azbil

No. CP-UM-5613E

Paperless Recorder

Model ARF200

Operation Manual

Thank you for purchasing the ARF200 Paperless Recorder.

This manual contains information for ensuring the correct use of the ARF200 Paperless Recorder. It also provides necessary information for installation, maintenance, and troubleshooting.

This manual should be read by those who design and maintain equipment that uses the ARF200 Paperless Recorder. Be sure to keep this manual nearby for handy reference.

Azbil Corporation

NOTICE

Be sure that the user receives this manual before the product is used.

Copying or duplicating this user's manual in part or in whole is forbidden. The information and specifications in this manual are subject to change without notice.

Considerable effort has been made to ensure that this manual is free from inaccuracies and omissions. If you should find an error or omission, please contact the azbil Group.

In no event is Azbil Corporation liable to anyone for any indirect, special or consequential damages as a result of using this product.

Conventions Used in This Manual

■ About Icons

The safety precautions described in this manual are indicated by various icons. Please be sure you read and understand the icons and their meanings described below before reading the rest of the manual.
Safety precautions are intended to ensure the safe and correct use of this product, to prevent injury to the operator and others, and to prevent damage to property. Be sure to observe these safety precautions.

⚠WARNING	Warnings are indicated when mishandling this product might result in death or serious injury.
⚠CAUTION	Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to the product.

■ Examples

Use caution when handling the product.

The indicated action is prohibited.

Be sure to follow the indicated instructions.

Safety Precautions

⚠WARNING

Be sure to turn OFF the power supply before connecting wires to the power or input/output terminals to prevent an electric shock.
To prevent electric shock, connect the protective ground terminal to a ground of less than 100 Ω.
To prevent electric shock, attach the terminal cover after wiring.

⚠CAUTION

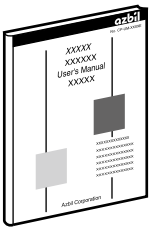
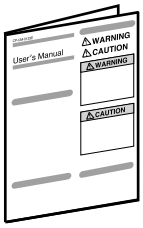
Wire the recorder following the instructions in this manual, using the specified type of power leads and installation methods. Failure to do so might cause electric shock, fire or faulty operation.
Do not disassemble the recorder or touch components inside it. Doing so might cause electric shock or faulty operation.
If some hazardous condition arises — for example, if there is smoke from the recorder or if there is a smell of something burning — immediately turn the power off.
When disposing of this recorder, treat it appropriately as industrial waste in accordance with local regulations.

Unpacking

Check the following items when removing the ARF200 from its package:

1. Check the model number to make sure you received the correct product.
2. Check for any obvious damage.
3. Check the contents of the package against the packing list to make sure that all items are included.

Handle the ARF200 and its accessories with care to prevent damage or loss of parts.
If there is some problem with your order, please contact your dealer immediately.

Name	Model No.	Q'ty	Remarks
ARF200		1	
Mounting bracket		1	
Wrench		1	
CF Card			ARF910CF0256 (256MB)
Screws (spare)		5	M3.5 X 8 bind
Stylus		1	
User's Manual 	CP-UM-5613E	1	This manual
	CP-UM-5612E	1	ARF200 Paperless Recorder Installation and Wiring
	CP-UM-5891JE	1	CF Card User's Manual

The model No. label is located on the top of the unit.

☞ Chapter 2. PART NAMES AND FUNCTIONS, page 4.
☞ 1-2 Model Selection Guide, page 2.

Contents

Chapter 1. OVERVIEW

1.1. Introduction

The ARF200 Paperless Recorder is able to measure temperature and various other industrial process quantities from 12 through to 24, 36 and 48 channels, and display various data in real time on a 12.1-inch TFT color LCD. This recorder can also store measured data in its internal memory or on a memory card (CF card or USB memory). Stored data can be loaded into off-the-shelf software like Excel, and data analysis software especially designed for the ARF200 is also available.

■ Main Features

- A variety of screen displays
  Real-time trends, bar graphs, data in table format, and combined displays of real-time trends plus bar graphs, real time trends with numeric values, and real time trends plus historical trends can be freely selected and monitored in the most suitable display format for your requirements. Other displays include a summary of past alarm activity and a list of annotations made with the marker function. In addition, up to 6 channel groups can be registered, allowing easy switching between them and 4-split screen display.
- Marker function
  Symbols and annotations (up to 30 alphanumeric characters) can be written on trend screens. Annotations can be written freely, and also up to 50 can be assigned to key combinations for easy writing. Annotations can be written on stored and replayed trend screens, too. Adding a symbol only without text is also possible.
- Various memory functions
  Start/stop of data storage can be executed by user-selected conditions like key operation, alarm occurrence, time, etc. and simultaneous storage to as many as 6 files is available. In normal operation, data is stored in internal memory and can be saved on a CF memory card.
- Analog recorder feeling
  Since the trend screen displays data in chart format with scales and “pens,” monitoring the data has the feel of monitoring an analog recorder.
- Easy setup
  Parameters are set easily and interactively by selecting an item from the menu and then by opening a window. Fast setup of essential parameters can be done on the Home screen.
- Consumables not required
  Since it is paperless, this recorder does not require the consumables needed by other recorders, like charts, pens and ink.
- Easy data management
  Older data stored on a CF card can be read and managed using off-the-shelf software like Excel (a registered trademark of Microsoft Corporation).
- Availability of software package
  Data analysis can be executed conveniently on a PC with a dedicated software package, ARF Data Analysis Tool, sold separately (ARF990DA0000, for Windows).

■ Additional functions

Additional functions are as follows:
Alarm outputs: Alarm relay outputs
Contact inputs: Digital (non-voltage contact) inputs

1.2. Model Selection Guide

■ Model number configuration

I	II	III	IV	V	VI	VII	VIII	Notes
Basic model No.	Power supply	Input	Option 1	Option 2	Option 3	Addition 1	Addition 2	
ARF212								12 inputs
ARF224								24 inputs
ARF236								36 inputs
ARF248								48 inputs
	A							100-240Vac, 50/60Hz
		S						Standard multi-input (100 ms specifications)
		L						Standard multi-input (1 s specifications)
			0					None
			1					12 relay outputs (normally open contacts)
			2					6 relay outputs (normally closed contacts)
			3					24 relay outputs (normally open contacts)
			4					12 relay outputs (normally closed contacts)
			5					12 relay outputs (normally open contacts) + 6 relay outputs (normally closed contacts)
			A					8 non-voltage contact inputs
			B					8 non-voltage contact inputs + 12 relay outputs (normally open contacts)
			C					8 non-voltage contact inputs + 6 relay outputs (normally closed contacts)
			D					8 non-voltage contact inputs + 24 relay outputs (normally open contacts)
			E					8 non-voltage contact inputs + 12 relay outputs (normally closed contacts)
			F					8 non-voltage contact inputs + 12 relay outputs (normally open contacts) + 6 relay outputs (normally closed contacts)
				0				None
					0			None
						0		None
						D		With inspection results
						Y		With traceability certification
							0	None

■ Optional parts

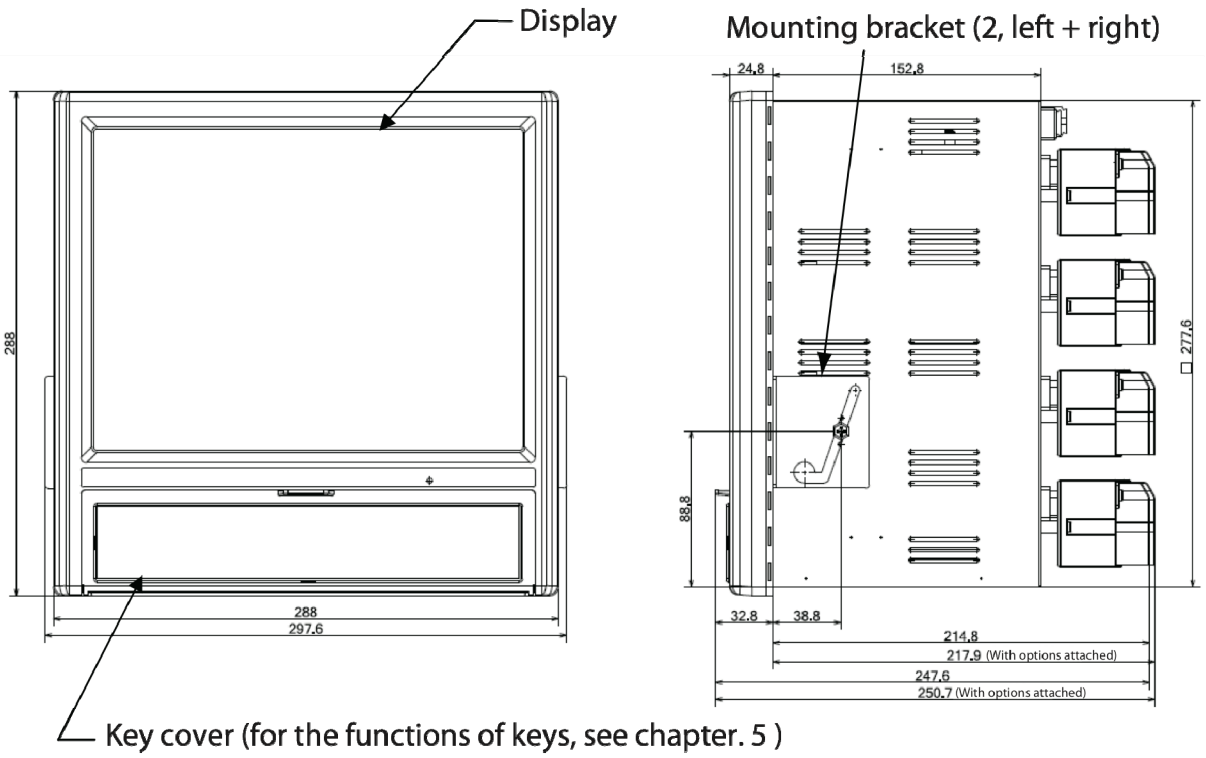
Name	Model number	Notes
CompactFlash card	ARF910CF0256	256 MB
CompactFlash card	ARF910CF0512	512 MB
CompactFlash card	ARF910CF1000	1 GB
CompactFlash card	ARF910CF2000	2 GB
Resistor	81401325	250 Ω ± 0.02 % (qty.: 1)
Resistor	81446642-001	250 Ω ± 0.05 % (qty.: 2)

■ Data analysis software

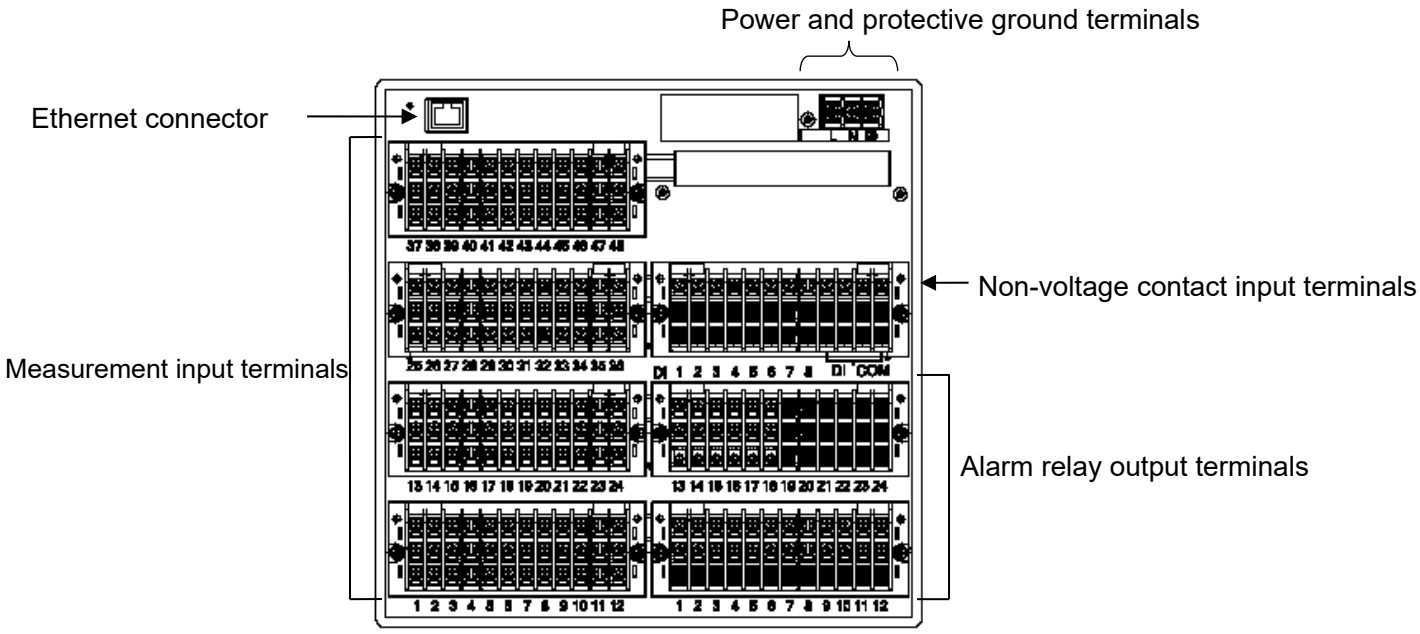
Name	Model number	Notes
ARF Data Analysis Tool	ARF990DA0000	

Chapter 2. PART NAMES AND FUNCTIONS

■ Main unit



■ Rear terminals



Chapter 3. MOUNTING AND WIRING

3.1. Installation Site

The ARF200 recorder is designed for indoor use. Install it in a location with the following characteristics:

- Steady ambient temperature and humidity of about 23 °C, 50 % RH
- Free from dust, smoke, steam, etc.
- Not subject to excessive mechanical vibration and shock
- Far from the sources of electrical or magnetic fields
- Not near flammable liquid or gas
- Protected from direct sunlight
- Where terminals are not near a heat source (to maximize measurement accuracy)

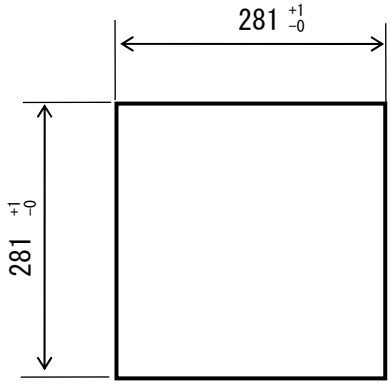
Handling Precautions

- To prevent temperature rise, do not put in an airtight enclosure.
- To prevent deformation of the front panel, do not expose to hot air exhaust (50 °C or more).

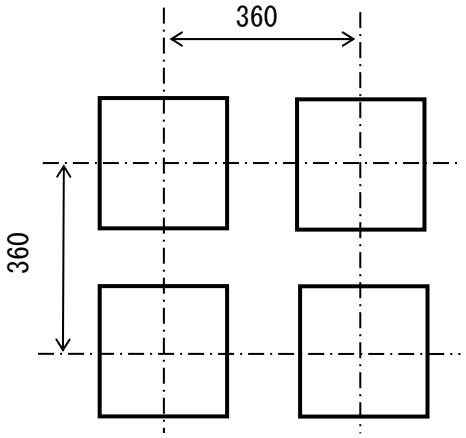
3.2. Mounting

■ Panel cutout dimensions

Unit: mm



● Minimum interval for gang-mounting



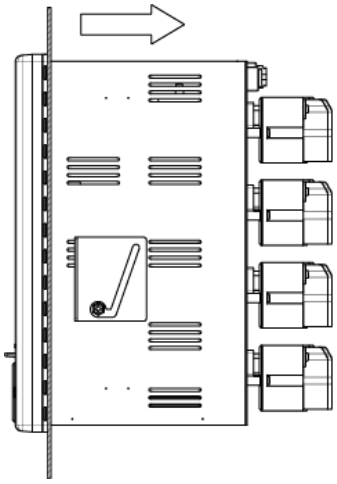
■ Mounting methods

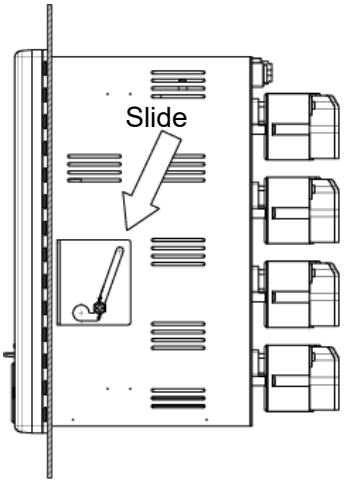
⚠ Warning

- **For mounting the recorder on the panel, be careful of injury by dropping it.**

(1) Insert the ARF200 into the panel cutout on the instrument panel.
(2) There are two screw holes, one on the left side and one on the right side of the ARF200. Lightly screw in the 2 screws provided.
(3) Next, put the hexagon head of the screws inserted above into the round holes of the mounting brackets, and firmly press the ARF200 against the instrument panel (from the front) while sliding as shown in the figure. In this state, tighten the mounting screws with the provided wrench or Phillips screwdriver.

Note that the left and right mounting brackets are different. (Installation should be done by two people.)





Handling Precautions

- The recommended tightening torque is 1.0 N·m. Tightening the mounting bracket screws to a higher torque might deform or damage the case.
- In mounting, the top surface should not be tilted down toward the back more than 20°, and it should not be tilted up at all. Do not tilt toward the right or left sides.
- Mount on a panel made of steel plate 2 to 6 mm thick or a panel having equivalent strength.

3.3. Wiring Precautions

⚠Warning

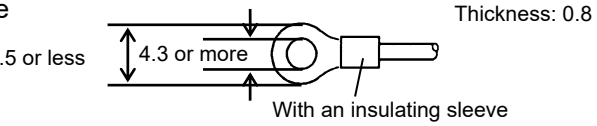
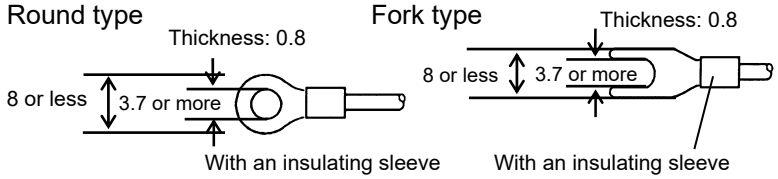
- Be sure to turn OFF the power supply before connecting wires to the power or input/output terminals to prevent an electric shock.
- Attach crimp terminals to the ends of wires to prevent looseness or disconnection of terminals and short-circuit between terminals. Use the crimp terminals with an insulating sleeve to prevent electric shock.
- Arrange and secure connected wires so that a passing person or object cannot easily be caught on them. Otherwise disconnection, electric shock, or other problems may occur.
- To prevent electric shock, connect the protective ground terminal to a ground of less than 100 Ω.
- To prevent electric shock, attach the terminal cover after wiring.

Handling Precautions

- Use a single-phase power supply having a stable voltage without any waveform distortion to prevent malfunction.
- Do not place the input/output wires close to, or in parallel with, power lines or high-voltage circuits. If they run parallel to each other, keep the I/O wires 50 cm or more apart.
- For thermocouple (TC) inputs, keep the input terminals away from a heat source (a heating body) to reduce a reference junction compensation error. Don’t expose the input terminals to direct sunlight, etc.
- Don’t use any unused terminals for relaying; otherwise the electric circuits may be damaged.
- To prevent malfunction, keep all connected wires as far from sources of electrical noise as possible. Use a countermeasure (see below) if wires are unavoidably close to a noise source.

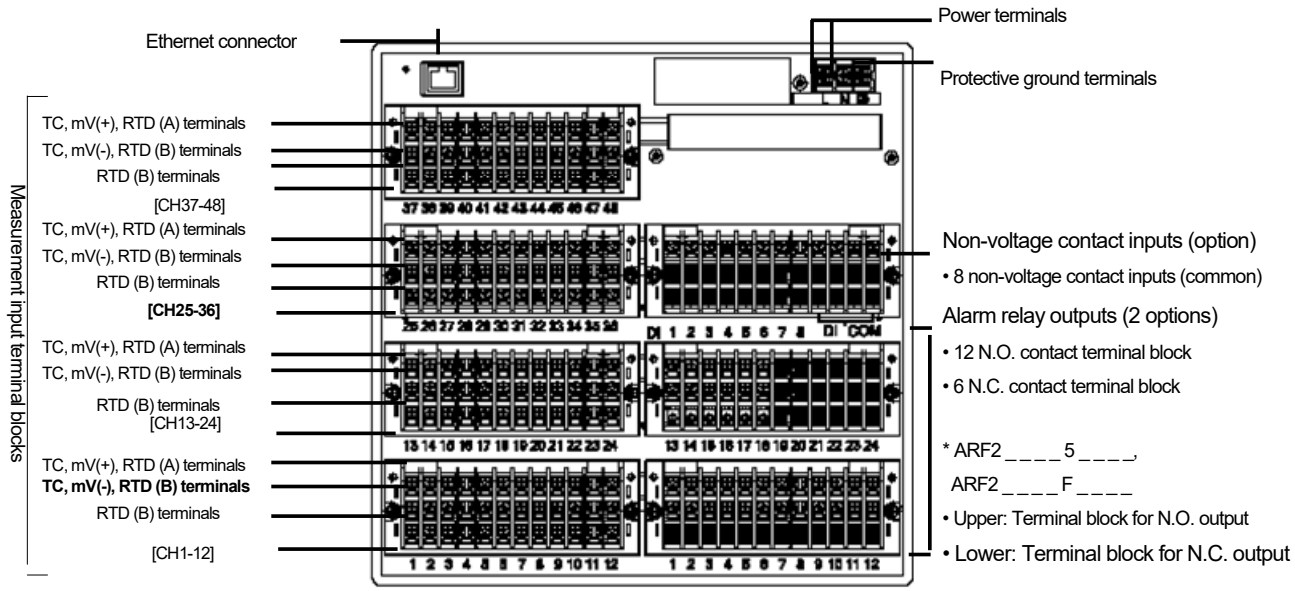
Major noise sources	● Electromagnetic switch, etc. ● Power line with waveform distortion ● Inverter ● Thyristor regulator
Counter-measure	Insert noise filters between power terminals and input/output terminals. A CR filter is often used.

Terminal type and crimp terminal dimensions

Terminal	Screw size	Tightening torque	Crimp terminal dimensions (unit: mm)
Power and protective ground terminals	M4	1.2N·m	Round type 
Other terminals	M3.5	0.8N·m	Round type Fork type  Note: Use the round type if possible.

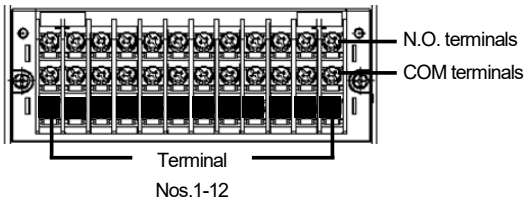
3.4. Terminal Block

The following figure shows the terminal block as configured for options (alarm relay outputs [12 Form A contacts, 6 Form C contacts] and 8 contact inputs). The Ethernet connector is the standard type.

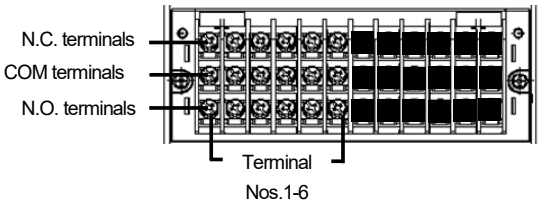


[Option terminal blocks (* Subject to change)]

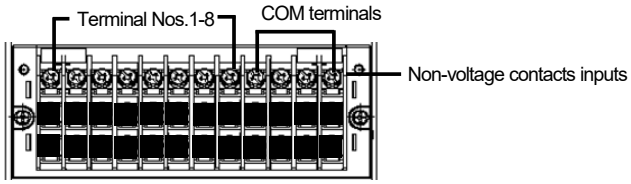
• Alarm relay outputs (12 normally open contacts)



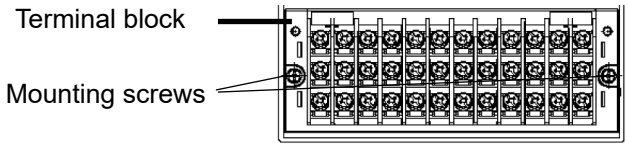
• Alarm relay outputs (6 normally closed contacts)



• 8 non-voltage contact inputs



Note: The input, alarm, and contact input terminal blocks can be removed to facilitate wiring. Because the terminal block is connected by connectors, it can be removed easily by loosening two screws.

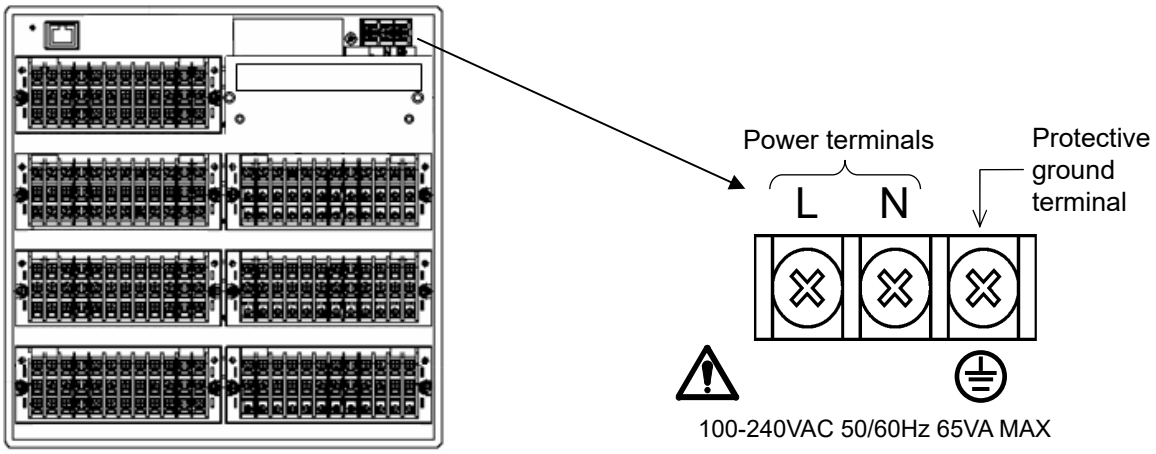


Handling Precautions

- The thermocouple input terminal block cannot be repositioned or replaced with a terminal block for another instrument. Measurement error will occur.
- Before mounting or dismounting a terminal block, turn off the external power switch to prevent the electrical circuits from being damaged.

3.5. Wiring of Power and Protective Ground Terminals

(1) Power and protective ground terminals



(2) Connection of power terminals

For connection to the power terminals, use a 600 V PVC-insulated cable terminated by crimp terminals with insulating sleeve.

Note: Use a cable conforming to the standards below.

- ✧ IEC 227-3
- ✧ ANSI/UL817
- ✧ CSA C22.2 No. 21 and No. 49

(3) Connection of protective ground terminal

Be sure to connect this terminal to the protective ground of the power supply facility. For this connection, use a cable terminated by a crimp terminal with an insulating sleeve.

- Ground wire: copper, 2 mm^2 or more in cross-sectional area (green/yellow)

Handling Precautions

- To prevent electric shock, attach the terminal cover after wiring.

3.6. Wiring of Measurement Input Terminals

(1) Allowable input voltage

・Thermocouple input (burnout disabled), DC voltage input (±2 V max.): ± 10 Vdc max.

・DC voltage input (±5 to ±50 V): ±60 V max.

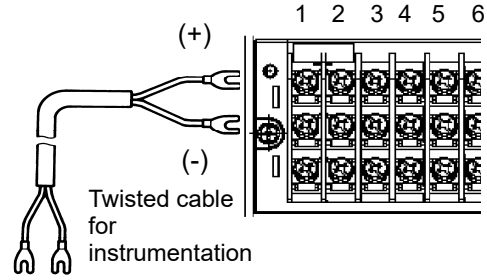
・Thermocouple input (burnout enabled), resistance thermometer (RTD) input: ±6 Vdc max.

Handling Precautions

•Use crimp terminals with insulating sleeves on the end of wires connected to the input terminals.

(2) DC voltage (or current) input

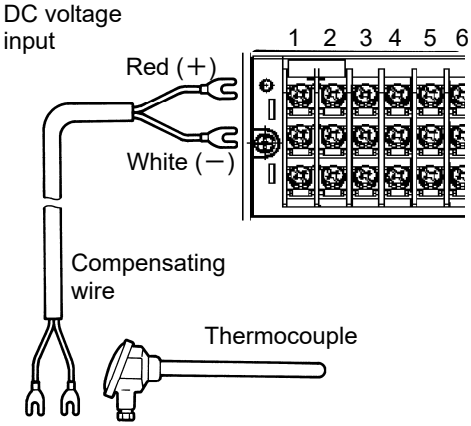
For input, use twisted cable made for instrumentation use, in order to suppress noise. For current input, connect a shunt resistor between the current input terminals of that channel before wiring.



(3) Thermocouple (TC) input

Be sure to use thermocouple wire (or compensating leads) to the input terminals of this recorder. If copper wire is used part of the way, a significant measuring error will occur. Avoid connecting a pair of thermocouple wires to another device (controller, etc.) in parallel because such a connection may affect the measurement of each device. If a parallel connection is unavoidable, check whether the effects are within the allowable range under the following conditions:

DC voltage input



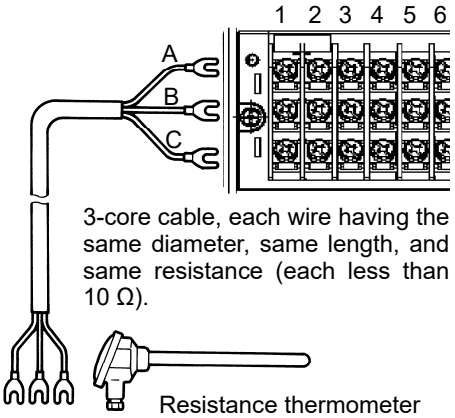
・Set the burnout to disabled.

・Ground the device that you wish to connect in parallel at one point. In addition, install the device near the ARF200 and if possible use the same power supply.

・Do not shut off the power of either device during operation.

(4) Resistance thermometer (RTD) input

Use a 3-core cable in which each lead has equal resistance. Also, do not connect a single RTD in parallel with more than one recorder (controller, etc.).



Handling Precautions

・ The allowable amount of noise on the measurement input terminals is 30 Vac (or 60 Vdc) or less. Because of common mode noise and the like, take care that the allowable noise level is not exceeded. After wiring, attach the terminal cover to prevent electric shock and protect the input wires. Also, the terminal cover can reduce the reference junction compensation error for thermocouple input.

・ Channels are isolated from each other. Note, however, that the C terminals for RTDs are short-circuited on the ARF _ _ _ AS (100 ms input cycle models) between channels 1 & 4, 5 & 8, and

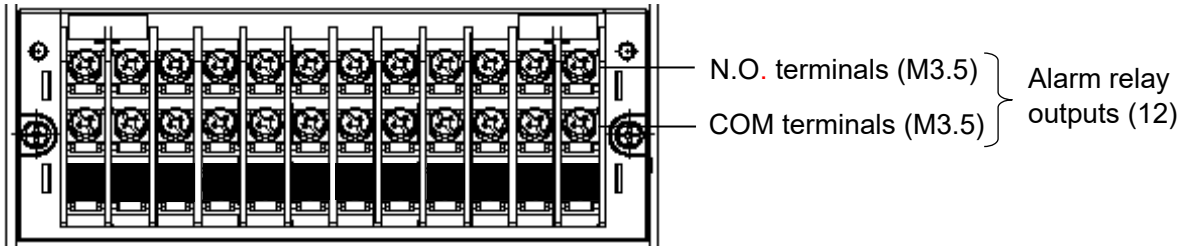
9 &12 in each input terminal block, and on the ARF _ _ _ AL (1 s input cycle models) the C terminals are short-circuited between all channels in each input terminal block.

3.7. Alarm Output Wiring (for applicable models)

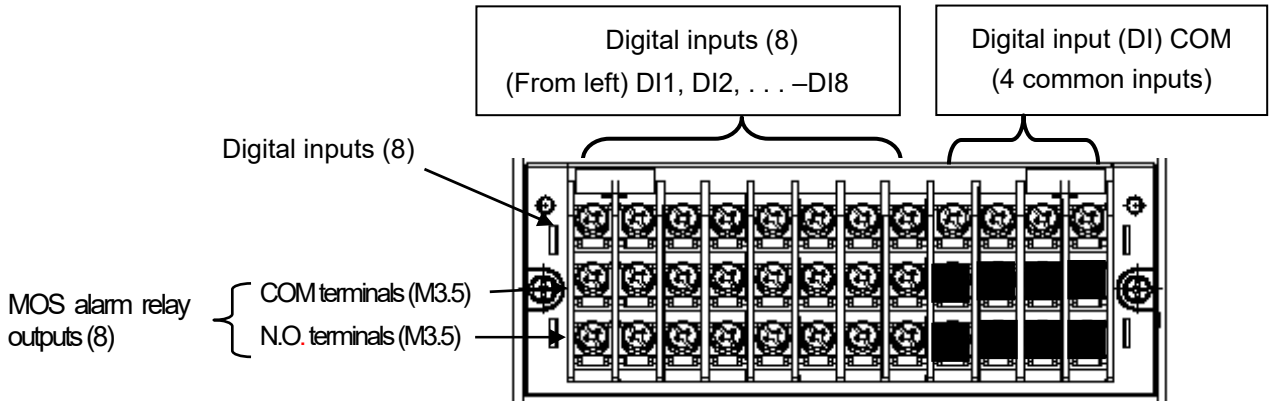
(1) Alarm output terminal layout

The terminal arrangement depends upon the type of alarm output.

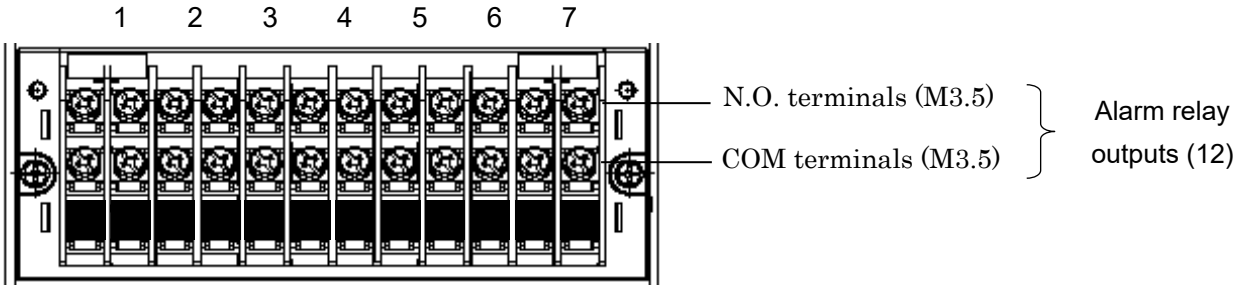
Alarm relay output (1a)



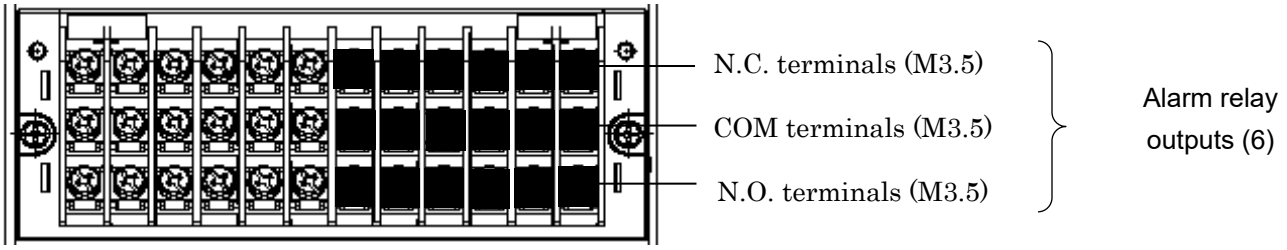
MOS alarm relay output (1a)



Alarm relay output (1a)



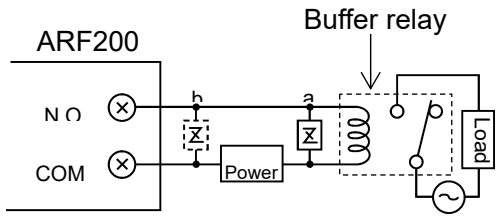
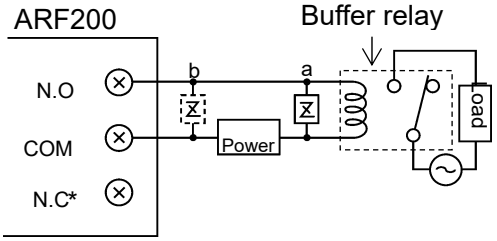
Alarm relay output (1c)



(2) Wiring

Turn off the power supply and buffer relay power supply before wiring to prevent electric shock.

- ✧ Connect leads to the load via a buffer relay.
- ✧ Use leads with crimp terminal lugs (with insulating sleeves).
- ✧ If a voltage of 30 Vac/60 Vdc or more is applied to the output terminals, connect the signal lead by a cable terminated by a round crimp terminal lug (with insulating sleeve). Also, use double insulation (2300 Vac withstand voltage or more) for signal leads to which a voltage of 30 Vac/60 Vdc or more is applied, and basic insulation (1390 Vac withstand voltage or more) for other signal leads. After wiring, be sure to attach the terminal cover to prevent electric shock.

Example of mechanical relay Form A contact output	Example of mechanical relay Form C contact output
 : Contact point protective surge absorber (placement on the "a" side is recommended)	 : Contact point protective surge absorber (placement on the "a" side is recommended) * The operation of N.C. terminals is opposite to that of N.O. terminals. They open when an alarm occurs.

⚠ Warning

Connect a load that is within the specified contact capacity of the alarm output terminals.

Since the power for the buffer relay is applied to the alarm output terminals, touching these terminals will result in an electric shock. Be sure to attach the terminal cover after wiring.

Handling Precautions

- The alarm output device can be damaged by a spark from the buffer relay or breakdown of the surge absorbing element. Be sure to take appropriate safety measures as necessary.

(3) Specifications for wiring

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Contact rating of mechanical relay outputs (both Form A and Form C contacts)</td><td>
<table>
<tr><th>Power supply</th><th>Resistive load</th><th>Inductive load</th></tr>
<tr><td>100 Vac</td><td>0.5 A</td><td>0.2 A</td></tr>
<tr><td>240 Vac</td><td>0.2 A</td><td>0.1 A</td></tr>
<tr><td>30 Vdc</td><td>0.3 A</td><td>0.1 A</td></tr>
</table>
Minimum load: 100 μA and 100 mVdc
</td></tr>
<tr><td>Selection of buffer relay</td><td>
• Coil rating: less than the contact rating of the output terminals
• Contact rating: more than twice the load current

A relay with a built-in coil surge absorption element is recommended. Add an additional buffer relay if the buffer relay does not satisfy the load rating.
</td></tr>
<tr><td>Selection of surge absorber and mounting</td><td>
• Use an appropriate surge absorber element to protect the contacts if the buffer relay does not already have one.
• The MOS relay might burn out if a signal exceeding the contact rating is applied, even momentarily.
• To prevent malfunction caused by a light load, the most effective mounting position for the surge absorber is on the coil side of the buffer relay (‘a’ in the wiring diagram in section 3.7, (2)).
• The surge absorber is generally composed of a capacitor (C) and resistor (R).

Reference values for C and R
C: 0.01 μF (rating about 1 kV)
R: 100 to 150 Ω (rating about 1 W)

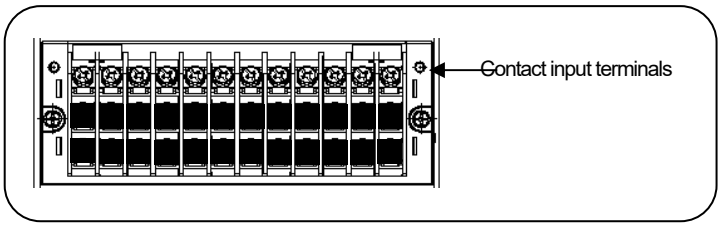
Azbil Corporation’s surge absorber is No. 81446365-001 (qty. 10).
</td></tr>
</table>

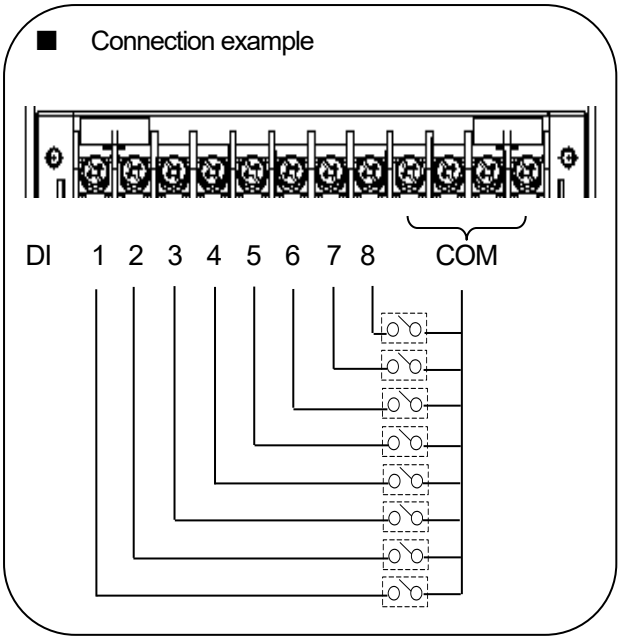
Handling Precautions

- The common terminal of each alarm output is separate from the others.

・ 3.8. Digital Input Terminals (for applicable models)

(1) Digital input terminals





(2) Wiring

Turn off the power before wiring to prevent an electric shock.
Use a non-voltage contact signal for digital input terminals.
Use crimp terminals with insulating sleeves on the end of wires connected to the digital input terminals.

Digital input specifications

Voltage with contacts open:	Approx. 5 V
Current when contacts close:	Approx. 4 mA short-circuit)

Handling Precautions

- Relays and switches connected to the contact input terminals should be designed for low voltage/current load use.

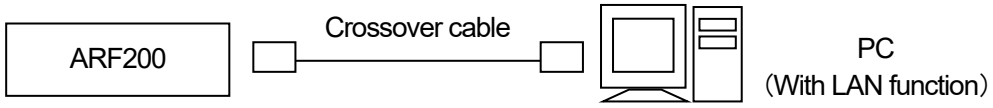
■ DI terminal functions

(1) Digital input	Detects ON/OFF (closed/open) state. Set the range type to DI. (See 11.2, “Input Settings.”)
(2) Pulse input	For pulse input, set the range type to either Pulse (+) or Pulse (-). (See 11.2, “Input Settings.”)
(3) Integration reset	Resets the cumulative count. When the specified digital input terminal is energized, the count is reset. (See 11.6, “Totalizer settings.”)
(4) Marker	Writes annotations. Annotations can be written on trends while the digital input terminal is ON. (See 11.8, “Marker settings.”)
(5) File write	Starts/stops recording of data in an internal memory file. Recording starts when the digital input terminal turns ON. (See 11.5, “File Settings Screen.”)
(6) Time correction	Adjusts the time when the digital input terminal turns ON. (See 11.11, “System Settings.”)

3.9. Ethernet Connections

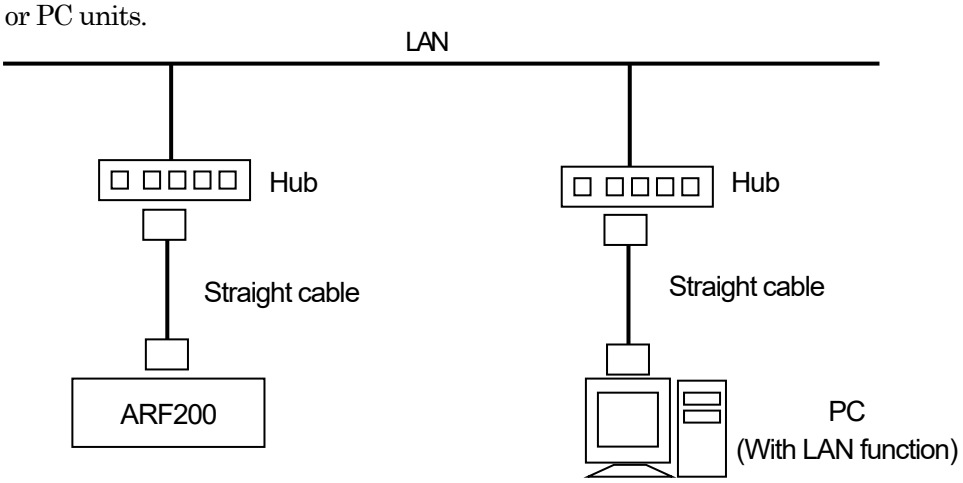
1-to-1 connection with a PC

To connect the PC and the ARF200 in a 1-to-1 connection, use a crossover cable or a hub.



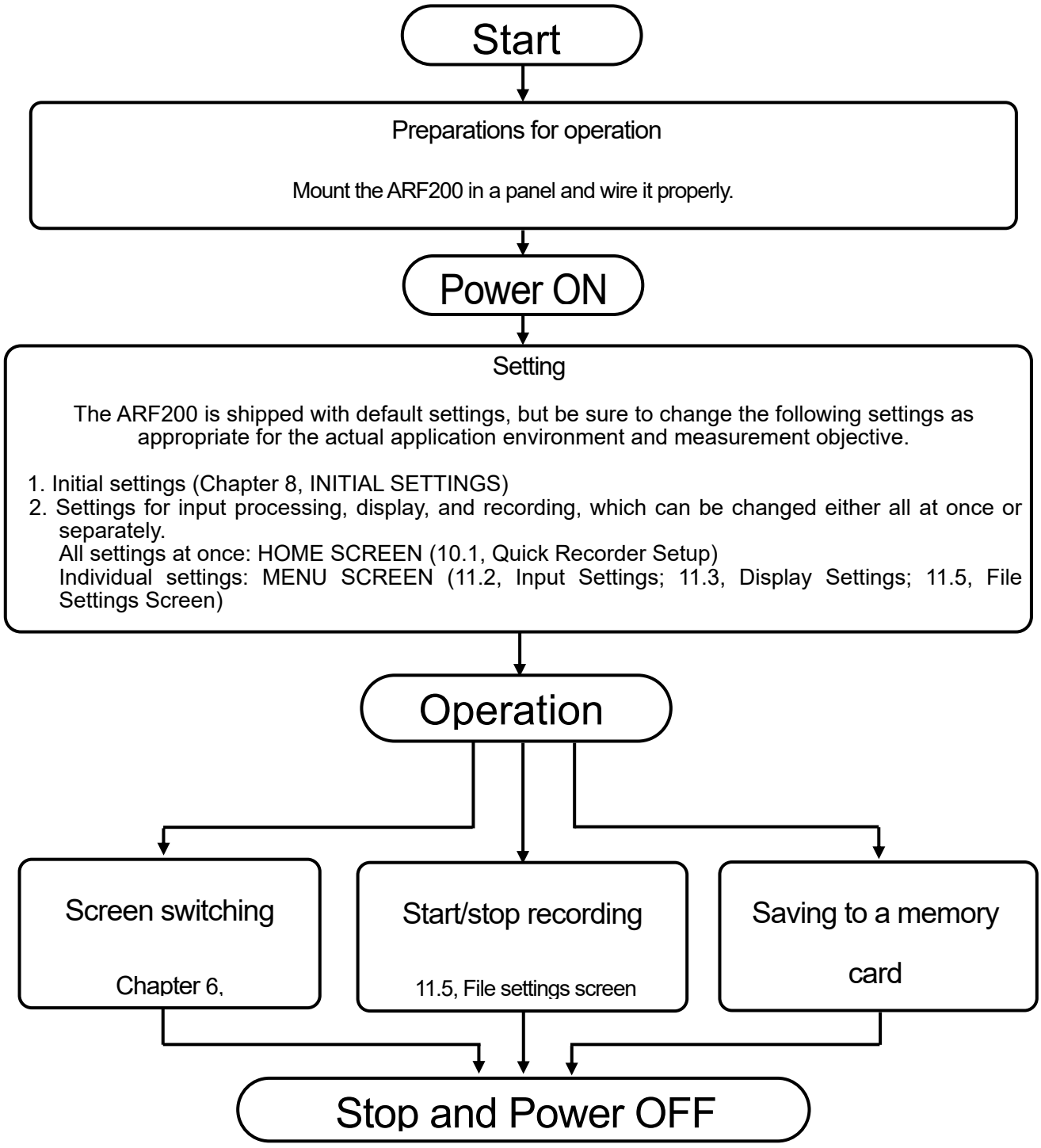
N-to-N connections with PCs

When connecting to multiple PCs or to an existing LAN, use a hub and straight cables between the hub and ARF or PC units.



