

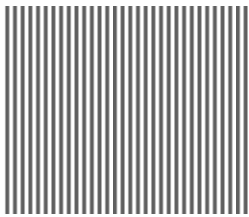
CHINO

Graphic Recorder

KR2000

with measured data protection

General
Instruction Manual



INSTRUCTIONS

CHINO

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MEMO

PREFACE

Thank you for purchasing the KR2000 series graphic recorder.
Before using your new recorder, please be sure to read this instruction manual that will advise you on how to use the instrument correctly and safely and how to prevent problems.

1. Separate instruction manuals

This instruction manual describes the standard operations and optional alarm output. For other options you specified, their instruction manuals are attached respectively. Read these instruction manuals together with this manual.

2. Request

- Request to instrumentation engineers, constructors, and sale agents
Make sure to deliver this instruction to the operator of this instrument.
- Request to the operator of this instrument
This instruction manual is necessary for maintenance, too. Keep this manual with care until the instrument is discarded.

3. Attention while unpacking

- Do not drop the recorder while take it out of the box
- When transporting this recorder, pack the instrument in the box and then put it with cushions in another box. We recommend keeping the box for transport.
- When not using the recorder for a while after taking it from the panel, put the recorder in the box and store at room temperature and in a dust free atmosphere.

4. Important notes for users

- No part of this manual can be reproduced or copied in any form without permission.
- The contents of this manual may be altered without prior notice.
- This manual has been documented by making assurance doubly sure. However, if any question arises or if any error, an omission, or other deficiencies are found, please contact your nearest CHINO's sales office.
- CHINO is not responsible for any operation results of this software.

5. Trademarks

- All company names and product names in this manual are trademarks or registered trademarks of their respective companies.
- Please note that the marks "TM" and "®" are omitted throughout this manual.

6. Disposal

6.1 Disposal

Separate the box, plastic bag, and shock material the recorder is packaged in according to the garbage collection method of the each community, and please cooperate to recycle.

Caution

1. A small amount of hazardous substance below the specified level with RoHS directive is included in this recorder.
2. When disposing the controller always request a professional to do it or dispose it in accordance with local regulations.
3. This recorder includes a lithium battery. When disposing the lithium battery, first remove the battery and always request a professional to do it.

Warning

Perchlorate Material

This instrument uses battery with Perchlorate Material.
Special handling may apply, see
<http://www.dtsc.ca.gov/hazardouswaste/perchlorate>

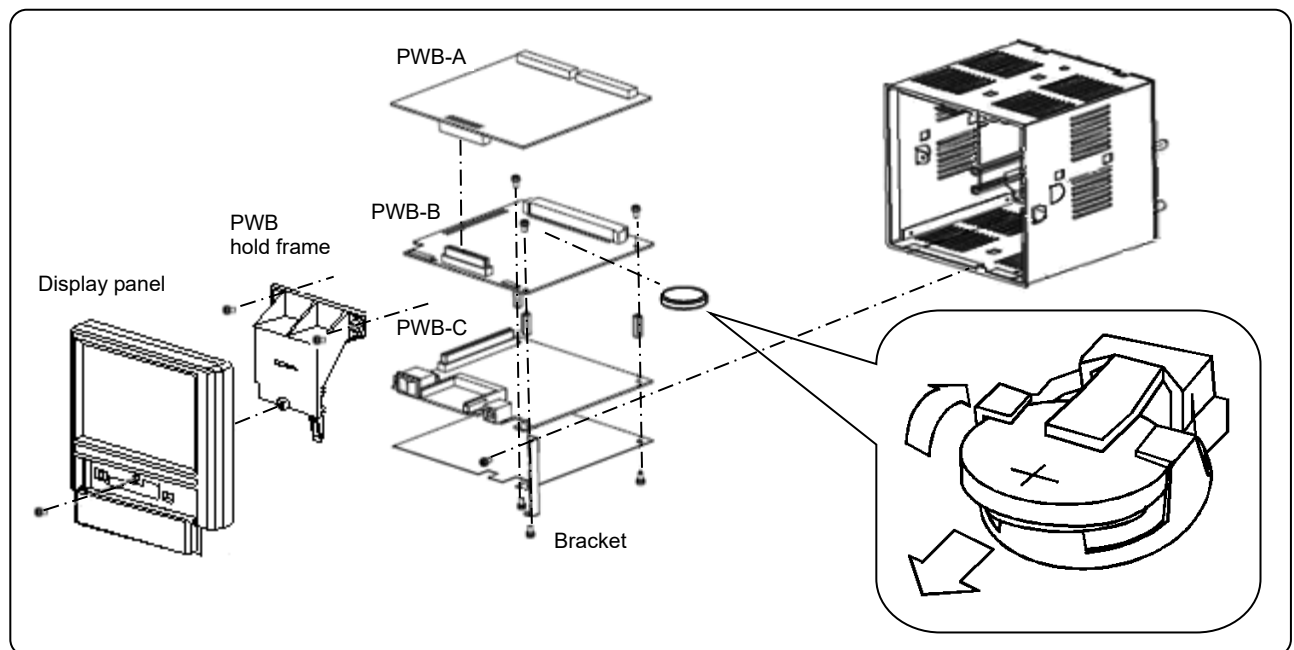
About disposal of Electrical and Electronic Equipment
This product is subject to the WEEE Directive.
When disposing of the product, please separate
and collect it properly for reuse and recycling.



