><th>Comment</th></tr>
<tr><td>Logic IC code
(0311-5007)</td><td> 

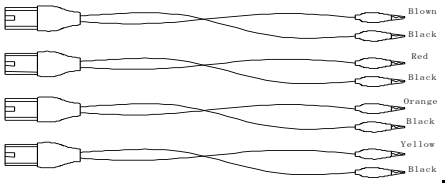
Round DIN8P Plug
←→EI Connector

Thin wire color
Blown, Black 1ch or 5ch
Red, Black 2ch or 6ch
Orange, Black 3ch or 7ch
Yellow, Black 4ch or 8ch</td><td>Length 1.5m</td></tr>
<tr><td>IC clip code

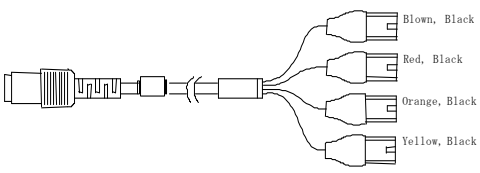
(0311-5008)</td><td> 

EI Connector
←→IC Clip

Thin wire color
Blown, Black (+) (GND) 1ch or 5ch
Red, (+) 2ch or 6ch
Orange, (+) 3ch or 7ch
Yellow, (+) 4ch or 8ch</td><td>Length 15cm</td></tr>
<tr><td>Alligator clip code

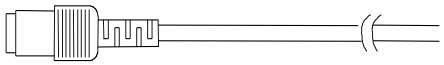
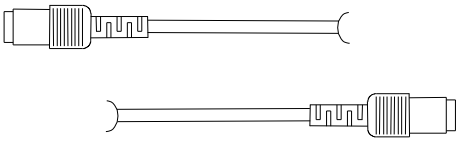
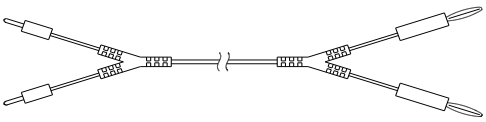
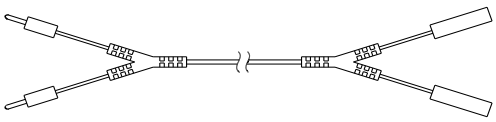
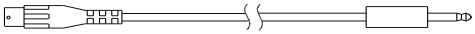
(0311-5009)</td><td> 

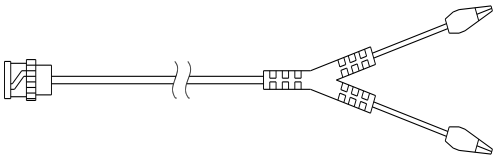
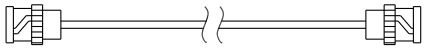
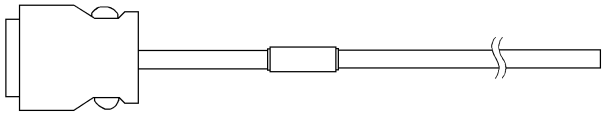
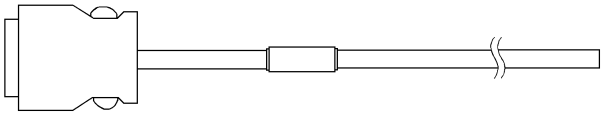
EI Connector
←→Alligator Clip

Wire color
Blown (+) ……1ch Black (GND) or 5ch
Red (+) ……2ch Black (GND) or 6ch
Orange (+) ……3ch Black (GND) or 7ch
Yellow (+) ……4ch Black (GND) or 8ch</td><td>Length 15cm</td></tr>
<tr><td>Event input cable
(RT31-163)</td><td> 