Chapter 4. SETUP

The ARF200 is shipped with default factory settings. For actual operation, however, be sure to do the following setup procedures.

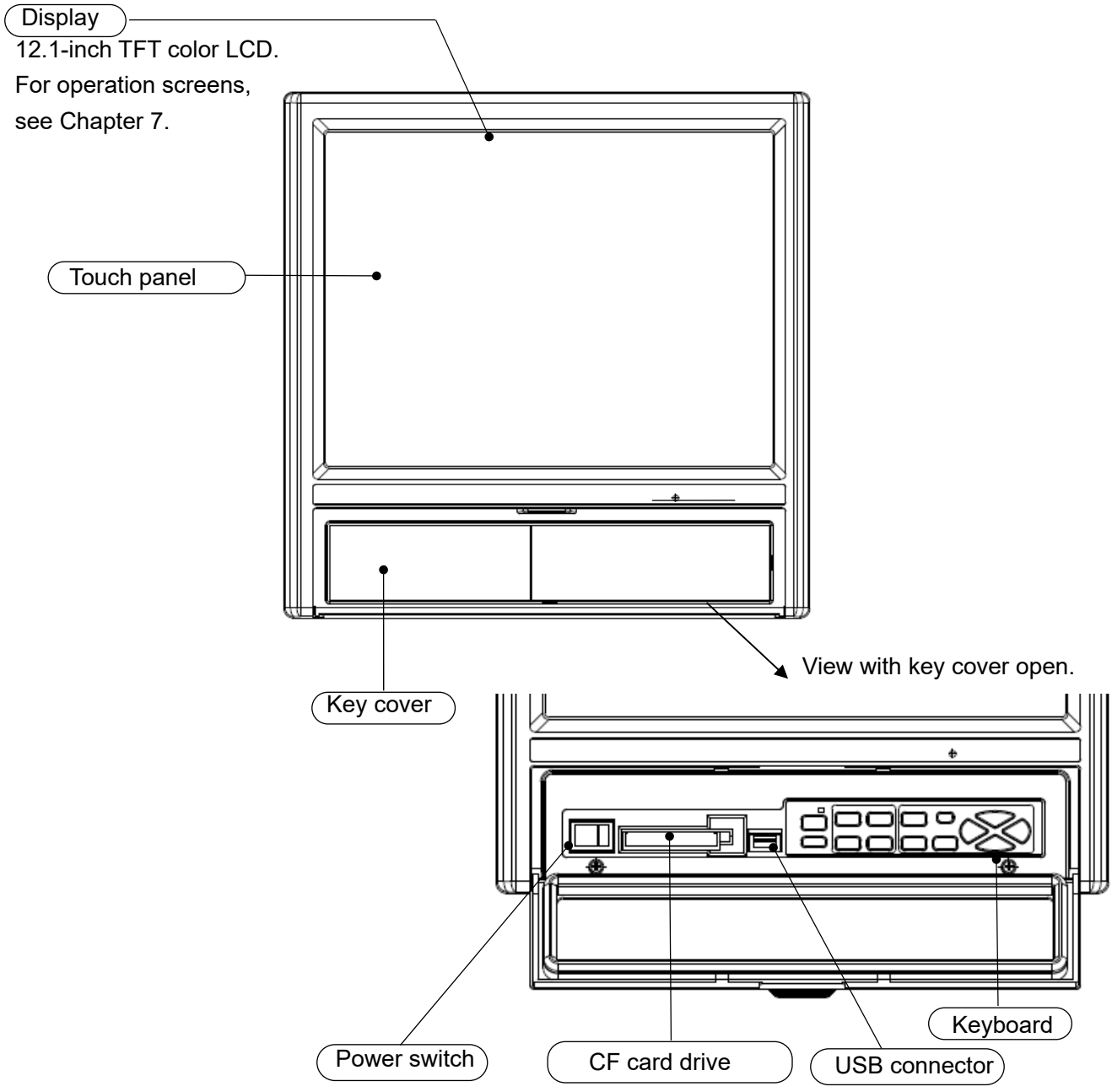


Note)

On portions of the LCD screen, some pixels may be always lit or always not lit, and there may be unevenness in brightness due to the characteristics of the liquid crystals, but these are not malfunctions.

Chapter 5. FRONT PANEL

5.1. Parts and Functions



Handling Precautions

- The front panel is made of glass. To avoid injuries due to broken glass, protect it from impact.

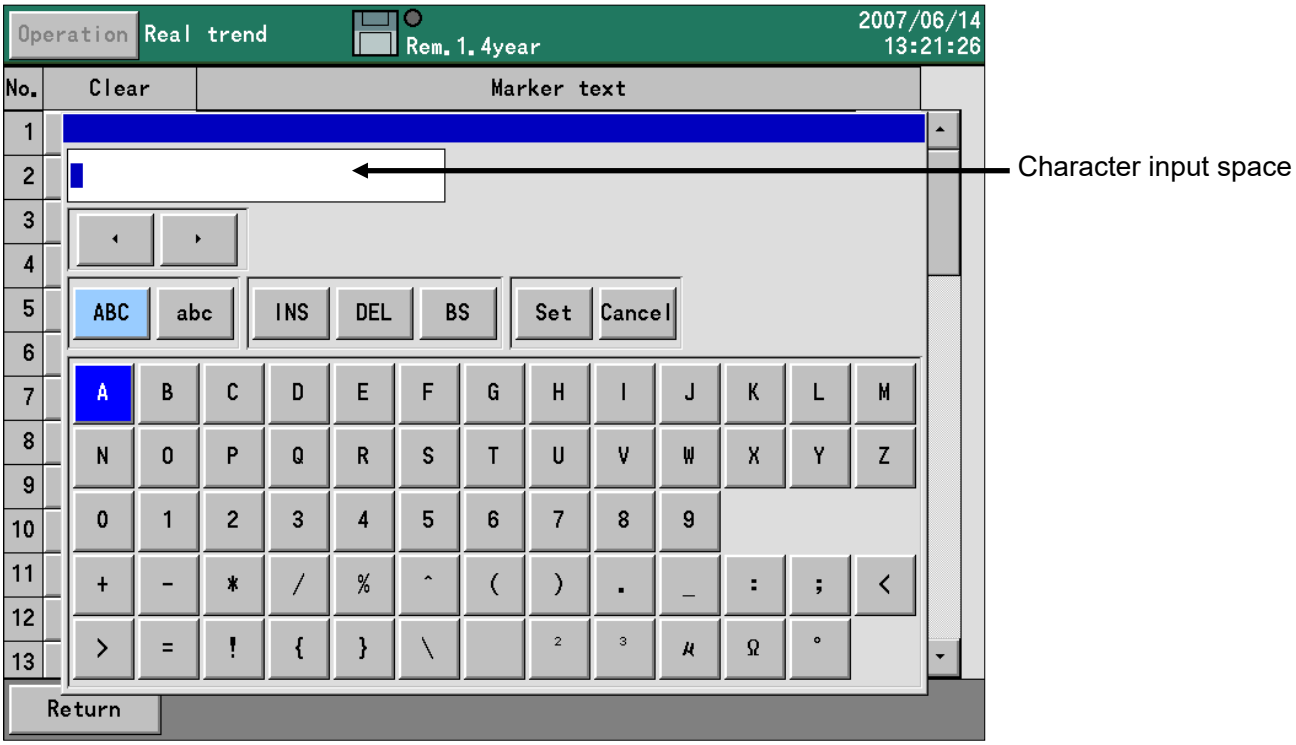
5.2. Functions of Keys

The usage and functions of the keys is different depending on whether an operation screen or a settings screen is displayed. All key operations can also be done on the touch panel, so all operations are possible with the key cover closed.

Key	Main Functions	
	Operation screen	Settings screen
START	Starts recording	Not used
STOP	Stops recording	Not used
SCROLL	Switches the scroll mode on and off, or moves to the historical trend screen	Not used
CURSOR	On the historical trend screen, switches the cursor mode on and off.	Invalid
MARKER	Writes an annotation on the trend screen	Not used
DISP	Displays the DISP menu	Takes a snapshot when pressed and held
HOME	Displays the HOME screen	Quits the Home screen
MENU	Displays the MENU screen or returns from MENU screen to previous screen	Returns to the previous screen
ESC	Cancels a menu or returns to the previous screen	Returns to the operation screen or to the previous screen
ENTER	Confirms a menu item selection or displays a menu (the “ENTER menu”) with varying contents, depending on the screen.	Opens the selected menu or enters the numeric value, character, etc. selected by the cursor. Also, returns to the operation screen, or stores a parameter.
 Arrow keys	These keys select (highlight) a menu item or change the display group or channel number.	Arrows move the cursor left, right, up and down.

5.3. Character Input

The character input screen seen below is used for setting or entering tags (labels for the channels), annotations using the marker function, and passwords. Pressing ENTER from a relevant screen displays the character input screen.



On the character input screen, after moving the focus (indicated in blue) to uppercase letters or lowercase letters, pushing the down arrow key moves the focus to the row of letters below. Then, use the arrow keys to move the focus to the desired character, and press the [ENTER] key. The selected character is then displayed in the character input space.

ABC — When selected, uppercase letters, symbols and numerals can be entered.

abc — When selected, lowercase letters, symbols and numerals can be entered.

INS — Insert key. Toggles character input between insert mode and overwrite mode.

DEL — Delete key. Deletes the character selected in the character input space.

BS — Backspace key. Deletes the character before the cursor position.

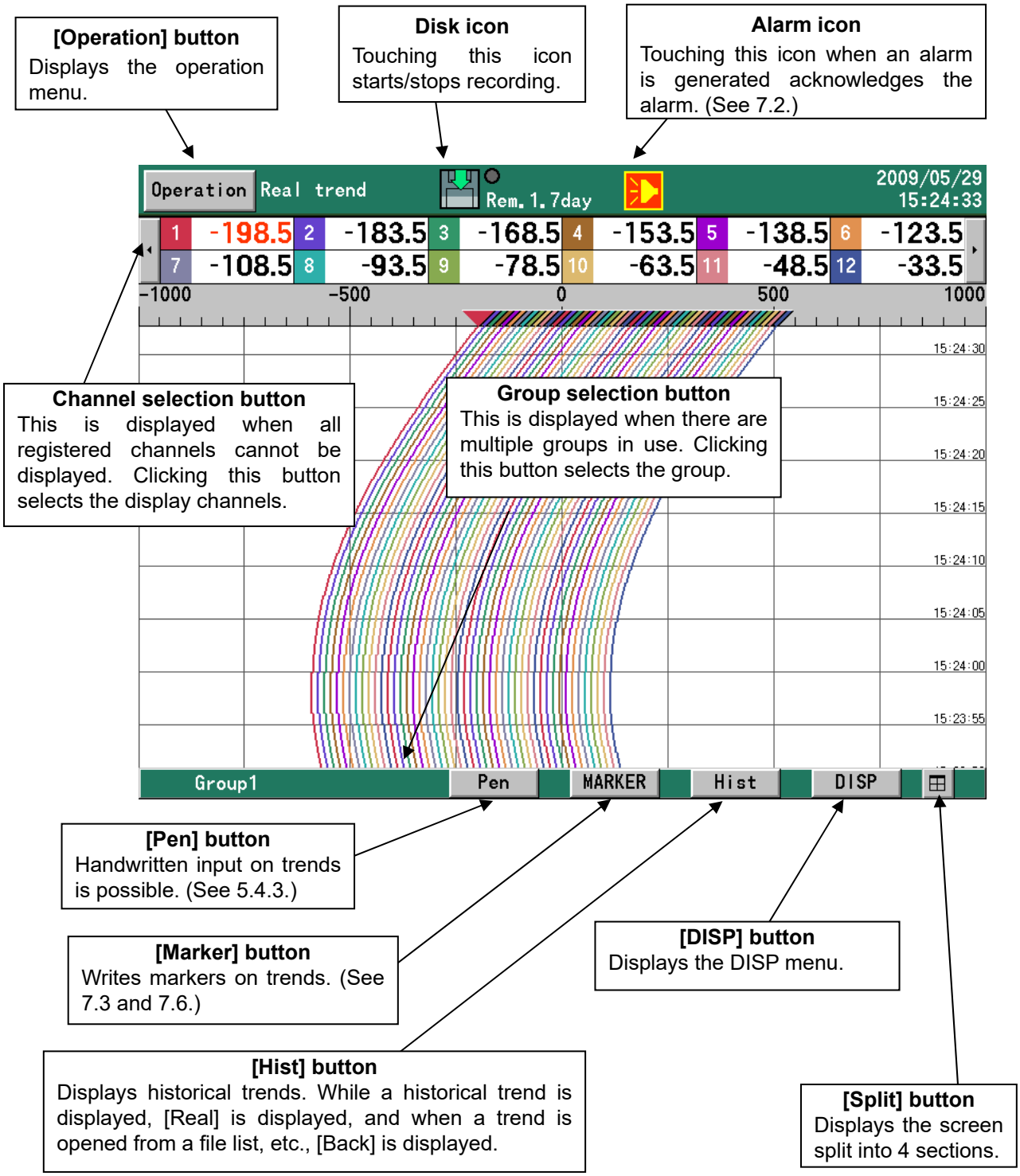
Set — Accepts the string of characters input in the character input space. The same result can be obtained by pressing the [ENTER] key when the input space is highlighted by the focus.

5.4 How to Operate the Touch Panel

All ARF200 operations can be done on the touch panel. If the touch panel is not operating normally or if the same operation method as on the ARF100 series is preferred, the keyboard can be used.

The ARF200 can be operated intuitively with the touch panel. The following describes basic screen operation methods. For details on each individual screen, see the descriptions in Chapter 7, OPERATION SCREENS.

5.4.1 Touch Operations on the Operation Screen



<[Operation] menu>

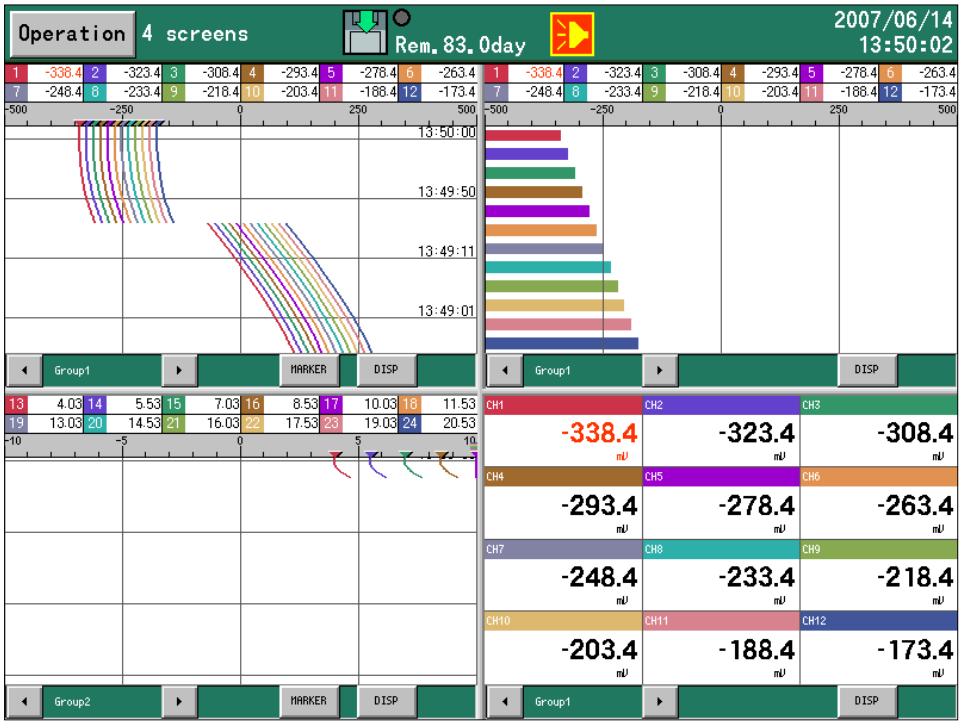
Menu Item	Description
Start recording	Starts recording. Same as the START key
Stop recording	Stops recording. Same as the STOP key
HOME setting	Opens the HOME settings. Same as the HOME key
MENU setting	Opens the MENU settings. Same as the MENU key

<[DISP] menu>

Menu Item	Description
Select display	Changes the operation screen type.
Select group	Changes the display group.
Automatic switching	Turns automatic switching of groups and channels ON/OFF. A checkmark indicates that this item is ON. It is disabled when "0" is set for the automatic selection time.
Snapshot	Saves a hard copy of the screen to the CF card (SNAPSHOT) folder.
Pause	Stops screen refreshing except for the status bar. Press any key to resume. During a pause, compilation, recording, and all other processing except drawing is executed. Also, a snapshot can be taken during a pause by clicking the DISP key.
Display off	Turns the LCD display off. Press any key to turn the display on again.
4-frame split screen	Displays the screen split into four sections.
Expansion/ compression	Trends can be displayed with the time axis compressed (same size to 1/60).

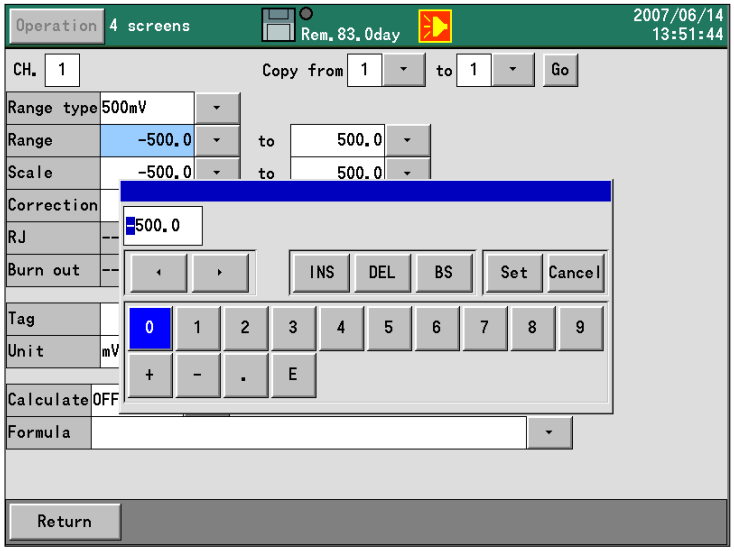
<Touch operation in a 4-frame split screen display>

The display type and group can be selected in each frame by touching the DISP button. For details see 5.5. Also, operations on each frame can be executed by clicking the group selection button and marker button for the frame.

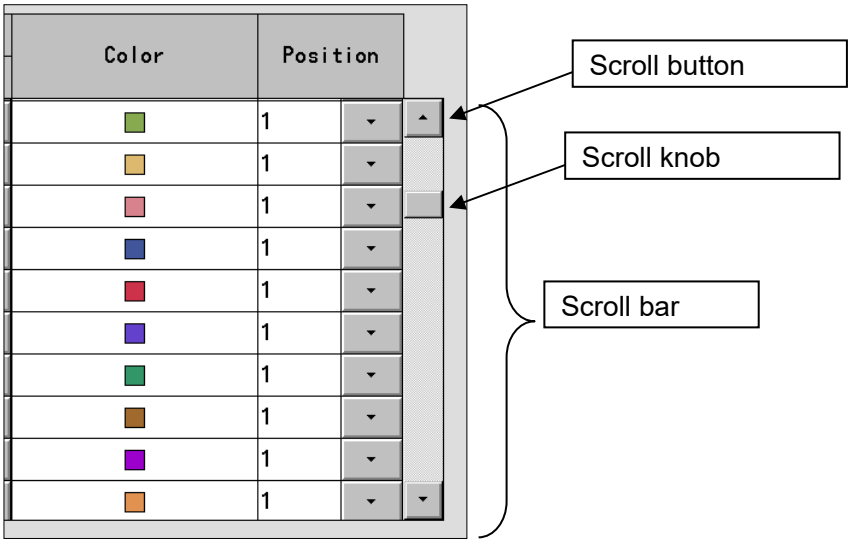


5.4.2 Touch Operations in Setting Screens

On the MENU and HOME settings screens, settings can be changed most easily by touch. To enter a value for any item, touch the button with the ▼ mark.
To return to the previous screen, click the [Back] button.



On screens with a scroll bar, information can be scrolled by touching and moving the scroll bar. Also, screens can be scrolled one at a time by touching above or below the scroll knob.



Note Cautions When Using the Touch Panel

- Do not rub or press a knife or other sharp object on the touch panel.
- Avoid storage or use in atmospheres subject to water, organic solvents and acid, or where the touch panel may come into contact these liquids.
- Avoid use in locations exposed to direct sunlight.
- Wipe off dirt from the touch panel using a soft, dry cloth or a cloth moistened with a neutral detergent or alcohol. If chemicals come into contact with the touch panel, wipe off immediately.
    - Condensation is a natural phenomenon and can occur inside the touch panel. If the touch panel is brought close to room temperature, condensation will disappear naturally. However, use of the touch panel with condensation inside should be avoided, since it can cause a malfunction.

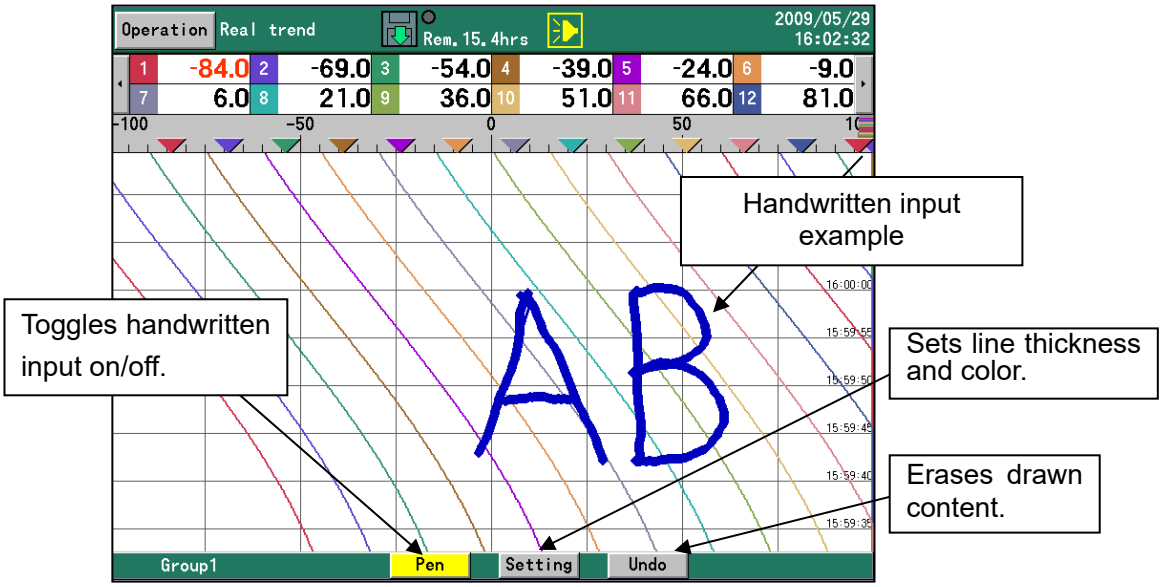
5.4.3 Handwritten Input on Trend Screens

On the real trend screen and historical trend screen, handwritten notations can be freely made by touching the display and drawing your finger along it.

To write with your finger, touch [Pen] once to enable the function.

When handwritten input is enabled, [Pen] is displayed in yellow as shown below.

If [Pen] is touched again, drawn details are fixed and saved, handwritten input is turned off, and from then on regular touch operation is possible. Drawn content that was saved can be read again into internal memory, CD card and USB memory. (See "7.10 CF Card/USB Memory Screen.")

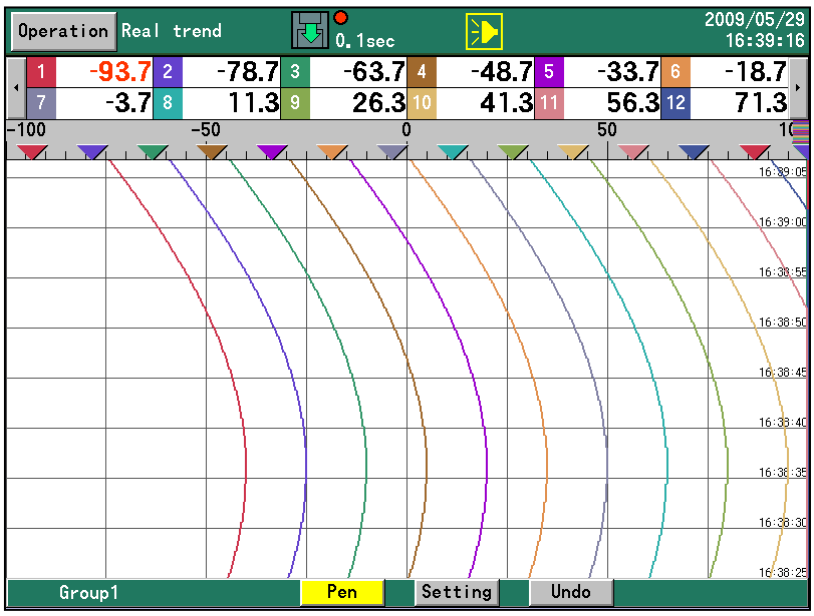


(Delete operation)

If [Undo] is touched while writing on the touch screen, the previously drawn content is deleted.

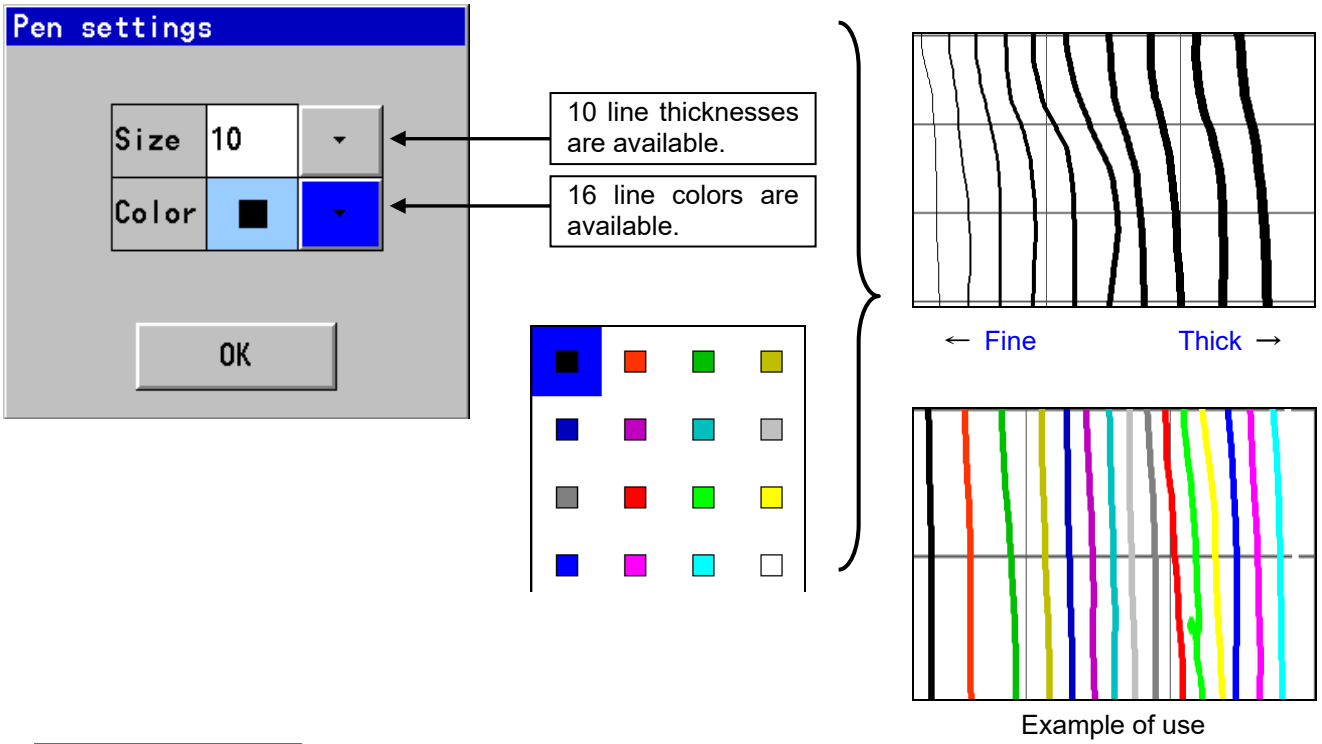
If the drawn content is continuous, all of it will be deleted in a single operation. However, if it is not continuous, only the previously drawn locus will be deleted. Further touches of the button will delete loci in the order of input, starting from the most recent locus.

Note: Once content is saved by touching the [Pen] button, it cannot be deleted with [Undo].



(Setting operation)

The thickness and color of handwritten input can be be changed by touching Setting.



Supplementary Explanation

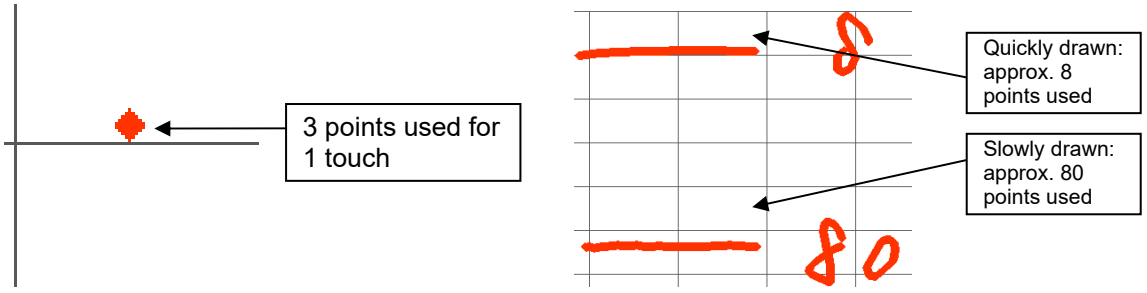
Number of Handwritten Points

The number of handwritten points is obtained by periodically sensing and sampling coordinate data when the touch panel is touched. The maximum number of points that can be input is 8,000. When the number of drawn points exceeds this limit, the oldest points are erased.

It is difficult to distinguish visually how many points have been input. However, since the number of points is sampled periodically, writing slowly with the pen will result in more points being used; and alternatively, writing quickly will result in fewer points being used.

The thickness of the locus, and the size and color of the font bear no relation to the number of points consumed.

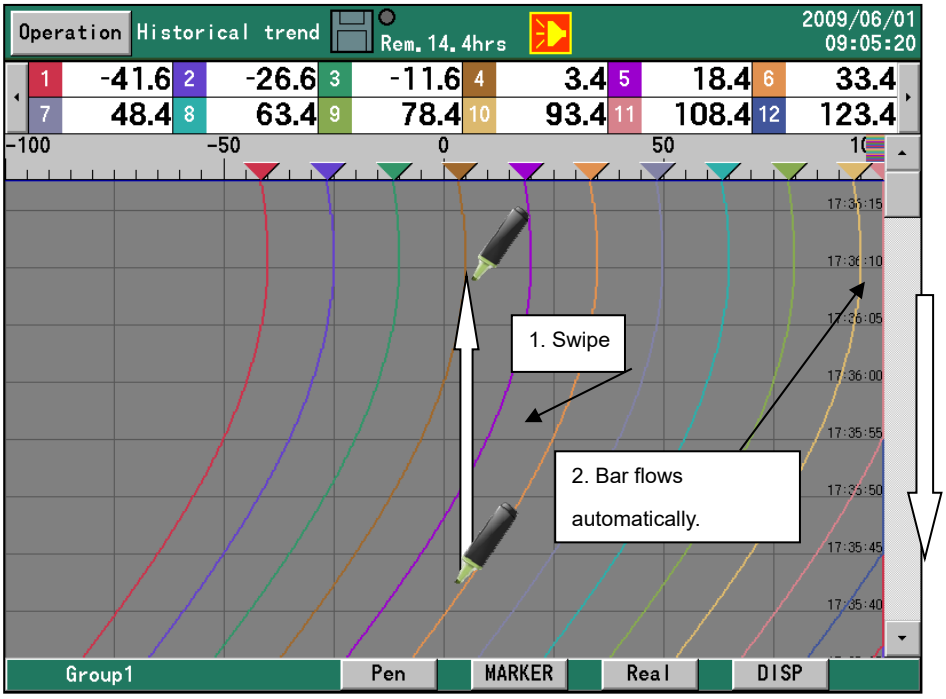
The reference figure below shows the number of handwritten points recognized by internal processing on the recorder.



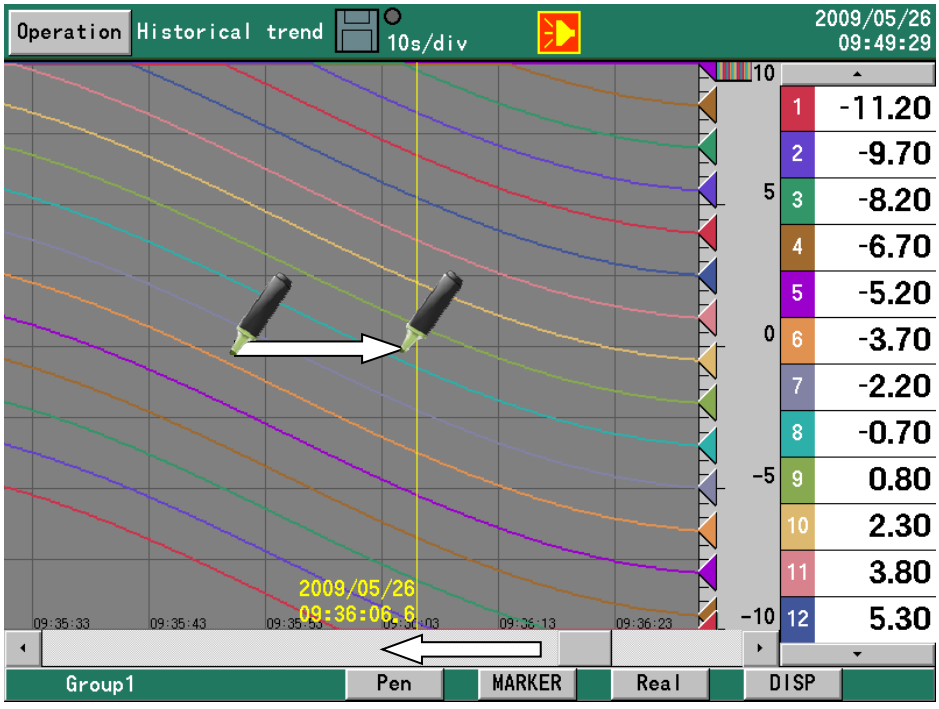
5.4.4 Automatic Scrolling on the Historical Trend Screen

Section 5.4.2 dealt with touch operations on screens with a scroll bar. On the historical trend screen (see 7.6, “Historical Trend Screen”) and the dual trend screen (7.7, “Dual Trend Screen”), on which recorded data can be played back, the scroll bar can be made to move automatically by swiping the screen as if to move it to see the latest part of the graph.

In response to this, the trend screen moves automatically, and automatic scrolling continues until the screen is touched again. The same operation is possible on historical trends read from either internal memory or external memory.



Automatic scrolling is possible also while the cursor is displayed. The cursor position tracks as required.



5.5 Operations in 4-Frame Split Screen Display

The screen of the recorder can be split into four sections for displaying information simultaneously on four separate screens. However, on a split screen display, the selectable display type is limited. Only trend time charts, numeric displays and bar graphs can be selected.

<How to switch from 1-screen display to 4-frame split display>

- Select "4 screens" from the DISP menu.
- Touch the  icon at the bottom right.

4-frame split screen display can be selected by either of the above methods.

<How to switch from 4-frame split screen display to 1-screen display>

- Touch inside the frame to be expanded.
- Touch the DISP button of the frame to be expanded, and select "1 screen."
- Click the DISP key to set to the frame selection mode*, click the direction key to select the frame to expand, and click the ENTER key.

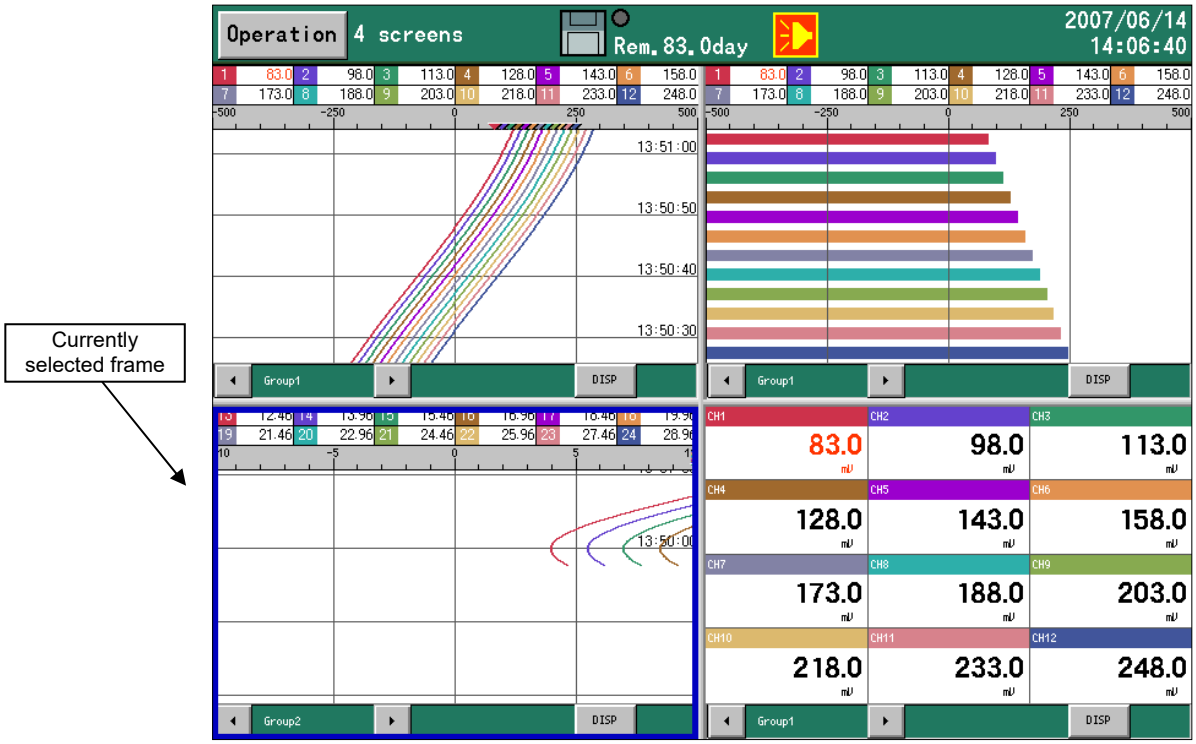
1-screen display can be selected by any of the above methods.

(*Frame selection mode)

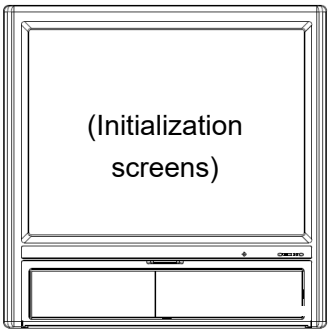
In the 4-frame split screen display, the frame selection mode is entered by clicking the DISP key. In this mode, the selected frame can be moved using the direction keys, and the following key operations are possible.

ENTER	Displays the currently selected frame as a single screen.
DISP	Displays the DISP menu for the currently selected frame. The content selected in this DISP menu is used in the currently selected frame.
ESC	Cancels frame selection mode.

In frame selection mode, the currently selected frame is enclosed by a blue frame.



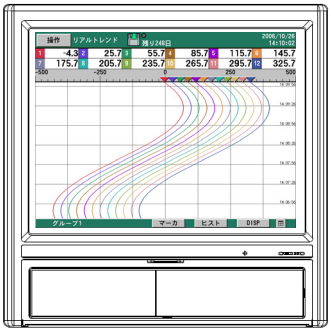
Chapter 6. SWITCHING SCREENS

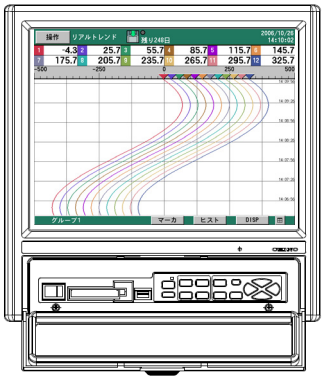


When the power is turned on, initialization takes about 10 to 30 seconds, and then an operation screen is displayed. With the factory settings, the operation screen that is displayed is the real-time trend screen. However, generally when the power is turned on, the operation screen that was being viewed when the power was turned off is displayed.

Approximately
10 to 30
seconds

Switching to a settings screen
To set parameters, push the [HOME] key or [MENU] key from an operation screen, and the display switches to one of the settings screens.





HOME

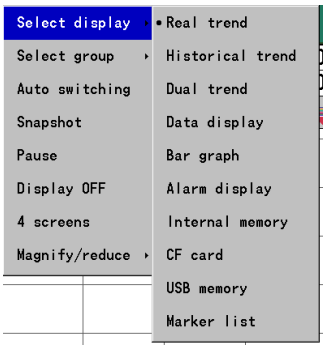
MENU

Open the key cover
(During key operation)

Switching Between Operation Screens

Switch between different types of operation screen with the DISP menu.

(1) Press [DISP] key to display the DISP menu.



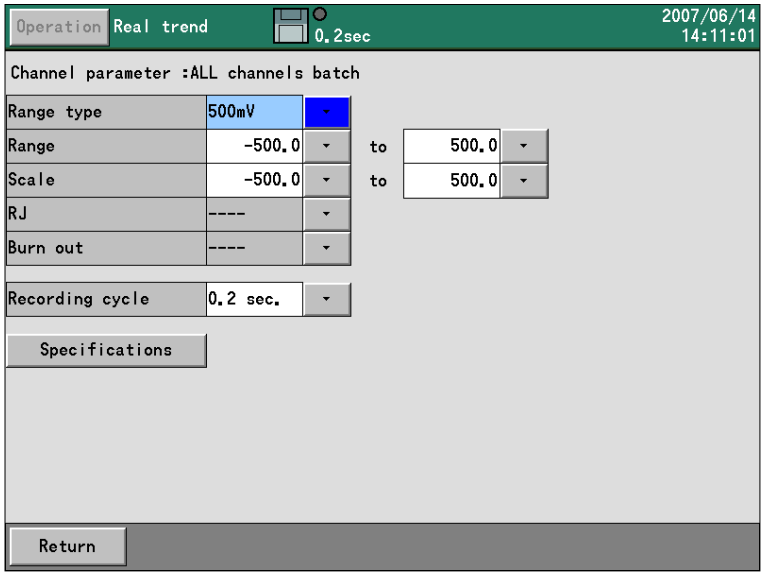
(2) Use the [arrow] keys to highlight your selection, and then press [ENTER] key. The selected screen is displayed.

- “Select display” selects the operation screen type (real time trend, numeric display, etc.).
- “Select group” selects the group to be displayed.

When “Auto switching” is selected (checked off), the display automatically switches between groups at a fixed interval.

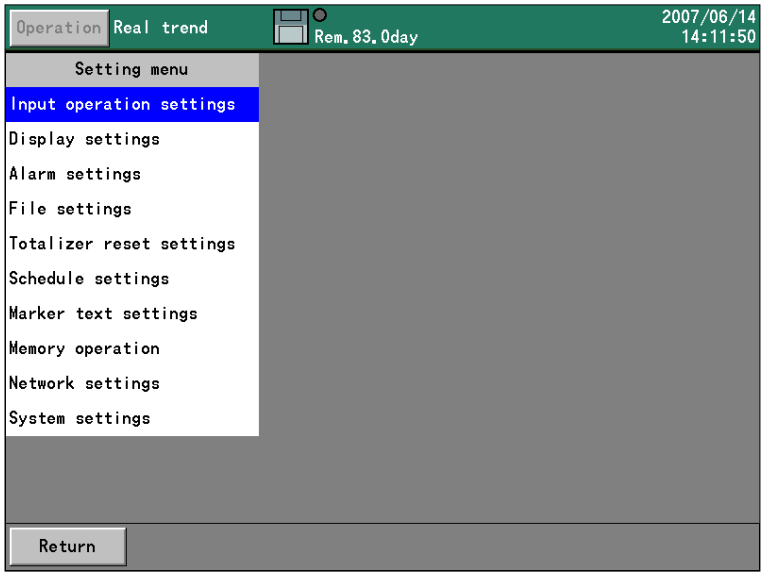
Home screen

On the Home screen it is easy to configure the same settings on all channels. The settings available on the Home screen are restricted, however, and settings cannot be changed on the Home screen while recording is in progress. Also, changing the recording cycle is possible for group 1 only.



MENU screen

Configuration is done mainly on the MENU screen. All items can be set here. Even if recording is in progress, all settings can be displayed, although some settings cannot be changed. These settings are displayed in gray.



Chapter 7. OPERATION SCREENS

7.1. Common Key Functions

7.1.1. Use of the keys

START

With touch operation, [Operation] → [Start recording]. Or, touch the disk icon.

Starts data recording. The data for any group which has been set to be recorded is stored in the internal memory. Any group for which recording conditions have not been set remains in standby state, and recording begins when conditions are set. Any group for which recording conditions have not been set is in standby state. Files are automatically saved to the CF card at fixed intervals and when they are complete.

STOP

With touch operation, [Operation] → [Stop recording]. Or, touch the disk icon.

Stops data recording for all groups. Files being written are completed and are stored on the CF card.

DISP

With touch operation, touch the [DISP] button.

Displays the DISP menu.

Menu item	Operation
Select display	Selects the operation screen type.
Select group	Selects a group for display.
Auto switching	Enables or disables automatic switching between groups and channels. Switching is enabled when checked. The automatic switching cycle can be set between 1 and 60 seconds (MENU screen > Display settings > Common parameters > Screen auto switch period). If the automatic switching time is set to zero, automatic switching does not operate.
Snapshot	Saves a copy of the screen to the SNAPSHOT folder on the CF card.
Pause	Stops refreshing of screens other than the status bar. Pressing any key refreshes the display. During a pause, all processes other than drawing, such as data recording and data storage, are executed. Snapshots also are executed during a pause by pressing the [DISP] key.
Display OFF	Turns off the LCD display. The display turns on again if any key is pressed.
4-split screen	Displays the screen split into four sections.
Expansion/compression	Trends can be displayed with the time axis compressed. (same size to 1/60)

HOME

With touch operation, [Operation] → [HOME setting].