6.2 Battery removal method

Do not replace the battery. Doing so might cause damage or malfunction. Do not remove the battery, except when disposing the recorder.

- (1) Open the key case and peel off the seal put in the central part. Then remove a screw that fixes the front display panel.
- (2) Pull the bottom of the front display panel toward you and lift up to remove the front display.
- (3) The front display panel is connected to PWB-B by 2 types of cables and is connected to the case by 1 type of cable. Disconnect these cables.
- (4) Remove the 2 screws holding PWB hold frame, and remove it.
- (5) Lift a side before PWB-A and disconnect PWB-A and -B. Just pull out PWB-A.
- (6) Remove the screw of the mounting bracket.
- (7) Disconnect the connector for the power switch cable on the left side of PWB-C and pull out both PWB-B and -C as a set.
- (8) Remove the 3 screws holding PWB-B and -C together, and separate PWB-B from PWB-C.
- (9) The battery holder is attached to the underside of PWB-B. Lift the front of the battery with a tool having a nonconductive tip and pull the battery out of the holder.



1 For safe use

This section "For safe use" has been compiled to promote the correct use of the instrument in order to prevent human injury or damage to property before they occur. Please read the following information carefully and be sure to observe the warnings and cautions in it.

1. Preconditions for use



This instrument is a component type general product to be mounted on an indoor instrumentation panel. Do not use this instrument in different situations.

Before using this instrument, ensure the system safety by taking appropriate measures such as fail-safe designing and periodic maintenance for the equipment to which this instrument is installed. Connection, adjustment or operation of this instrument should be performed by a professional engineer with knowledge of instrumentation.

Also, a person who handles this instrument should read this instruction manual to fully understand the cautions and basic operations.





2. Labels on this instrument

The following labels are used for safe use.

Label	Name	Meaning
	Alert symbol mark	Indicates the location which should refer to the manual in order to prevent an electric shock and injury.
	Protective conductor terminal	A terminal is provided for connection to the protective conductor of the power supply facility for the prevention of an electric shock.

3. Symbols in this manual

The cautions to be observed for preventing the damage of this instrument and unexpected accidents are sorted by the following symbols according to their importance degrees for enabling operators to use this instrument safely.

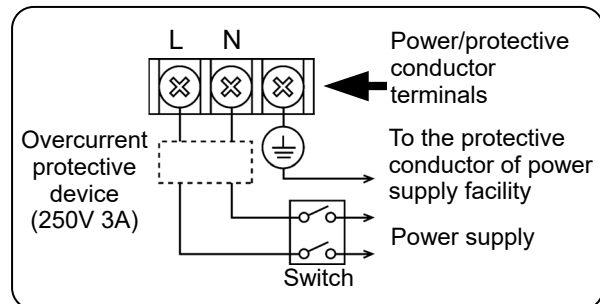
 Warning	The nonobservance of information under this symbol may result in hazardous, critical or serious injury to the user.
 Caution	The nonobservance of information under this symbol may result in a hazardous situation or a light injury to the user or in physical damage to the property.
 Remarks	This symbol shows a caution when the instrument does not function as specified or when such a possibility exists.
 Reference	This reference serves as a supplement for handling and operation, and it may be convenient for the user.

Warning

This paragraph covers important warning for safety to be observed before reading the instructions. Fully understand the following warning before reading this manual. These warnings are important for preventing the damage to human bodies as well as accidents.