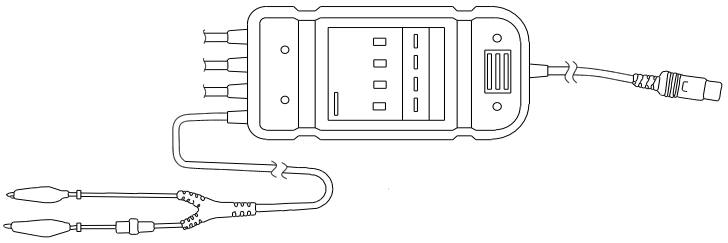
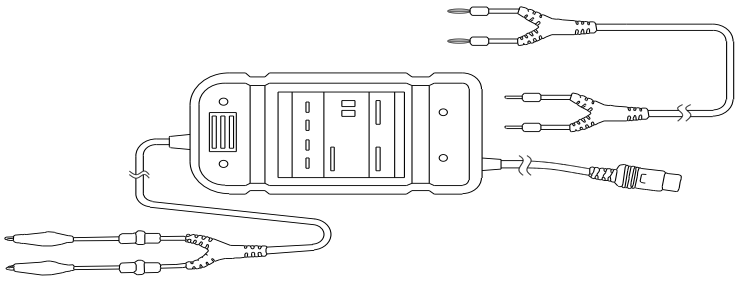
Logic IC code*(0311-5007)
With two ferrite cores
Round DIN8P Plug
←→EI Connector

IC clip code (0311-5008) 2 bags
Alligator clip code (0311-5009) 2 bags</td><td>Length 1.5m</td></tr>
</table>

Name(System)	Form		Comment
Event input cable (0311-5001)		Round DIN8P	Length 1.5m
	Thin cable color Blown ……1ch 5ch Red ……2ch or 6ch Orange ……3ch 7ch Yellow ……4ch 8ch Shield ……GND(0V) White ……+15V Output *When the white+15V output wire is not used, make sure to terminate.		
Event input extension cable (0311-5005)		Round DIN8P Plug ←→Round DIN8P Socket	Length 1.5m
Voltage output cable (0311-5004)		Pin Chip ←→Banana Plug	Length 1.5m
Voltage output extension cable (0311-5006)		Pin Chip ←→Pin Chip Jack	Length 1.4m
Clamp meter output cable (0311-5184)		Safety BNC ←→Microphone Mini Plug	Length 2m

Name(System)	Form		Comment
Trigger input cable (0311-5084)		BNC ←→Alligator Clip Red…+ Black…- Mold Color : Red	Length 2m
Output cable (47226)		BNC←→BNC	Length 2m
Remote cable (00311-5251-0000)	Connector:28 pin 		Length 1.5m
Event cable (00311-5252-0000)	Connector:34 pin 		Length 1.5m

21.2. Probes·Clamp Meter List

Name(System)	Form	Comment
Floating voltage probe (1539)	 Alligator Clip ←→Round DIN8P Plug	4 Input
Voltage regulation probe (1540: 100/120 VAC) (1543: 220/240 VAC)	 ·Alligator Clip ←→Round DIN8P Plug ·Banana Plug ←→Pin Chip	1 Input

21.3.Spare Parts List

System	Name	Rating	Comment
YPS106	Recording paper	Roll Paper 219. 5mm × 30 m 5Rolls/Box	0511-3167(5 Rolls)
YPS108	Recording paper	Roll Paper 219. 5mm×30m、 220. With tear-off Strip 150 mm Pitch Remaining Indicator Printing:300 mm Pitch 99 to 00 5Rolls/Box	0511-3166(5 Rolls)
YPS112	Recording paper	Z-Fold Paper 219. 5mm × 200 m, Folding width 300 mm Remaining Indicator Printing: per page 669 to 000 1book/Box	0511-3182
YPS114	Recording paper	Rolled chart paper 219.5mm x 100m 2 rolls/box	0511-3197

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(6) Troubles attributed to third party's conflicts;
(7) Troubles caused by a force majeure such as natural disasters

Address inquiries to:

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