Displays the HOME screen.

MENU

With touch operation, [Operation] → [MENU].

Displays the MENU screen.

ENTER

With touch operation, differs according the screen.

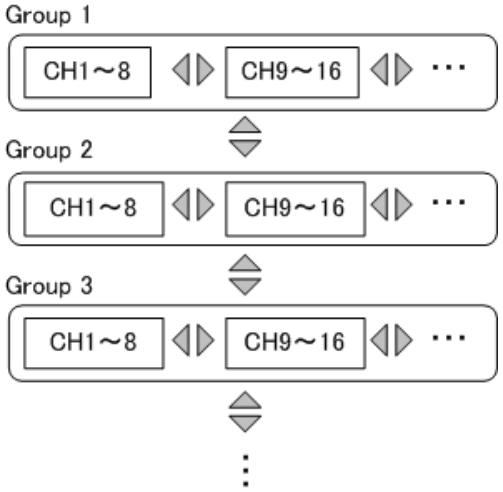
On many screens, displays a menu. Menu contents differ depending on the screen.

ESC

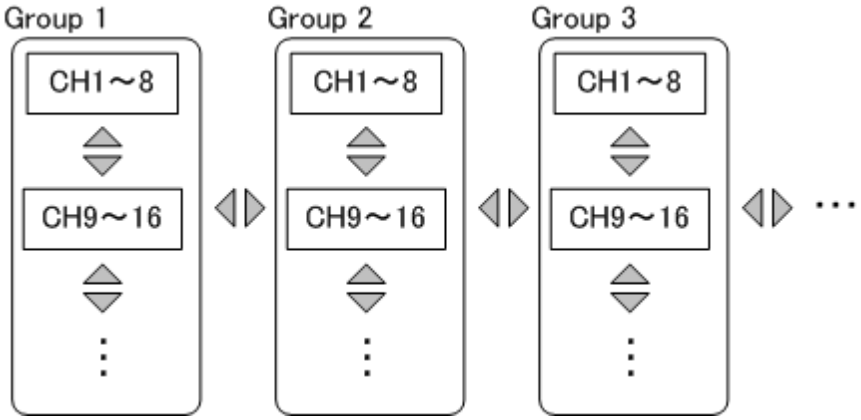
With touch operation, [Back] button (in the settings screen)

Returns to the previous screen (except when the present screen is the real-time trend, bar graph, or numerical display screen).

When trends are displayed vertically, the up and down keys switch the displayed group and the left and right keys switch the displayed channels.



When trends are displayed horizontally, the left and right keys switch the displayed group and the up and down keys switch the displayed channels.



With touch operation, N/A

7.1.2. Displayed data

Readings and messages displayed on screens

Data or message	Description
(Numeric value)	Numeric values are displayed based on the scale settings for each channel. The number of digits after the decimal point is determined by the maximum and minimum values of the scale. If the numeric value is in exponential format, it is shown in the format “1.2E+3.” In such a case, display of up to 2 digits after the decimal point can be set, but possibly only 1 digit will be shown, depending on the screen.
BURN	Burnout, open circuit.
OVER	A signal exceeding the measurable upper limit (upper limit + 5 % of the range) was input. Or, the calculated result exceeds the value that can be indicated.*
UNDER	A signal falling below the measurable lower limit (lower limit - 5 % of range) was input. Or, the calculated result falls below the smallest value that can be indicated.*
CAL ER	Calculation error. The equation is not correct. Or, an error (BURN, OVER, UNDER, or CAL ER) occurred on the channel used for the equation.
RJ ERR	Abnormal conditions were detected. This message is displayed when an input circuit is open, or when the device for reference junction compensation is damaged.

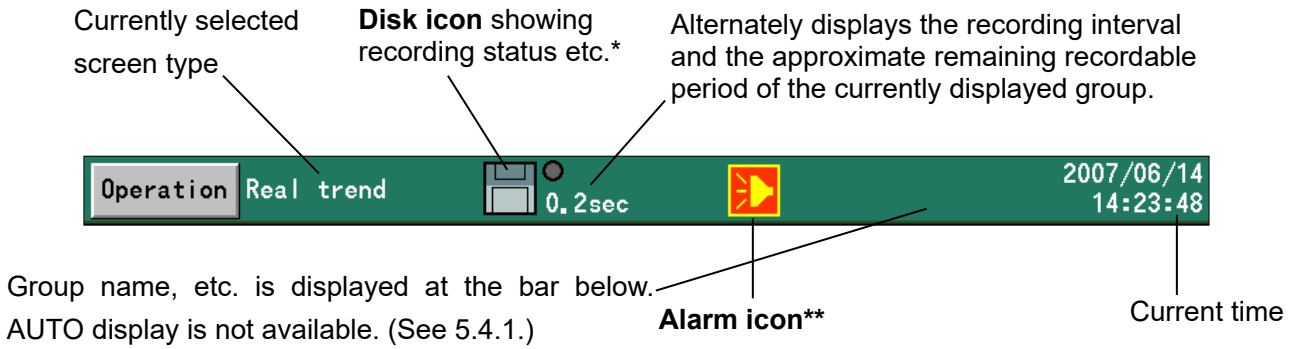
*The ranges that can be indicated for calculated results are as follows:

Standard format: ±30000, excluding the decimal point. For example: -30.000 to +30.000.
Exponential format: 1.00E-15 to 9.99E+15

The numeric data displayed is current (at 0.5 second intervals) irrespective of the recording cycle, etc., except for historical data displayed as part of historical trends or dual trends. To slow down the updating speed, change the numeric value display update interval (see 11.3.4).

7.2. Status Bar Information

The status bar is always at the top of the screen. It shows information such as the status of the recorder. If a schedule is set (see 11.7), the background color of the status bar is gray for periods other than the scheduled period.



The Disk Icon

- The recording state of the currently displayed group is indicated by an arrow state.

Arrow	State
Flowing up	Recording is in progress.
Flashing	The START key was clicked, but the recorder is in a recording standby state since recording conditions have not been met.
Hidden	The START key has not been clicked. (stopped by STOP key)

- The state of the CF card is indicated by background color.

Background color	State
Gray	Normal
Yellow	The amount of space left on the CF card is 10% or less. (When the overwrite mode (13.11.4) is set, the display does not turn yellow.)
Red	There is no space left on the CF card. (When the overwrite mode (13.11.4) is set, the display does not turn red.)

- When “x” is displayed on the disk mark, this indicates that the CF card is not inserted.

- The round mark at the top right of the icon indicates the access state on the CF card. When this mark is red, do not remove the CF card. Doing so might damage or destroy the data. Before removing the CF card, make sure that the round mark is gray.

Color	State
Gray	The CF card is not being accessed.
Yellow	Data will be written to the CF card within about 5 seconds.
Red	The CF card is being accessed.

When “USB memory” is selected at “External Memory Selection” (see 13.11.17), “USB” is displayed on the icon. In this case, data is saved to the connected USB memory. For details on USB memory, see “15. Recording Data to USB Memory.”

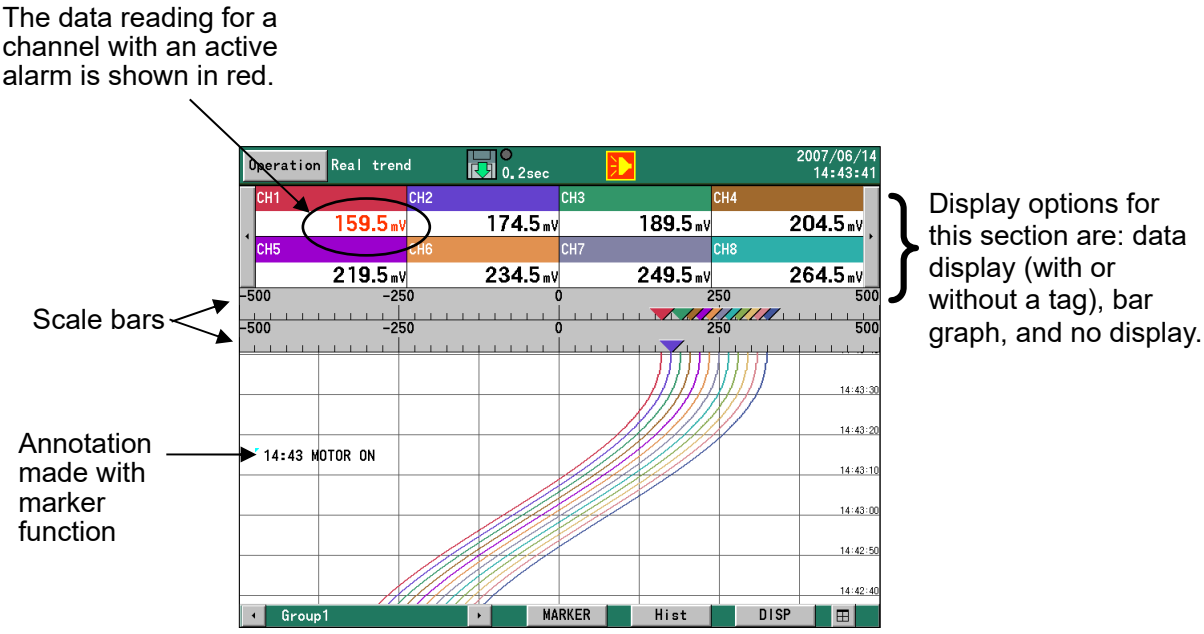
**The Alarm Icon

When an alarm occurs, the alarm icon is shown in the status bar. The alarm icon staus is turned by the alarm status and the alarm acknowledgment status. To clear the alarm icon display, alarm acknowledge operation in the ENTER menu of the operation screen is required or the alarm icon must be touched.

Alarm status	Alarm acknowledgment (ACK) status	Icon status
No alarms	—	Not shown
Recent alarm	Not acknowledged yet	Interior blinking
Recent alarm	Acknowledged	Lit
Old alarm	Not acknowledged yet	Blinking
Old alarm	Acknowledged	Not shown

7.3. Real-time Trend Screen

The data trends can be viewed as on an analog recorder. Up to 4 scale bars can be displayed. A "pen" for each channel is positioned on the scale bars according to the display position setting for the channel. If the same display position is set for multiple channels, the scale numbers on the scale bar apply to the channel with the lowest channel number. Pens and trends of the other channels on the scale bar are displayed in the correct relative position, taking the scale bar width as 100% of the each channel's range.



The ENTER menu

Expansion/ compression	Trends can be displayed with compression of the time axis. (Same magnification to 1/60)

With touch operation, the same items as in the DISP menu are available.

Special functions of keys (see 7.1 above for other functions)

SCROLL

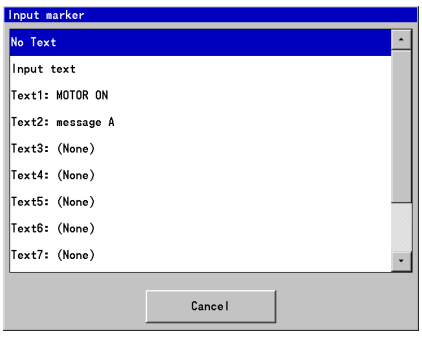
With touch operation, [Hist] button

Displays the historical trend (or dual trend) screen. The same can be done by selecting historical trend (or dual trend) in the DISP menu. SCROLL displays the type of screen (historical/dual) that was last selected from the DISP menu.

MARKER

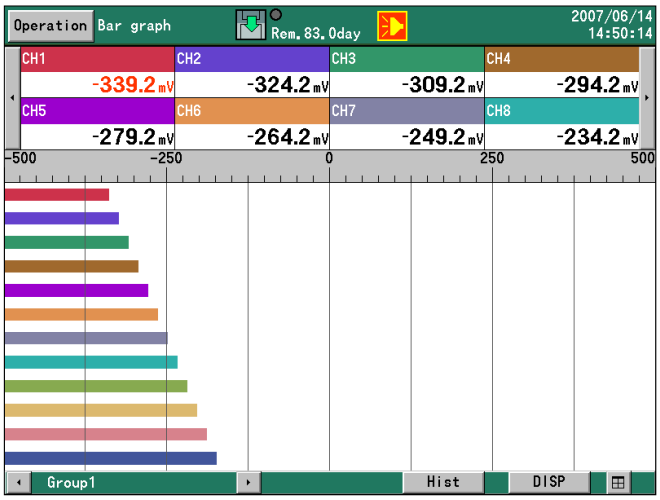
With touch operation, [Marker] button

The marker dialog box for adding an annotation is displayed. The marker cannot be used if recording is stopped. Either input a text or select a text already input (using the MENU settings) and add the text to the trend screen by pressing [ENTER] key. If "Input Text" is selected, the character input screen is displayed.



7.4. Bar Graph Screen

On this screen, bar graphs display the readings for each channel in real time, for easy visual evaluation. The scales and length of the bars are determined by the display scale of the channel with the lowest channel number in the group.



Display options for this section are: data display (with or without a tag), and no display.

The ENTER menu

Not available

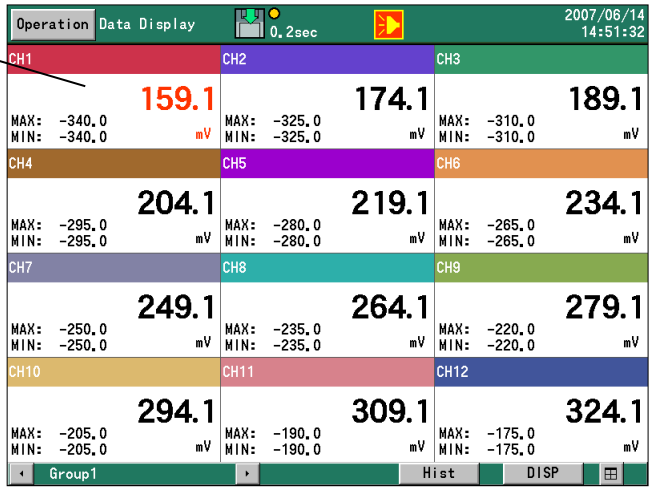
Special functions of keys (see 7.1 above for other functions)

None.

7.5. Numeric Display Screen

Data readings for each channel and alarm status are displayed. Depending on the number of numeric data display frames and the number of registered groups, the data for 1, 2, 3, 4, 6, 8, 9, 10, 12, 24, 36, 48 or 56 channels is displayed.

The data reading for a channel with an active alarm is shown in red.



The ENTER menu

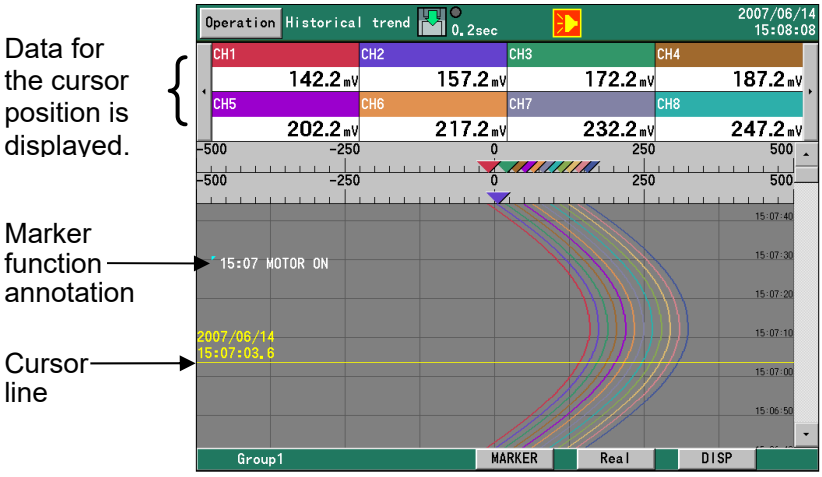
Not available

Special functions of keys (see 7.1 above for other functions)

Not available

7.6. Historical Trend Screen

Previously recorded data can be played back in trend format. If “Historical trend” is selected from the DISP menu (or if [SCROLL] key is pressed while the real-time trend screen is displayed), internal memory is displayed. When a file has been selected from the “Internal memory” screen, “CF card” screen or “USB memory” screen, the data of the target file is displayed. The scales, trends and pens conform to the current settings for the real-time trend screen.



The ENTER menu

Expansion/compression	Trends can be displayed with compression of the time axis. (Same magnification to 1/60)

(With touch operation)

The same items as in the DISP menu are available.

Special functions of keys (for functions see too 7.1 below)

When the trends are displayed vertically, the up and down keys switch the displayed group and the left and right keys switch the displayed channels.

When the trends are displayed horizontally, the left and right keys switch the displayed group and the up and down keys switch the displayed channels.

SCROLL

Pressing this key activates scroll mode, which is indicated by a yellow frame around the indicator line on the scroll bar. In scroll mode, the arrow keys scroll the trends screen by screen. When SCROLL is pressed again, scroll mode turns OFF and the arrow keys scroll the trends a pixel at a time.

CURSOR

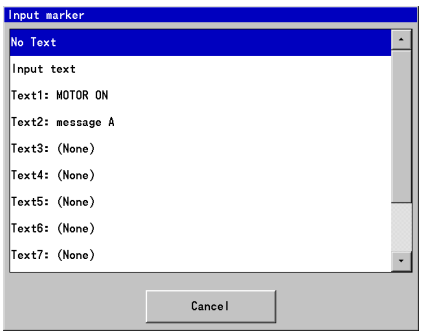
With touch operation, select display channel → channel selection button on left and right of data display area
Cursor movement → Touch trend.
Scroll → Operate scroll bar.

Pressing this key activates cursor mode, in which a cursor line is displayed in yellow. When an arrow key is pressed, the cursor line moves without scrolling the trends, and the data for the cursor position is displayed on the upper display in numerical format (or as a bar graph).

MARKER

With touch operation, [Marker] button

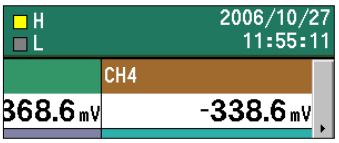
The marker dialog box is displayed. Select a text already entered (in the MENU settings) and insert it at the cursor position by pressing [ENTER]. Or, select “Input Text.” The character input screen is displayed and a new text can be input.



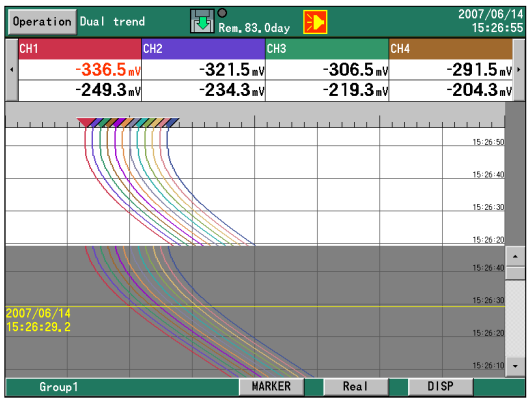
HOME

With touch operation, touch the H, L icons on status bar

If the data format set for the displayed file is maximum/minimum, the numeric value display (or bar graphs) show maximum and minimum values. The status bar will indicate either H (= high or max.) or L (= low or min.). Other functions of the [HOME] key are the same as elsewhere.



7.7. Dual Trend Screen



Upper row: current data readings
Lower row: data for the cursor position in the historical trends

The screen is split into upper and lower parts to display both real-time trends and historical trends, allowing them to be easily compared. The numerical data section is also split, and shows both current readings and the readings for the cursor position in the historical trends. The trend format, pen positions, etc. are the same as on the real-time trend screen.

However, if the recorder is set to display multiple scales, only 1 scale is displayed, and no numeric values are displayed on the scale. Otherwise the operation of this screen is the same as for the historical trend screen.

The ENTER menu

With touch operation, the same items as in the DISP menu are available.

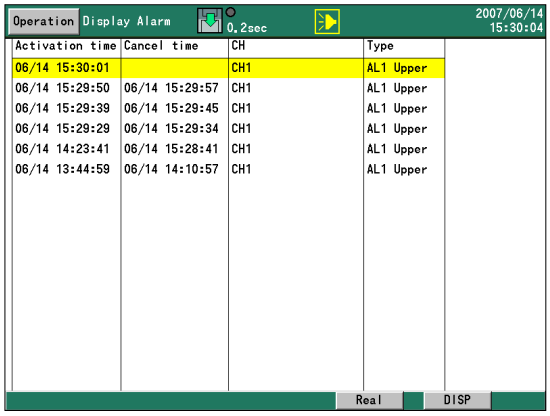
Expansion/compression	Trends can be displayed with compression of the time axis. (Same magnification to 1/60)

Special functions of keys (see 7.1 above for other functions)

Same as for historical trends (see 7.6).

7.8. Alarm Display Screen

Alarms that have occurred are listed. Activation (alarm occurrence) date and time, cancellation date and time (when applicable), channel number or tag, and alarm types are displayed in reverse chronological order (latest on top). All alarms that have occurred are displayed, without regard to groups. The maximum number of alarms in the list is 1000. When the number of alarms exceeds 1000, the oldest alarm information is overwritten.



The selected row is highlighted in yellow.

The ENTER menu

Trend display	The trend display for the selected row at the date and time of the alarm will appear. If recording was not in progress when the alarm occurred or if the file cannot be found, the trend will not be shown. The internal memory is searched for the file first, and then the CF card is searched.

Special functions of keys (see 7.1 above for other functions)

Up and down arrows move the yellow highlighting up and down.
Left and right arrows are not used.

SCROLL

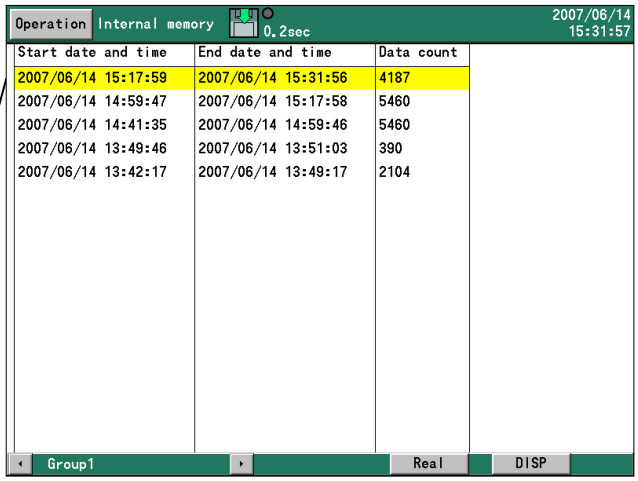
With touch operation, operate the scroll bar.

Operation is the same as on the historical trends screen. See 7.6 above.

7.9. Internal Memory Screen

This screen lists the files contained in the recorder's internal memory. The start date and time, the end date and time (the last moment of recording) and the number of records (data count) are displayed. Files are displayed in chronological order (latest on top). All files in the selected group only are displayed.

The selected row is highlighted in yellow



The ENTER menu

With touch operation, the ENTER menu is displayed by touching a row in the list.

Trend display	The trends recorded in the file of the selected row will appear.

Special functions of keys (see 7.1 above for other functions)

Up and down arrows move the yellow highlighting up and down.
Left and right arrows are not used.

SCROLL

With touch operation, operate the scroll bar.

Operation is the same as on the historical trends screen. See 7.6 above.

About internal memory

The ARF200 writes all data to internal memory as a file. The recorded data is copied to the CF card at a preset interval and when recording in a file is complete.

Limitations on internal memory

- **File size**. When data reaches the maximum file size in internal memory, the file is completed.

  File sizes can be calculated by the following formula:

  File size = Data size x number of channels x number of recordings
  Note that the maximum number of recordings is 450,000.

  Data size is normally 4 bytes in binary expression and 6 bytes when the data format is "max/min".
  When recording ends when recording conditions are not established, the STOP key is pressed or the power is turned off before the maximum file size is reached, recording is concluded at that time.

Number of Groups Used	Max. File Size (KB)	Number of Recordings When 12 Points Are Used (4-byte data)
1	3904	83280
2	1920	40960
3	1216	25940
4	896	19110
5	704	15010
6	576	12280

Note)
If a file is saved in CSV format, the number of recordings listed above will be the approximate number of lines. For example, if 12 inputs are used by 3 groups, the number of lines per file is approximately 25,940.
If the number of lines is limited by the spreadsheet software, etc., change the number of recordings (the number of lines) by resetting the recording cycle, referring to "Setting file size" in 11.5, "File settings."

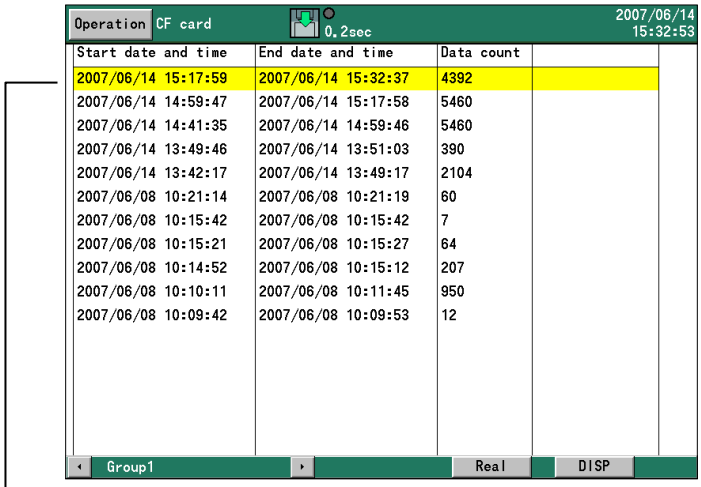
- **Number of files**. The maximum number of files that can be saved in the internal memory is 250. For files per group, divide 250 by the number of groups and round down.

- **Total capacity for files**. The total file size that can be saved in the internal memory can be computed by: 64 KB × (125 ÷ (Number of groups) – 2). If the data exceeds this size, files will be deleted, starting with the oldest.

7.10. CF Card/USB Memory Screen

This screen shows a list of files stored on the CF card or the USB memory for the group identified in the status bar. The screen displays the start date and time, the end date and time (or the time of the latest recording, if recording is in progress), and the number of records (data count). Files are displayed in reverse chronological order (the latest on top). All files in the selected group only are displayed.

If data is stored in binary format, the number of records is displayed in the Data count column. If data is stored in CSV format, instead of the number of records, "(Text)" is displayed in the column.



The selected row is highlighted in yellow.

The ENTER menu

With touch operation, the ENTER menu is displayed by touching a row in the list.

Trend display	For binary files, the trends recorded in the file referred to by the selected row will be displayed.
Delete	Deletes the file in the selected row. However, deletion is not possible while recording is in progress.
FTP transfer	Send the file in the selected row to the FTP server. See 11.10.4, "FTP client configuration."

Special functions of keys (see 7.1 above for other functions)

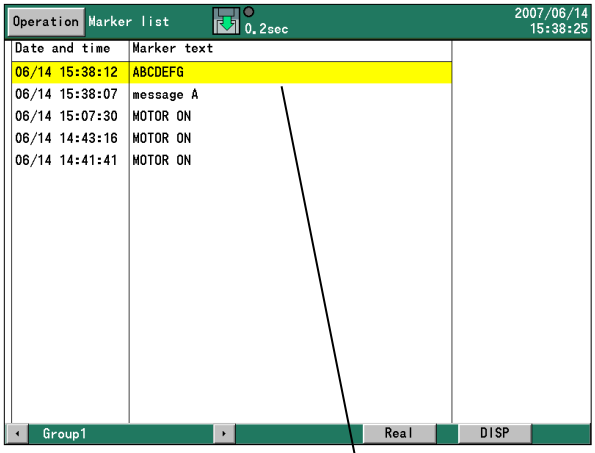
Up and down arrows move the yellow highlighting up and down.
Left and right arrows are not used.

SCROLL

With touch operation, operate the scroll bar.
Operation is the same as on the historical trends screen. See 7.6 above.

7.11. Marker Screen

Shows a list of annotations recorded on the trends with the marker function. The date and time and the annotation are displayed in chronological order (latest on top). Only annotations in the selected group are displayed.
A maximum of 200 annotations can be recorded. If the number of annotations exceeds 200, the oldest annotation is overwritten.



The selected row is highlighted in yellow.

The ENTER menu

Trend display	The trend at the position of the marker for the selected row will be displayed, unless the file cannot be found.
Delete	Deletes the marker on the selected row. However, markers cannot be deleted from a completed file on the CF card.
Delete all	Deletes all markers. However, markers cannot be deleted from a completed file on the CF card.

Special functions of keys (see 7.1 above for other functions)

Up and down arrows move the yellow highlighting up and down.
Left and right arrows are not used.

SCROLL

With touch operation, operate the scroll bar.

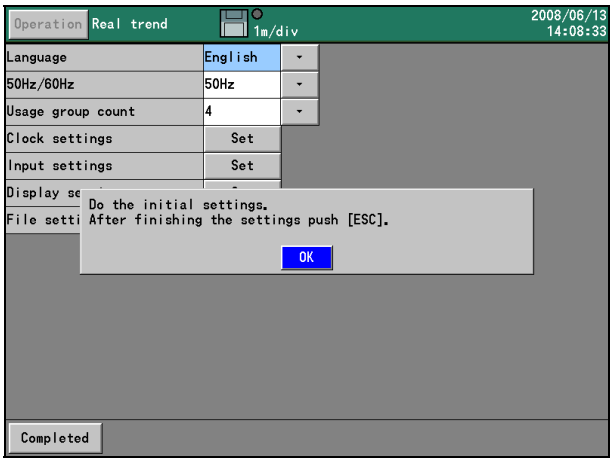
Operation is the same as on the historical trends screen. See 7.6 above.

Chapter 8. INITIAL SETTINGS

When the power is turned on with the default factory settings or when the settings are initialized, the initial settings screen will appear. Set parameters for the following, at a minimum:

- Language
- Power frequency (50/60 Hz)
- Usage group count
- Clock
- Input
- Display
- File

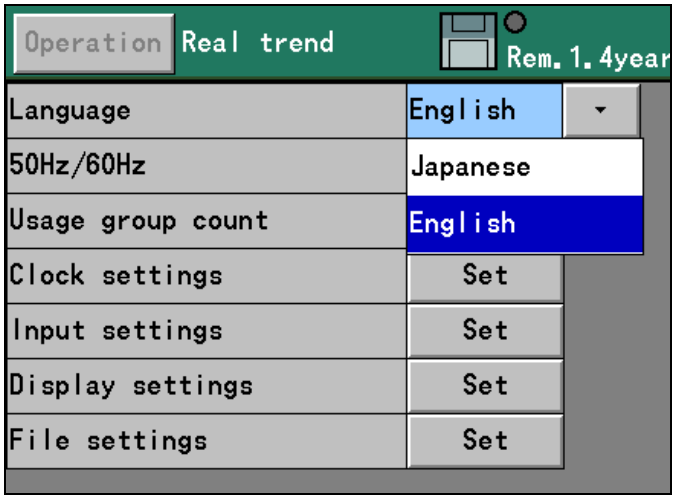
You can exit without changing anything. In that case, the paperless recorder operates with the default factory settings.



Press [ENTER] key when the above message is displayed. The message disappears and the settings can be changed.

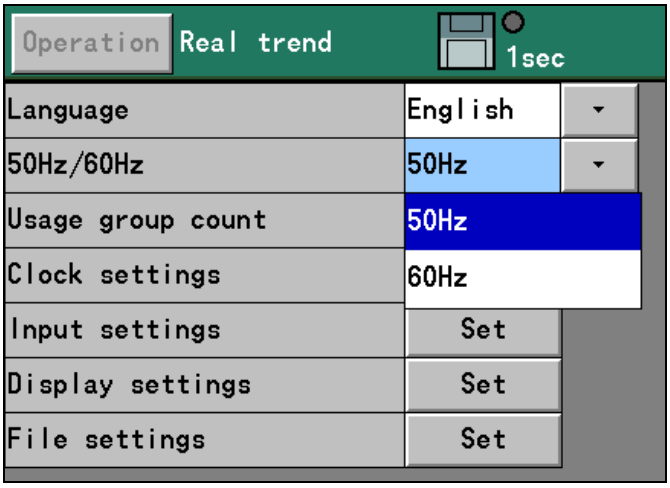
1) Language

Move the focus to “Language” with the arrow keys and press [ENTER]. A pull-down menu is displayed. Select English or Japanese and press ENTER to finalize the choice.



2) Power frequency

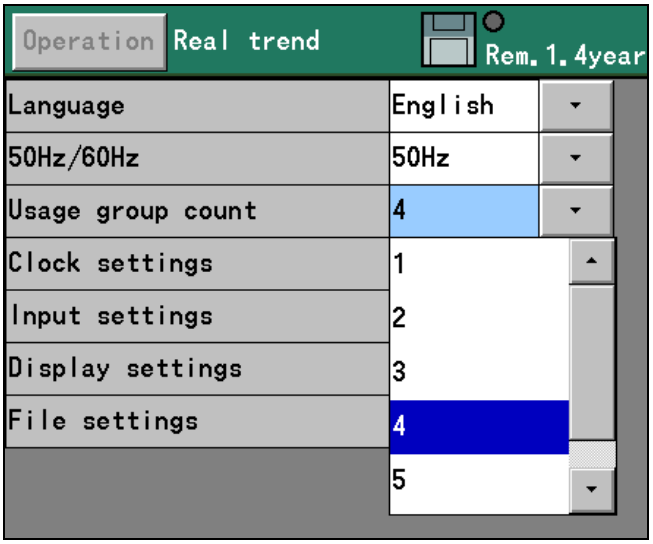
The sub-screen is displayed by touching the ▼ button for the 50Hz/60Hz item.
The selected item is displayed by touching the item to set from 50Hz or 60Hz in the sub-screen. Before setting this, check the frequency of the power supply you are using.



3) Usage group count

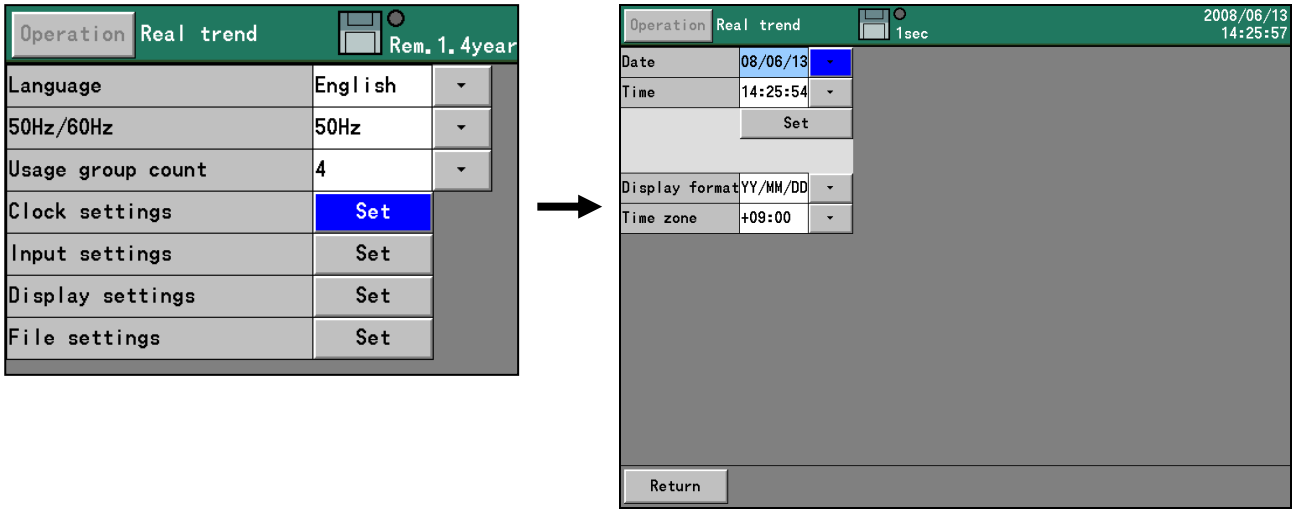
The sub-screen is displayed by touching the ▼ button for the Usage group count item.

- The usage group count can be set between 1 to 6.
- The smaller a usage group count is set, the longer the time that internal memory can be recorded becomes. (See "7.9 Internal Memory Screen.")



4) Clock settings

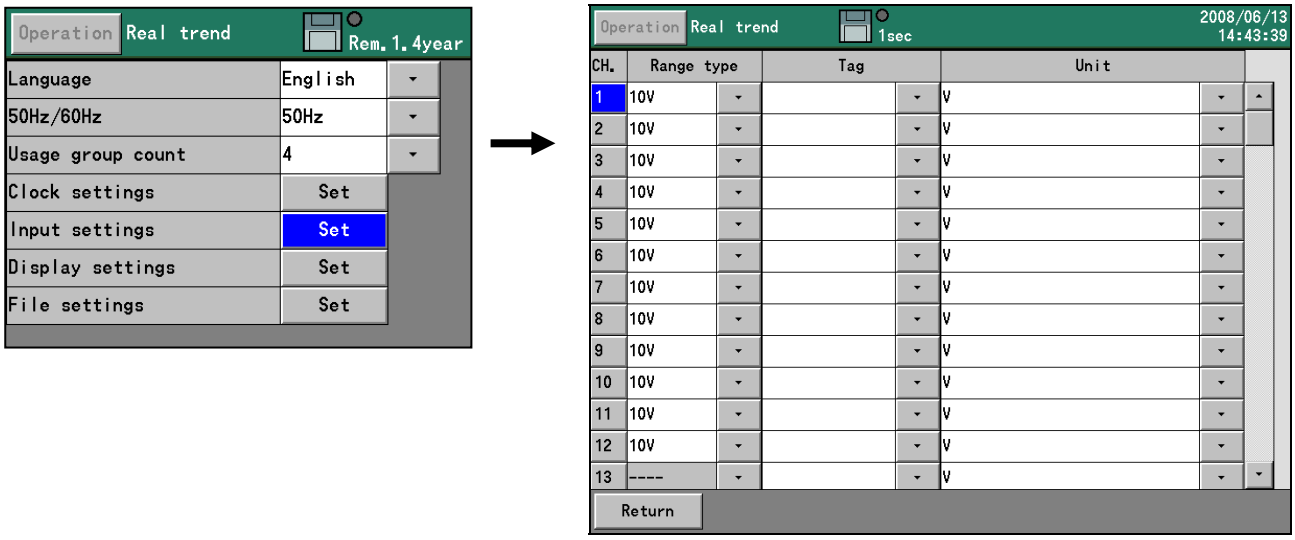
The clock setting screen below is displayed by touching the [Set] button at the Clock settings item.



For detailed setting instructions, refer to “11.11.1. Clock”.

5) Input settings

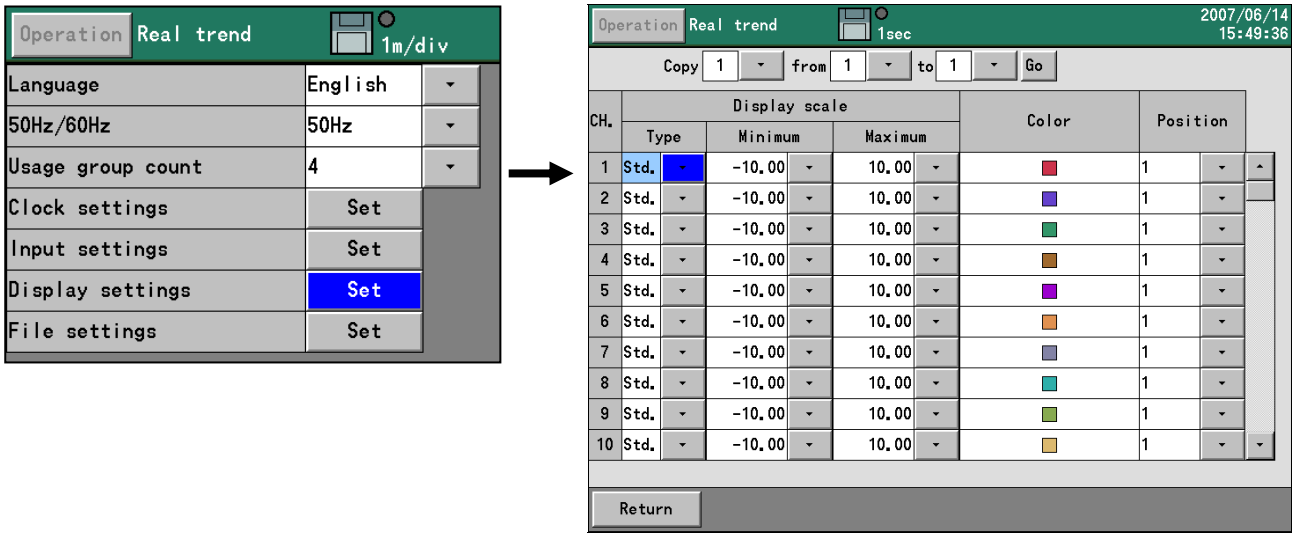
The input setting screen below is displayed by touching the [Set] button at Input settings item.



For detailed settings instructions, refer to “11.2 Input settings”.

6) Display settings

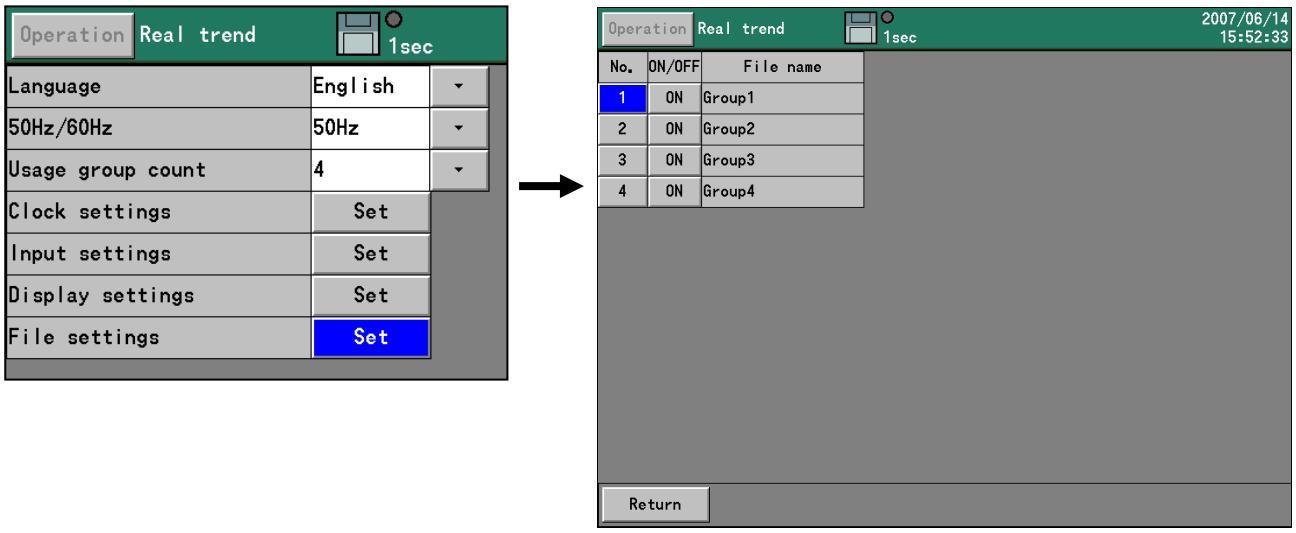
The display setting screen below is displayed by touching the [Set] button at Display settings item.



For detailed setting instructions, refer to “11.3.1. Channel parameters”.

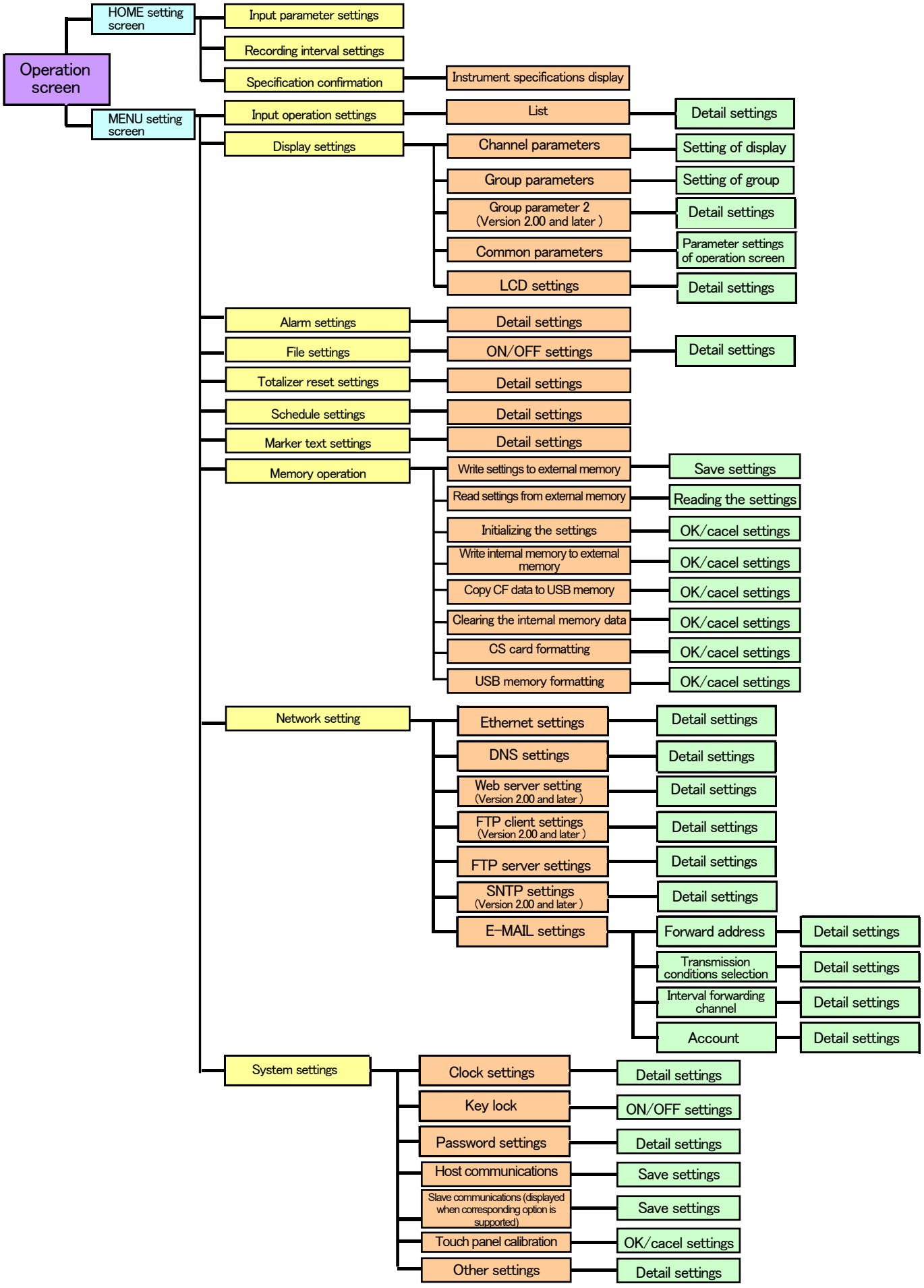
7) File settings

The file setting screen below is displayed by touching the [Set] button at File settings item.



For detailed setting instructions, refer to “11.5. File settings screen”.