1. Switch and overcurrent protective device

This recorder is not provided with a replaceable overcurrent protective device. Prepare a switch and an overcurrent protective device for the power supply (circuit breakers, circuit protectors or the like) within 3m of this recorder in a location where the operator can access easily. Use a switch and an overcurrent protective device conforming to IEC947-1 and IEC947-3.



2. Be sure to ground this instrument

Before turning the power on, connect the protective conductor terminal of this recorder to the protective conductor of the power supply facility. In order to prevent an accident by electric shock, do not disconnect this connection during operations.

3. Before turning on the power supply

In order to ensure safety, before turning on the external power switch make sure that the power voltage is within the range indicated on the power supply label.

4. Don't repair or modify this instrument

Make sure that any persons other than service engineers approved by CHINO CORPORATION do not repair or modify this instrument by replacing parts. Otherwise it may be damaged or will not function normally or an accident such as electric shock and burn may occur by putting your hand and a tool in the internal unit. For ordinary operation, it is not necessary to pull out the internal unit.

Reference

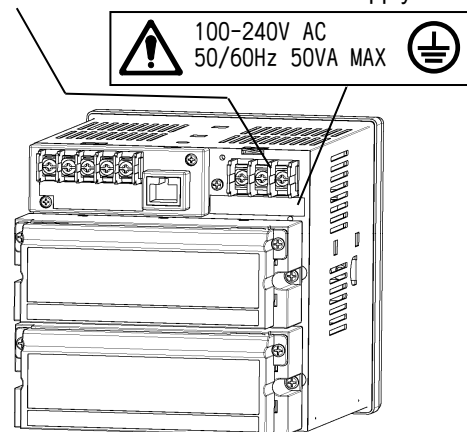
Fuse in the power supply

The following fuse is mounted in the power supply unit of this recorder for safety use. However, this fuse is not replaceable.

Maker : Nippon Seisen Cable., Ltd.

Model : FCT 250V 3A 8H02

Power terminal
Protective conductor terminal
Power supply label



5. Use this recorder following this instruction manual

Use this recorder correctly and safely by following this instruction manual. CHINO CORPORATION will not be responsible for any injury, damage, lost profit or any other claim, which may result from its wrong use.

6. Installing the safety device

This recorder is designed as a general-purpose product for general industrial products. It is not intended for use in human-life and property related applications such as nuclear and radiation related equipment, medical equipment, aerospace equipment, railroad, and marine transportation equipment. To use this product for equipment that requires high quality and safety that affects human-life and property, design and install the protection and safety circuits to ensure safety at your own responsibility

7. Turn off the power supply if an abnormal symptom occurs

Turn off the power supply immediately and contact your local CHINO's sales agent if any abnormal odor, noise or any smoke occurs, or if this recorder becomes high temperature that is too hot to be touched.

2 Before use

Check the following items before using the recorder. If something is wrong, contact your local CHINO's sales agent.

2.1 Exterior check

Check that the instrument is not broken on the outer side.

2.2 Model check

The model number and serial number of this recorder can be confirmed by the label on the upper side of the case.

Check the model of your instrument from the model code before use.

■ Model code

KR2P□□M□□A

Model (Check with model code)

Serial No.

KR2P**M**A

K2*****

MADE IN JAPAN



Measurement points/Sampling rate

60: Universal input 6 points (100ms)

20: Universal input 12 points (100ms)

61: Universal input 6 points (1s)

21: Universal input 12 points (1s)

Communication interface (Option)

N: None

R: High order (RS-232C /RS-485) switchable

Q: High order (RS-232C /RS-485) + Low order (RS485)

Alarm output, Contact input (Option)

0: None

1: Mechanical relay output (12 points 'a' contact)

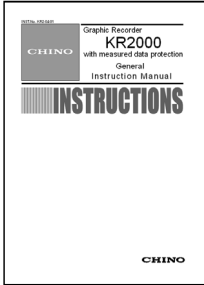


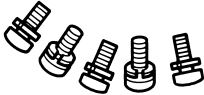
2: Mechanical relay output (6 points 'c' contact)

7: No-voltage contact input (8 points) + Alarm relay output (8 points)

* When the recording cycle is set less than 0.5 seconds at the KR2P61/2P21, input channel numbers become 4 points automatically.

2.3 Checking attachments

Package contains the following attachments. Please confirm.

Parts name	Quantity	Remarks
①Instruction manual	1	INE-834□(General), ZAILA-P (analysis software) CD-ROM
	(1 copy)	KR2-02-□(Wiring/Installation) A4 Booklet
②Mounting bracket	2	For panel mounting
③Terminal screw	5	For input and alarm (digital input) terminals (M3.5) (Spares for missing)
<div>① Instruction manual</div> <div></div> <div>② Mounting bracket</div> <div></div> <div>③ Terminal screws</div> <div></div>		

3 Installation

Warning

■ Make sure to read and understand this instruction manual to prevent any accident.

3.1 Mounting location

In order to avoid unfavorable effects on measurement accuracy and recording operation, mount the KR 2000 series graphic recorder at the following locations.

(1) Industrial environment

Select a place away from a source generating electric field and/or magnetic field and where mechanical vibrations/shock is not existed.

- Over voltage category • • • II (EN standard)
- Altitude • • • • • 2000m or less
- Pollution degree • • • • • 2 (EN standard)
- Place of use • • • • • Indoor

(2) Ambient temperature/humidity

Keep away from direct sunlight and so not close an area around the KR 2000 series graphic recorder to avoid temperature increase.

- Place with stable ambient temperature of around 23°C and humidity 50%rh
- Place not exposed to hot blast (50°C or more) for avoiding deformation of the front panel
- Place where there are no wind and no heat source near terminals for avoiding measurement errors.

(3) Atmosphere

- Avoid a place where flammable gases exist.
- Avoid a place with dust, smoke, vapors etc.

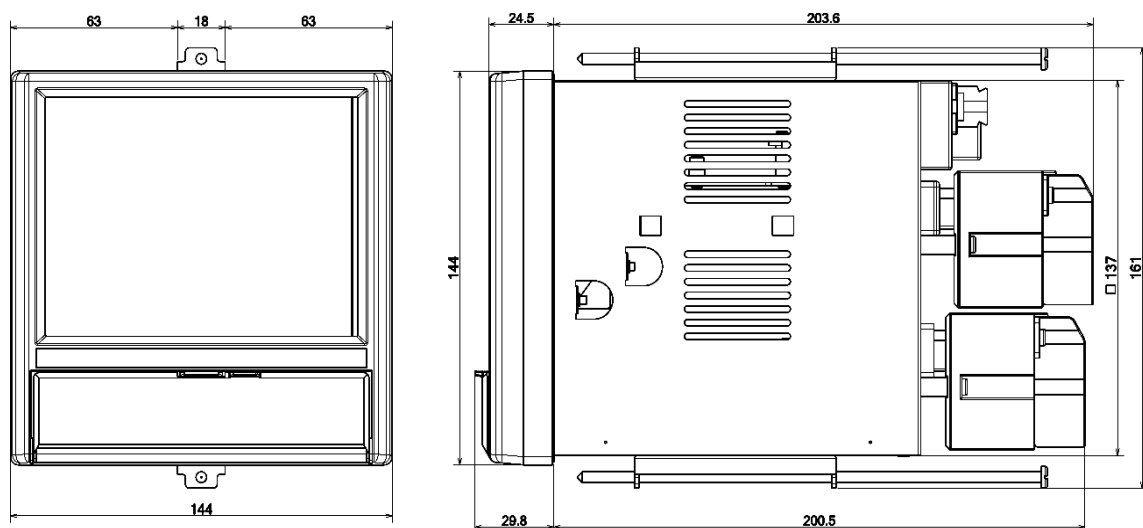
(4) Mounting angle

- Lateral tilting • • • 0°
- Longitudinal tilting • • • Forward tilting: 0°, Backward tilting: 0-20°

Mounting angle other than the above angles will have unfavorable effects on recording operation.

3.2 External dimensions

The following figure shows the dimensions of this recorder with its mounting brackets.