Chapter 9. MENU STRUCTURE

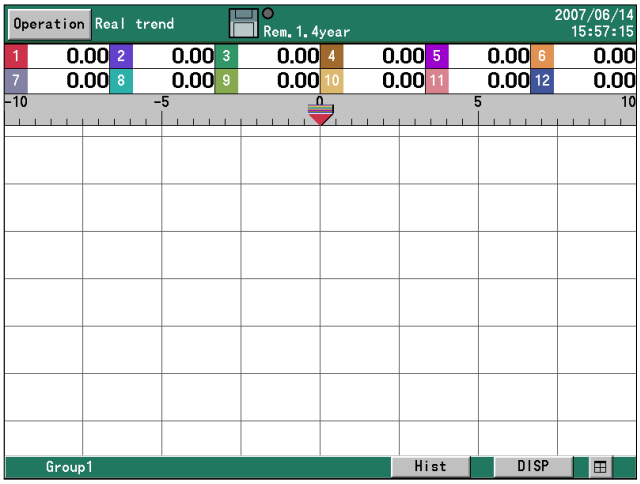


Chapter 10. HOME SCREEN

10.1. Quick recorder setup

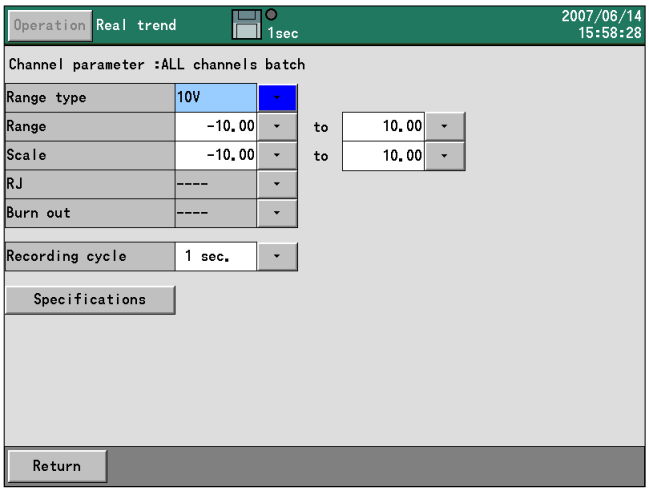
For convenient setup and checking, input and recording settings for all channels at the same time can be set on the HOME screen.

☐ Operation screen



Press [HOME] key or touch [Operation] → [HOME setting]

☐ Home screen



Pressing [HOME] key from the operation screen displays the HOME screen. To make the various settings, bring the cursor (blue) to the item to set using the arrow keys, and press the [ENTER] key or touch the ▼ button for the item. The selection screen is displayed so that the item can be set.

■ Available range type (sensor type) settings

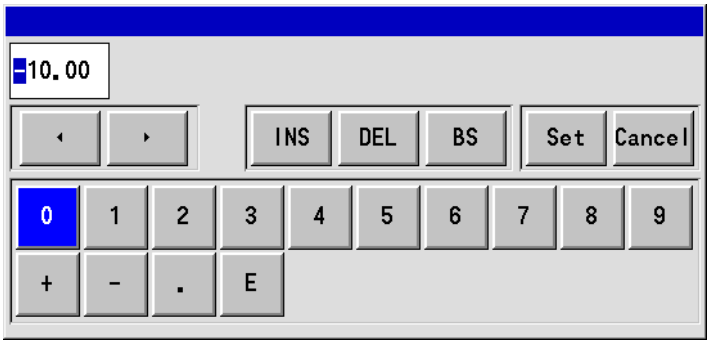
DC voltage	mV: 13.8, 27.6, 69, 200, 500 V: 2, 5, 10, 20, 50
Thermocouple	K, E, J, T, R, S, B, N, W-WRe26, WRe5-WRe26, PR40-20, NiMo-Ni, CR-AuFe, Platinel 2, U, L
Resistance thermometer (RTD)	Pt100, JPt100, Pt50, Pt-Co

■ Range

• Set the range. (The range depends on the range type and sensor type.)

■ Scale

• Set the scale. (The scale depends on the range type and sensor type.)



Correctly input the position of the decimal point here since it becomes the position of the decimal point for measurement values.

■ Reference junction compensation (RJ)

• Set the RJ to either internal or external.

■ Available burnout settings

None	The burnout function is not used.
UP	If burnout occurs, indication will be upscale.
DOWN	If burnout occurs, indication will be downscale.

■ Available recording cycle settings

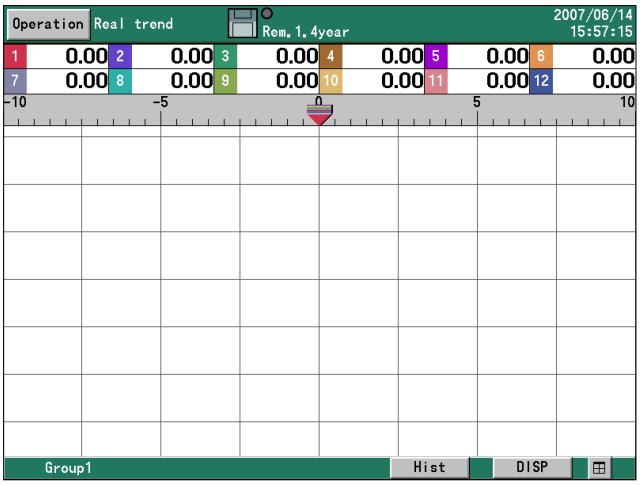
• Only the ARF _ _ _ AS (100 ms input cycle models) can be set to 0.1, 0.2 and 0.5 seconds.

Seconds	0.1, 0.2, 0.5, 1, 2, 3, 5, 10, 15, 20, 30
Minutes	1, 2, 3, 5, 10, 15, 20, 30, 60

10.2. Specifications display

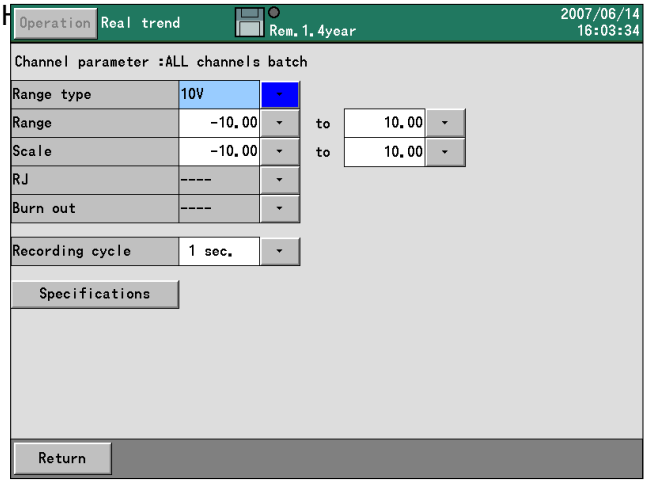
- The basic specifications of this recorder can be checked from the HOME screen.
- If you have a question about the recorder, contact your distributor after checking the specifications.

☐ Operation screen



Press [HOME] or [Operation] → [MENU settings].

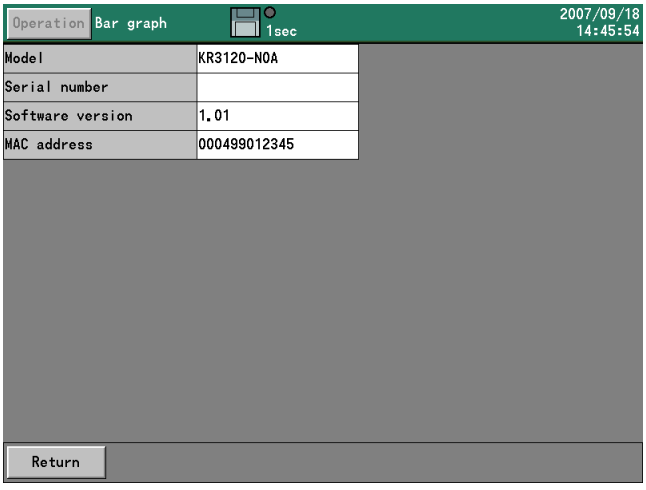
☐ Home screen



Touch Specifications or select by "↓" and move the focus to "Specifications".

Then press [ENTER] key.

☐ Specifications display screen



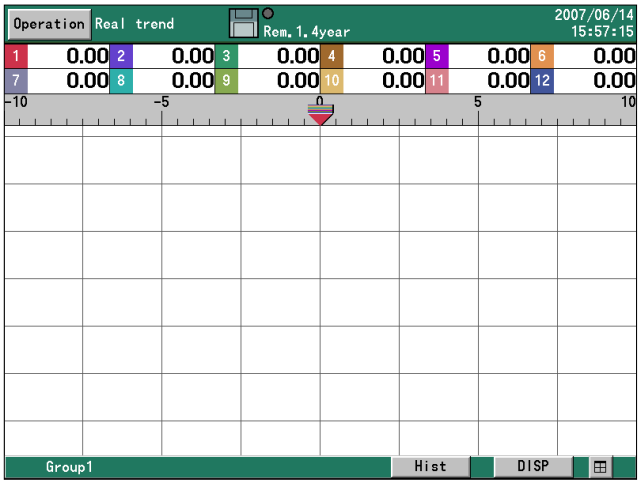
The following items can be checked on the specifications confirmation screen:

- Model number
- Serial number
- Software version
- MAC address

Chapter 11. MENU SCREEN

11.1. Overview

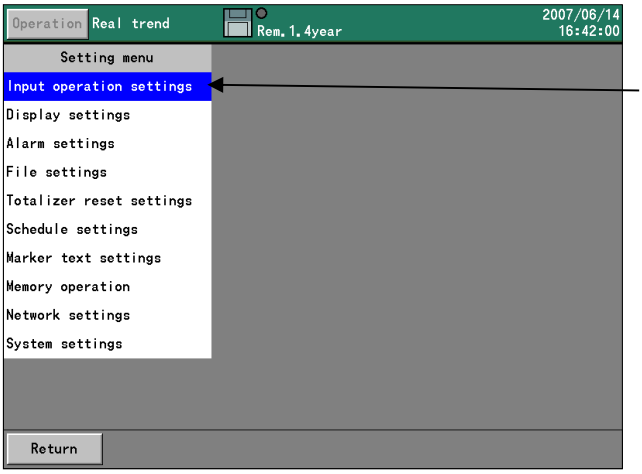
☐ Operation screen



Press [MENU] key from the operation screen, and the MENU screen is displayed. Select the desired item with the arrow keys and press [ENTER] key to switch to the desired parameter setting screen.

Press [MENU] or touch [Operation] → [MENU settings]..

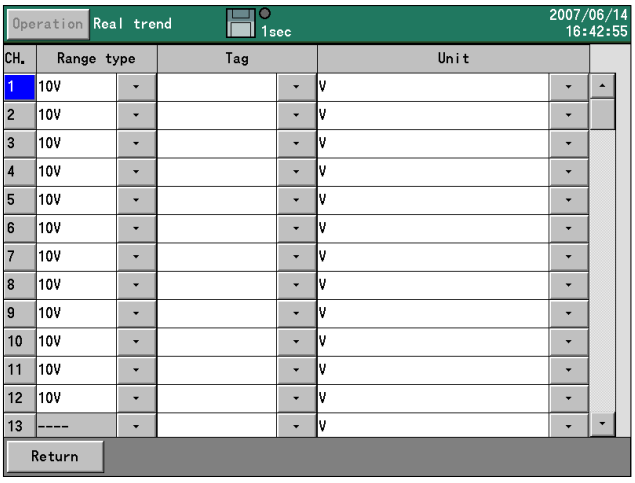
☐ MENU screen



A list of parameters appears. Select the desired item with the arrow keys (▲ and ▼). The selected item is highlighted as shown on the left. (Here, “Input operation settings” is selected.) Then press [ENTER] key.

☐ Input settings screen

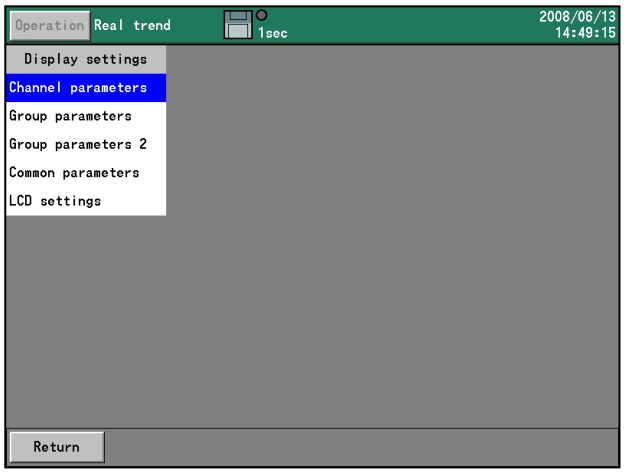
Select “Input operation settings” and press [ENTER] key.



See 11.2, “Input settings.”

☐ Display settings screen

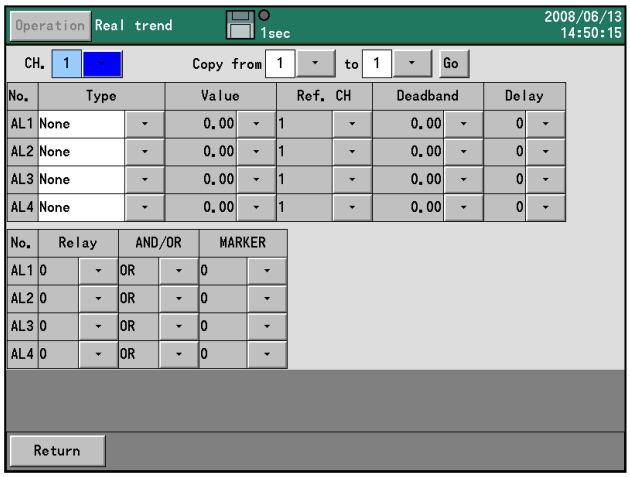
Select “Display settings” and press [ENTER] key.



See 11.3, “Display settings.”

☐ Alarm settings screen

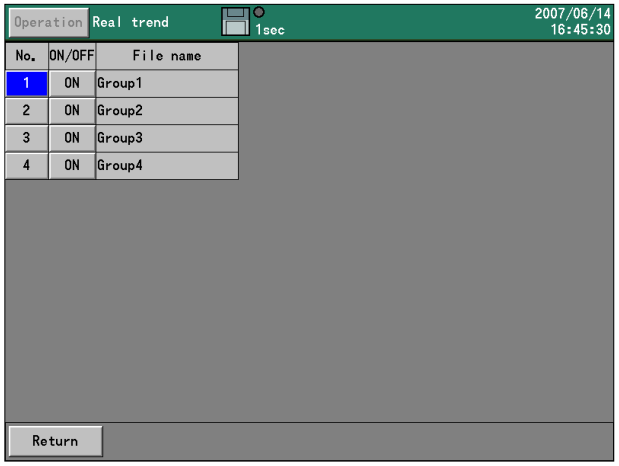
Select “Alarm settings” and press [ENTER] key.



See 11.4, “Alarm settings.”

☐ File settings screen

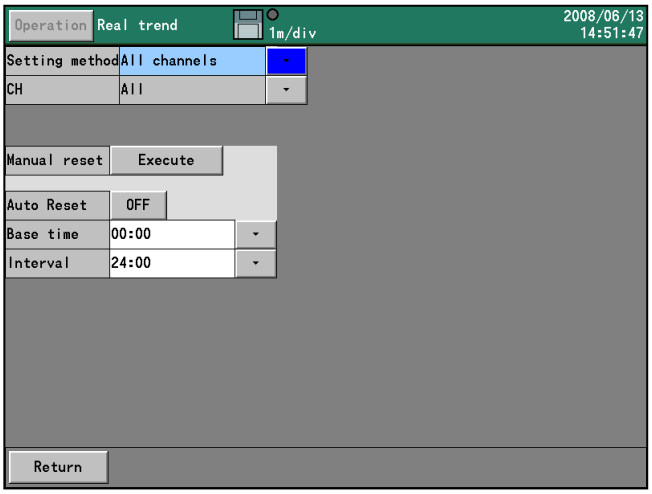
Select “File settings” and press [ENTER] key.



See 11.5, “File settings.”

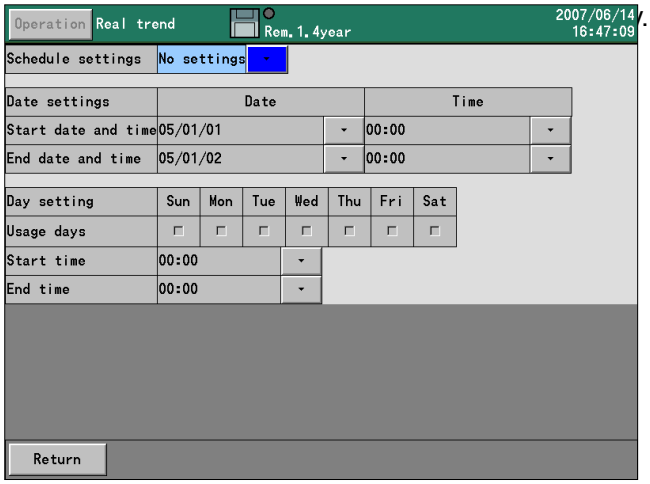
☐ Totalizer settings screen

Select “Totalizer reset settings” and press [ENTER] key.



See 11.6, “Totalizer settings.”

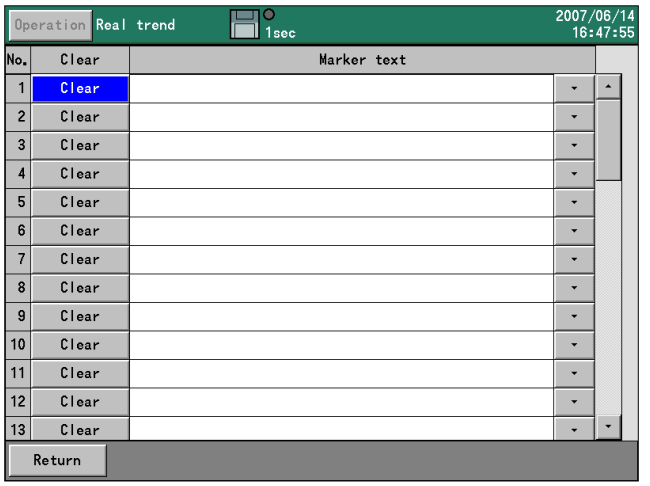
☐ Schedule settings screen



See 11.7, “Schedule settings.”

☐ Marker settings screen

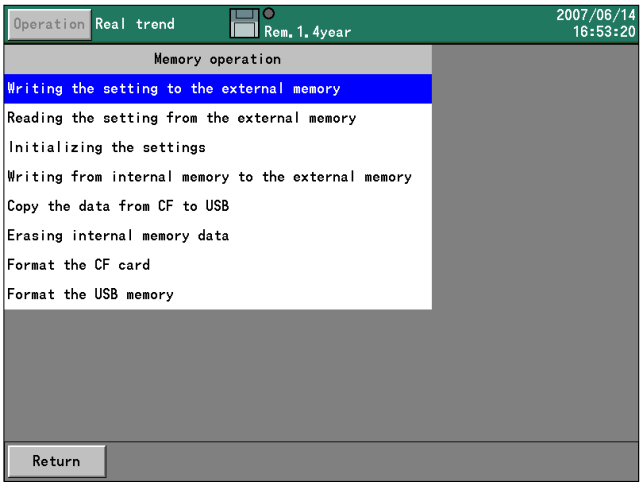
Select “Marker settings” and press [ENTER] key.



See 11.8, “Marker settings.”

☐ Memory operation screen

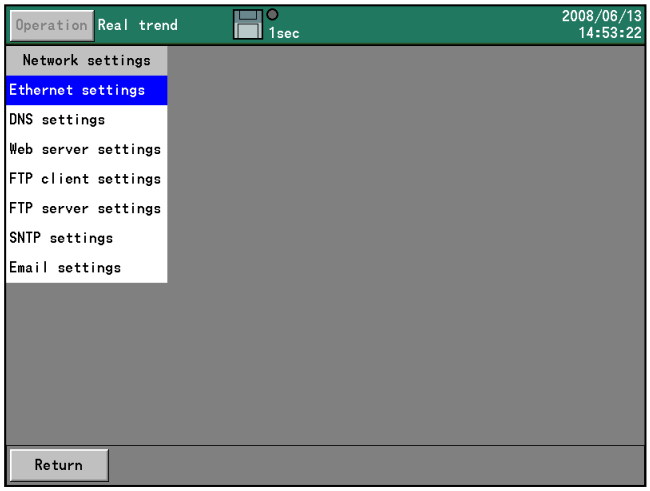
Select “Memory operations” and press [ENTER] key.



See 11.9, “Memory operations.”

☐ Network settings screen

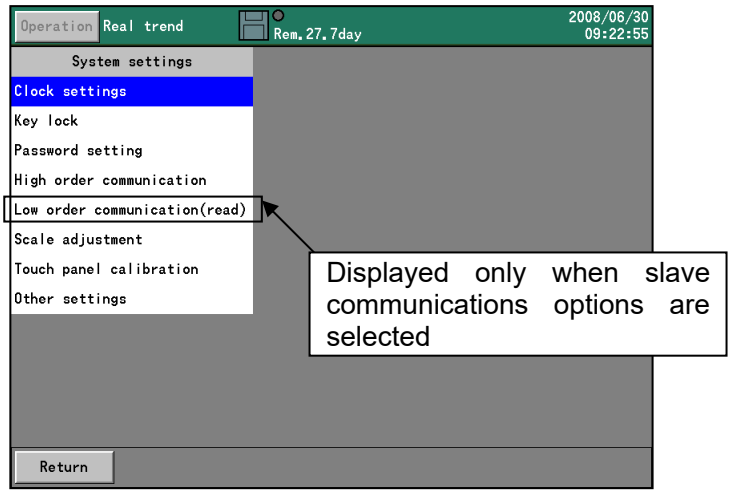
Select “Network settings” and press [ENTER] key.



See 11.10, “Network settings.”

☐ System settings screen

Select “System settings” and press [ENTER] key.

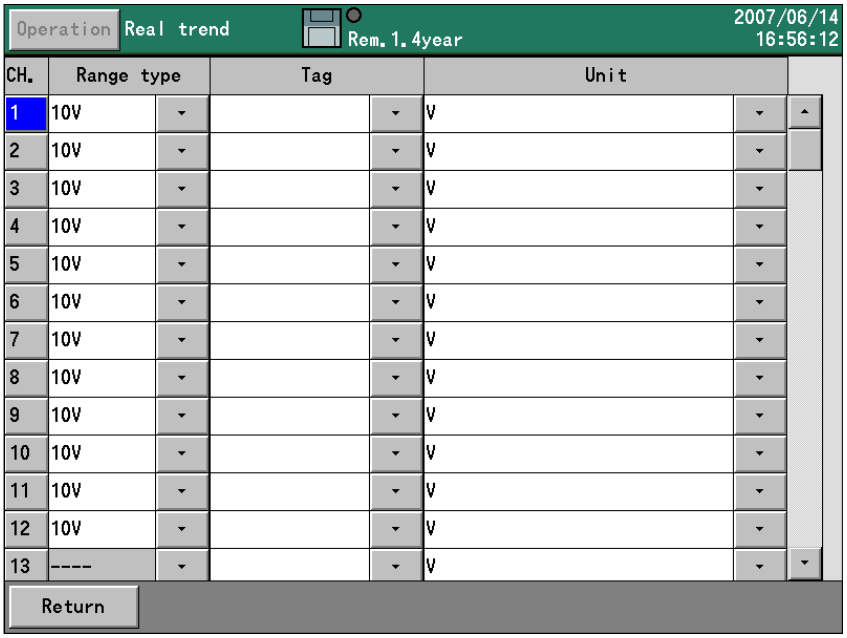


See 11.11, “System settings.”

11.2. Input Settings

11.2.1. Input parameter selection

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



The ARF200 can be set for up to 128 channels. Depending on the model, functions are allocated among the channels as shown in the table below.

Analog input channels

Can be assigned to analog inputs. The input range types can be selected from among DC voltage, thermocouple, and RTD.

Channels set for calculation

No analog inputs are assigned to these channels. These channels are for assigning measurement values that use formula.

By setting up a formula to determine the input value for a channel, the ARF200 can record more data than the number of actual input items. In this case the range type cannot be selected.

Also, with the Network Instrumentation Module (Ethernet) option, the addresses of Network Instrumentation Modules registered as connected slave devices can be assigned.

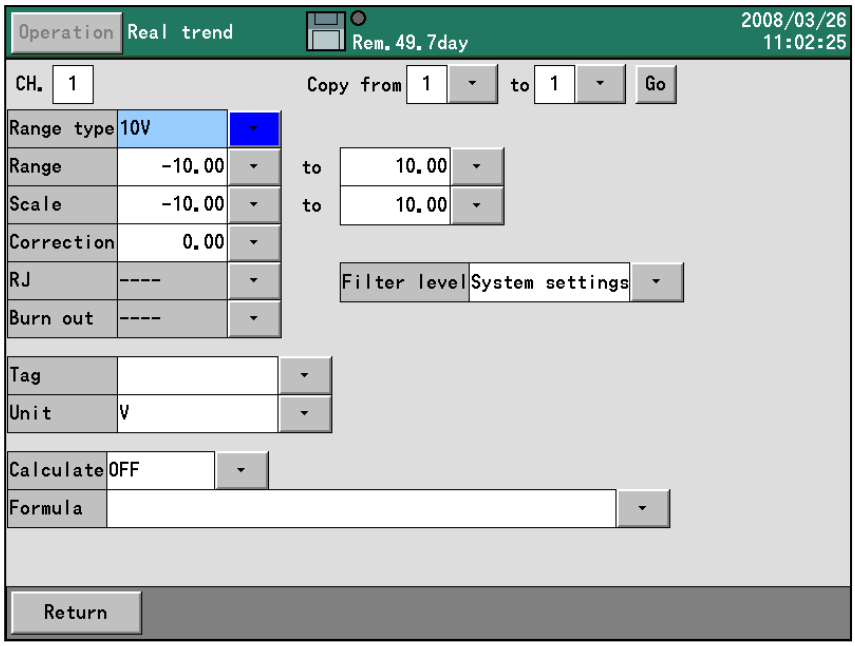
Digital input channels

Models with digital input (an option) have 8 digital inputs.

The range type can be selected from “Digital input,” “Pulse (+),” or “Pulse (–).”

	ARF212		ARF224		ARF236		ARF248	
	Without contact input	With contact input	Without contact input	With contact input	Without contact input	With contact input	Without contact input	With contact input
Analog input channels	CH1~12	CH1~12	CH1~24	CH1~24	CH1~36	CH1~36	CH1~48	CH1~48
Channels set for calculation	CH13~128	CH13~120	CH25~128	CH25~120	CH37~128	CH37~120	CH49~128	CH49~120
Digital input channels	—	CH121~128	—	CH121~128	—	CH121～128	—	CH121~128

Touching a channel number displays the detailed setting screen for that channel.



Note: The filter level setting is available in version 2.00 and later.

■ Available range type (sensor type) settings

Analog input type (ARF112: CH1–12, ARF224: CH1–24, ARF236: CH1–36, ARF248: CH1–48,,)

DC voltage	mV: 13.8, 27.6, 69, 200, 500 V: 2, 5, 10, 20, 50
Thermocouple	K, E, J, T, R, S, B, N, W-WRe26, WRe5-WRe26, PR40-20, NiMo-Ni, CR-AuFe, Platinel 2, U, L
RTD	Pt100, JPt100, Pt50, Pt-Co

Digital input type (Digital input type (for models with digital input): CH121 to 128)

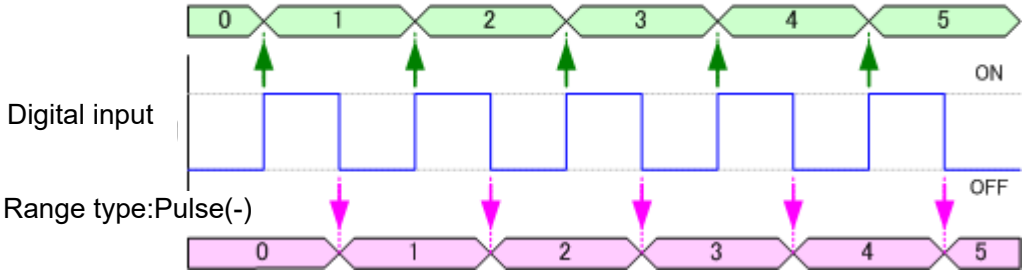
Digital input	DI
Pulse input	Pulse (+)*, Pulse (-)**

Pulse (+)*: pulse counter increases at a rising edge (OFF to ON) of input signal.
Pulse (-)**: pulse counter increases at a falling edge (ON to OFF) of input signal.

Digital input: DI
Records ON/OFF status of digital input.

Pulse input: Pulse (+) and Pulse (−)
Counts pulse inputs (calculates the number of pulses) using ON/OFF inputs of the contacts as pulse signals. Pulse inputs of 5 Hz or more can be counted.
Pulse (+): counts changes of digital input from OFF to ON.
Pulse (−): counts changes of digital input from ON to OFF.

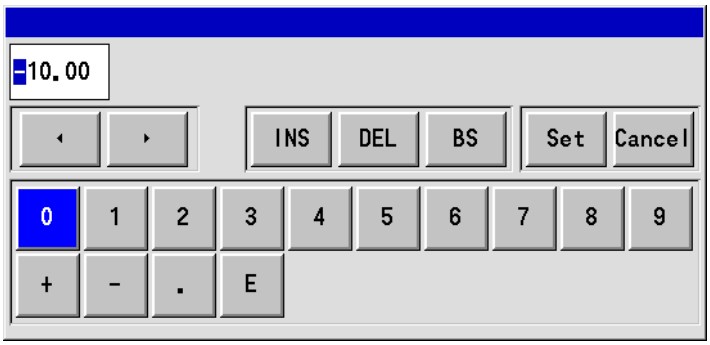
Range type:Pulse(+)



The pulse input total rolls over (is reset) to the low limit of the scale when it reaches the high limit.

■ Range
• Set the range. (The range depends on the range type and sensor type.)

■ Scale
• Set the scale. (The scale depends on the range type and sensor type.)



Correctly input the position of the decimal point here since it becomes the position of the decimal point for measurement values.。

■ Sensor correction
• Set a value (shift value) to be added to the input value.

■ Reference junction compensation (RJ)
• Set the RJ to either internal or external.

■ Available burnout settings

None	The burnout function is not used.
UP	If burnout occurs, indication will be upscale.
DOWN	If burnout occurs, indication will be downscale.

■ Setting the filtering level
• The input filter level can be set from 0 to 3, with 0 as no filter and 3 as the strongest filter. If

"System settings" is selected for "Filter level," the filter level will be determined by the settings in System settings > Other.
Note: Setting the filter level is possible only in version 2.00 and later.

■ Tag (label)

• A tag can be displayed instead of the channel number. (Up to 15 one-byte characters)
This is valid when data display of [Display settings] → [Common parameters] is set with tags.

■ Units

• Set the engineering units for the channel. (Up to 7 one-byte characters)

■ Usage of formula

OFF	Raw input data is displayed and recorded for this channel.
ON	Input data processed by a formula is displayed and recorded for this channel.

■ Definition of formula

• If the formula usage setting is ON, define a formula for the channel (see 11.2.2 below).

■ Copying parameters with the copy function

The above shows the setup for copying parameters from Ch 01 to Channels 02 to 05. Select the Go button and press [ENTER] key, and the Channel 01 parameters are copied to Channels 02, 03, 04, and 05.

11.2.2. Formula definition

1) Types of calculation

Arithmetic operations

The basic four arithmetic operations are available.

Operation	Symbol	Example	Remarks
Addition	+	*X***+***Y*	
Subtraction	-	*X***–***Y*	
Multiplication	*	*X******Y*	
Division	/	*X*/*Y*	
Remainder	%	*X***%***Y*	
Exponential	^	*X***^***Y*	

Note: X and Y in the table indicate a formula or number.

Comparison

Comparison is done and the result is given as 1 (satisfied) or 0 (unsatisfied).

Operation	Symbol	Example	Remarks
Equal value	==	*X***==***Y*	
Unequal value	!=	*X***!=***Y*	
More than	>>	*X***>>***Y*	
Less than	<<	*X***<<***Y*	
Equal or more than	>=	*X***>=***Y*	
Equal or less than	<=	*X***<=***Y*	

Note: X and Y in the table indicate a formula or number.

Logical operations

Binary logical operations are done and the result is returned as 1 or 0.

Operation	Symbol	Example	Remarks
Logical AND	AND	*X* **AND** *Y*	
Logical OR	OR	*X* **OR** *Y*	
Exclusive OR	XOR	*X* **XOR** *Y*	
Negation	NOT	**NOT (***X***)**	Put the object being negated in parentheses.

Note: X and Y in the table indicate a formula or number. X and Y should be expressible in terms of 0 or 1.

Other operations

The following calculations can also be done.

Operation	Symbol	Example	Remarks
Round up after the decimal point	CEL	**CEL(***X***)**	
Round down after the decimal point	FLR	**FLR(***X***)**	
Absolute value	ABS	**ABS(***X***)**	
Square root	SQR	**SQR(***X***)**	
Power of e	EXP	**EXP(***X***)**	
Natural logarithm (base e)	LOG	**LOG(***X***)**	
Common logarithm (base 10)	LOG10	**LOG10(***X***)**	

Note: X in the table indicates a formula or number.

Channel data operation functions

The following calculations can also be done:

	Symbol	Example	Remarks
Input data	CH	**CH(*X*)**	See the value before the operation of the specified channel. *1
Calculation result data	PCH	**PCH(*X*)**	
Previous calculated result data	OCH	**OCH(*X*)**	Data at the previous scanning
Totalization (integration)	ITG	**ITG(*X*)**	See (2) below
	ITG24	**ITG24(*X*)**	
F value	FV	**FV(*X#To#Z#R)***	See (3) below
Relative humidity	RH	**RH(*D#W*)**	See (4) below
Dew-point temperature	DEW	**DEW(*T#H*)**	See (5) below
Moving average (1 hour)	AVE	**AVE**(X#T)	*2
Moving average (5 min)	AVEH	**AVEH** (X#T)	
Past data (1 hour)	OLD	**OLD**(X#T)	*2
Past data (5 min)	OLDH	**OLDH**(X#T)	
First delay filter	IIR	**IIR**(X#T)	*2

In the table, X represents the channel number.

*1. The analog input channel or contact input channel can be specified.

*2. Do not use the same function two times or more in one formula, or the results will not be calculated correctly.

Note: The operation result of the specified destination is used as the channel data operation function. If a formula makes use of calculation results from a channel whose number is greater than the channel currently being processed, the calculation results obtained previously from the designated channel are used.

System information acquisition function

	Symbol	Example	Remarks
CF card remaining amount	CF	**CF(*A*)**	A = Unit of the remaining amount: 0: Megabytes 1: Minutes 2: Hours 3: Days

(2) Totalizing operation

For the totalizer, the ITG function or the ITG24 function is used.

To reset the totalizer, refer to section 11.6.

a) Normal totalizing operation
Perform totalizing operation on the channel to be totalized by the input cycle.

Format for entering the formula
ITG(d) d: channel number

Calculation details
$\mathbf{D_n = D_{n-1} + \{(PV_n + PV_{n-1}) \times (T_n - T_{n-1})\} \div 2}$

D_n: Totalized result D_{n-1}: Previous totalized result
PV_n: Data to be totalized PV_{n-1}: Data totalized at the previous calculation
T_n: Time of calculation T_{n-1}: Time of the previous calculation (0.1 s before)

Example: Inputting the instantaneous value (L/min) from the flowmeter and calculating the cumulative count
Since the unit used by the formula for integration (ITG) on the ARF200 is the second, it is necessary to convert the PV from L/min to L/s. Therefore, the ITG is divided by 60: ITG (d)/60 (or ITG (d)/3600 if the PV unit is L/hour).

If the auto-totalizer reset is set to ON, the cumulative count will be reset at the totalizer reset base time and at every interval. If there is a data error (OVER, UNDER etc.), the calculation is not done, and the previous results are used.

b) 24-hour totalizing operation
The total of a target channel is calculated every 0.1 s.
The calculation details are the same as for a normal totalizing operation.

Format for entering the formula
ITG24(d) d: channel number

If the auto-totalizer reset is set to ON, the cumulative count will be reset at the totalizer reset base time alone.

(3) F value

Format for entering the formula
FV(X#To#Z#R)

X: Channel to be calculated To: F-value calculation reference temperature
Z: Z-value R: F-value calculation starting temperature

The formula used to calculate F is $\int \mathbf{10^A dt}$
$A = (T - To) \div Z$ T: channel data to be calculated
When T exceeds R, the F-value is reset to 0.

(4) Relative humidity

Format for entering the formula
RH (D#W)
D: Dry bulb temperature W: Wet bulb temperature

The following formula is used for relative humidity calculation.
((B - 0.000662 × 1013.0 × (D - W)) ÷ A) × 100
A: Dry bulb saturated water vapor pressure B: Wet bulb saturated water vapor pressure
D:Dry bulb temperature W:Wet bulb temperature

The following formula is used for the calculation of saturated water vapor pressure
6.1121 × EXP ((17.502 × T) ÷ (240.9 + T)) T: Temperature

(5) Dew-point temperature

Format for entering the formula
DEW (T#H)
T: Temperature data channel H: Relative humidity channel

For the input of relative humidity, use the results of the RH calculation shown above in (4), or the output from an external thermometer, and then register the channel as Xh.

The formula below is used for the dew-point temperature.

t: Temperature data
h: Relative humidity data
D: Dew-point temperature

1) K = t + 273.15
2) When t ≥ 0
W = EXP(-5800.2206 / K + 1.3914993 + K × (-0.048640239 + K × (0.41764768E-4 - 0.14452093E-7 × K)) + 6.5459673 × LOG(K))/1000
When t < 0
W = EXP(-5674.5359 / K + 6.3925247+ K × (-9.677843E-3 + K × (0.62215701E-6 + K × (0.20747825E-8 - 9.484024E-13 × K))) + 4.1635019 ×LOG(K))/1000
3) S = W × h/100
4) P = S × 1000
5) Y = LOG(P)
6) When P ≥ 611.2
D = -77.199 + Y × (13.198 + Y × (-0.63772 + 0.071098 × Y))
When P < 611.2
D = -60.662 + Y × (7.4624 + Y × (0.20594 + 0.016321 × Y))

(6) Moving average

Calculate the average of the data for past T seconds.

Format for entering the formula
AVE (X#T)
AVEH (X#T)
X: Data channel No. T: Time series interval (sec.)
The table below shows the difference between AVE and AVEH.

	AVE	AVEH
Sampling cycle	1 s	0.1 s
Range of T	1 to 3600	1 to 300

(7) Past data

Calculate the data T seconds earlier.

Format for entering the formula
OLD (X#T)
OLDH (X#T)
X: Data channel No. T: Amount of time to go back (sec.)
The table below shows the difference between OLD and OLDH.

	OLD	OLDH
Sampling cycle	1 s	0.1 s
Range of T	1 to 3600	1 to 300

(8) First delay filter

Filters the data of channel X.

Format for entering the formula
IIR (X#T)
X: Data channel No. T: Time constant (sec.)

Calculation details
{dt÷(dt+t)}×(x-d)+d
dt: sampling cycle (0.1 s fixed) t: time constantq x: current value of channel X
d: previous operation results

(9) Example of arithmetic expression where calculations are combined

- (CH(1)*3-20)/6: (Channel 1 data × 3 – 20) ÷ 6
- (CH(1)+CH(2))<300: When the sum of channel 1 and channel 2 is less than 300, the value is 1.
- ABS(CH(1))>=50: When absolute value of channel 1 is 50 or more, the value is 1.
- (PCH(1)>=100)AND(PCH(2)<=50): When channel 1 data has a value of 100 or more and channel 2 data is 50 or less, the value is 1.

Handling Precautions

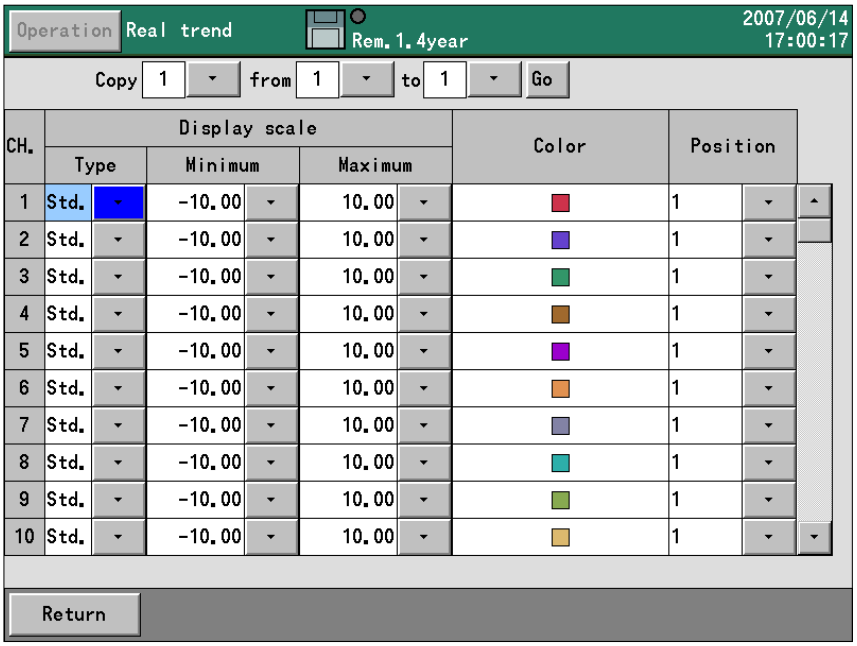
- The following functions cannot be used together. Doing so will cause a calculation error.
  ITG, ITG24, AVE, AVEH, OLD, OLDH, and IIR
  Example: AVE(OLD(1#10)#60)

11.3. Display settings

11.3.1. Channel parameters

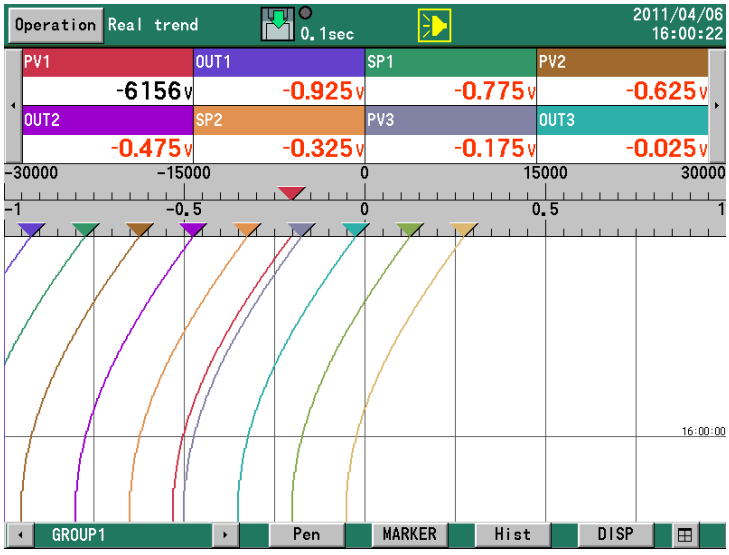
- Start from the MENU screen.
- Press [ENTER] key and the screen shown below will be displayed.

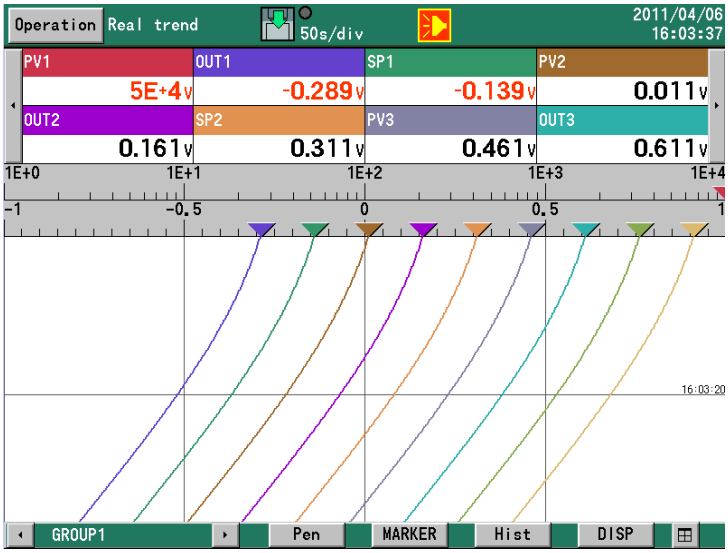
Wave pattern type, maximum/minimum values of the display scale, color and the display position of each channel can be set.



■ Setting the display scale

The display scale settings determine how the data is displayed on the screen.

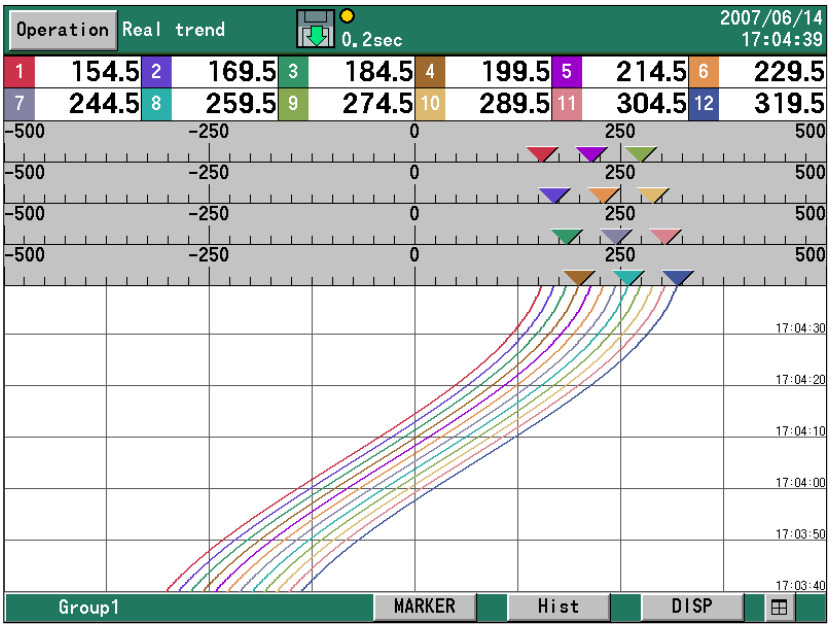
Item	Description
Type	Standard: The upper and lower limit of the display scale can be set within the range ±30000 excluding the decimal point, or a value down to three digits past the decimal point can be set.  Expo" (exponent) sets the minimum and maximum values in

	exponential form. The screen is also displayed in exponential form. The significant of the minimum and maximum values is 1–9.99, and the exponent part can be set in a range of ±15. 
Minimum, maximum	・In the trend display, the coordinates are calculated such that the minimum value is positioned at the extreme bottom left and the maximum value is positioned at the extreme upper right. Horizontal direction is shown by ( ). When there are multiple channels displayed in the same position, the min. and max. values of the channel with the smallest number are displayed on the scale bar. Each of the pens is displayed in the correct relative position, taking the width defined for the channel by its min. and max. values as 100% of the scale bar. ・The min. and max. values are displayed with the preset number of digits after the decimal point.