Unit : mm

3.3 Method of mounting the panel

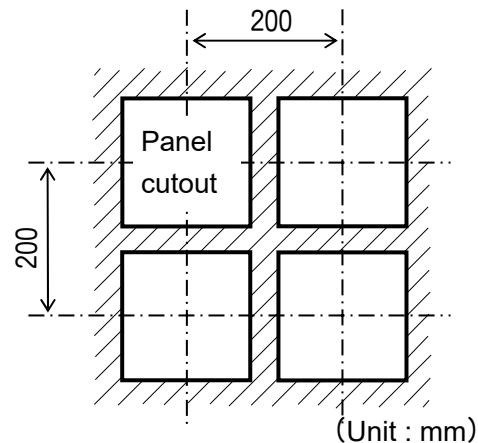
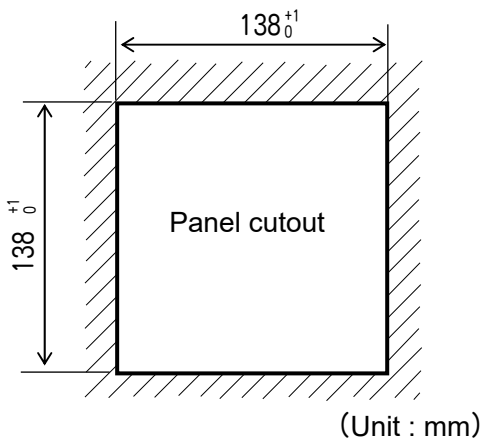
Warning

■ Mount on the panel and use

- (1) This instrument has been designed to be mounted on an indoor instrumentation panel.
- (2) Use a panel made of a steel plate of 2mm to 6mm in thickness or a panel equivalent in strength.
- (3) For mounting the recorder on the panel, be careful of injury by dropping it