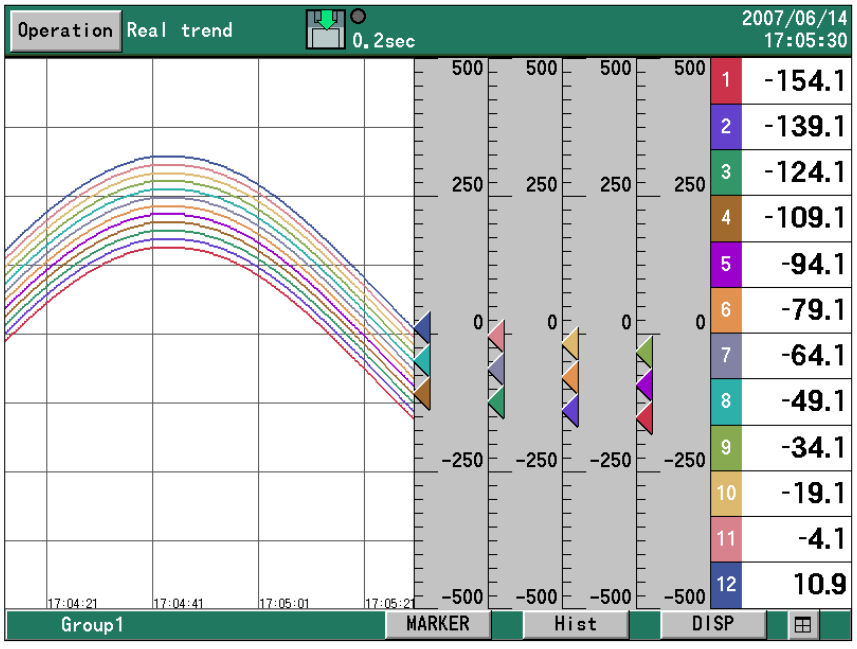
■ Setting the display position

• The display position (1, 2, 3, or 4) indicates the position of the scale on which the pen is placed.

For vertical trend graphs



For horizontal trend graphs



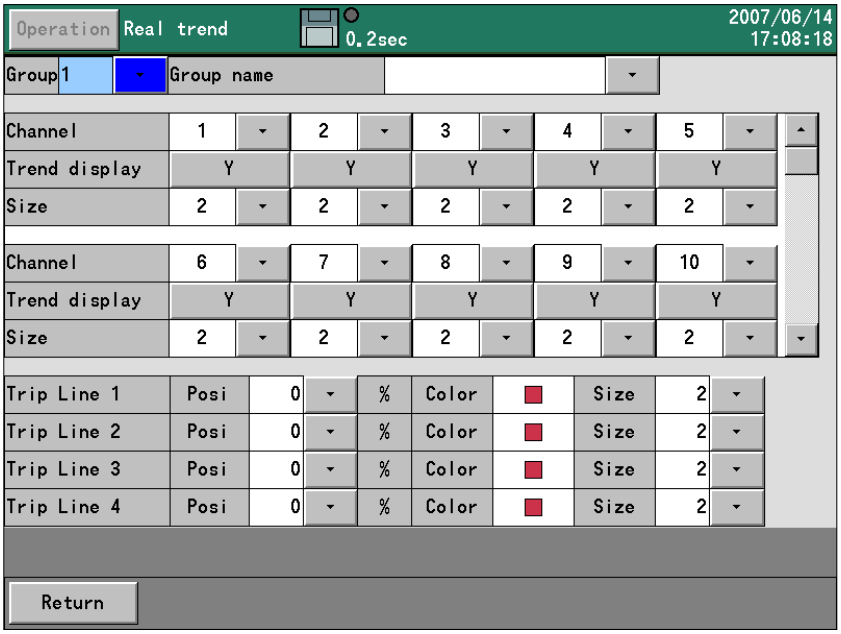
■ Copying parameters with the copy function

The above shows the setup for copying Ch 01's parameters to Channels 02 to 05. Select the Go button and press [ENTER] key, and the Channel 01 parameters are copied to Channels 02, 03, 04, and 05.

11.3.2. Group parameters

- Start from the MENU screen.
  - Press the ▼ button for the item to be set and then move to the input screen.

The group specified by the number next to "Group" in the upper left can be configured.



■ Group name

- If set, the group name is used in the screen display and is used as the file name of the recorded data. (Up to 16 one-byte characters)

■ Channel

- Set the channel to be registered to the group. Also set the channel (during setting, the display will be blank even if “0” is set) not to be registered to the group. If a channel number is set, the registered channel’s data will be recorded on the CF card even if the trend display is set to “N.” Set a blank for unused channels.

■ Trend display

- When a value is selected, pressing the [ENTER] key toggles between “Y” and “N.” If the trend display is set to “N,” there will not be a trend display for that channel. However, even when its trend display is set to “N,” the channel’s data will be recorded in a file if the channel has been registered in a group.

	Trend display	Data display	File recording
Trend display setting [Y]	●	●	●
Trend display setting [N]	—	—	●

■ Size

- This is the thickness of the trend line. Select from 1 to 5.

■ Trip line

• This is a fixed dotted line displayed on the trends.

– Posi(tion)

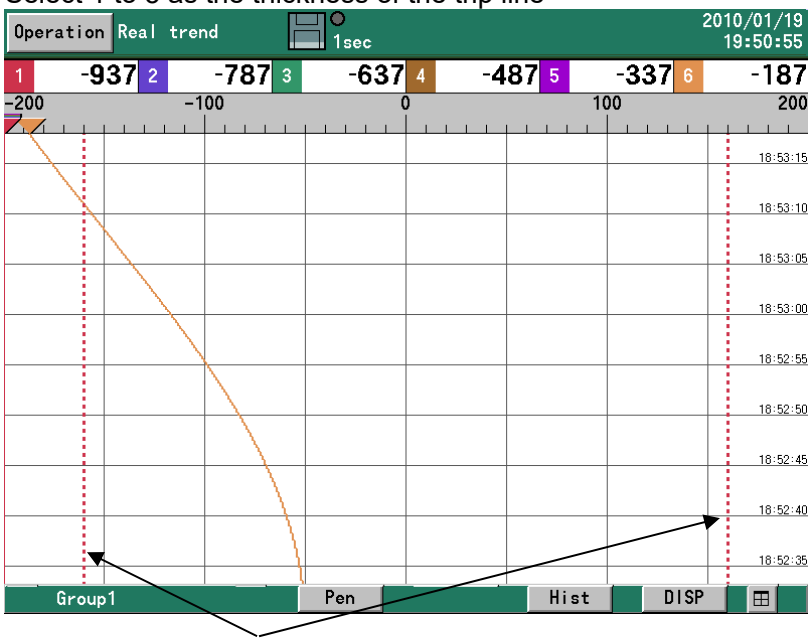
Set the display position of the trip line in the range 0–99 % of the display width.

– Color

Select the color of the trip line from a choice of 48 colors.

– Size

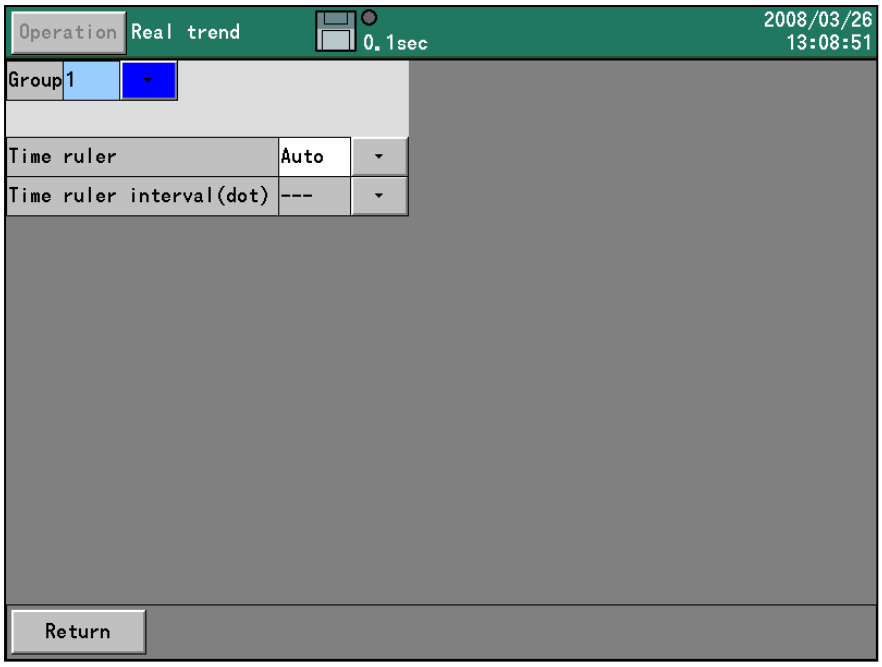
Select 1 to 5 as the thickness of the trip line



11.3.3. Group Parameters 2

- Start from the MENU screen.
- Highlight “Display settings” using the arrow keys. Press [ENTER] key. Highlight “Common parameters.”
- Press [ENTER] key and the screen shown below will be displayed.

When group parameter 2 is selected in the display setting screen from the MENU setting menu screen, the screen shown below will be displayed.
The group for the number specified by the numeric at the top left “Group” can be set.

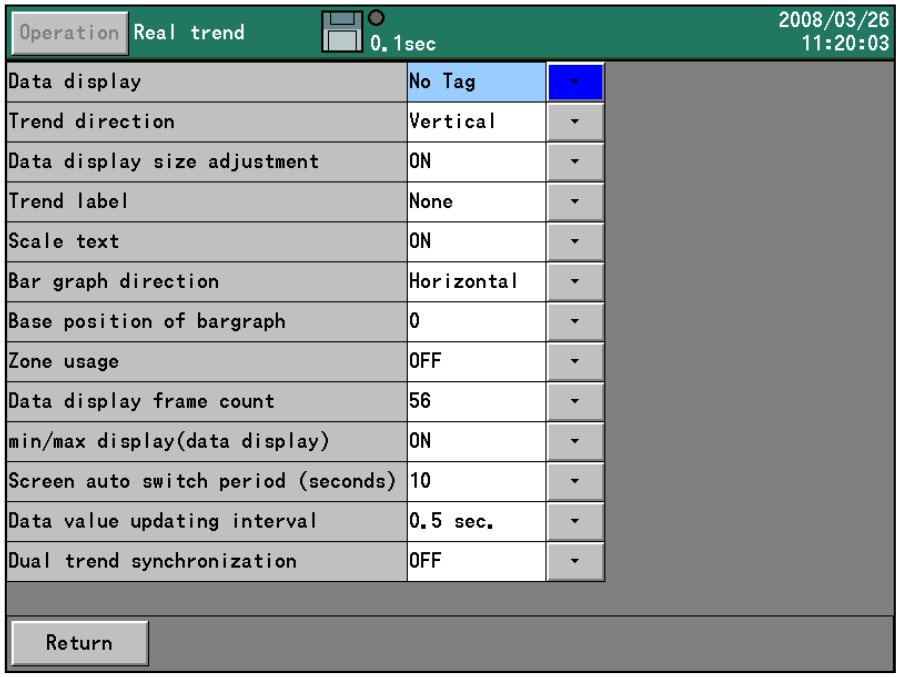


■ Time axis ruled line
- Select “Auto” or “Specified.” If “Auto” is selected, the interval between ruled lines is determined automatically according to the recording interval.

■ Time axis ruled line interval
- Specify the interval between ruled lines on the time axis in trend displays. Even numbers from 12 to 510 can be specified.
  This setting is enabled only if “Specified” is selected for “Time axis ruled line.”

11.3.4. Common parameters

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



■ Data display

- Set the upper side (or right side) display of the trend screen to indicate tags, bar graph, or nothing.

No tag	With tag	Bar graph	None

■ Trend direction

- Set the wave direction to be vertical or horizontal.

■ Data display size adjustment

- This function automatically increases the size of the data display shown on the trend screen if there are not many registered channels. In the following cases, data is shown in larger characters.

Data display	Trend direction	Number of registered channels
Without tag	Vertical	Up to 3
With tag	Vertical	Up to 4
Without tag	Horizontal	Up to 6
With tag	Horizontal	Up to 4

■ Trend label

- This sets the label that is displayed on the trend.

None	Channel	Tag

■ Scale text

- Set the scales to display or not display numerical values.

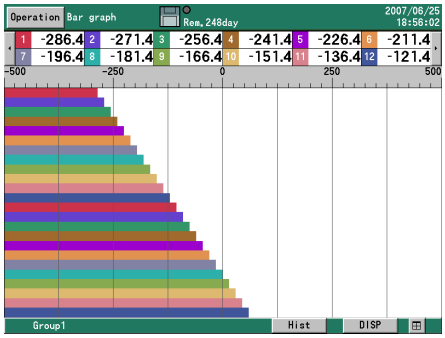
■ Bar graph direction

- Set the bar graph direction on the bar graph screen to be vertical or horizontal.

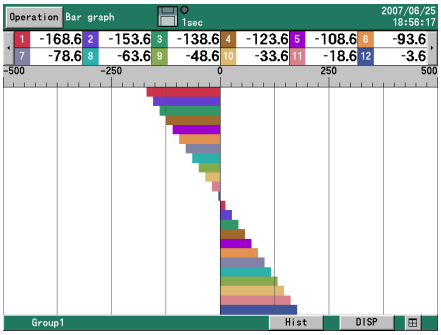
■ Bar graph base position

• This sets the base position for bar graphs on the bar graph screen at a value from 0 to 100. At a setting of 0, bars start on the left side (or the bottom) of the screen. At a setting of 100, bars start on the right side (or the top).

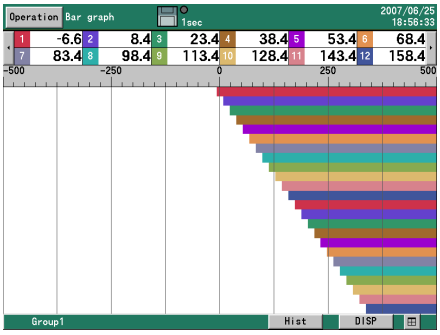
Setting: 0



Setting: 50



Setting: 100



■ Zone usage

•The display range of the measured/calculated data is called the zone. When the zone is set to ON, the display range can be divided into zones. For more details, see the next page.

■ Numeric display frame count

• Set the number of divisions of the numeric display frame from one of 1/2/3/4/6/8/9/10/12/24/36/48/56.

■ Max/min display (numeric display)

• Select one of “With or “Without”. When “With” is selected, the minimum and maximum values of that channel data are displayed in the numeric display screen. Note, however, that these values are not displayed when the numeric display frame count above is set to 24 or higher.

■ Screen auto switching period

• Determines how often the display is automatically switched, if “Auto switching” has been set to ON with the DISP menu.

■ Data value updating interval

• Determines how often the measured data displayed on the screen is updated.

0.5 seconds, 1 second

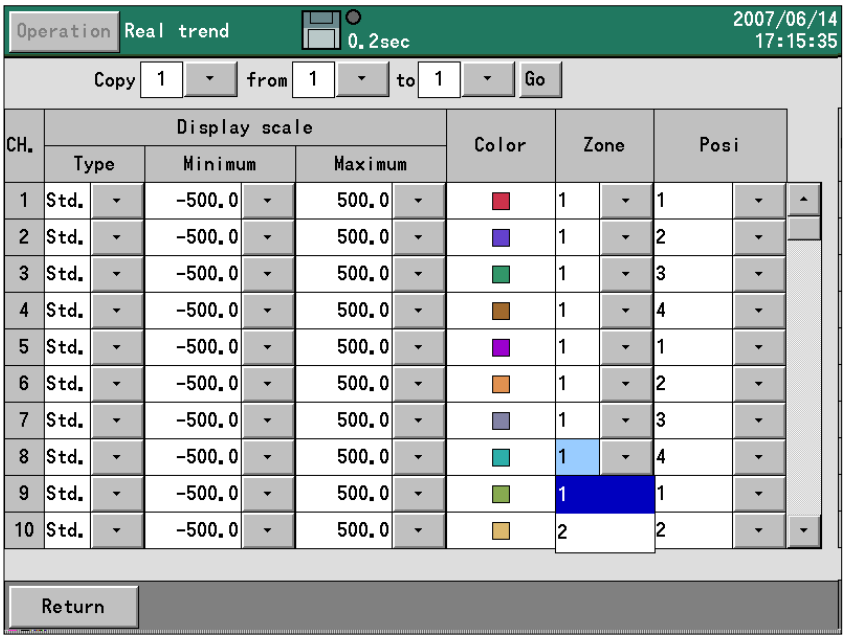
■ Dual trend synchronization

• If a file with past data is opened as a dual trend when the function above is ON, the data will scroll at the same rate as that of the real-time trend. When scrolling reaches the end of the file, if there is a consecutive file, it will open automatically and scrolling through it will begin.

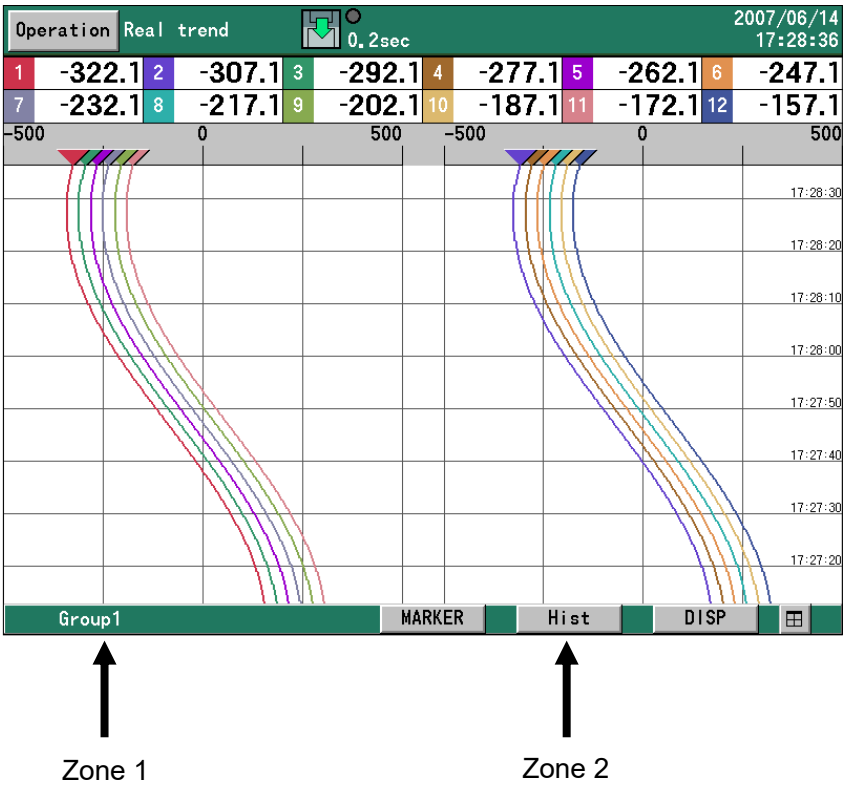
Zone

The area in which measured/calculated data is displayed is called a zone. By assigning each channel to a zone, the data display can be more easily read.

Select “ON” for Zone usage. From the MENU screen, when Display settings and then Channel parameters is selected, the following screen (with an added column for zone) is displayed.

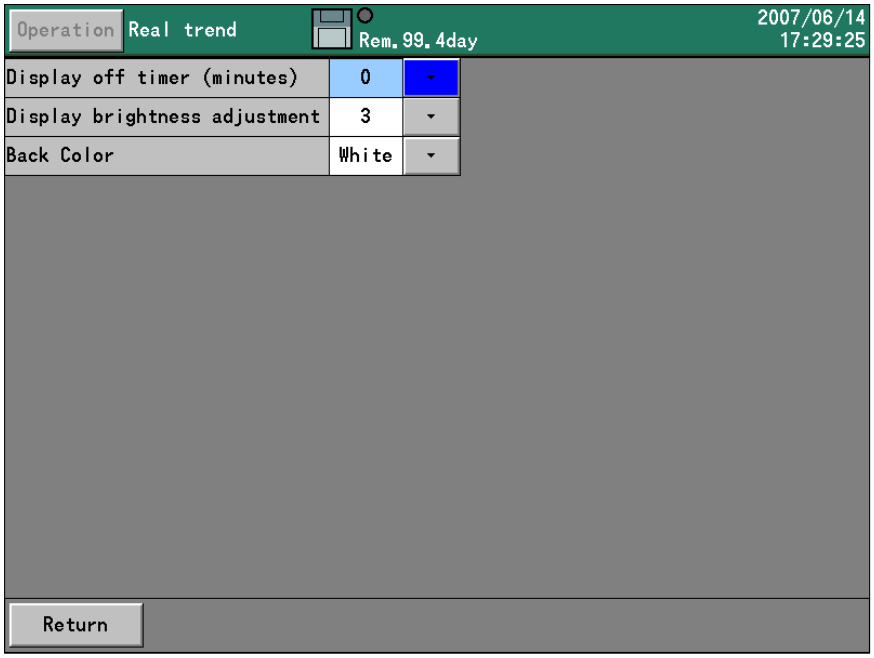


Channels can be assigned to either Zone 1 or 2. As a result, the display of waves on the trend screen is divided into 2, with channels displayed either in Zone 1 or in Zone 2.



11.3.5. LCD settings

- Start from the MENU screen.
  - Press the ▼ button for the item to be set and then move to the input screen.



■ Display off timer (minute)

If there is no key operation during the time (in minutes) set for the display-off timer, the LCD display will turn off.

- The display-off timer for the LCD can be set from 1 to 60 minutes.
  If the setting is “0,” the display-off timer for the LCD does not operate.
- To cancel the “display off” and resume viewing, press any key.

■ Display brightness

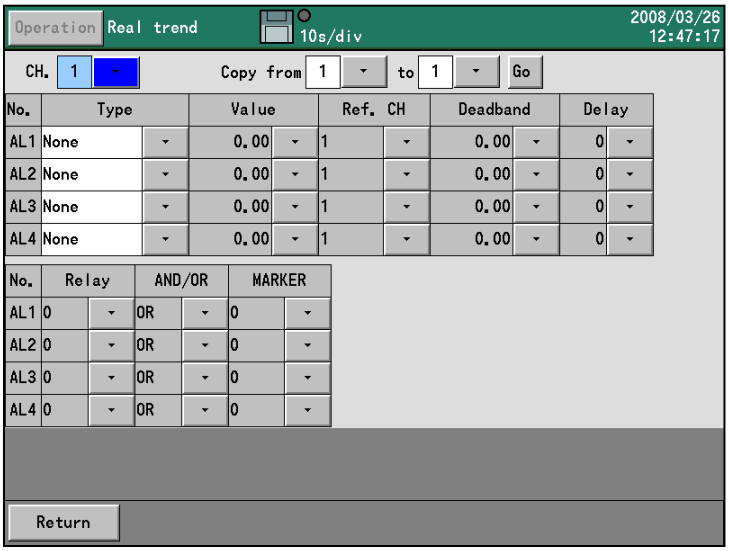
- Select from 4 degrees of brightness for the LCD backlight. 1 is the brightest and 4 is the darkest.
  The factory setting is 3.

■ Back color

- Select a background color for the screen, either white or black.

11.4. Alarm settings

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



■ Type

- There are 6 settings for alarm type, as shown below.

None	The alarm is not set	Diff. upper	Differential upper limit alarm
Upper	Upper limit alarm	Diff. lower	Differential lower limit alarm
Lower	Lower limit alarm	Error	Error alarm

"Error" refers to the occurrence of BURN, OVER, UNDER, CAL ER, or RJ ERR.

■ Value

- This determines the threshold for the alarm.

■ Ref. CH

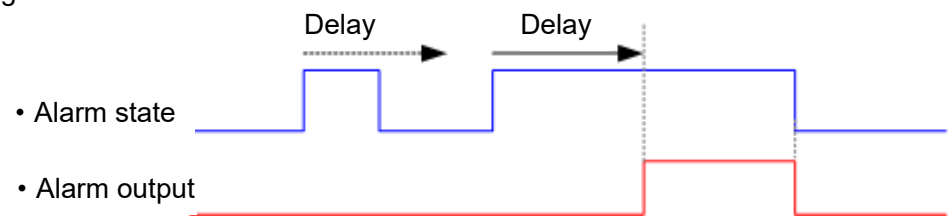
- Sets the reference channel for the differential upper/lower limit alarms.

■ Dead band

- Determines the dead band between the alarm threshold and its release. (See next page.)

■ Delay

- Sets a delay for alarm occurrence (0–3600 seconds).
  If an alarm is triggered and continues longer than the delay time set for the alarm, alarm output is generated.



■ Relay (for models with the optional alarm output terminal)

- It is possible to set relays even without an alarm output terminal (but there is no effect).
- The alarm output terminal number can be set from 0 to 12. However, there is no alarm output when 0 is set.

■ AND/OR (output mode)

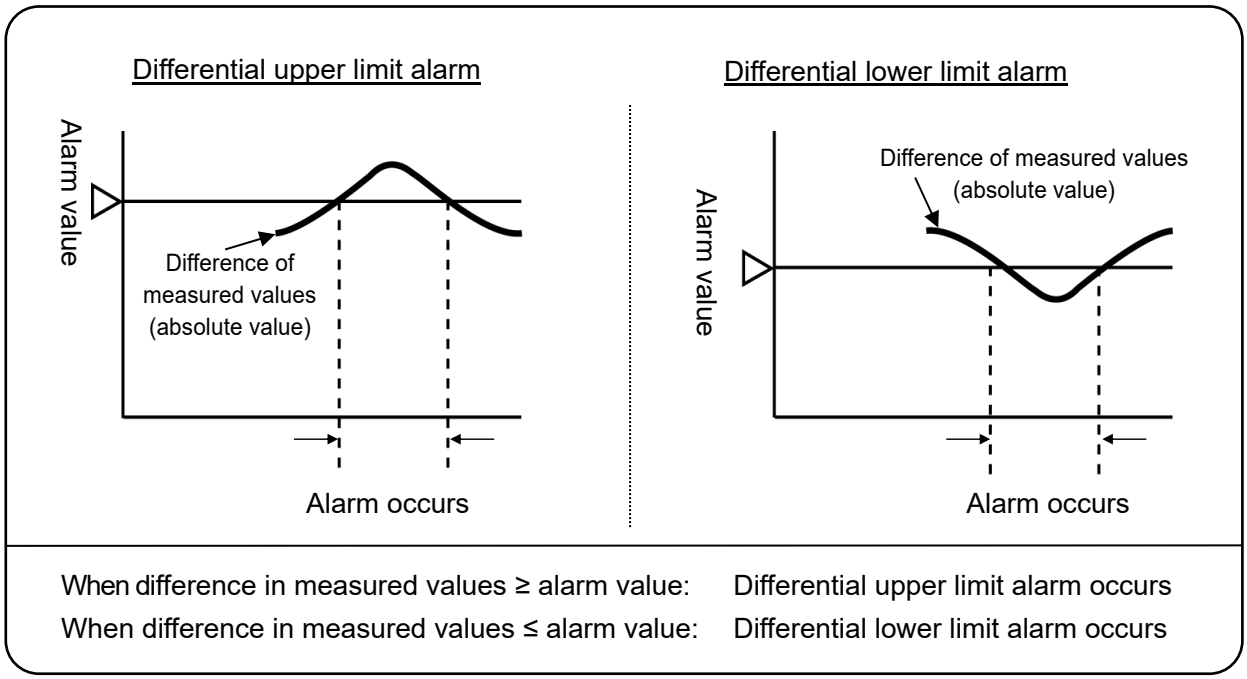
AND	Alarms are assigned with the AND condition for activation of an alarm output terminal. The relay turns ON when all alarms set for one alarm output terminal are activated.
OR	Alarms are assigned with the OR condition for activation of an alarm output terminal. The relay turns ON when any of the alarms set for one alarm output terminal is activated.

- If both AND and OR are set for the same alarm output terminal, the relay turns ON when all the alarms set for AND are activated, or when one of the alarms set for OR is activated.

■ Marker*

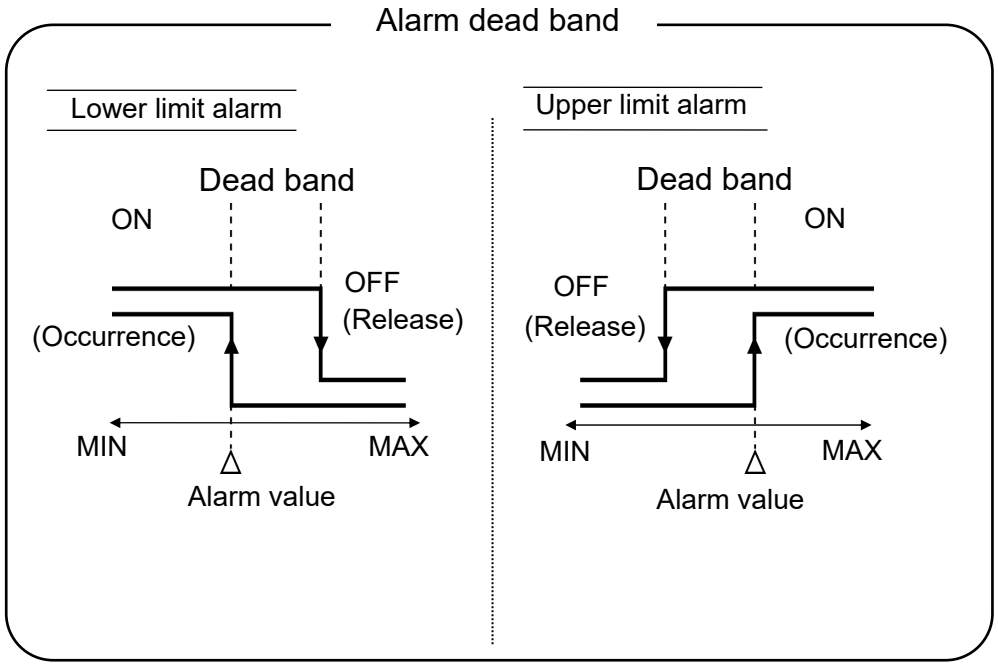
- It is possible to set a marker No. that automatically writes an annotation on the trend screen when an alarm occurs.
- If the setting is “0,” the marker function does not operate.

Differential alarms



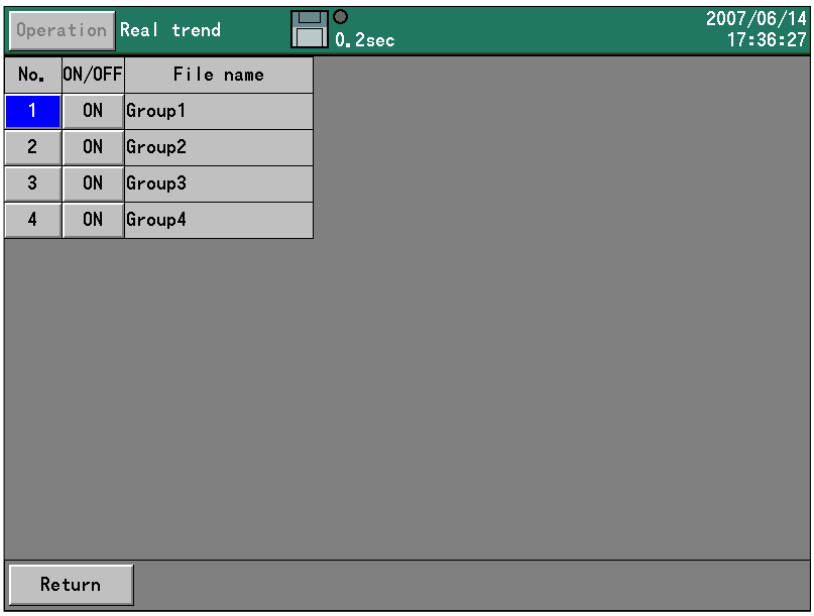
When difference in measured values ≥ alarm value: Differential upper limit alarm occurs
When difference in measured values ≤ alarm value: Differential lower limit alarm occurs

Alarm dead band



11.5. File settings screen

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



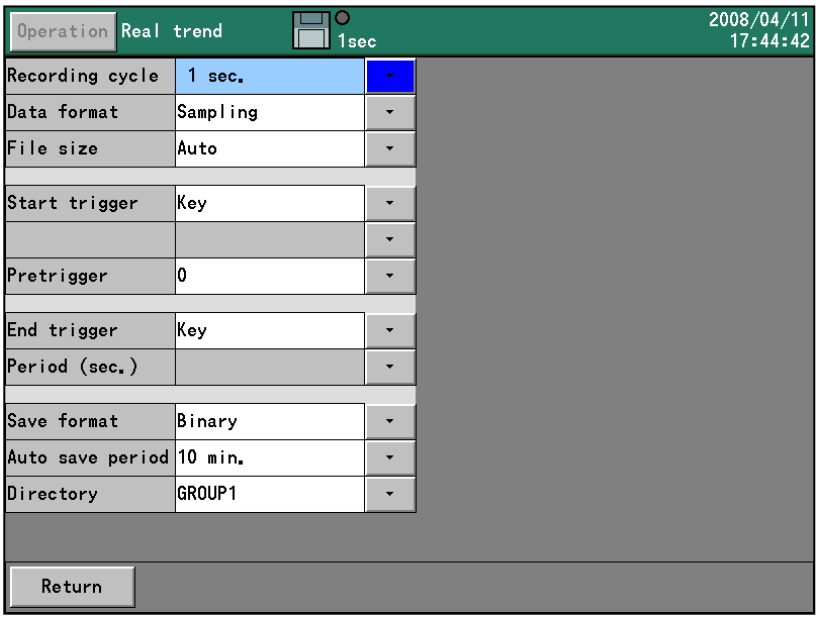
■ No.

The setting for number of groups that has been set in the recorder's group count setting (in System settings → Other settings → Usage group count) is displayed here.
Select the desired number and press the [ENTER] key. A screen with file settings for the group will be displayed. For setting instructions, see the next page.

■ ON/OFF

When ON is selected, data will be recorded. No data is recorded or displayed when OFF is selected.

Group file settings



■ Recording cycle

Seconds	0.1, 0.2, 0.5, 1, 2, 3, 5, 10, 15, 20, 30
Minutes	1, 2, 3, 5, 10, 15, 20, 30, 60

■ Data format

If the recording cycle is set to 0.1 seconds, Sampling is the only selectable data format. In recording the data into the file, the average, maximum, minimum or maximum/minimum values in the period of the recording cycle can be recorded. If Maximum/minimum is selected, the record size will be 1.5 times larger.

Format	Sampling	Average	Maximum	Minimum	Maximum/minimum
Record size (bytes)	4	4	4	4	6

■ File size*

This setting specifies the file size (time period). When a file reaches the specified size it is complete, and subsequent recorded data is stored in another file.
When “Auto” is specified, data is recorded up the file size upper limit.
Periods consisting of minutes or hours are not calculated starting from the time when the setting is made, but rather are calculated starting from 0:00 (12:00 midnight) clock time. Similarly, weekly periods are calculated from 0:00 on Sunday, and monthly periods from 0:00 on the first day of the month.

Minutes	10, 15, 20, 30, 60
Hours	2, 3, 4, 6, 8, 12, 24
Other	1 week, 1 month

However, if recording stops or recorded data reaches the upper limit of the file size (see 7.9 “Internal Memory Screen”) before the specified period, the file is completed at that time.

■ Recording triggers

Recording is triggered in one of the following ways:

Trigger type	Description
START key	Recording starts when the [START] key is pressed.
Alarm	After the [START] key is pressed, recording begins when the alarm relay is activated. If this item is selected, the relay terminal number can be selected.
Digital input (option)	After the [START] key is pressed, recording starts when the digital input terminal turns ON. If this item is selected, the input terminal number can be selected.

■ Pre-trigger (0–950)

When recording begins, past data retroactive to the count set here is recorded.

Example: When the recording starts at 13:00:00 with the pre-trigger “10” and the recording cycle “2 seconds,” data from 12:59:40 to 12:59:58 are added to the beginning of the file.

Note: When the power is turned off or the settings are changed, the pre-trigger data is cleared, and the data for the entire interval specified here might not be available. In this case, only the data available to be saved is added to the beginning of the file.

■ End trigger

Select the condition for ending recording. The same details as for the recording trigger are displayed for the first item.

Trigger type	Description
Key	Recording stops when the [STOP] key is pressed.
Alarm	Recording stops when the [STOP] key is pressed or when the digital input terminal turns OFF.
Digital input (option)	Recording stops when the [STOP] key is pressed or when the digital input terminal turns OFF.
Recording period	After recording data for the preset period (in seconds), recording stops. At that time, if the recording trigger conditions are satisfied, recording begins again immediately (within 1 second).

■ Recording period (seconds) (0 to 30000)

After a recording trigger occurs, the ARF records data for the preset period and then stops. However, if the STOP key is pressed the ARF stops recording in spite of the recording period setting.

■ The save format

Select the file format in which the data will be recorded on the CF card.

Save format	Description
Binary	Data is recorded in binary format, with a .krf file extension. To replay the data, the ARF or the associated data analysis software is necessary.
CSV	Data is recorded as a CSV text file. The data can be read with spreadsheet software like Microsoft Excel. In addition, the data can be used in the included report application software. When a trigger interrupts recording, the file is completed. When recording resumes, data is written to a new file. If “,” is set as the decimal point marker, the data will be saved as a tab-delimited text file with a .txt extension.
CSV (continuous)	Data is written in CSV format. If a trigger stops recording, subsequent data will be appended to the same file when recording resumes.

Note: The factory setting is Binary.

■ Auto save period

This setting determines how often the file in internal memory is copied to the CF card. In addition to this cycle, each file is copied to the CF card when it is complete (see 7.9).

Minutes	No setting, 1 min, 2 min, 3 min, 5 min, 10 min, 20 min, 30 min, 60 min

Note: Factory setting is 1 minute.

■ Setting the directory (16 characters or less)

・In saving the data to external storage media, a directory name for saving can be set.

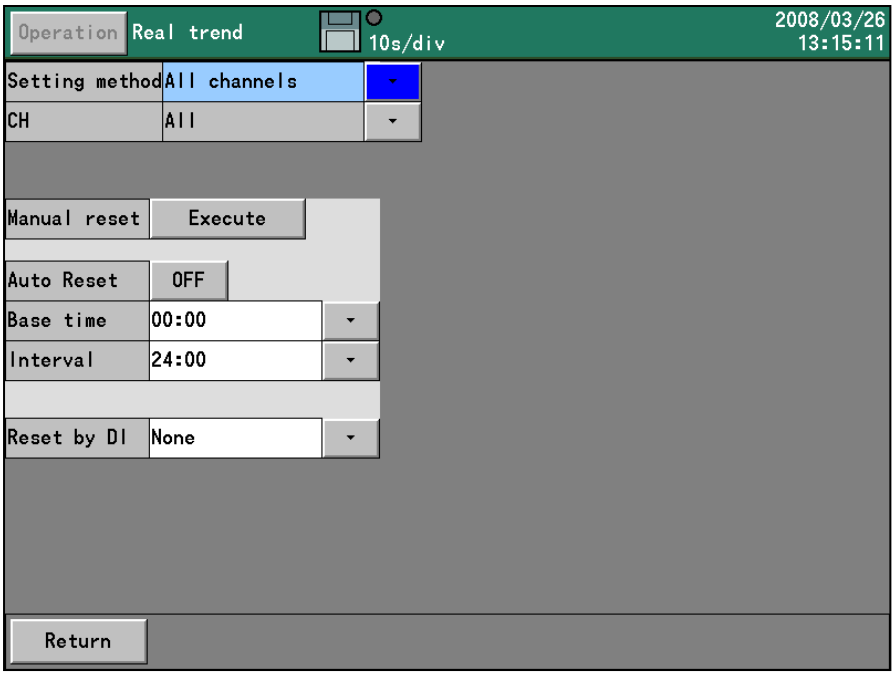
・A file path can also be specified. The delimiting symbol is “\” (backslash). See 5.3, “Character Input.”

11.6. Totalizer settings

Totalizer function (integration) is determined by the calculation settings for each channel. This screen is for selecting the procedure for resetting the cumulative count to 0.

		Totalizer		F-value calculation	Pulse input	
		ITG	ITG24	FV	Pulse (+)	Pulse (-)
Manual reset		●	●	●	●	●
Auto reset	Base time	●	●	●	●	●
	Interval	●	—	●	●	●
Digital input reset		●	—	●	●	●

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



■ Setting instructions

- The method of resetting the total count for each channel can be specified here. If “All channels” is selected, the settings here apply to all channels. Selecting “Individual” allows each channel to have individual settings.

■ CH*

- If “Individual” is selected, the settings on this screen apply to the channel specified here.

*: The CH setting is available in version 2.00 and later.

■ Manual reset

- Resets the cumulative count to 0 manually.

■ Auto reset

- If automatic reset of integration is needed, set this to ON. Otherwise, leave it OFF.

■ Base time and interval

- The timing of totalizer reset is determined by: base time + (interval × n), where n = 0, 1, 2, 3 … .

Example: If the base time is set at 0:00 hours and the interval setting is 04:00, the cumulative count is reset at 0:00, 04:00, 08:00, 12:00, 16:00, and 20:00 o’clock.

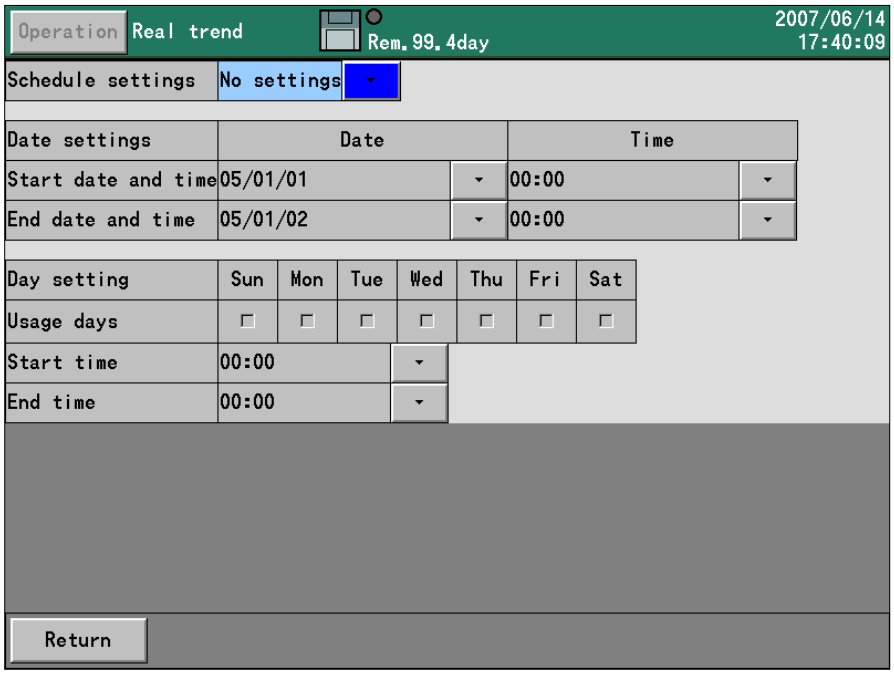
■ Reset by digital input (DI) (optional feature)

- The cumulative count can be reset when the assigned digital input terminal is energized. Select “None” if this function is not needed.

  Note: This setting is not displayed if the ARF does not have a digital input option.

11.7. Schedule settings

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



If a schedule is set on this screen, recording takes place only during the set period. Even if recording conditions specified by other settings are satisfied, the recorder does not record outside of the scheduled period. Outside the scheduled period, the status bar color changes to gray.

■ Schedule settings
- Select from none, date or day.
- Depending on this setting, the settings below are either enabled or disabled.

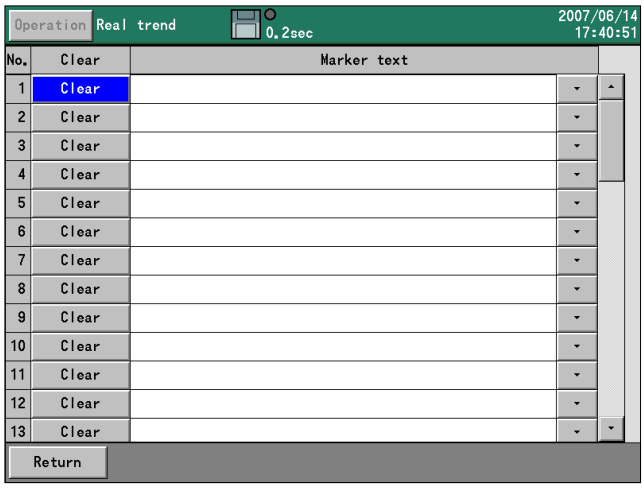
■ Date and time
- Set the start date and time, and the end date and time.

■ Day
- Check the days to which the day settings apply.
- Set the start time and end time.

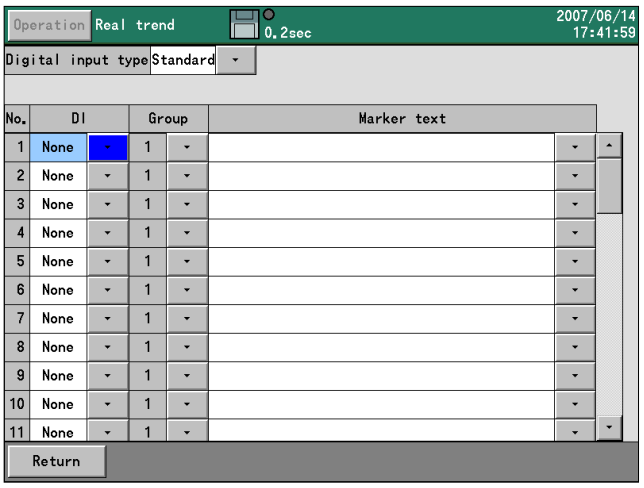
11.8. Marker settings

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.

Models without a digital input option



Models with a digital input option



On this screen, up to 50 annotations (30 one-byte characters max.) for use on the trends can be registered in advance.

For actual application of the annotation to the trend with the marker function, see 7.3. Even if no texts are registered on this screen, annotations can be created and added to the trends.

- Selecting “Clear” erases the annotation.
- If the message column is selected, the character input screen will appear.

(Adding annotations with the (optional) digital input
Annotations can be added to the trends by energizing the digital input terminal.

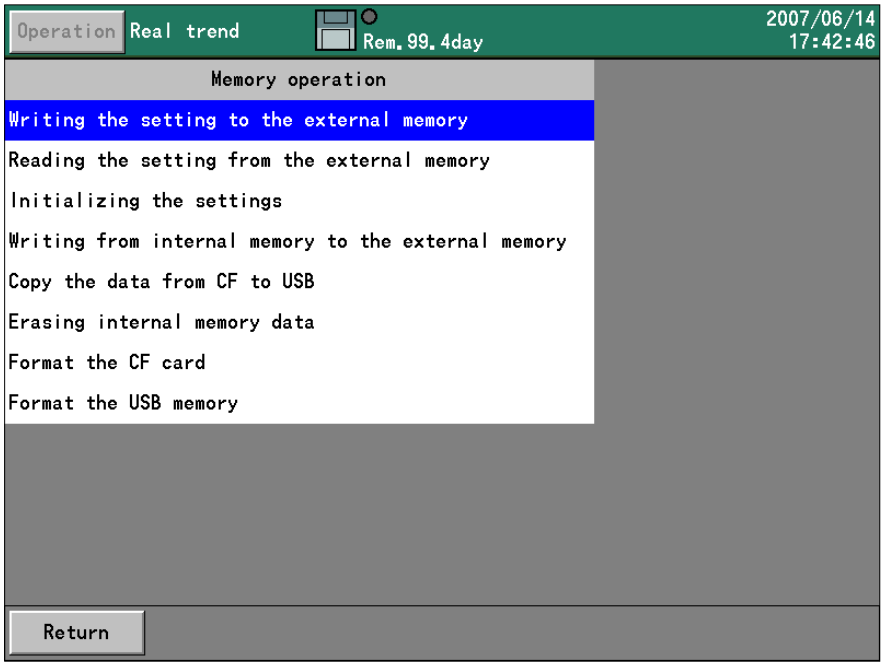
Digital input—standard
When the input terminal designated for digital input is energized, the corresponding annotation is written on the trends of the specified group.

Digital input—binary
Set the annotation number (1 to 50) using digital input terminals 1 to 7, with the binary expression of the low-order bit at terminal 1 and the high-order bit at terminal 7.

After terminals 1 to 7 have been set for a number from 1 to 50, turn terminal 8 ON, and the corresponding annotation will be written on the trend of the specified group.

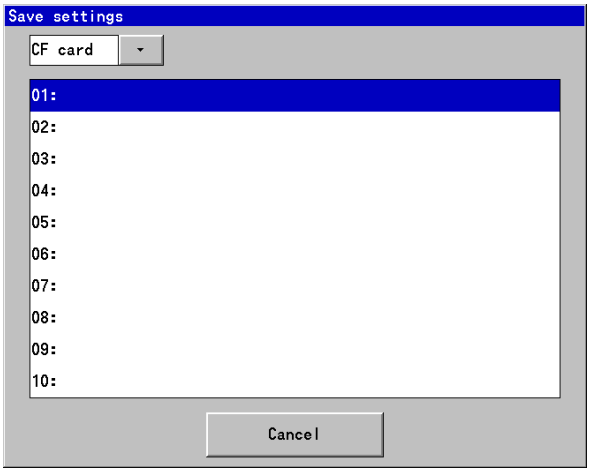
11.9. Memory operations

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



■ Writing settings to external memory

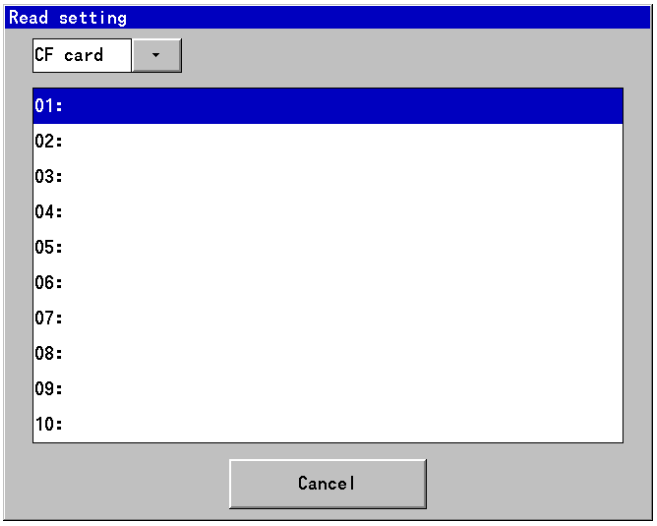
Writes up to 100 current settings to the external memory.



The dialog box shown above is displayed. When writing of files to either CF card or USB memory is selected, a list of setting files in the “SETUP” folder in those files is displayed.
To overwrite an existing file, select that file and press the ENTER key. To create a new file, touch a free number, or select it and press the ENTER key.
Input a file name and press the “Done” key to write the settings.
Files are saved in the “SETUP” folder in the CD card appended with the “.krs” extension.
Setting files can also be read and used on other ARF200 series recorders.

■ Reading settings from external memory

Reads setting files from CF card, and overwrites the current settings.



The dialog box shown above is displayed. When reading of files in either CF card or USB memory is selected, a list of setting files in the “SETUP” folder in those files is displayed.
Either touch the row of the file to read, or select it and press the ENTER key.

■ Initializing the settings

• This function overwrites the current settings with the factory settings.

■ Writing internal memory to external memory

Writes all data in internal memory to external memory (CF card or USB memory).

■ Writing CF card data to USB memory

Writes the data (files in the directory at the current write destination) of all groups recorded to CF card to USB memory.

■ Erasing internal memory

• Erases all data from internal memory.

■ Card format

• Reformats the CF card quickly.

■ USB memory format

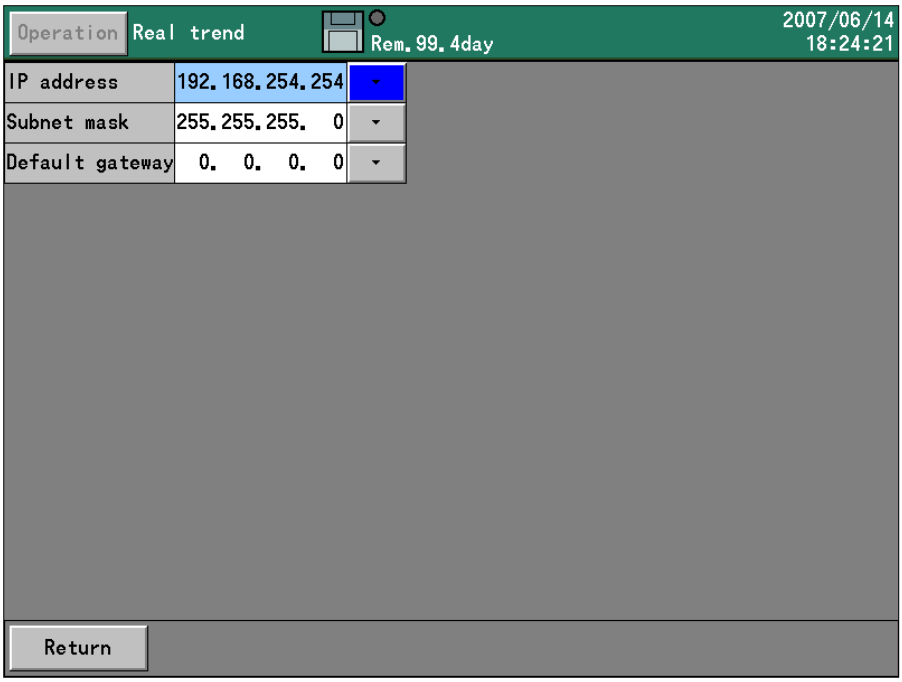
Quick-formats USB memory.

If settings are updated, they are saved to the CF card and identified with the name “latest.” If necessary, parameters can be restored by reading the latest settings from the CF card.

11.10. Network settings

11.10.1. Ethernet

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



This screen sets up the address, etc. that this recorder needs for an Ethernet connection.

■ IP address
- Sets the IP address for this recorder. DHCP (automatic assignment of IP addresses) cannot be used. Ask the network administrator to connect the IP address.

■ Subnet mask
- Sets the subnet mask for this recorder.

■ Default gateway
- Used to set the default gateway address, if there is a router (etc.) gateway on the network.

Example for a small-scale network

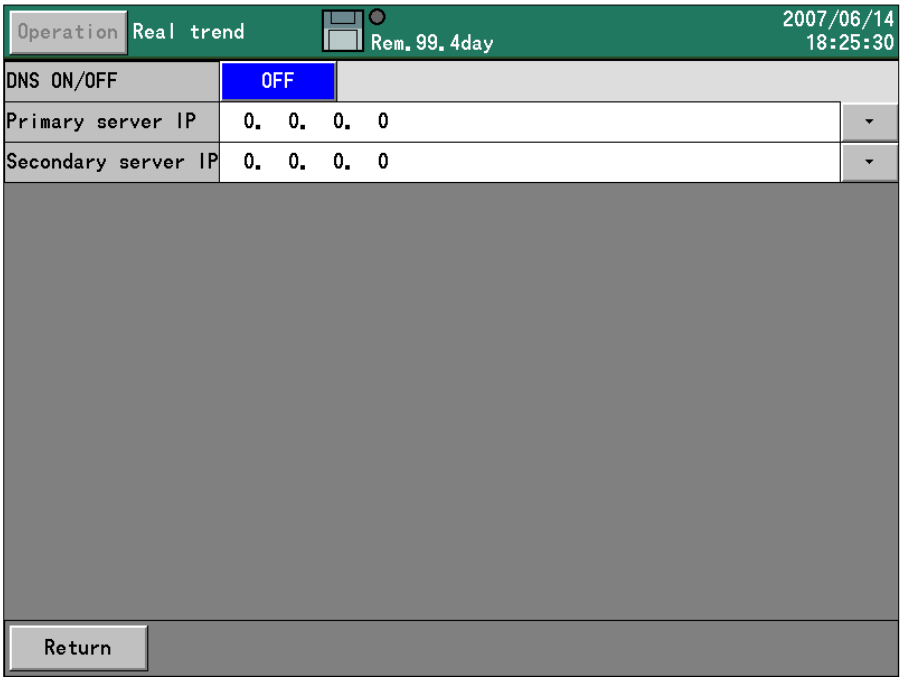
When using the recorder in a small network without connecting to an interoffice LAN or Internet via a router, set the IP address as follows:

Instrument	IP address	Subnet mask
ARF100 A	192.168.254.254	255.255.255.0
ARF100 B	192.168.254.253	255.255.255.0
…	…	…
PC A	192.168.254.1	255.255.255.0
PC B	192.168.254.2	255.255.255.0
…	…	…

11.10.2. DNS settings

The DNS server is for converting the address specified with a name into the IP address. When the addresses of the FTP server, POP3 server, SMTP server, etc. are entered with names, make sure to set the DNS server.

- Start from the MENU screen.
- Press [ENTER] key and the screen shown below will be displayed.
- Press the ▼ button for the item to be set and then move to the input screen.



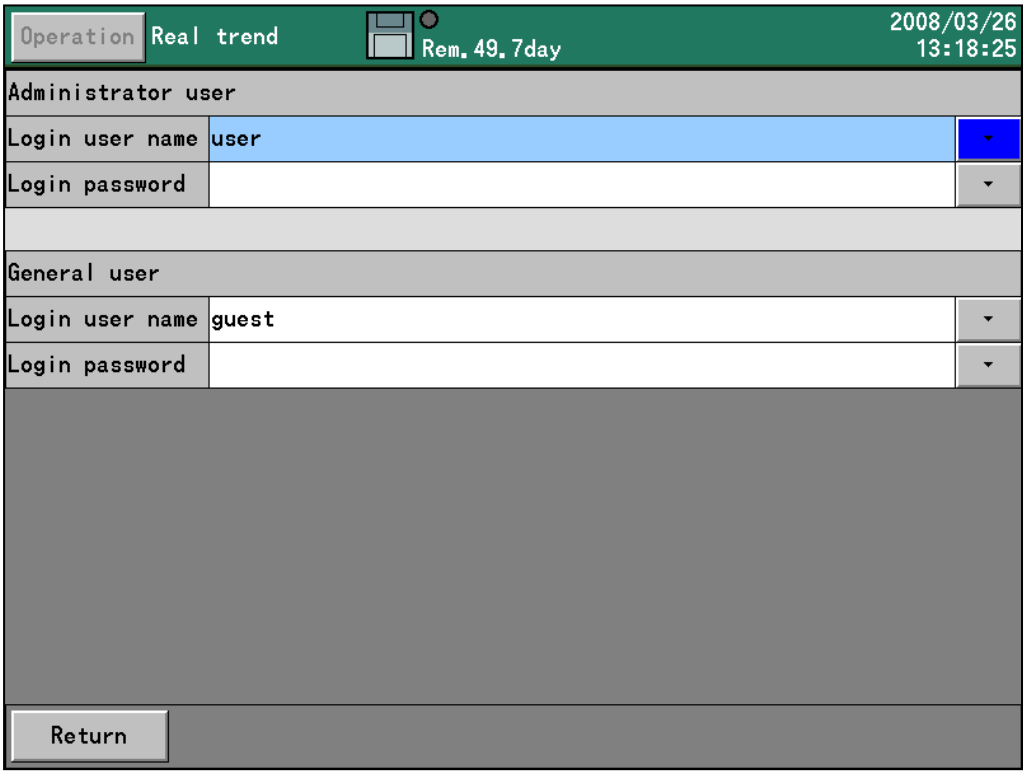
■ DNS ON/OFF
- Enable/disable DNS.

■ Primary/secondary server IP
- Defines the IP address of the DNS server. If the primary server is not found, the secondary server address is used. If there is only one DNS server, the secondary server address can remain as is.

11.10.3. Web server settings

User name and password for logging on to the ARF200 web server function can be set on the screen shown below.

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



Select either “Administrator” or “General user” as the user type.

Administrator	Can execute all operations.
General user	Can use the recorder and data displays alone. In the recorder display, only screen updating is possible.

■ Login user name
- Set the user name that the Administrator or General user will use for logging in to the Web server.

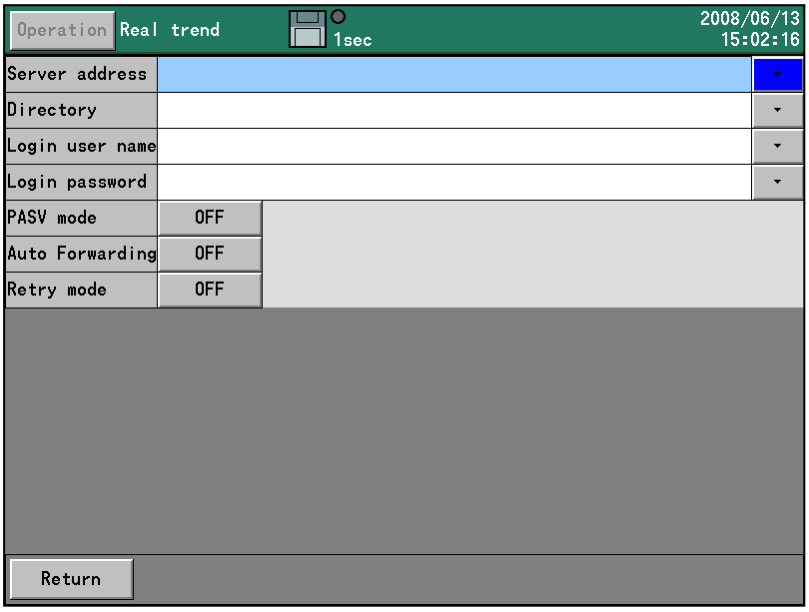
■ Login password
- Set the password that the Administrator or General user will use for logging in to the Web server.

11.10.4. FTP client settings

Transmits recorded data to the server PC (FTP server) on the network from the ARF200.
Automated transfer: Automatically sends a recorded file when it is replaced by a new one.
Manual transfer: File to be sent is selected by the user from the ARF screen. (See 7.10 “CF Card/USB Memory Screen.”)

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.

From the Menu screen, select Network settings → FTP client settings to display the following screen.



■ Server address
- Specify the address of the server to which files will be transferred. If a name (such as xx.co.jp or xx.com) is specified instead of an IP address, be sure to configure the DNS settings (11.10.2).

■ Directory
- Designate a directory to which files will be written. If the directory does not exist, it will not be created automatically.
  As an example, if the address of the directory on the server is ftp://192.168.254.1/ARF200/DATA, use “ARF200/DATA” as the directory name.

■ Login user name
- Set the user name for logging in to the FTP server.

■ Login password
- Set the password for logging in to the FTP server.

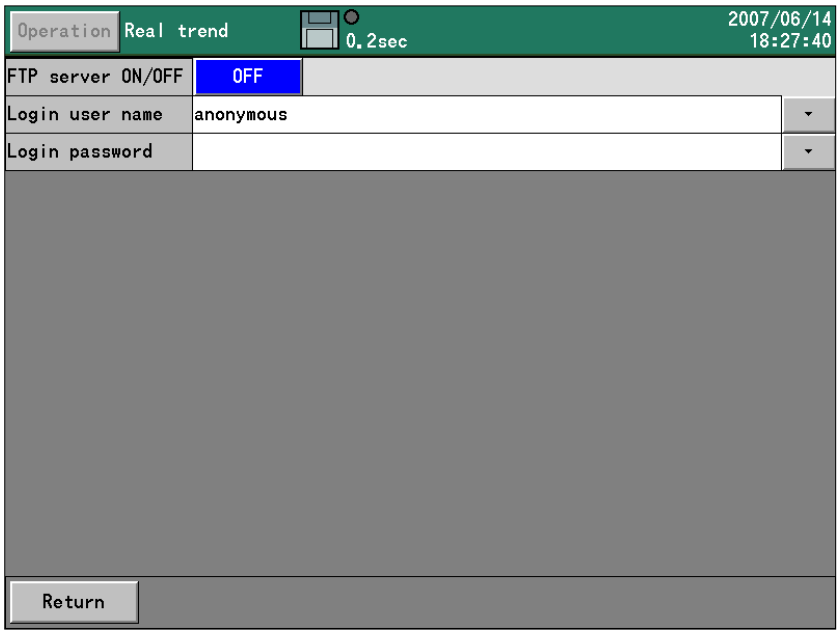
■ PASV mode
- For transfer in PASV mode, set to ON. In PASV mode, communication is always one-way, from the client PC to the server. Due to firewall restrictions, etc., some data cannot be transferred in any mode other than PASV mode.

■ Automated transfer
- For automatic transfer of recorded files when they are replaced with a new one, set to ON. Otherwise, automated transfer will not occur. To transfer data manually, select the desired file from the file list on the ARF200’s internal memory screen and transfer it by FTP.

■ Retry mode
- When Retry mode is OFF, if FTP transfer fails three times, the ARF200 will stop attempting the transfer and display an error message. When Retry mode is ON, the ARF200 will continue to attempt the transfer until it is successful. However, if th2100 is turned off, files awaiting transfer will not be sent when it is turned back on.

11.10.5. FTP server

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



The settings below configure the recorder's FTP server function.

■ FTP server ON/OFF
- When set to ON, the FTP server function is enabled. Set it to OFF if the FTP server function is not needed.

■ Login user name
- Set the user name for logging in to the FTP server.

■ Login password
- Set the password for logging in to the FTP server.

Directions for the FTP server

The FTP server function allows files on the recorder's CF card to be read from a PC on the network. The directions below tell how to connect using a Web browser (Internet Explorer, Netscape, Opera).

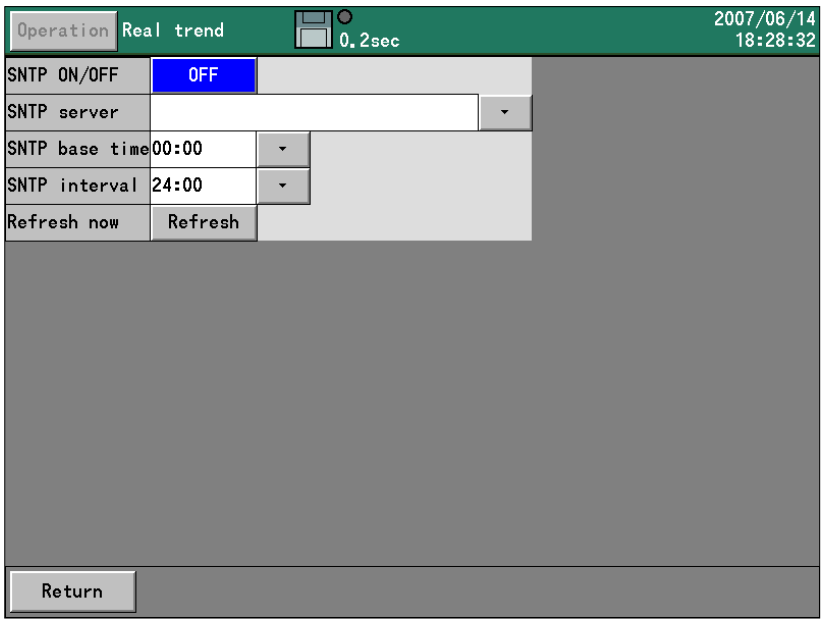
Note: For connection to the FTP server using a Web browser, if a user name other than "anonymous" is set, a normal connection may not be possible.

(1) Enter "ftp:///(IP address of the recorder)/" into the address bar in the browser and press the Enter key on the PC.
(2) A list of files and folders will be displayed in the browser.
(3) From then, as in Windows Explorer, file operations such as moving, copying, and opening can be executed. However, writing to the recorder is not permitted.

For connections using FTP client software other than a Web browser, set the software to log in with the user name and password that were set above.

11.10.6. SNTP settings

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



■ SNTP ON/OFF

•For automatic time synchronization by SNTP, select ON. Otherwise, select OFF.

■ SNTP server

• Specify the SNTP server. If a name (for example, xx.co.jp, xx.com, etc.) is specified instead of an IP address, be sure to configure the DNS settings (11.10.2).

■ Check base time and check interval

• Time synchronization is executed at times determined by the formula:
Check base time + (Check interval × n), where n = 0, 1, 2, 3 . . .

Example: If the check base time is 0:00 and the check interval is 04:00, time synchronization by SNTP is executed at 0, 4, 8, 12, 16, and 20 hours.

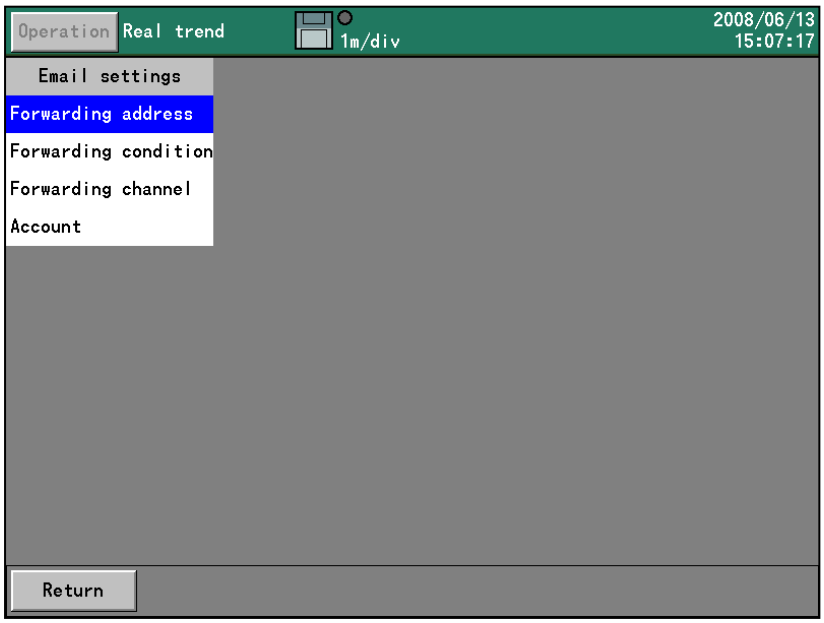
■ Quick update

• Whenever the “Update” button is pressed, the ARF200 and SNTP server times are synchronized.

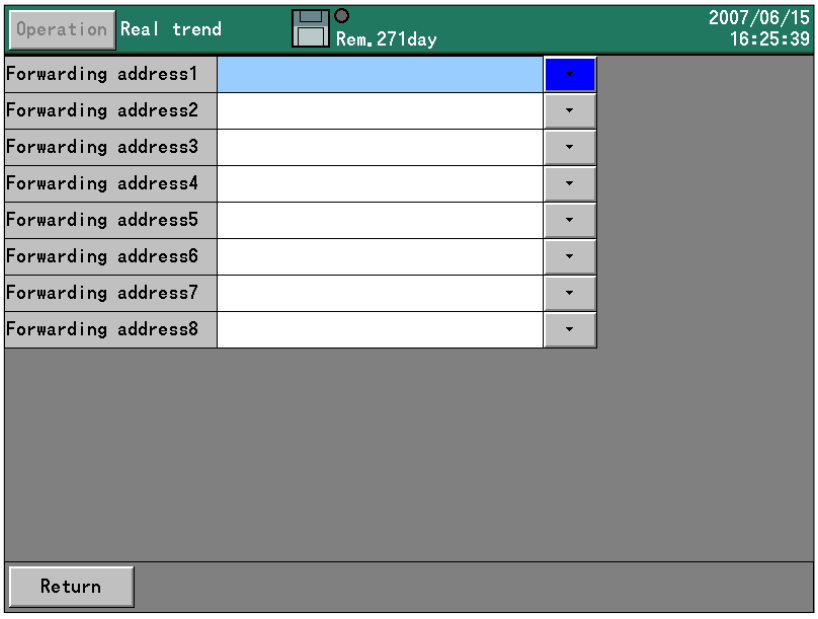
11.10.7. E-mail settings

This recorder can send e-mail when an alarm event occurs, or at a specific time.
Up to 8 recipients can be designated in advance. The recorder sends e-mail to the recipients when the event (defined by a maximum of 8 conditions) occurs.

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



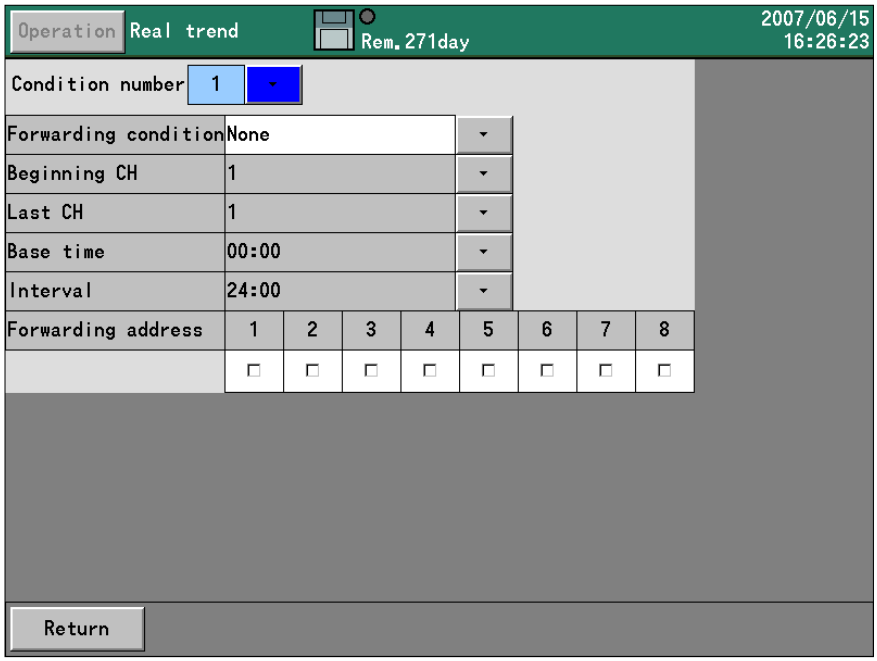
Select “Forwarding address” to get the screen shown below. (For entry of e-mail addresses, see section 5.3, “Character input.”)



Enter the recipient address(32 one-byte characters max.).

・Up to 8 destinations can be set.

Select “Forwarding condition” and press [ENTER] key to get the following screen.



■ Condition number

- Up to 8 sets of e-mailing conditions can be registered. This screen sets the conditions for the number selected here.

■ Forwarding condition

- Determine the conditions for sending e-mail to the specified destinations.

Condition	Description
None	Do not use these conditions.
Alarm activation (when alarm occurs)	E-mail is sent when an alarm occurs on the specified channel.
Fixed interval	After the specified base time, e-mail is sent every time that the specified time interval elapses.

■ Starting and ending CH

- These settings are effective if “Alarm activation time” is selected as the forwarding condition. The recorder sends e-mail when an alarm occurs on any of the channels that are included from the starting channel to the ending channel.

■ Base time and interval

- These settings are effective when “Fixed interval” is selected as the forwarding condition. The recorder sends e-mail at the following times:

  Base time + (interval × n) n = 0, 1, 2, 3, … .

  Example: If the base time is 0:00 and the interval is 04:00, e-mail is sent at zero plus four, eight, twelve, sixteen, and twenty hours.

■ Forwarding address

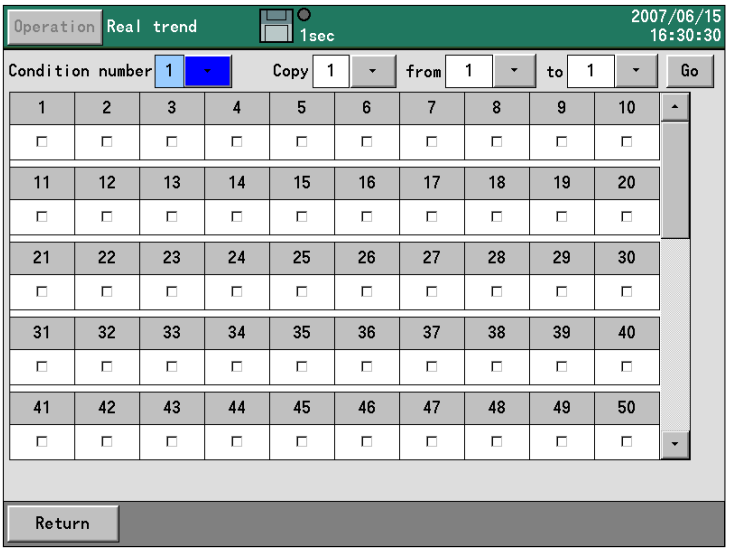
- Check the address (1–8) where the e-mail is to be sent.

Transmission channel

When this is selected, the screen shown below will be displayed.

When “At alarm generation” is specified in selecting the e-mail transfer conditions, the data of the channel registered in this screen is written to the mail main text and the mail is sent. When nothing is registered, the data of the channel on which an alarm was generated is written and sent.

When “Specified time” is specified in selecting the e-mail transfer conditions, the data of the channel registered in this screen is written to the mail main text and the mail is sent.



■ Condition number

• Select the e-mailing condition number for the settings.

■ Channel data to be included in fixed interval mail

• Check which channels’ data will be sent.

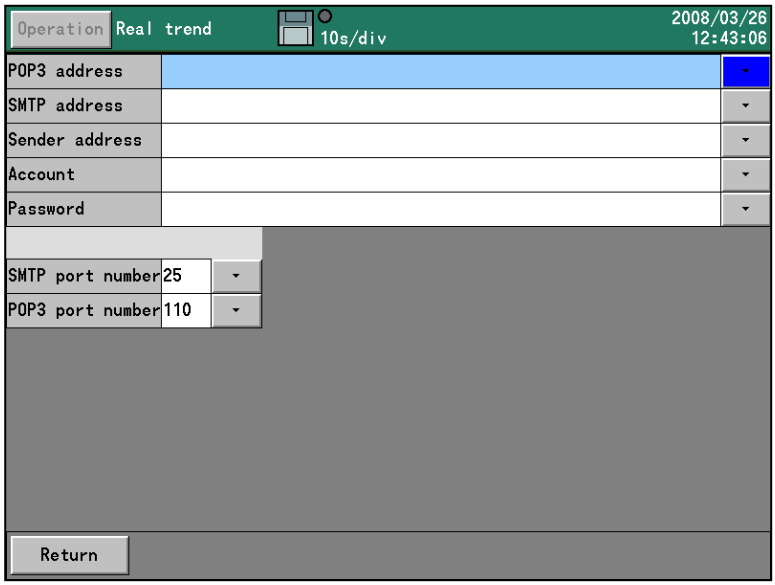
■ E-mail messages

• The ARF2

00 can send e-mail messages like those below when there is an alarm, or on a regular schedule.

If the instrument name is specified (under System settings → Other settings), the instrument name will appear in the subject line of the e-mail: “Message from (instrument name).”

Select “Account” from the E-mail settings screen to get the following screen.



■ POP3 address
- This address is used when the SMTP server requires POP3 authentication. Enter the address of the POP3 server. Do not enter anything if POP3 authentication is not required.

■ SMTP address
- Enter the address of the SMTP server.

■ Sender address
- Enter the e-mail address for this recorder. If this address is not correct, some SMTP servers will not accept e-mail transmissions.

■ Account
- Enter the e-mail account to be used when logging in to the mail server.

■ Password
- Enter the password for logging in to the mail server.

■ SMTP port No.
- Enter the SMTP port number. It is 25 for standard servers.

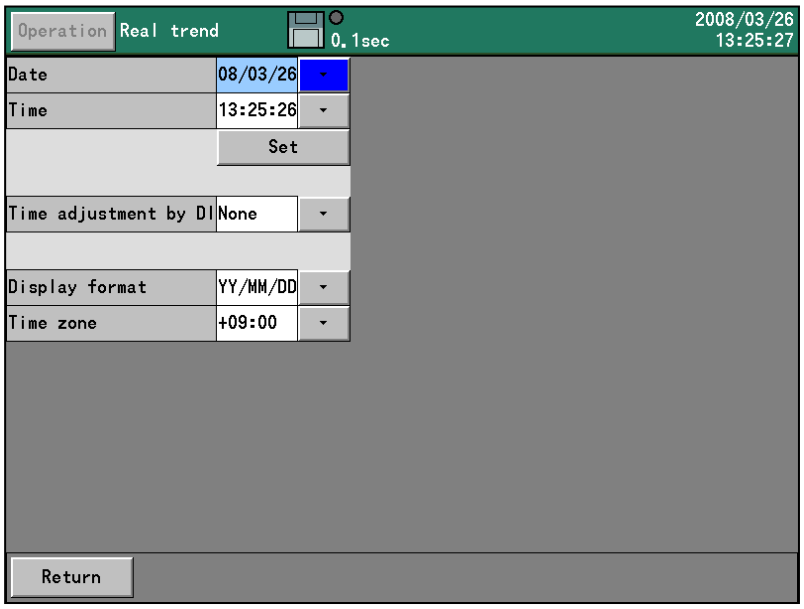
■ POP3 port No.
- Enter the POP3 port number. It is 110 for standard servers.

11.11. System settings

11.11.1. Clock

The date and time of the recorder's internal clock can be set.

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



■ Date and time
- Enter the date and time in the same way that characters are entered.
- New settings for the internal clock become effective when the Set button on the screen is pushed. For best accuracy, use a time signal or the like to time the pushing of the button.

■ Time correction by DI *
When the specified digital input turns ON, if the number of seconds in the time is less than 30, it will round down to 0. If number of seconds in the time is 30 or greater, 1 minute will be added to the time and the number of seconds will be reset to 0.

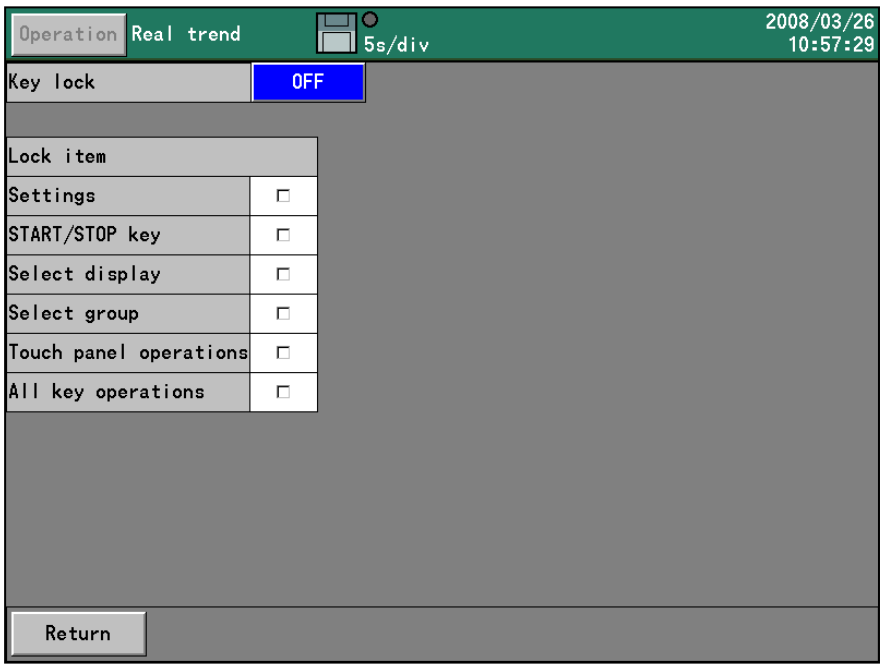
■ Display format
Select the display format for the date from the following:

YY/MM/DD: Year/ month/ day
MM/DD/YY: Month/ day/ year
DD/MM/YY: Day/ month/ year

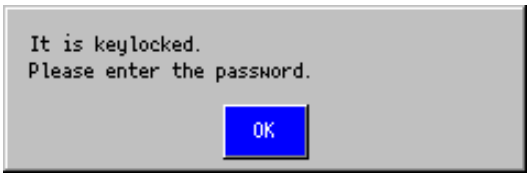
■ Time zone
Set the time difference from UTC (Coordinate Universal Time). This setting is used as a sent date and time of the e-mail header.

11.11.2. Key lock

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



When the key lock is ON, use of the MENU screen settings and entry into setting screens is disabled without a password. To set the password, see “Password” on the next page. (Message when the key lock is ON)



■ Key lock

- Sets the key lock ON or OFF. When it is turned on, the following message is displayed.

■ Restricted items

- This menu determines what activities are restricted by the key lock.

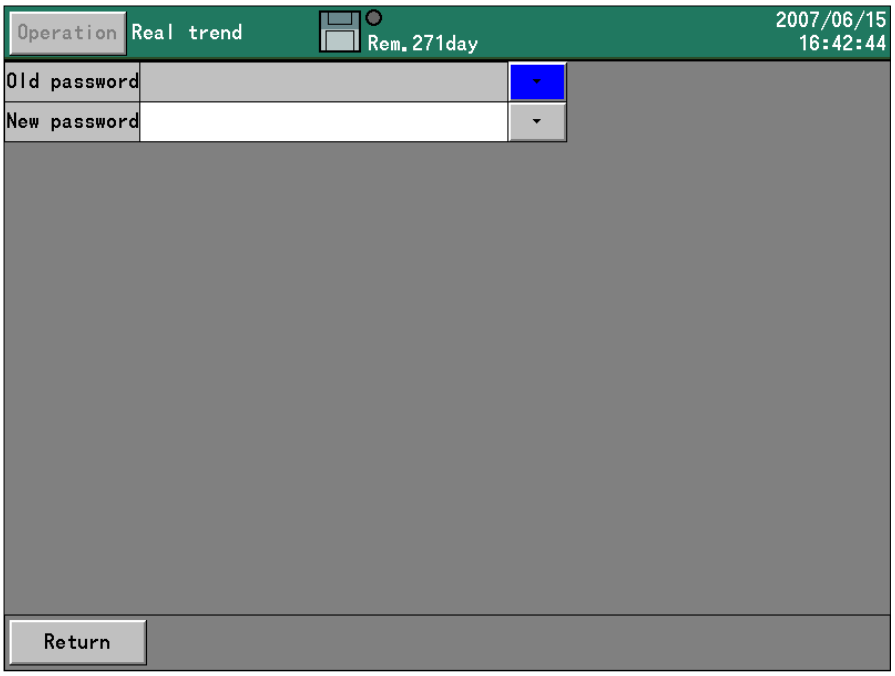
Item	Description
Setting	Prevents access to the MENU and HOME settings screens.
[START]/[STOP] key	Locks the [START] and [STOP] keys.
Display selection	Prevents selection of items on the DISP menu.
Group selection	Locks the group selection on the DISP menu.
Touch panel operation	Locks operation on the touch panel.
All key operations	Locks all key operations except for those needed in entering the MENU screen and MENU settings screens.

11.11.3. Password

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.

This password is used for the following:

- To unlock the keys
- To log in and display the web page



■ Setting the password

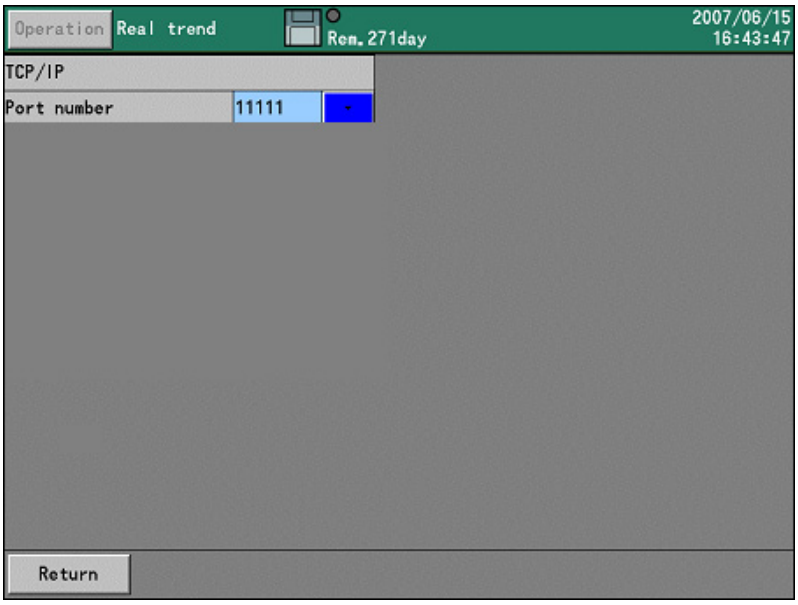
- Enter the password for the key lock into the “New password” field.
- For help, see 5.3, “Character input.”

■ Changing the password

- Enter the current password into the “Old password” field and then enter a new password into the “New password” field.

11.11.4. Host communications

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.

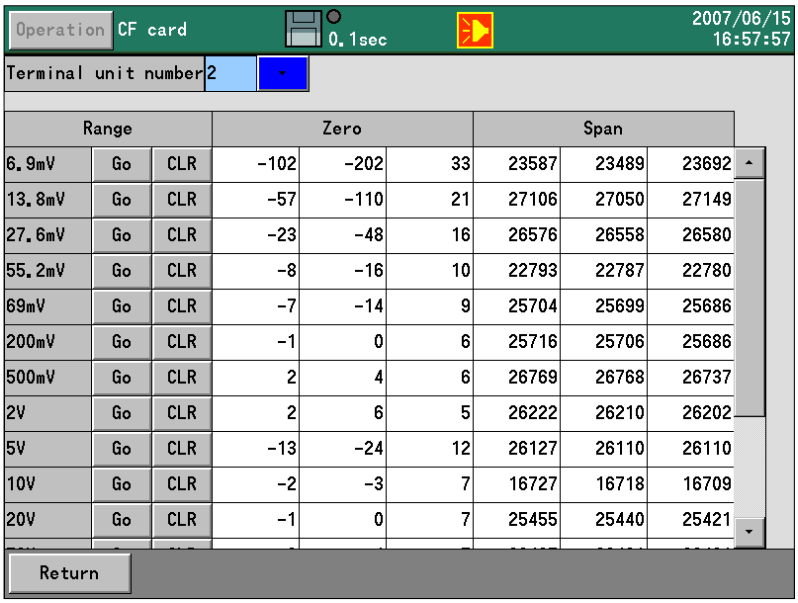


■ TCP/IP port number
• Not used by the ARF200 series.

11.11.5 Graduation adjustment

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.

When gradation adjustment in the system settings is selected from the MENU setting menu screen, the screen shown below will be displayed.

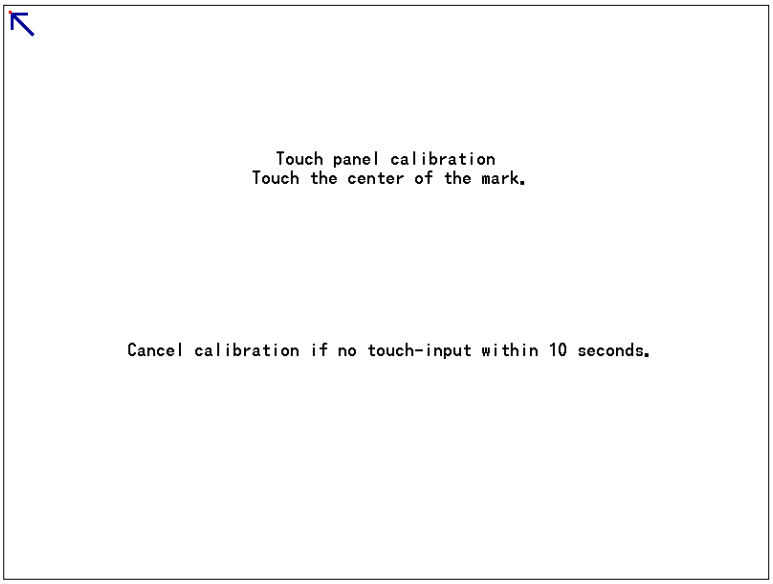


Range			Zero			Span		
6.9mV	Go	CLR	-102	-202	33	23587	23489	23692
13.8mV	Go	CLR	-57	-110	21	27106	27050	27149
27.6mV	Go	CLR	-23	-48	16	26576	26558	26580
55.2mV	Go	CLR	-8	-16	10	22793	22787	22780
69mV	Go	CLR	-7	-14	9	25704	25699	25686
200mV	Go	CLR	-1	0	6	25716	25706	25686
500mV	Go	CLR	2	4	6	26769	26768	26737
2V	Go	CLR	2	6	5	26222	26210	26202
5V	Go	CLR	-13	-24	12	26127	26110	26110
10V	Go	CLR	-2	-3	7	16727	16718	16709
20V	Go	CLR	-1	0	7	25455	25440	25421

11.11.6 Touch panel calibration

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.

When touch panel calibration in the system screen is selected from the MENU setting menu screen, the screen shown below will be displayed.

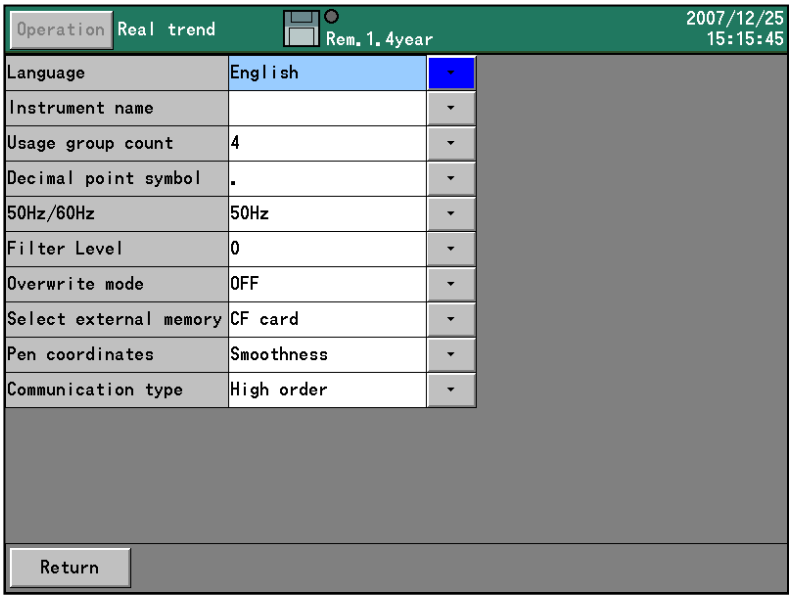


The touch panel is calibrated before shipment from the factory. However, coordinates sometimes move out of position with the passing of time. If this happens, calibrate the coordinates of the touch panel in this screen.

Touch the tip of the arrow with a fine-tipped object. The arrow moves if the touch panel recognizes the touch. Calibration of the touch panel coordinates is completed by repeating this operation to touch 5 points on the touch panel.

11.11.5. Other

- Start from the MENU screen.
- Press the ▼ button for the item to be set and then move to the input screen.



■ Language
- Sets either Japanese or English as the interface language.

■ Instrument name
- This name is used as the sender in e-mail messages. “Message from (instrument name)” is used as the subject.
- If the instrument name is left blank, the e-mail subject line will be "Message from Recorder."

■ Group count
- The number of groups can be set from 1 to 6.
- The smaller the group count, the longer the available time for recording each group in internal memory (see 7.9, “Internal memory”).

■ Decimal point symbol
- For the decimal point symbol, either “.” (period) or “,” (comma) may be used.
- If the decimal point symbol is a comma and the format for saved files is CSV, CSV files are delimited with tabs (see 11.5, “File settings”).

■ 50/60 Hz
- The recorder can be set for use with either 50 or 60 Hz AC power.

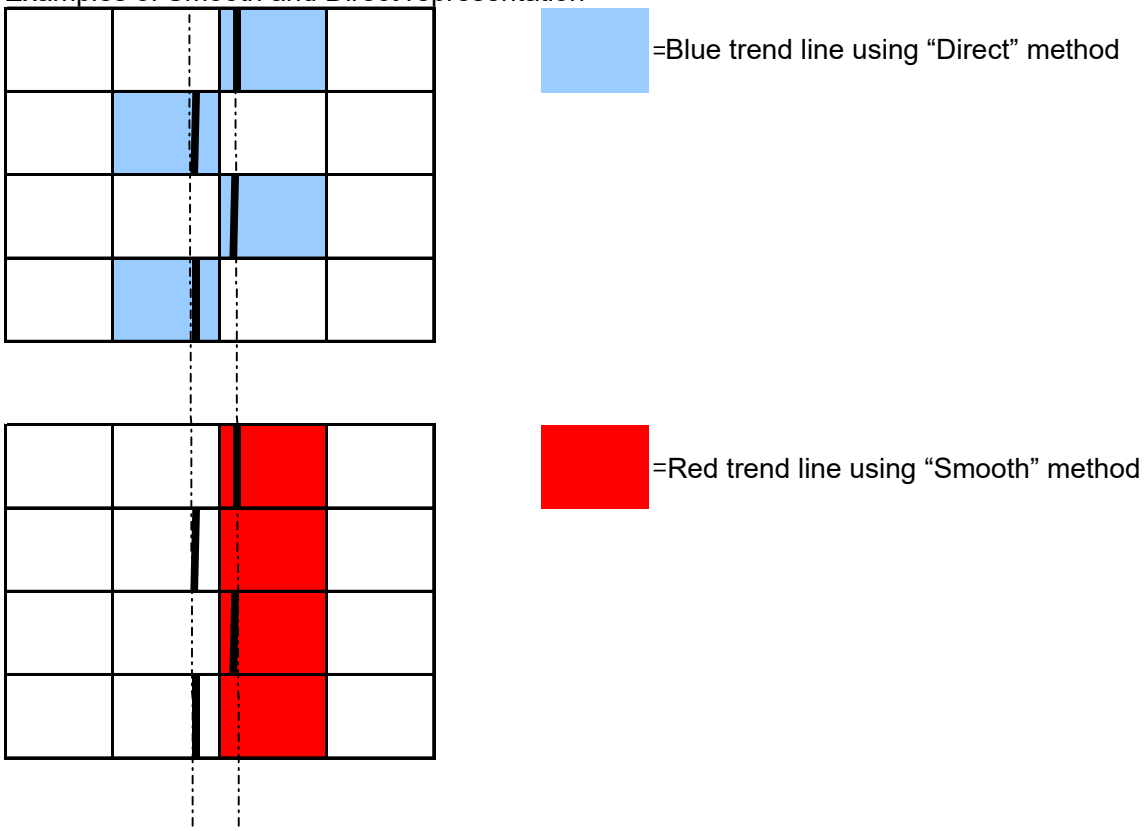
■ Filter level
- The input filter level can be set from 0 to 3, with 0 as no filter and 3 as the strongest filter.

■ Overwrite mode
- If overwrite mode is ON and space runs out on the CF card, the recorder will continue to write data to the CF card by deleting the oldest file. If the overwrite mode is OFF and there is no remaining space on the CF card, the recorder stops writing to the CF card. However, recording continues in internal memory.

■ Pen coordinate calculation*

- Select either Smooth or Direct as the method of calculating the trend coordinates.
- If “Smooth” is selected, the trend coordinates, even when affected by changes of data, will not change unless the amount of data change exceeds the equivalent of 1 dot on the screen. Thus the trend line will not be out of alignment if data fluctuates only within a range equivalent to 1 dot.
- If “Direct” is selected, the trend coordinates will always be determined by the calculated data.

Examples of Smooth and Direct representation



Data fluctuation range is smaller than 1 dot.

Chapter 12. WEB SCREEN

12.1. Remote monitoring and configuration

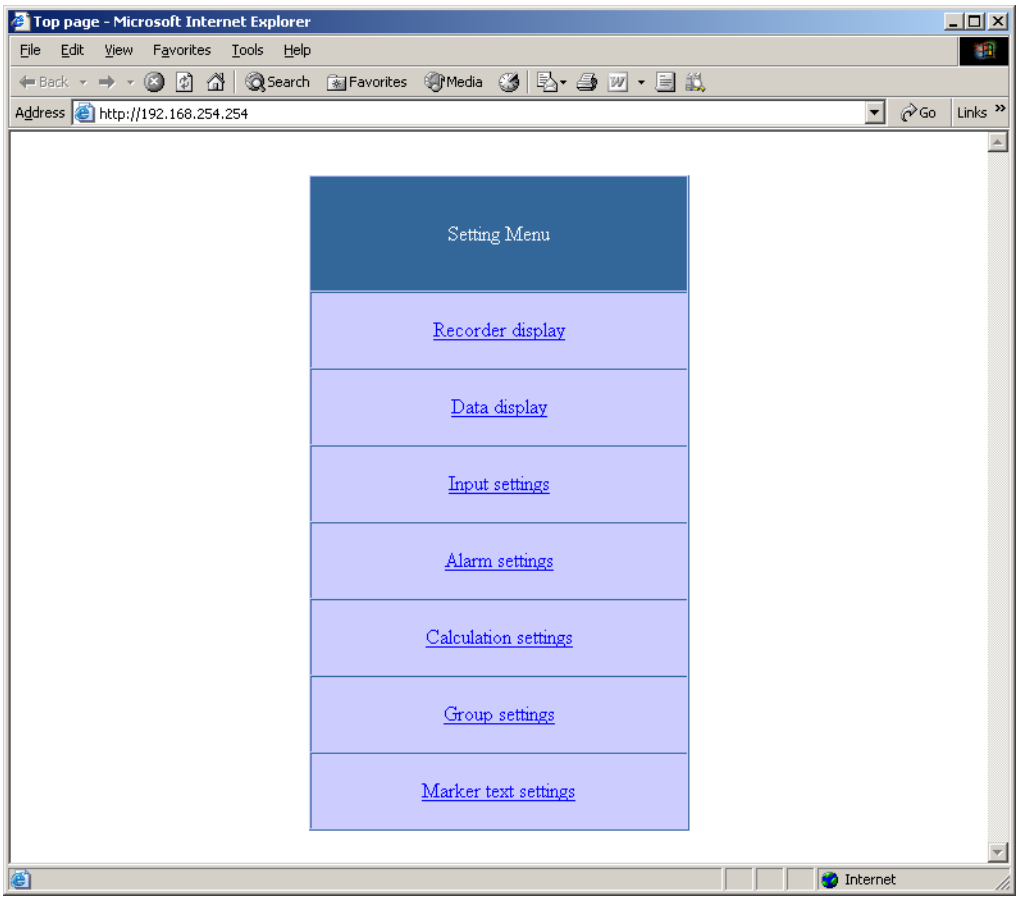
Recorder settings related to inputs and recording can be configured using a web browser, and also recorded data can be displayed.

12.1.1. Top Page

After accessing the IP address of the recorder via the web browser (Internet Explorer in the image below), and after password authentication, the screen seen below is displayed.

Set the login user name and password in the network settings and Web server settings in the MENU settings.

- Recorder display: The same screens as seen on the recorder can be displayed on the browser, and the same operations can be executed.
- Data display: The data for each recording channel can be displayed.
- Input settings: The input parameters for every channel can be set.
- Alarm settings: Alarm parameters can be set.
- Calculation settings: The formulas for every channel can be set.
- Group settings: Record-related items can be set.
- Marker function: Annotations can be set.

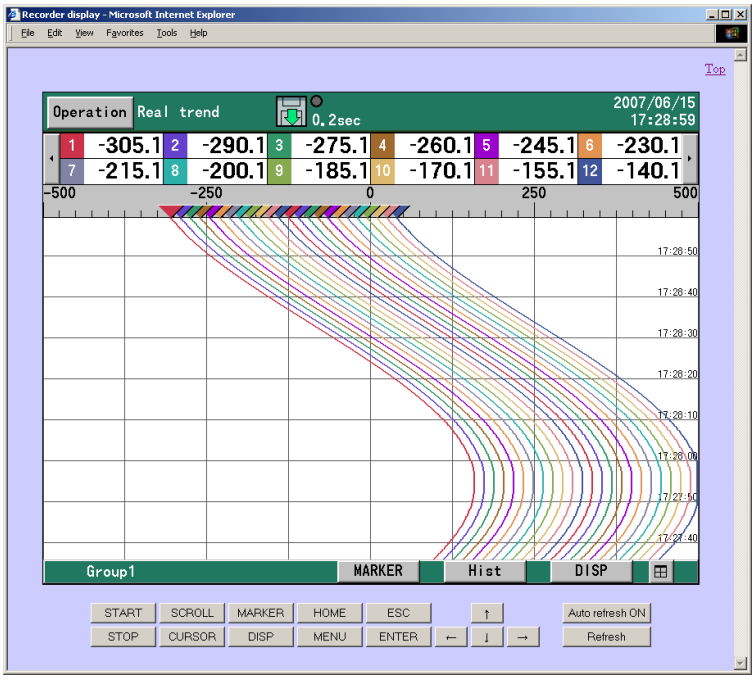


12.1.2. Recorder display

The same contents seen on the recorder can be displayed. The buttons at the bottom of the screen act like the keys on the recorder. Because an image file is used, loading this page takes more time than loading other pages.

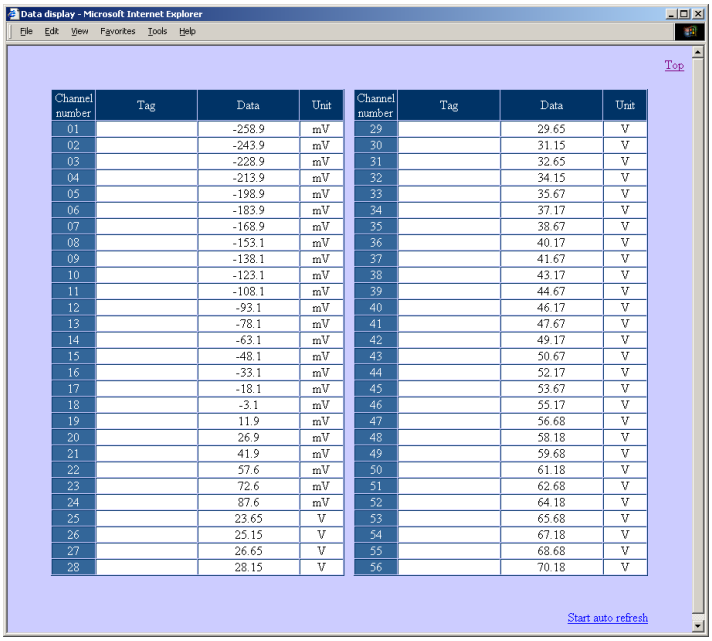
To prevent an operational error, do not operate the recorder and this screen at the same time. Also, do not use the Refresh, Back, Forward, etc. buttons on the browser, but rather use the buttons at the bottom of this screen.

When the Refresh button at the lower right of this screen is clicked, the current display is reloaded. Click “Auto refresh ON” to have the screen updated at about 10-second intervals. To stop auto refreshing, click “Auto refresh OFF.”



12.1.3. Data display

The data for the 128 recording channels can be displayed with tags and engineering units. Two kinds of screens are selectable, a fixed display for which data is obtained at the time of initial display, and a screen with data automatically updated every 10 seconds. At first, after the link on the top page is clicked, the fixed display is shown. To change to the automatically updated screen, click “Start auto refresh” at the bottom of the screen. To change to the fixed display from the automatically updated display, click the “Stop auto refresh” link at the bottom of the screen.

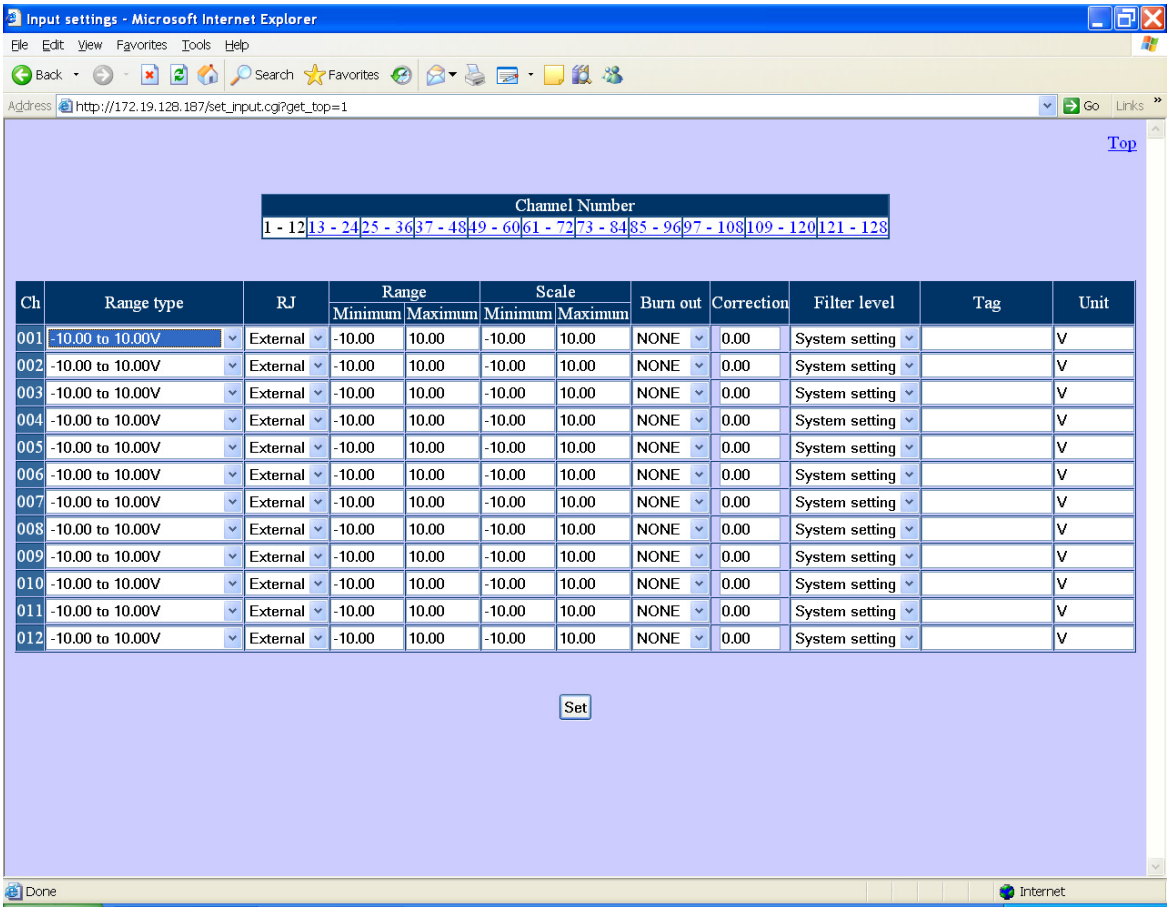


Channel number	Tag	Data	Unit	Channel number	Tag	Data	Unit
01		-258.9	mV	29		29.65	V
02		-243.9	mV	30		31.15	V
03		-228.9	mV	31		32.65	V
04		-213.9	mV	32		34.15	V
05		-198.9	mV	33		35.67	V
06		-183.9	mV	34		37.17	V
07		-168.9	mV	35		38.67	V
08		-153.1	mV	36		40.17	V
09		-138.1	mV	37		41.67	V
10		-123.1	mV	38		43.17	V
11		-108.1	mV	39		44.67	V
12		-93.1	mV	40		46.17	V
13		-78.1	mV	41		47.67	V
14		-63.1	mV	42		49.17	V
15		-48.1	mV	43		50.67	V
16		-33.1	mV	44		52.17	V
17		-18.1	mV	45		53.67	V
18		-3.1	mV	46		55.17	V
19		11.9	mV	47		56.68	V
20		26.9	mV	48		58.18	V
21		41.9	mV	49		59.68	V
22		57.6	mV	50		61.18	V
23		72.6	mV	51		62.68	V
24		87.6	mV	52		64.18	V
25		23.65	V	53		65.68	V
26		25.15	V	54		67.18	V
27		26.65	V	55		68.68	V
28		28.15	V	56		70.18	V

12.1.4. Input settings

The recorder's input parameters can be set. Click the "Set" button after entering each item, and the settings are written to the recorder.

The settings for 6 channels at a time are displayed on the screen. To change to a different block of channels, click the desired link under "Channel Number" at the top of the screen. These settings cannot be changed while recording is in progress.



Available settings

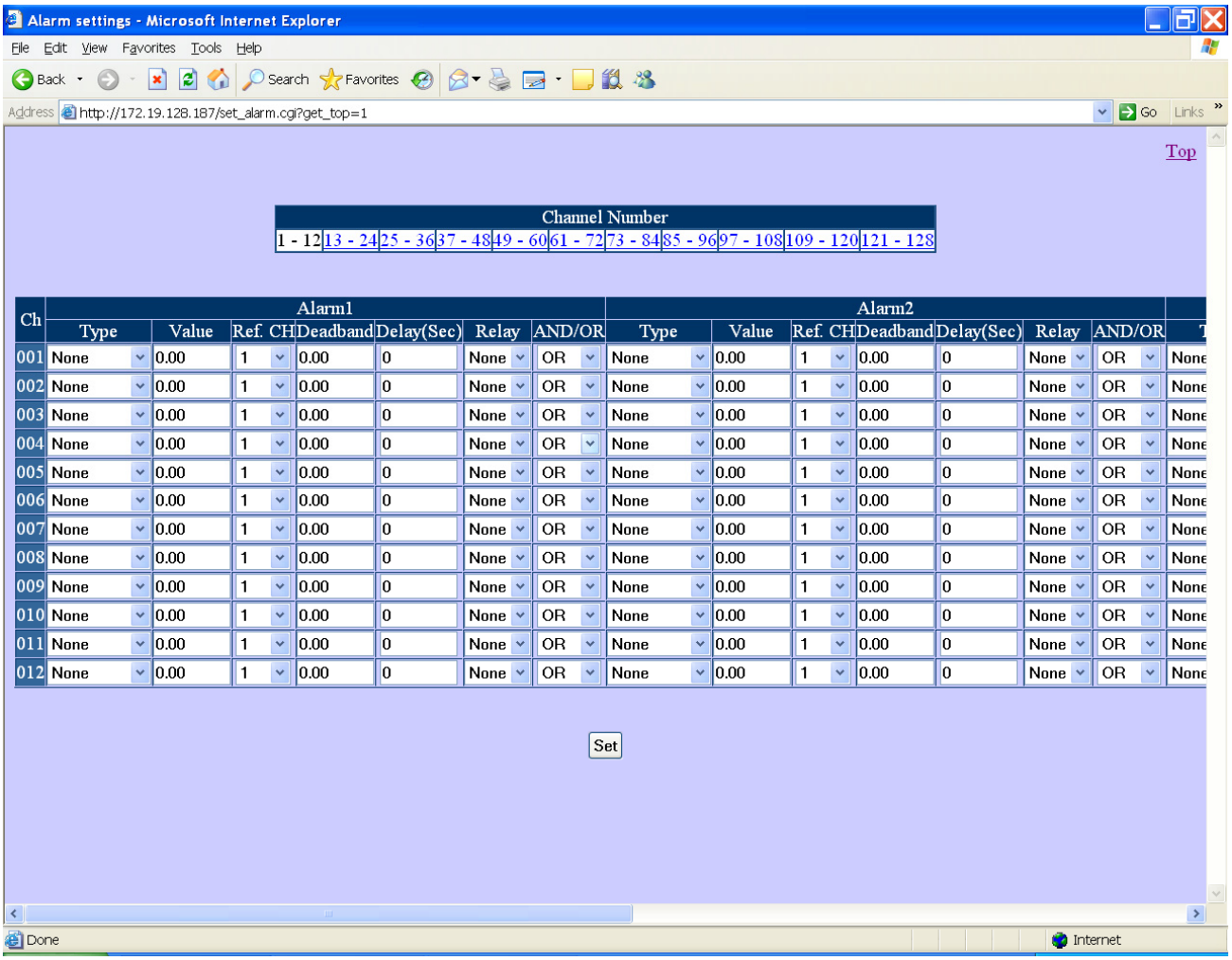
Item	Description
Range type	Input range
RJ	Reference junction compensation (internal/external)
Range Min.	The minimum value for the range
Range Max.	The maximum value for the range
Scale Min.	The minimum value for the scale
Scale Max.	The maximum value for the scale
Burnout	In case of a critical error, recorder indication can be set for upscale display, downscale display, or no special display.
Sensor correction	The input value is shifted by the amount set here.
Filter level	Input filter level settings from 0 (no filter) to 3 (strongest) are available. If "System settings" is selected, the setting in System settings → Other settings → Filter level is used.
Tag	Tags (labels) of up to 15 characters
Unit	The engineering unit for the data (up to 7 characters)

12.1.5. Alarm settings

Alarm parameters can be set using the web browser. Click the “Set” button after entering each item, and the settings are written to the recorder.

The settings for 12 channels at a time are displayed on the screen. To change to a different block of channels, click the desired link under “Channel Number” at the top of the screen.

Settings can be changed during recording.

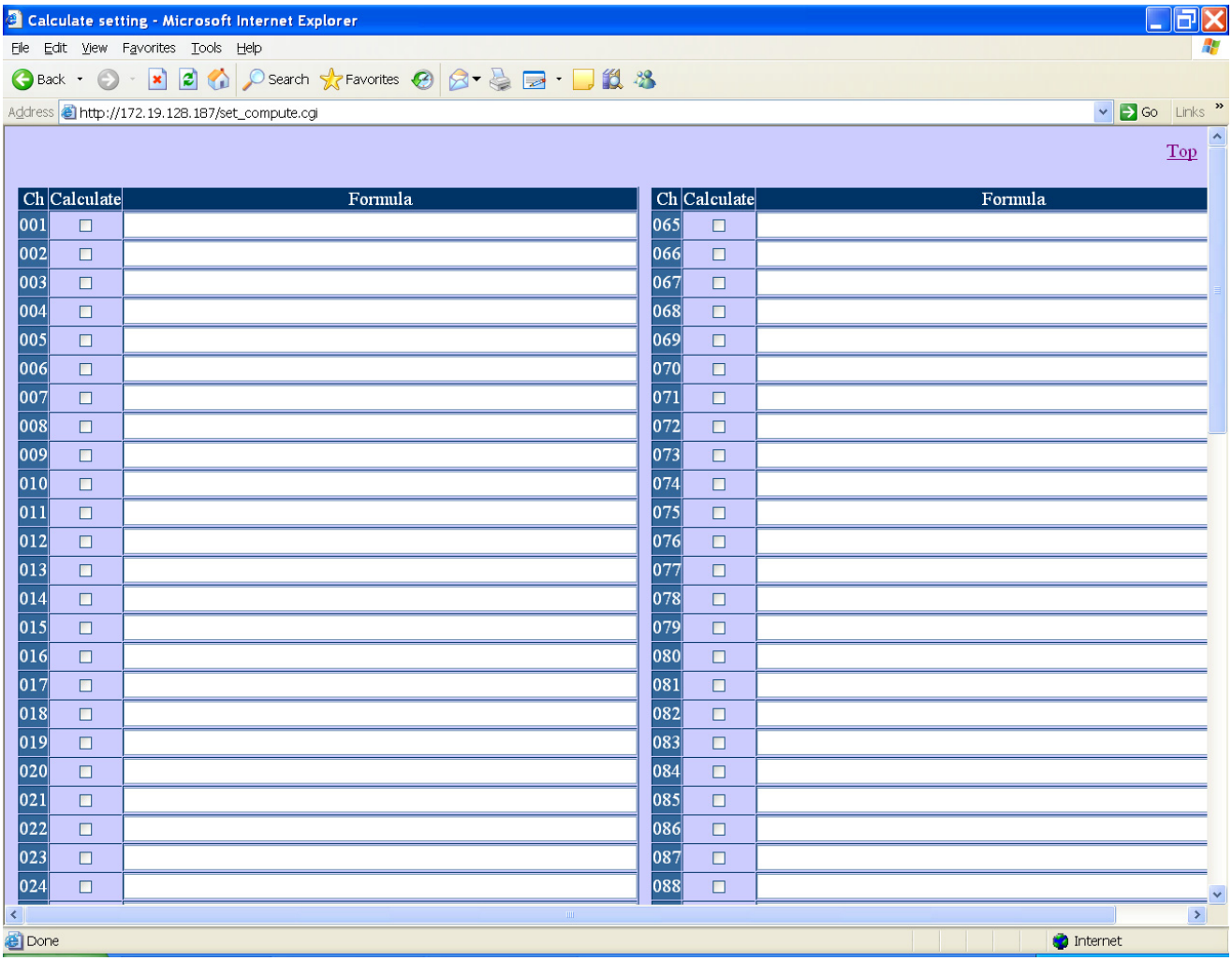


Available Settings

Item (for Alarms1–4)	Description (see too 11.4)
Type	None, upper limit, lower limit, differential upper/lower limit, error
Value	The threshold for the alarm
Reference CH	The reference channel for use with differential upper/lower limit alarms
Dead band	The dead band between the alarm threshold and the release point
Delay	0–3600 second delay for alarm occurrence.
Relay number	Alarm output relay number, from 0 (no output) to 12
AND/OR	Governs behavior if multiple alarms are assigned to one output terminal.

12.1.6. Calculation settings

These settings determine whether calculation is used, and which formula is used for each channel. Click the Set button after entering each item, and the settings will be written to the recorder. The settings cannot be changed while recording is in progress.

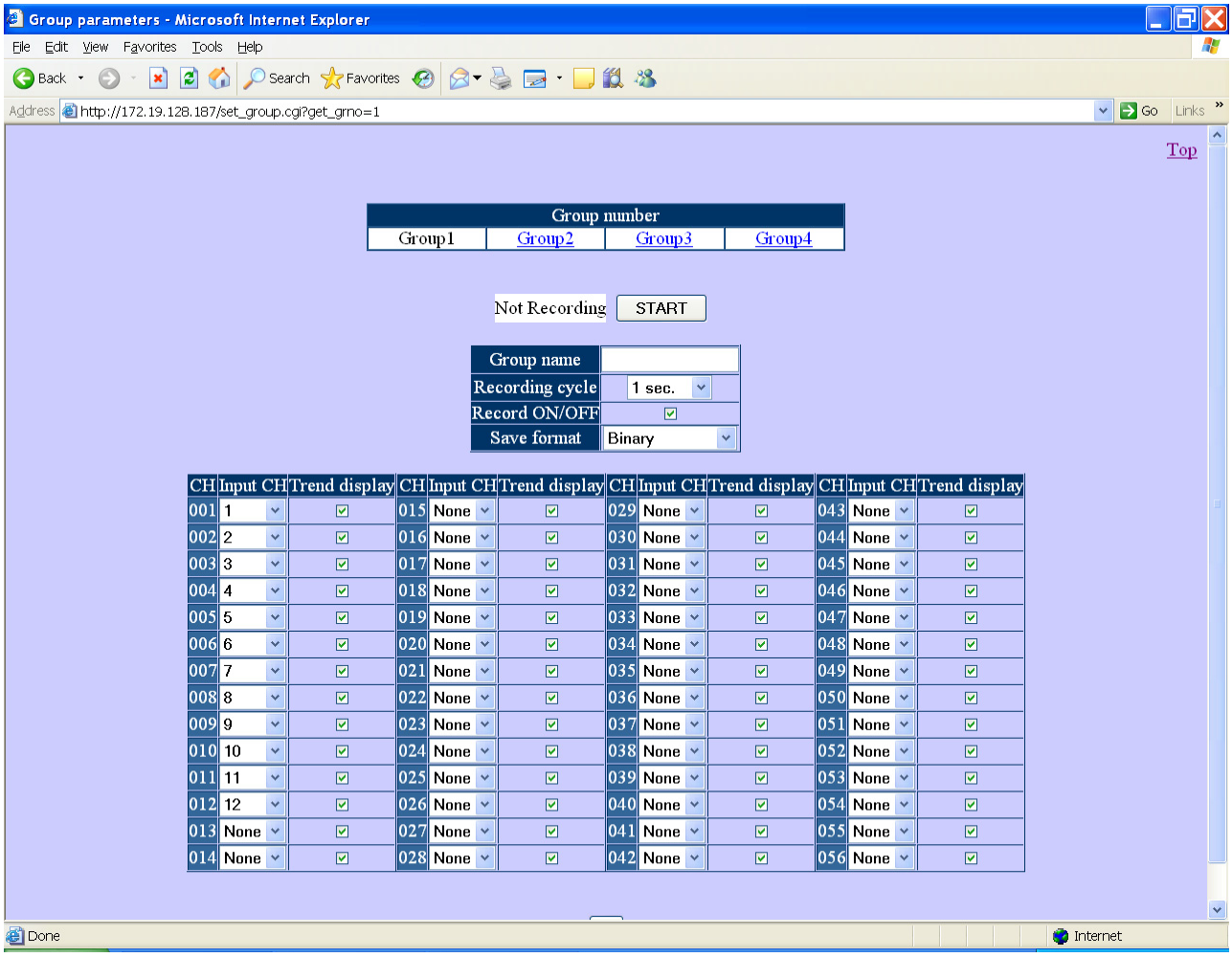


Available settings

Item	Description
Calculate	Choice to use or not use calculation.
Formula	A formula of up to 48 characters can be defined.

12.1.7. Group settings

Parameters related to recording can be changed. Click the Set button after entering each item, and the settings will be written to the recorder. The settings of one group are displayed on one screen. Click the desired group number at the top of the screen to change groups. Groups from Group 1 to the recorder's group count setting (in System settings → Other) can be selected here. If the Record ON checkbox is checked for a particular group, its settings cannot be changed until recording is stopped.

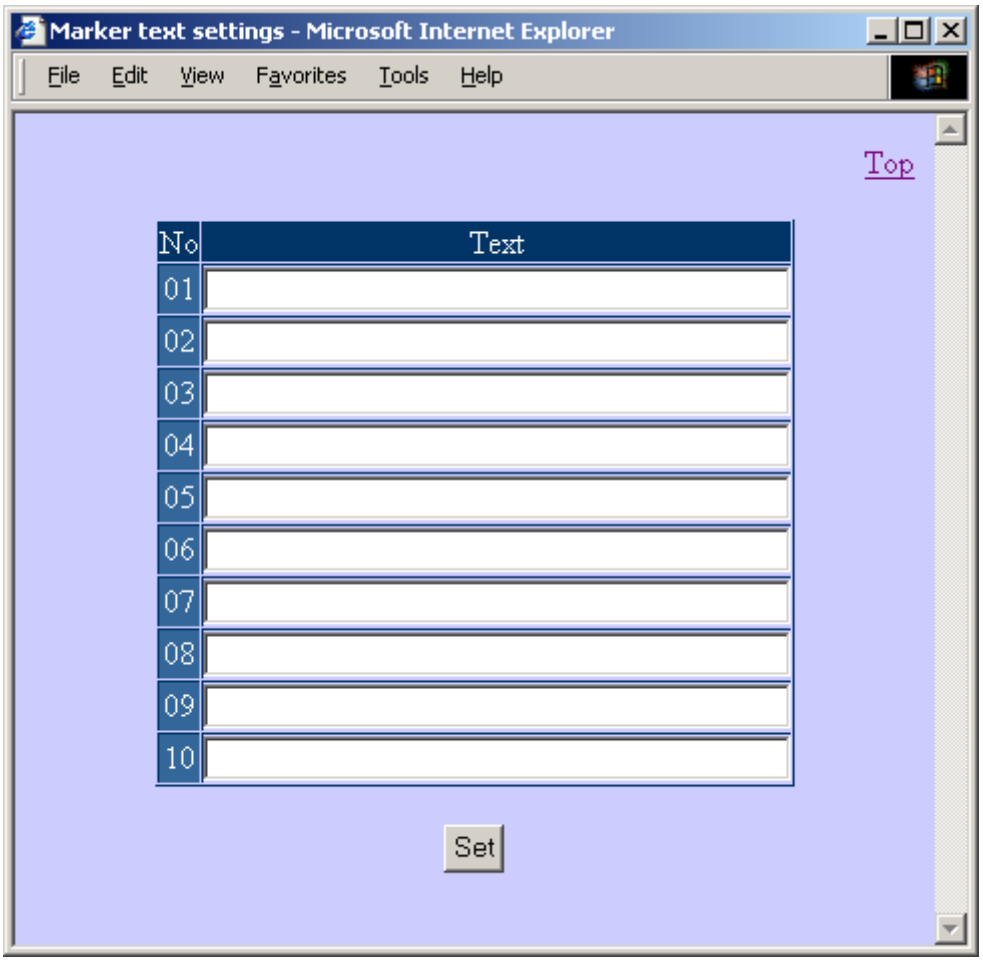


Available settings

Item	Description
Group name	Can be up to 16 characters long.
Recording period	The recording cycle (time interval used for data display and recording).
Recording ON/OFF	Whether recording for the selected group is ON or OFF.
File format	The file format for data saved to the CF card is selectable. (See 11.5.)
Input channel	The measurement input terminal number (INPUT CH) to be used for each recording channel (virtual channel) is selectable.
Trend display	Checkbox status determines whether or not each recording channel's trend is displayed.

12.1.8. Marker settings

Annotations used by the recorder's marker function can be changed. Click the "Set" button after entering each item, and the settings will be written to the recorder. When a text is entered in the last row (No. 10 in the figure), 10 more rows appear. Up to 50 annotations can be registered. See. 7.3 and 7.6 for writing the annotations on the trends.



Available settings

Item	Description
Texts 01 to 50	Annotations can be up to 30 characters long.

Chapter 13. RECORDING TO USB MEMORY

13.1. Overview

The USB port provided on the ARF200 can be used to record to USB memory instead of the CF card and to copy data recorded to CF card to USB memory.

13.2 Connectable Media

Use only the following devices. Using other devices might damage the ARF200.

USB memory (8 GB max.)
All USB memory operations are not guaranteed.
External media, such as hard disks, ZIP, MO, and optical disks, cannot be used.

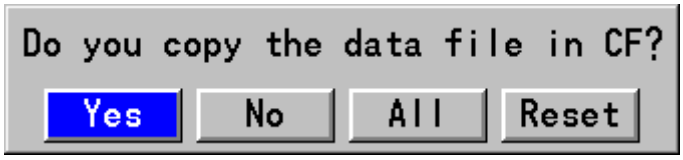
13.3 Method of Use

There are four ways of using USB memory cards (1) to (4) as follows:

(1) Use as external media for recording data instead of the CF card
(When “USM memory” is selected at “11.11.7 Selecting External Memory”)

(2) Copying data when the USB memory is inserted
(When “CF card” is selected at “11.11.7 Selecting External Memory”)

The following message is displayed when the USB memory is inserted.



“Yes”: Copies files from the previous copy onwards.
“No”: Nothing happens. When the USB memory is next inserted, files are copied referenced to the time of the previous copy.
“Copy All”: Copies all files recorded on the CF card.
“Reset”: Nothing happens. When the USB memory is next inserted, files are copied referenced to the time of this copy.

(3) Batch copying data recorded to CF card (according to “11.9 Memory Operations”)

(4) Reading/writing setting files (according to “11.9 Memory Operations”)

During accessing of the USB memory, the round mark to the side of the disk icon changes color to red in the same way as during writing to the CF card. In this state, do not remove the USB memory while this mark is red.

Handling Precautions

Writing to USB memory might fail in environments subject to noise. When writing to USB memory, do so in environment free of noise.

Chapter 14. CALIBRATION

14.1. Overview

To maintain measurement accuracy, calibrating the recorder every year is recommended.

Calibration type	Description
Zero and span adjustment	Adjust by inputting the zero and span for each measurement range. For ARF2 _ _ AS models, input processing is performed by one A/D converter on blocks of 4 channels, and for ARF2 _ _ AL models, input processing is performed by one A/D converter on blocks of 12 channels. Accordingly, adjustment should be performed by inputting the zero and span for each measurement range three times for each input terminal unit on ARF2 _ _ AS models and once for each input terminal unit on ARF2 _ _ AL models.

Sensor correction (shifting of the values) for each channel can also be done.（See 11.2, Input settings）

14.2. Conditions

Items	Reference conditions
Ambient temperature	23 ± 2 ºC
Ambient humidity	50 ± 10 %
Power voltage	100 Vac ± 1%
Power frequency	50 or 60 Hz ± 0.5%

14.3. Preparation

14.3.1. Required tools

Tools	Input types			Remarks
	DC voltage	Thermocouple	Resistance temperature detector	
DC voltage current generator	●			Accuracy: ±0.05 % or less
Reference junction compensator		●		0 ºC ± 0.2 ºC
Thermocouple for test		●		Same type of thermocouple as input type
Standard variable resistor			●	Accuracy: ±0.05 % or less
3-core copper wire			●	Same resistance value as other cores

14.3.2. Before calibration

(1) Attach the terminal board cover and turn power on.
(2) The recorder should be ON for at least an hour of warm-up time in order to stabilize.

Handling Precautions

- The checking and adjusting of measured values requires careful attention, in addition to standard tools and reference conditions. When checking and adjustment are required, contact your dealer or Azbil Corporation.

14.4. Connections

Connections differ depending on the input type. Connect standard tools to the measurement input terminals that are to be adjusted.

⚠ Caution

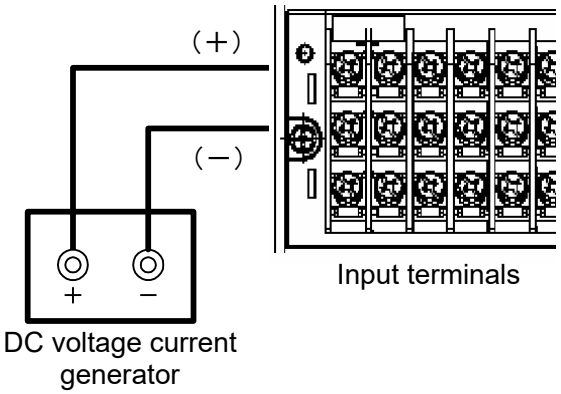
To prevent electric shock, turn off the power source before making connections.

<For ARF2 _ _ AS models>

(1) DC voltage input

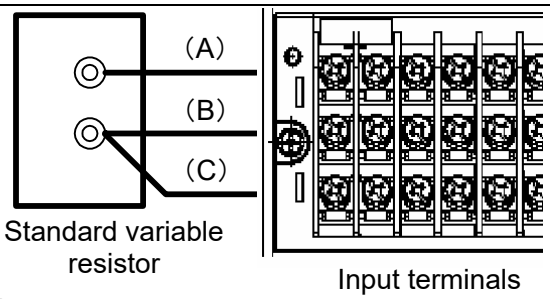
Adjustment is done on three input terminals of each input terminal unit: INPUT CH2, CH5 and CH11.
Connect the INPUT CH2, CH5 and CH11 at the same time as shown in the figure on the right.

INPUT CH1-4 are adjusted by adjusting INPUT CH2.
INPUT CH5-8 are adjusted by adjusting INPUT CH5.
INPUT CH9-12 are adjusted by adjusting INPUT CH11.



(2) Resistance temperature detector input

Adjustment is done on three input terminals of each input terminal unit: INPUT CH2, CH5 and CH11.
Connect the INPUT CH2, CH5 and CH11 as shown in the figure on the right.
Connections to each terminal must be done separately (not at the same time).

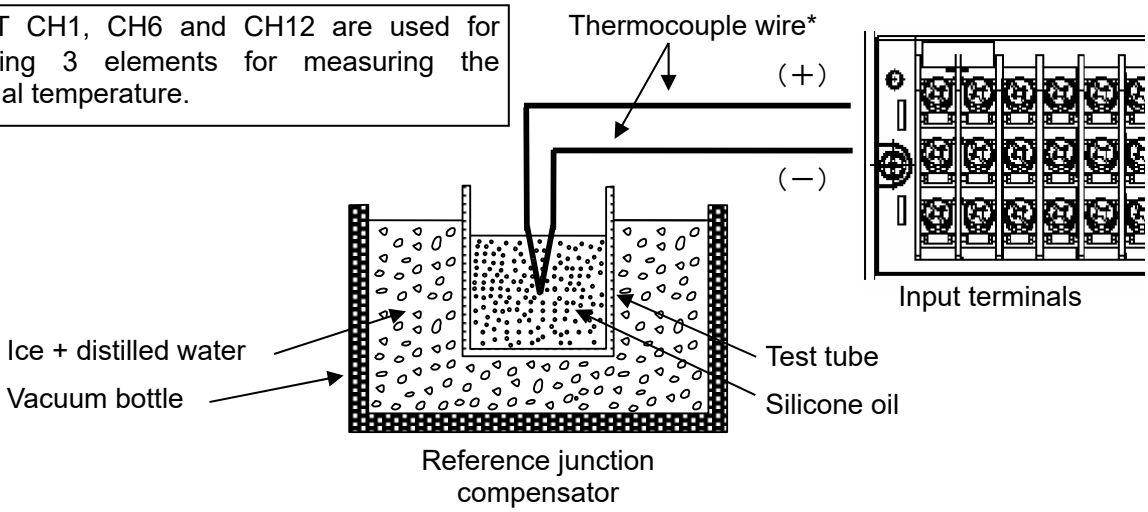


INPUT CH1-4 are adjusted by adjusting INPUT CH2.
INPUT CH5-8 are adjusted by adjusting INPUT CH5.
INPUT CH9-12 are adjusted by adjusting INPUT CH11.

(3) Thermocouple input

Adjustment is done on three input terminals of each input terminal unit: INPUT CH1, CH6 and CH12. For thermocouple adjustment, connect to CH1, CH6 and CH12 as shown in the figure below.

■ INPUT CH1, CH6 and CH12 are used for adjusting 3 elements for measuring the terminal temperature.



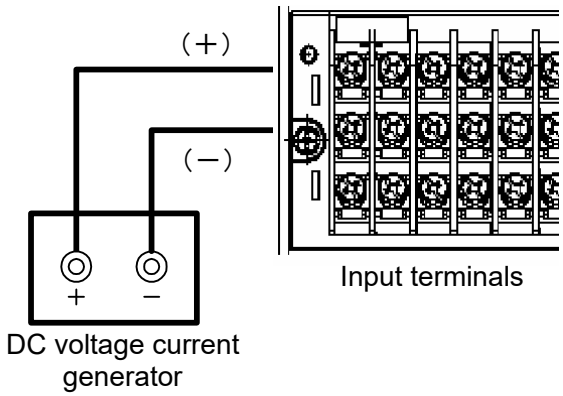
The thermocouple input can only become as small as the amount of thermo-electromotive force equivalent to the temperature at the terminals. The recorder compensates for this amount (called reference junction compensation). The input used for adjustment comes from the reference junction compensator (at a standard 0°C). In other words, the reference junction compensator is used to subtract the reference junction compensation amount.

<For ARF2 _ _ AL models>

(1) DC voltage input

Adjustment is done on 1 input terminal of each input terminal unit: INPUT CH2. Connect the INPUT CH2 as shown in the figure on the right.

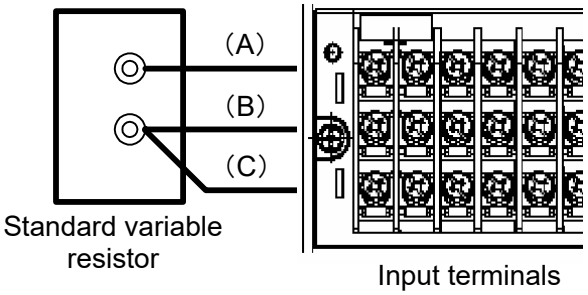
All channels of that unit are adjusted by adjusting INPUT CH2.



(2) Resistance temperature detector input

Adjustment is done on 1 input terminal of each input terminal unit: INPUT CH2. Connect the INPUT CH2 as shown in the figure on the right.

All channels of that unit are adjusted by adjusting INPUT CH2.

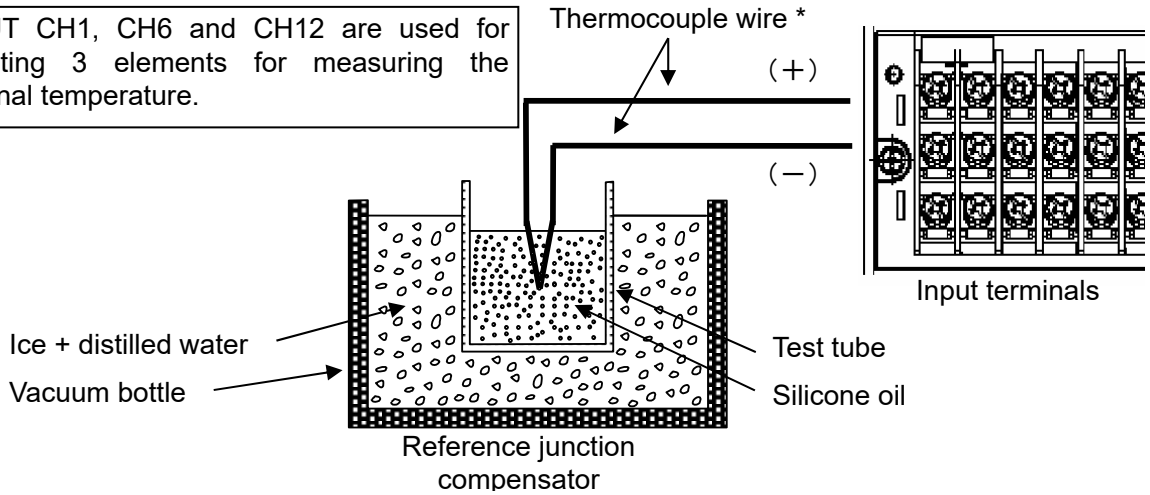


(3) Thermocouple input

Adjustment is done on three input terminals of each input terminal unit: INPUT CH1, CH6 and CH12.

For thermocouple adjustment connect to CH1, CH6 and CH12 as shown in the figure below.

■ INPUT CH1, CH6 and CH12 are used for adjusting 3 elements for measuring the terminal temperature.



The thermocouple input can only become as small as the amount of thermo-electromotive force equivalent to the temperature at the terminals. The recorder compensates for this amount (called reference junction compensation). The input used for adjustment comes from the reference junction compensator (at a standard 0°C). In other words, the reference junction compensator is used to subtract the reference junction compensation amount.

Handling Precautions

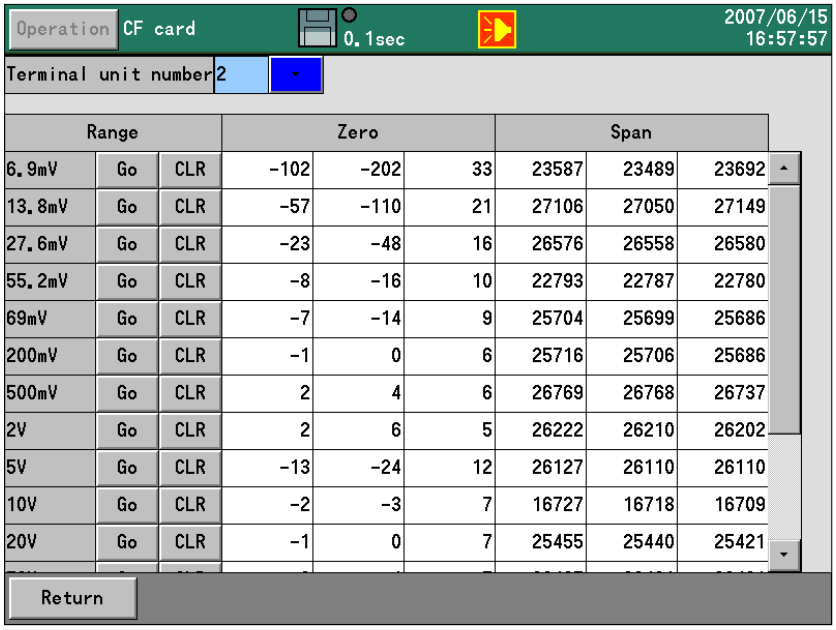
- If the INPUT channel is changed, thermocouple input adjustment must be done after the temperature stabilizes.

14.5. Zero and span adjustment

14.5.1. Calibration screen

- Adjust ranges by inputting zero and span values into each INPUT channel (terminal) used for adjustment.
- With the arrow keys, move the focus to “Go” in the range to be adjusted.

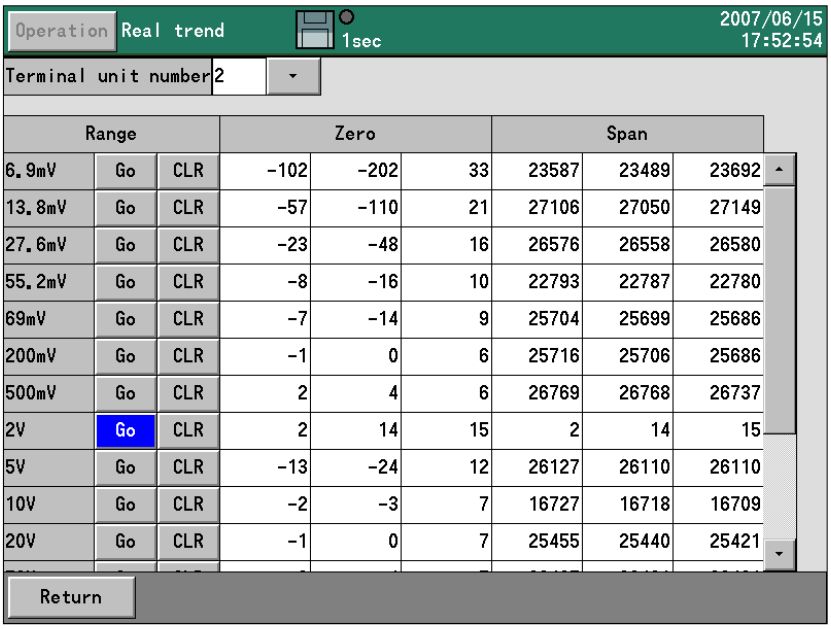
In the operation screen, if [Operation]-[MENU Settings] is selected and then [System Settings]-[Gradation Settings] is selected, the adjustment screen below is displayed.
The numbers displayed are the analog-to-digital counts after adjustment.



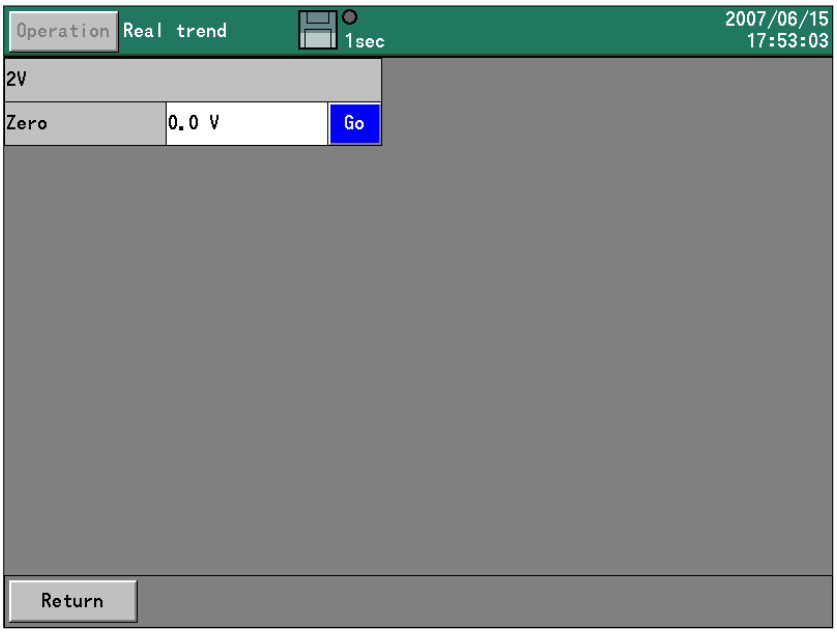
14.5.2. Adjustment of the DC voltage input range

Connect as shown in 14.4, “Connection. (1) DC voltage input.”
For the ARF112, connect to INPUT CH2, CH5, and CH11 at the same time and input the voltages for the range being adjusted. For ARF106 models, connect to INPUT CH2 and CH5 at the same time and input the voltages for the range being adjusted.

(1) Click the “Go” button for the range being adjusted.



(2) The input voltage is displayed on the screen. Input this voltage into the recorder.



(3) Adjust the zero point。

Example: To adjust the ±2V range

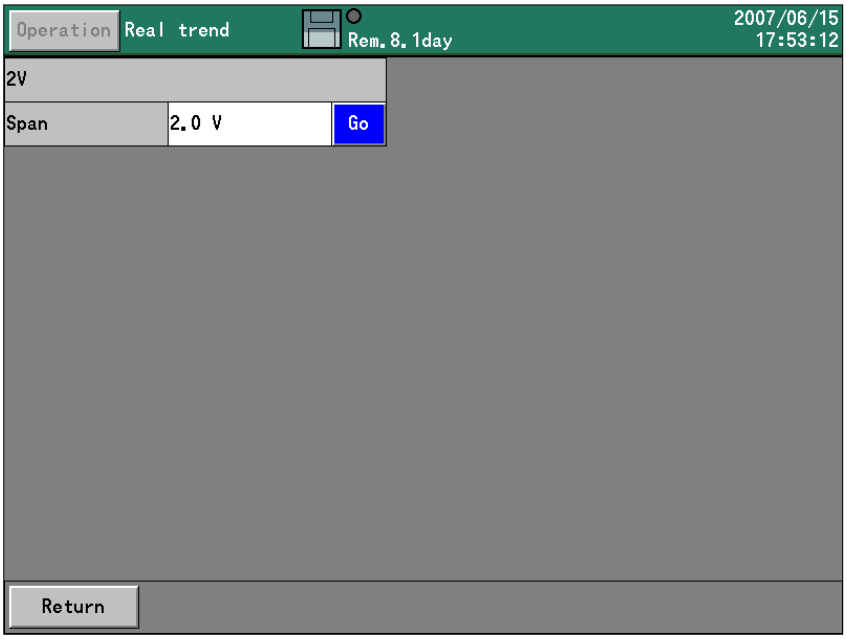
- Input 0V by the DC voltage current generator.

(4) Wait about 5 seconds after inputting the zero voltage, and then press [Go] button.

(5) Adjust the span.

Example: Adjustment of the ±2 V range

Input a voltage of +2 V with the DC voltage current generator.



(6) Wait about 5 seconds after inputting the span voltage, and then press [Go] button.

(7) After the adjustment of the span, the screen will return to the calibration screen for all ranges.

(8) Repeat steps (1) to (6) if adjustment is needed for other ranges.

14.5.3. Adjustment of resistance temperature detector input range

Connect as shown in 14.4, "Connection. (2) Resistance temperature detector input."
For the ARF112, input the resistance for the range being adjusted.

(1) Select "Go" at the range to be adjusted, and press the [ENTER] key.
(2) The resistance that should be input is displayed on the screen. Input it into the recorder.
(3) Adjust the zero point.
Example: Adjustment of the Pt100 range.
Input a resistance of 100.00 Ω with a standard variable resistor.
(4) Wait about 5 seconds after inputting the zero value, and then press the [Go] button.
(5) Adjust the span point.
Example: Adjustment of the Pt100 range.
Input a resistance of 157.33 Ω with a standard variable resistor.
(6) Wait about 5 seconds after inputting the span value, and then press the [Go] button.
(7) After the adjustment of the span, the screen will return to the calibration screen for all ranges.
(8) Repeat steps (1) to (6), if adjustment is needed for other ranges. If the channel to be calibrated is kept open, it will not be calibrated.

14.5.4. Adjustment of thermocouple input range and reference junction compensation (RJ 0 °C)

Handling Precautions

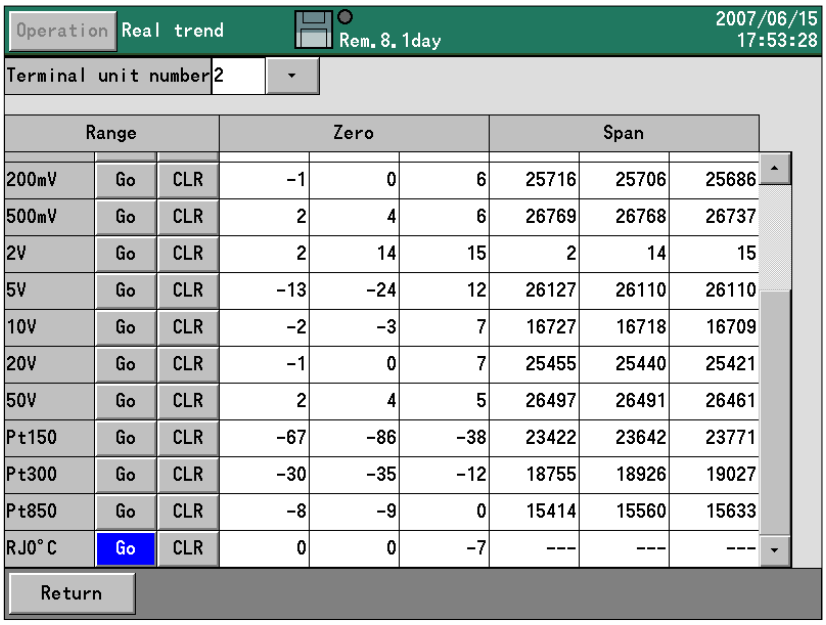
- After adjustment of the DC voltage input range, adjust the thermocouple input range. If the thermocouple input range is adjusted first, the adjustment results will be negatively affected.

Connect as shown in 14.4, "Connection. (3) Thermocouple input." Connect the thermocouple to be used for range adjustment to INPUT CH1, CH6 and CH12 separately (not at the same time).

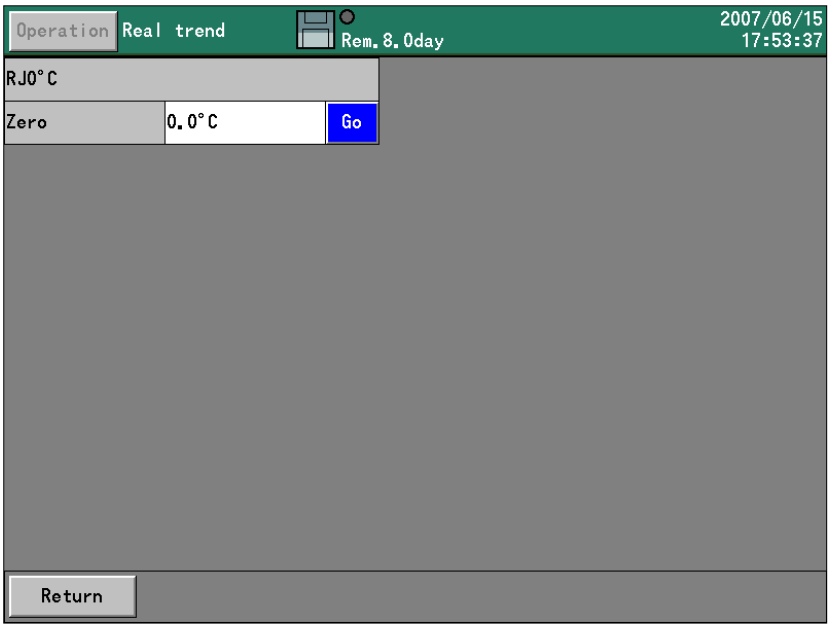
(1) Before moving to the calibration screen, set up the input for terminals CH1, CH6 and CH12 as follows (see 11.2.1, Parameter selection):

Range type	Set to the connected thermocouple type
Range	Set the number of digits after the decimal point to 1. Recommended range: ±13.8mV for reference range and 0.1°C for display resolution (See Chapter 17, SPECIFICATIONS, Measurement range / indication accuracy / display resolution)
RJ	Internal
Burnout	None

(2) Select “Go” for the “RJ 0°C” range on the calibration screen, and press [Go] button.



(3) Wait about 30 seconds, then press the [Go] button.



(4) After finishing the adjustment, the calibration screen for all ranges will be displayed.
(5) Press [ESC] key, and the MENU screen will be displayed.

Handling Precautions

- If a mistake is made in the course of adjustment, or if some other problem occurs, try to adjust again.
- To restore the calibration setting for a particular item to the factory default, select “CLR” and press [ENTER] key.

Chapter 15. PART REPLACEMENT

Replacing parts periodically is recommended as preventive maintenance, for long and productive use of the paperless recorder.

⚠Caution

Return the recorder to the factory when part replacement is needed. Replacing parts yourself might result in electric shock or fire.

15.1. Replacement intervals

The recommended intervals shown below are rough estimates only, based on standard conditions.

Part name	Replace after	Remarks
Power supply unit	5 years	At an ambient temperature of 25 °C
LCD	5 years*	
Keypad	5 years	
Relay (for mechanical alarm output)	70,000 times	Resistive load (at contact rating or less)
	20,000 times	Inductive load (at contact rating or less)
Lithium battery	5 years	

*: This period is based on the half-life of the backlight's brightness when the display brightness is set at 3 (the factory setting).

Standard conditions are defined below.

Item	Conditions
Temperature	20 to 25 °C
Humidity	20 to 80 % RH
Length of operation	8 hours/day
Environment	Free from corrosive gas. Little dust or soot. No excessive moisture. Little mechanical vibration or shock. No other negative influences on operation.

Handling Precautions

- The degree of reduction of the LCD's brightness differs depending on the usage conditions. The replacement interval can be extended by using the screen saver function and by setting the brightness control lower.

Chapter 16. TROUBLESHOOTING

The troubleshooting measures below are grouped by symptom.

1. Not working

Points to check	Remedy
Is power reaching the power terminals?	Turn the power on.
Is the power supply within specifications?	Supply 100–240 Vac, 50/60 Hz power.
Are connections to the power terminals correct?	Connect the cable to power terminals L and N correctly.
Is the POWER switch turned ON?	Turn the POWER switch on (located behind the keyboard).
—	Try turning the external power source OFF and then ON.

2. Abnormal measurement values

Observation	Points to check
Fluctuating measurements	・Are measurement terminal connections loose? ・Are input signals fluctuating?
Inaccurate measurements	・Is the input signal correct? ・For thermocouples, has the wire connected to the input terminals been extended? ・Is there an error in the input value? If so, recalibrate, referring to chapter14, “Calibration.”
Influence from ambient temperature (thermocouple input only)	・Is the terminal cover mounted?

3. Battery voltage drop

■ When low battery voltage is detected

When the internal battery voltage becomes low, the recorder displays alarm message 1 on the screen at power-up and at one-hour intervals during operation. After the message saying that the battery life will soon end, the remaining battery life is approximately 100 hours or less. If the power is turned off in this state, data in internal memory, such as operating data and settings (see below), may be lost. For this reason, stop data recording at once and save data from the internal memory to the CF card. Promptly request Azbil Corporation to replace the battery.

■ If the internal battery is dead

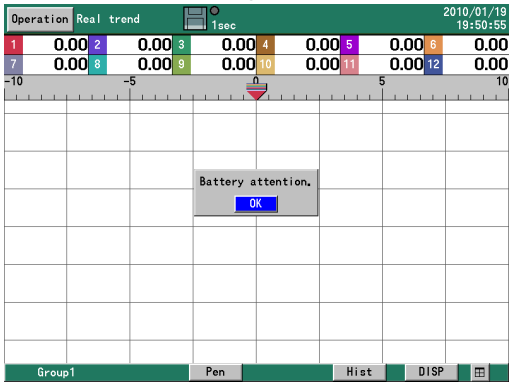
Alarm message 2, indicating that the battery is dead, appears on the screen at power-up and at one-hour intervals during operation. In this state, the problems described below can occur every time the power is turned on. Promptly request Azbil Corporation to exchange the battery.

- Low battery / dead battery problems
  - Data may be lost before storage on the CF card.
    The “Auto save period” setting determines the frequency of writing to the CF card. The factory setting is 1 minute. Data acquired within the auto save period (i.e., since the last save) may be lost. If the set period is 1 minute, data from less than 1 minute ago may be lost. Note: The data stored on the CF card will not be lost.
  - Cumulative data may return to the default value

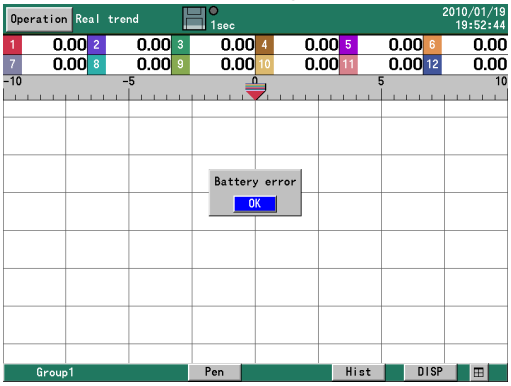
If the internal battery is dead, cumulative data will be replaced by the default value.

- The alarm display screen and the annotation list screen may be lost.
  Note: Only the display screens are lost, not the data stored on the CF card.
- The function that saves the operating status in case of a power outage no longer operates, and operating parameters return to the defaults
  The operating status before a loss of power, such as the type of display screen, display group number, compression ratio of trend display, auto-switching enable/disable and starting of the recording command cannot be preserved.
- The internal clock will be incorrect
  If power is lost or turned off while the internal battery is dead, the internal clock will be behind by the amount of time that the power was off.
- When low battery voltage is detected, changing the settings may restore them to default values.
  If the power is turned off a few seconds after the settings are changed, the settings may return to their defaults.
  Note: Data stored on the CF card will not be lost. We recommend storing frequently used settings on the CF card.
  If the settings return to the defaults, the alarm message “Set the initial settings” will be displayed.

Alarm message 1



Alarm message 2



If the problem cannot be solved

If a problem cannot be solved, contact your dealer or Azbil Corporation. Have the model No., date code, observations, and other pertinent information at hand.

Data in internal memory can be deleted unexpectedly during repair. Back up data to the CF card before sending the recorder for repair. Azbil Corporation is not liable for data in internal memory that is lost or damaged.

Chapter 17. DISPOSAL

When discarding, please remove the internal battery and dispose of the recorder and battery properly, following local regulations.

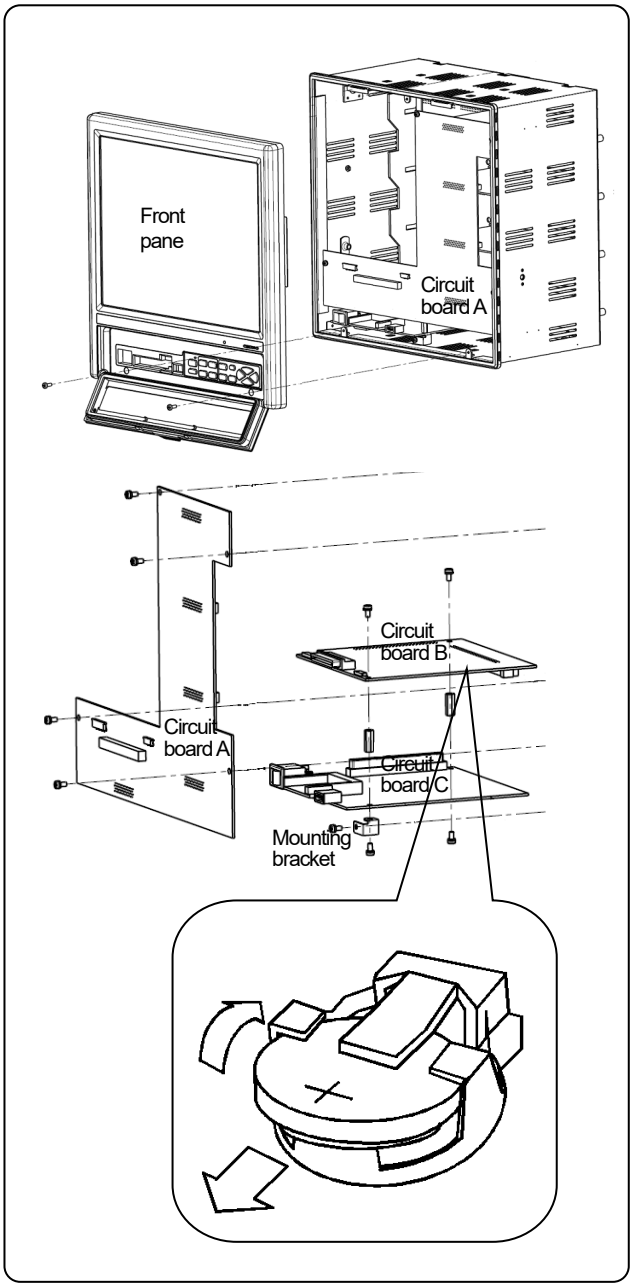
Handling Precautions

- Removing and replacing the battery may cause damage or malfunction. Except when discarding the recorder, contact the azbil Group for battery removal/replacement.

Removing/replacing the battery

Remove the front pane.

1. Open the key case and remove the 2 screws attaching the front pane to the case (main unit).
2. To remove the front pane from the case, pull the lower part of the pane toward you and then slide it upward.
3. The front pane is connected to the circuit boards in the case by 3 wires. Disconnect them from the pane. The front pane is connected to circuit board A by 1 cable. Disconnect this cable.
4. Circuit board A is connected by 3 cables. Disconnect these 3 cables.
5. Remove the 4 screws holding circuit board A, and draw out circuit board A towards you.
6. Remove the screw that holds the mounting bracket to the case.
7. Disconnect the wire on the side of the power switch on the left edge of circuit board C, and then pull out coupled circuit boards B and C.
8. Remove the 2 screws holding boards B and C together, and separate boards B and C.
9. The battery holder is installed on the rear side of circuit board B. Remove the lithium battery from the battery holder using a fine-tipped insulated tool.



Chapter 18. SPECIFICATIONS

■ General specifications

Rated voltage:	100–240 Vac 50／60Hz (variable voltage range power supply)		
Power consumption:	65 VA max.		
Operating conditions:			
Reference operating conditions	Ambient temperature/humidity:	21–25 ºC , 45–65 % RH	
	Power	100 Vac ± 1 %, 50/60 Hz ± 0.5 %	
	Left/right, forward/backward tilt:	0°	
	Warm-up time:	30 min or more	
Normal operating conditions	Ambient temperature/humidity:	0–50 ºC, 20–80 % RH	
	Power:	90–264 Vac, 50/60 Hz ± 2 %	
	Left/right, forward tilt:	0°	
	Backward tilt:	0° to 20°	
Transportation conditions	Packed as when shipped from the factory		
	Ambient temperature/humidity:	-20 to +60 ºC, 5–90 % RH (no condensation)	
	Vibration:	10 to 60 Hz, less than 4.9m/s^2	
Storage conditions	Ambient temperature/humidity:	-20 to 60ºC, 5–90 % RH (no condensation)	
Power failure protection:	Settings stored in FLASH memory and SRAM. Data stored in FLASH memory. A lithium battery backs up the clock and parameter RAM for more than 5 years. (operating conditions: 8 hrs or more/day)		
Insulation resistance:	Betw. secondary** terminals and ground:	20 MΩ min. at 500 Vdc	
	Betw. primary* terminals and ground:	20 MΩ min. at 500 Vdc	
	Betw. primary* and secondary** terminals:	20 MΩ min. at 500 Vdc	
	Betw. alarm output (mechanical relay) and other secondary** terminals:	20 MΩ min. at 500 Vdc	
Dielectric strength:	Betw. secondary** terminals and ground:	1 minute at 500 Vac	
	Betw. primary* terminals and ground:	1 minute at 1500 Vac	
	Betw. primary* and secondary** terminals:	1 minute at 2300 Vac	
*Primary terminals:	*Power terminals, alarm output terminals*		
**Secondary terminals:	*Input terminals, digital input terminals, communications terminals*		
Case assembly material:	Door frame:	ABS resin	
	Case:	Steel	
Color:	Door frame:	Black (Munsell N3.0)	
	Case:	Gray (Munsell N7.0)	
Mass:	Approx. 7.2 kg (48-input model with full options installed)		
Mounting location:	Panel		
Clock accuracy:	±2 min every 30 days (excluding error due to power ON/OFF; under reference operating conditions)		
Terminal screws	Power terminals:	M4.0	
	Protective ground terminal:	M4.0	
	Input terminals:	M3.5	
	Alarm output terminals:	M3.5	
	Digital input terminals:	M3.5	
	Communication terminal:	M4.0	

■ Standards

EMC directive	EN61326-1 Class A (For use in industrial locations)
Low-voltage directive	EN61010-1 EN61010-2-030 ・ Overvoltage (installation) category II, pollution class 2 ・ Measurement category II
Protective structure:	IEC529 IP54 compliant (for front)

*Indication equivalent to max. 1mV sometimes fluctuates under EMC Directive test conditions.

■ Input specifications

Measurement input channels: 12, 24, 36, 48

Input type: Full multi range

DC voltage: ±13.8 mV, ±27.6 mV, ±69.0 mV, ±200 mV, ±500 mV, ±2V, ±5V*, ±10V*, ±20V*, ±50V*
*: With built-in resistance voltage divider

DC current: Available by adding external shunt resistor

Thermocouple: B, R, S, K, E, J, T, N, NiMo-Ni, CR-AuFe, PR40-20, WRe5-WRe26, W-WRe26, Platinel II, U, L

RTD: Pt100, JPt100, Pt50, Pt-Co

Range setup: Input types and ranges are set by key operation. The measurement range is selected automatically according to the range that is set.

Scale setup: Setting of minimum values, maximum values and engineering units is by key operation.

Accuracy rating: See the Measurement Range/Accuracy Rating/Display Resolution Table..

Temperature drift: ±0.01 % of full scale / ºC (input types other than RTD are converted into the reference range, see the accuracy rating table)

Sampling rate:

ARF2 _ _ AS	Approx. 100 ms/48 points
ARF2 _ _ AL	Approx. 1 s/48 points

Reference junction compensation accuracy:

K, E, J, T, N, Platinel II:	±0.5 ºC max.
R, S, NiMo-Ni, CR-AuFe, WRe5-WRe26, W-WRe26, U, L:	±1.0 ºC max.

(The above error amounts are added to the accuracy ratings for the internal reference junction compensation.)

Input resolution: Approx. 1/32,000 (converted into reference range)

Burnout: Signal disconnection detection for thermocouple and resistance thermometer inputs. Upscale burnout, downscale burnout or burnout indication disabled can be selected for each input.

Allowable signal source resistance:

Thermocouple input (burnout disabled) and DC voltage input (±2 V or less):	1 KΩ or less
DC voltage input (±5 to ±50 V):	100 Ω or less
RTD input (Pt100, JPt100):	10 Ω or less per wire (3 wires)

Input resistance:

Thermocouple input:	Approx. 1 MΩ
DC voltage input (±2 V or less):	Approx. 1 MΩ
DC voltage input (±5 to ±50 V):	Approx. 1 MΩ

Maximum input voltage:

Thermocouple input (burnout disabled), DC voltage input (±2 V or less):	±10 Vdc max.
DC voltage input (±5 to 50 V):	±60 Vdc max.
Thermocouple input (burnout enabled), RTD input :	±6 Vdc max.

Maximum common mode voltage: 30 Vac

Insulation withstand voltage across channels:

1000 VAC or more across each channel
High withstand voltage semiconductor relay used
(Terminal B of resistance temperature detector shorted internally across channels)

Common mode rejection ratio: 120 dB min. (50 or 60 Hz)

Series mode rejection ratio: 50 dB min. (50 or 60 Hz). The peak value for noise contained in the signal must be no more than 1.5 times the standard range.

■ Recording specifications

Internal memory: 8MB

Recording cycle: Selectable from:

Seconds	0.1, 0.2, 0.5, 1, 2, 3, 5, 10, 15, 20, 30 s
Minutes	1, 2, 3, 5, 10, 15, 20, 30, 60 min

Recorded data:

- Measurements: Group name, recording start date/time, recording cycle, measured data, alarm data, marker function annotations
- Programmed parameters: All parameters

Recorded measurement format: Binary, 4 bytes/record (6 bytes/record with maximum and minimum values)

Recording methods: Key operation*, triggers (alarm occurrence)*, scheduler

*: Pre-trigger recording is available for key operation and trigger signals. Up to 950 pre-trigger measurement records. Recording cycle can be set individually for each file.

Memory usage display: The amount of memory used in each file is displayed on the operation screens by an icon.

External memory: CF card or USB memory (FAT16, FAT32 formatted)
USB memory: All USB memory operations are not guaranteed.

■ Display specifications

Display: 12.1-inch TFT color LCD (800 × 600 pixels,)

Trend display colors: 46 colors (selectable)

Trend screens: Real-time trends, historical trends, or dual trend display is selectable. Vertical or horizontal orientation of scales and pens can be selected. Numerical data display can be turned on/off. Scroll function is available.

Bar graph screen: Numerical data display can be enabled or disabled.
Shows data + tag + engineering unit + alarm activation status

Data screen: Data display on/off selectable
(data + tag + unit + alarm generation status)

Alarm summary screen: Current alarm output status + alarm log (channel, level, alarm occurrence and cancellation times)

Skip function: On trend screens and data screens, channels to be skipped in display can be set for each group.

Scrolling: On the historical trend screens, previous data can be viewed by scrolling.

- Historical trend screens: Entire memory file area
- Dual trend screens: Historical trend section only

Playback (historical trend): Historical data is displayed by specifying a file. Data logging continues. View by scrolling or by time specified. Can also play back from CF memory card and USB memory.

Data search (historical trend): A search for an alarm or annotation displays the relevant historical trend.

Annotation display: Annotations made with the marker function can be displayed on the real-trend screen by key operation or by digital input and stored in a message data file. Annotations can be entered in advance of use (maximum 50 texts, 30 characters per text).

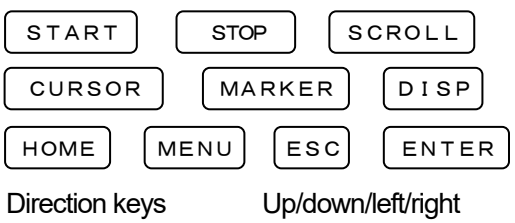
Display updating interval: Same as recording cycle interval

Screen saver: If no key is pressed for the period specified (from 1–60 minutes), the LCD backlight goes OFF.

■ Setting and operation specifications

Operation method: Touch panel operation or exclusive key operation

Keys: The 14 keys are: START, STOP, SCROLL, CURSOR, MARKER, DISP, HOME, MENU, ESC, ENTER, and 4 directional arrow keys.



Touch panel specifications

Type:	Analog resistance membrane
Chemical resistance:	Toluene, trichloroethylene, acetone, alcohol, gasoline, machine oil, aqueous ammonia, glass cleaner, mayonnaise, ketchup, wine, salad oil, edible vinegar, lipstick, etc.

■ Alarm Specifications

Number of settable alarms:	Up to 4 per channel
Alarm types:	Upper limit, lower limit, differential higher limit, differential lower limit, error
Alarm memory:	Alarm occurrence time, cancellation time, and type are stored for the latest 200 alarms (the total number from all channels).
Alarm outputs (option):	Relay outputs 12 points (normally open contacts) Relay outputs 6 points (normally closed contacts) Relay outputs 24 points (normally open contacts) Relay outputs 12 points (normally closed contacts) Relay outputs 12 points (normally open contacts) + 6 points (normally closed contacts)

■ Measurement range, indication accuracy, and display resolution

Input type		Measurement range	Reference range	Indication accuracy	Display resolution
Thermo-couple	K	-200.0 to +300.0 °C	±13.8 mV	-200.0 to 0 °C ±0.2 % FS ± 1 digit 0 to +300.0 °C ±0.1 % FS ± 1 digit	0.1 °C
		-200.0 to +600.0 °C	±27.6 mV	-200.0 to 0 °C ±0.2 % FS ± 1 digit 0 to +600.0 °C ±0.1 % FS ± 1 digit	0.1 °C
		-200 to +1370 °C	±69.0 mV	-200 to 0 °C ±0.2 % FS ± 1 digit 0 to +1370 °C ±0.1 % FS ± 1 digit	1 °C
	E	-200.0 to +200.0 °C	±13.8 mV	-200.0 to 0 °C ±0.2 % FS ± 1 digit 0 to +200.0 °C ±0.1 % FS ± 1 digit	0.1 °C
		-200.0 to+350.0 °C	±27.6 mV	-200.0 to 0 °C ±0.2 % FS ± 1 digit 0 to +350.0 °C ±0.1 % FS ± 1 digit	0.1 °C
		-200 to +900 °C	±69.0 mV	-200 to 0 °C ±0.2 % FS ± 1 digit 0 to +900 °C ±0.1 % FS ± 1 digit	1 °C
	J	-200.0 to +250.0 °C	±13.8 mV	-200.0 to 0 °C ±0.2 % FS ± 1 digit 0 to +250.0 °C ±0.1 % FS ± 1 digit	0.1 °C
		-200.0 to +500.0 °C	±27.6 mV	-200.0 to 0 °C ±0.2 % FS ± 1 digit 0 to +500.0 °C ±0.1 % FS ± 1 digit	0.1 °C
		-200 to +1200 °C	±69.0 mV	-200 to 0 °C ±0.2 % FS ± 1 digit 0 to +1200 °C ±0.1 % FS ± 1 digit	1 °C
	T	-200.0 to +250.0 °C	±13.8 mV	-200.0 to 0 °C ±0.2 % FS ± 1 digit 0 to +250.0 °C ±0.1 % FS ± 1 digit	0.1 °C
		-200.0 to +400.0 °C	±27.6 mV	-200.0 to 0 °C ±0.2 % FS ± 1 digit 0 to +400.0 °C ±0.1 % FS ± 1 digit	0.1 °C
	R	0 to 1200 °C	±13.8 mV	0 to 400 °C ±0.2 % FS ± 1 digit 400 to 1200 °C ±0.1 % FS ± 1 digit	1 °C
		0 to 1760 °C	±27.6 mV	0 to 400 °C ±0.2 % FS ± 1 digit 400 to 1760 °C ±0.1 % FS ± 1 digit	1 °C
	S	0 to 1300 °C	±13.8 mV	0 to 400 °C ±0.2 % FS ± 1 digit 400 to 1300 °C ±0.1 % FS ± 1 digit	1 °C
		0 to 1760 °C	±27.6 mV	0 to 400 °C ±0.2 % FS ± 1 digit 400 to 1760 °C ±0.1 % FS ± 1 digit	1 °C
	B	0 to 1820 °C	±13.8 mV	0 to 400 °C Not available 400 to 800 °C ±0.15 % FS ± 1 digit 800 to 1820 °C ±0.1 % FS ± 1 digit	1 °C
	N	-200.0 to +400.0 °C	±13.8 mV	-200.0 to 0 °C ±0.3 % FS ± 1 digit 0 to 400.0 °C ±0.15 % FS ± 1 digit	0.1 °C
		-200.0 to +750.0 °C	±27.6 mV	-200.0 to 0 °C ±0.3 % FS ± 1 digit 0 to 750.0 °C ±0.15 % FS ± 1 digit	0.1 °C
		-200 to +1300 °C	±69.0 mV	-200 to 0 °C ±0.3 % FS ± 1 digit 0 to 1300 °C ±0.15 % FS ± 1 digit	1 °C
	W-WRe26	0 to 2315 °C	±69.0 mV	0 to 100 °C ±4 % FS ± 1 digit 100 to 400 °C ±0.5 % FS ± 1 digit 400 to 2315 °C ±0.15 % FS ± 1 digit	1 °C
	WRe5-WRe26	0 to 2315 °C	±69.0 mV	±0.2 % FS ± 1 digit	1 °C
	PR40-20	0 to 1888 °C	±13.8 mV	0 to 300 °C ±1.5 % FS ± 1 digit 300 to 800 °C ±0.8 % FS ± 1 digit 800 to 1888 °C ±0.2 % FS ± 1 digit	1 °C
	NiMo-Ni	-50.0 to +290.0 °C	±13.8 mV	±0.2 % FS ± 1 digit	0.1 °C
		-50.0 to +600.0 °C	±27.6 mV		0.1 °C
		-50 to +1310 °C	±69.0 mV		1 °C
	CR-AuFe	0.0 to 280.0 K	±13.8 mV	0.0 to 20.0 K ±0.5 % FS ± 1 digit 20.0 to 50.0 K ±0.3 % FS ± 1 digit 50.0 to 280.0 K ±0.2 % FS ± 1 digit	0.1 K
	Platinel 2	0.0 to 350.0 °C	±13.8 mV	±0.15 % FS ± 1 digit	0.1 °C
		0.0 to 650.0 °C	±27.6 mV		0.1 °C
		0 to 1395 °C	±69.0 mV		1 °C

Input type		Measurement range	Reference range	Indication accuracy	Display resolution
Thermo-couple	U	-200.0 to +250.0 °C	±13.8 mV	-200.0 to 0 °C ±0.3 % FS ± 1 digit 0 to +250.0 °C ±0.15 % FS ± 1 digit	0.1 °C
		-200.0 to +500.0 °C	±27.6 mV	-200.0 to 0 °C ±0.3 % FS ± 1 digit 0 to +500.0 °C ±0.15 % FS ± 1 digit	0.1 °C
		-200.0 to +600.0 °C	±69.0 mV	-200.0 to 0 °C ±0.3 % FS ± 1 digit 0 to +600.0 °C ±0.15 % FS ± 1 digit	0.1 °C
	L	-200.0 to +250.0 °C	±13.8 mV	-200.0 to 0 °C ±0.2 % FS ± 1 digit 0 to +250.0 °C ±0.1 % FS ± 1 digit	0.1 °C
		-200.0 to +500.0 °C	±27.6 mV	-200.0 to 0 °C ±0.2 % FS ± 1 digit 0 to +500.0 °C ±0.1 % FS ± 1 digit	0.1 °C
		-200 to +900 °C	±69.0 mV	-200 to 0 °C ±0.2 % FS ± 1 digit 0 to +900 °C ±0.1 % FS ± 1 digit	1 °C
Resistance temperature detector (RTD)	Pt100	-140.0 to +150.0 °C	160 Ω	±0.15 % FS ± 1 digit	0.1 °C
		-200.0 to +300.0 °C	220 Ω	±0.1 % FS ± 1 digit	0.1 °C
		-200.0 to +850.0 °C	400 Ω	-200.0 to +700.0 °C ±0.1 % FS ± 1 digit 700.0 to 850.0 °C ±0.15 % FS ± 1 digit	0.1 °C
	JPt100	-140.0 to +150.0 °C	160 Ω	±0.15 % FS ± 1 digit	0.1 °C
		-200.0 to +300.0 °C	220 Ω	±0.1 % FS ± 1 digit	0.1 °C
		-200.0 to +649.0 °C	400 Ω	±0.1 % FS ± 1 digit	0.1 °C
	Pt50	-200.0 to +649.0 °C	220 Ω	±0.1 % FS ± 1 digit	0.1 °C
	Pt-Co	4.0 to 374.0 K	220 Ω	4.0 to 50.0K ±0.3 % FS ± 1 digit 50.0 to 374.0K ±0.15 % FS ± 1 digit	0.1 K
DC voltage		-13.80 to +13.80 mV	±13.8 mV	±0.1 % FS ± 1 digit	10 µV
		-27.60 to +27.60 mV	±27.6 mV		
		-69.00 to +69.00 mV	±69.0 mV		
		-200.0 to +200.0 mV	±200.0 mV		100 µV
		-500.0 to +500.0 mV	±500.0 mV		
		-2.000 to +2.000 V	±2 V		1 mV
		-5.000 to +5.000 V	±5 V		
		-10.00 to +10.00 V	±10 V		10 mV
		-20.00 to +20.00 V	±20 V		
		-50.00 to +50.00 V	±50 V		

Notes:

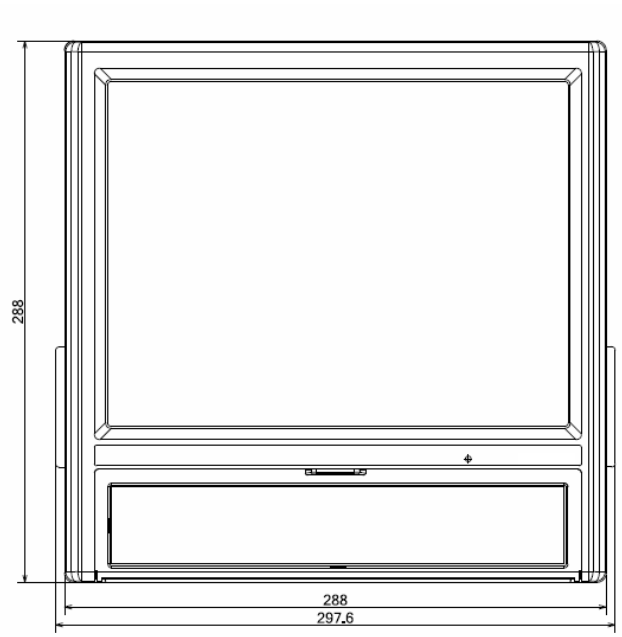
- The indication accuracy applies under standard conditions.
- The thermocouple input (internal reference junction) does not include reference junction compensation accuracy.

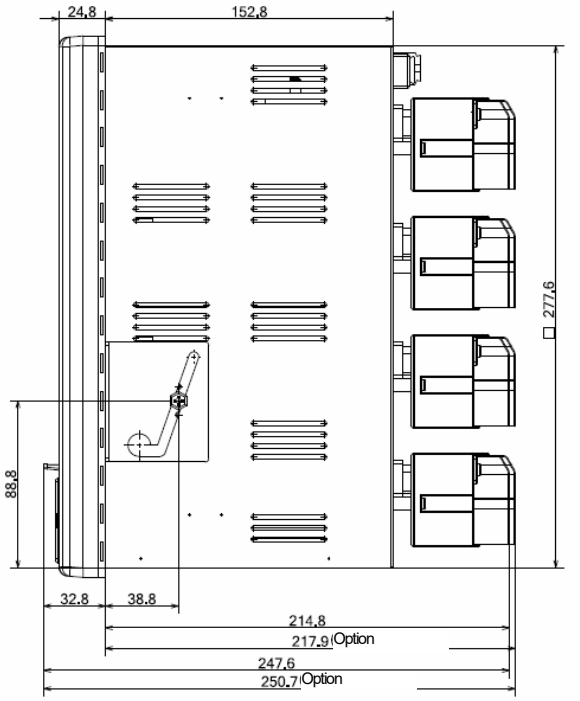
K, E, J, T, R, S, B, N:	IEC584, JIS C1602-1995
U (Cu-CuNi), L (Fe-CuNi):	DIN43710
W-WRe5, WRe5-WRe26, PR40-20, NiMO-Ni, CR-AuFe, Platinel 2:	ASTM
Pt100:	IEC751 (1995), JIS C1604-1997
JPt100:	JIS C1604-1981, JIS C1606-1989
Pt50:	JIS C1604-1981

Note) Indication equivalent to max. 1 mV sometimes fluctuates under EMC Directive test conditions.

■ External dimensions

Unit: mm





Revision History (CP-UM-5613E)

Printed	Edn.	Revised pages	Description
July 2011	**1**		
Sep. 2013	**4**	1 2 6 128 End of a book	ARF990DA0000, for “Windows98/Me/2000/XP” → “for Windows” Tropical treatment, With inspection results + tropical treatment was deleted. WARNING was added. ■ Standards was changed. AAS-511A-014-03
June 2015	**5**	128 End of a book	CE marking, EMC directive, and Low voltage directive were deleted. AAS-511A-014-05
Aug. 2017	**6**	128 End of a book Back cover	CE marking, EMC directive, and Low voltage directive were added. AAS-511A-014-09 Restriction Label(Required by SJ/T11364-2014) and KC mark were added.
Aug. 2022	**7**	iii 3 49, 50, 51, 55, 56, 57, 58 127 128 End of a book Back cover	Unpacking was changed. ■ Optional parts was changed. The reference pages were deleted. The symbol of the crossed-out wheeled bin was deleted. ■ General specifications and ■ Standards were changed. AAS-511A-014-10 WEEE cautions was added.
Jan. 2024	**8**	44	About internal memory Changed number of records.

Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products.

You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

   1.1 Warranty period

   Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

   1.2 Warranty scope

   In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place. Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

   (1) Failure caused by your improper use of azbil product (noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
   (2) Failure caused for other reasons than Azbil Corporation's product;
   (3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
   (4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
   (5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
   (6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

   Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

   You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

   (1) Regulations and standards or laws that your Equipment is to comply with.
   (2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
   (3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use
   Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down. You are required to provide your Equipment with safety design such as fool-proof design,*1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance,*3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

   *1. A design that is safe even if the user makes an error.
   *2. A design that is safe even if the device fails.
   *3. Avoidance of device failure by using highly reliable components, etc.
   *4. The use of redundancy.

3. Precautions and restrictions on application

   3.1 Restrictions on application

   Please follow the table below for use in nuclear power or radiation-related equipment.

	Nuclear power quality*5 required	Nuclear power quality*5 not required
Within a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Cannot be used (except for limit switches for nuclear power*7)
Outside a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Can be used

   *5. Nuclear power quality: compliance with JEAG 4121 required
   *6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes,"etc.
   *7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

   Any Azbil Corporation's products shall not be used for/with medical equipment.

   The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product. However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

   3.2 Precautions on application

   you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below. Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

(1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals
(2) For use of specific purposes, such as:
    * Nuclear energy/radiation related facilities
      [When used outside a radiation controlled area and where nuclear power quality is not required]
      [When the limit switch for nuclear power is used]
    * Machinery or equipment for space/sea bottom
    * Transportation equipment
      [Railway, aircraft, vessels, vehicle equipment, etc.]
    * Antidisaster/crime-prevention equipment
    * Burning appliances
    * Electrothermal equipment
    * Amusement facilities
    * Facilities/applications associated directly with billing
(3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
(4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
(5) Machinery or equipment that may affect human lives, human bodies or properties
(6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety

4. Precautions against long-term use

   Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.

5. Recommendation for renewal

   Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations.

   In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.

6. Other precautions

   Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.

7. Changes to specifications

   Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquires or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.

8. Discontinuance of the supply of products/parts

   Please note that the production of any Azbil Corporation's product may be discontinued without notice. After manufacturing is discontinued, we may not be able to provide replacement products even within the warranty period.

   For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.

9. Scope of services

   Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:

   (1) Installation, adjustment, guidance, and attendance at a test run
   (2) Maintenance, inspection, adjustment, and repair
   (3) Technical guidance and technical education
   (4) Special test or special inspection of a product under the conditions specified by you

   Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.

基于SJ/T11364-2014「电子电气产品有害物质限制使用标识要求」的表示式样

产品中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
箱体部分	×	○	○	○	○	○
门部分	×	○	○	○	○	○
印刷电路基板单元	×	○	○	○	○	○
端子板部分	×	○	○	○	○	○
电源部分	×	○	○	○	○	○
附属品	×	○	○	○	○	○

本表格依据SJ/T 11364 的规定编制。

○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。

×：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。

Disposal of Electrical and Electronic Equipment (for Environmental Protection)

This is an industrial product subject to the WEEE Directive.
Do not dispose of electrical and electronic equipment in the same way as household waste.
Old products contain valuable raw materials and must be returned to an authorized collection point for correct disposal or recycling.

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