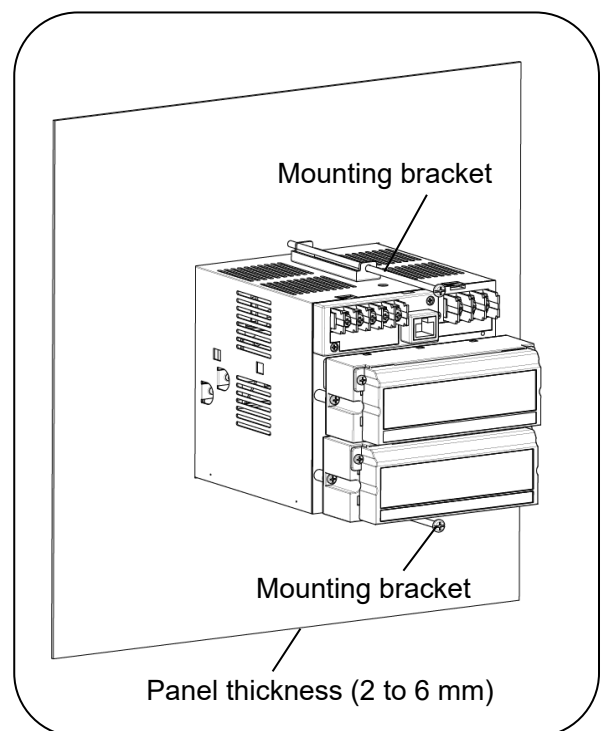
(1) Panel cutout size

● Minimum interval for installation of multiple instruments



(2) Mounting method

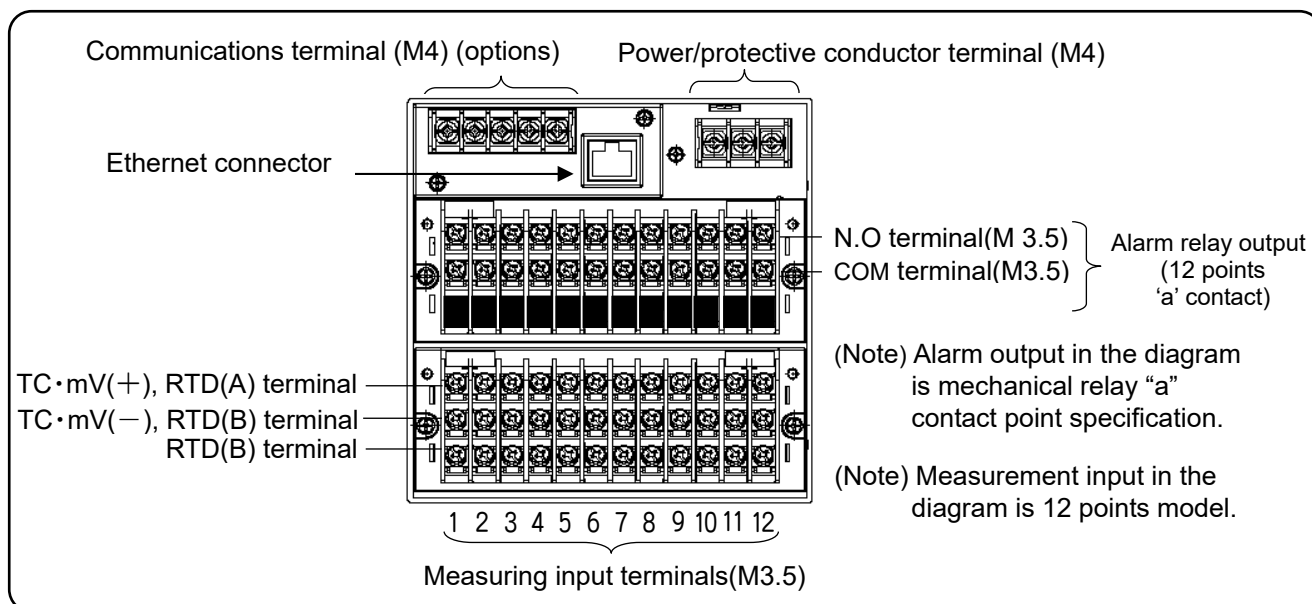
- (1) Insert this recorder into the panel cutout from the front of the panel.
- (2) Insert the mounting brackets into the holes of the top and bottom sides, and fix them with screws using a Phillips screwdriver. Set the tightening torque on screws to 1.0 N·m (when using Phillips-head screwdriver).



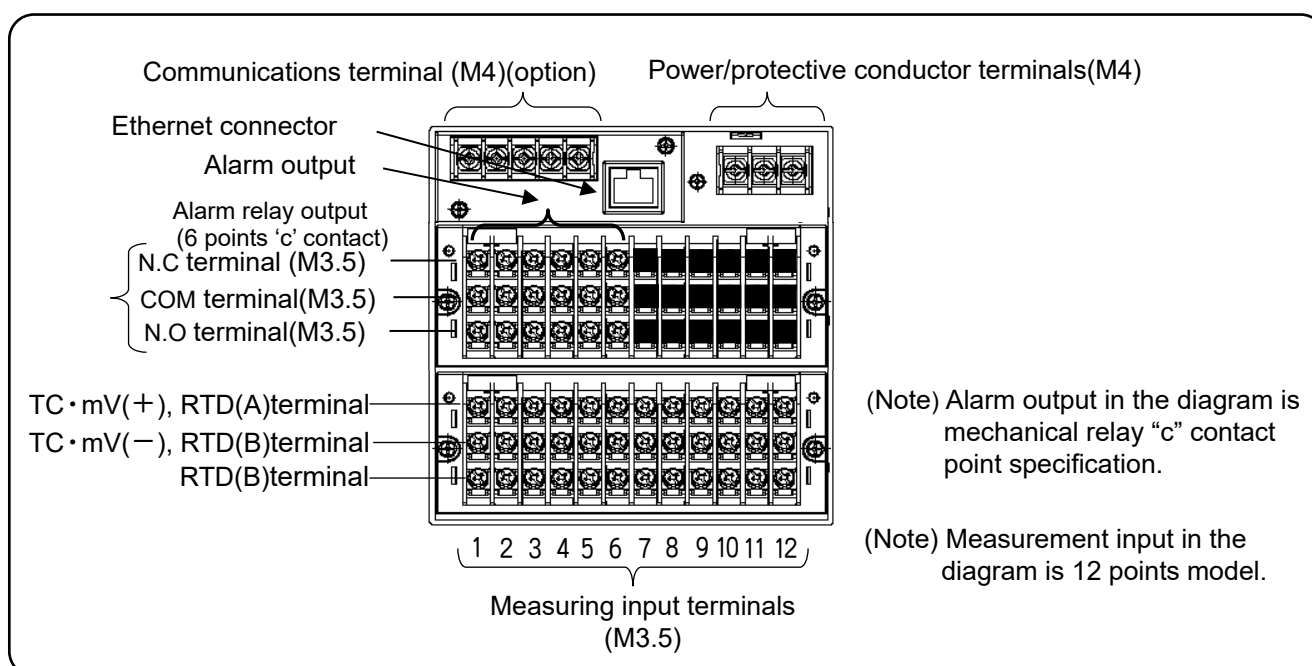
4 Connections

4.1 Terminal board arrangement

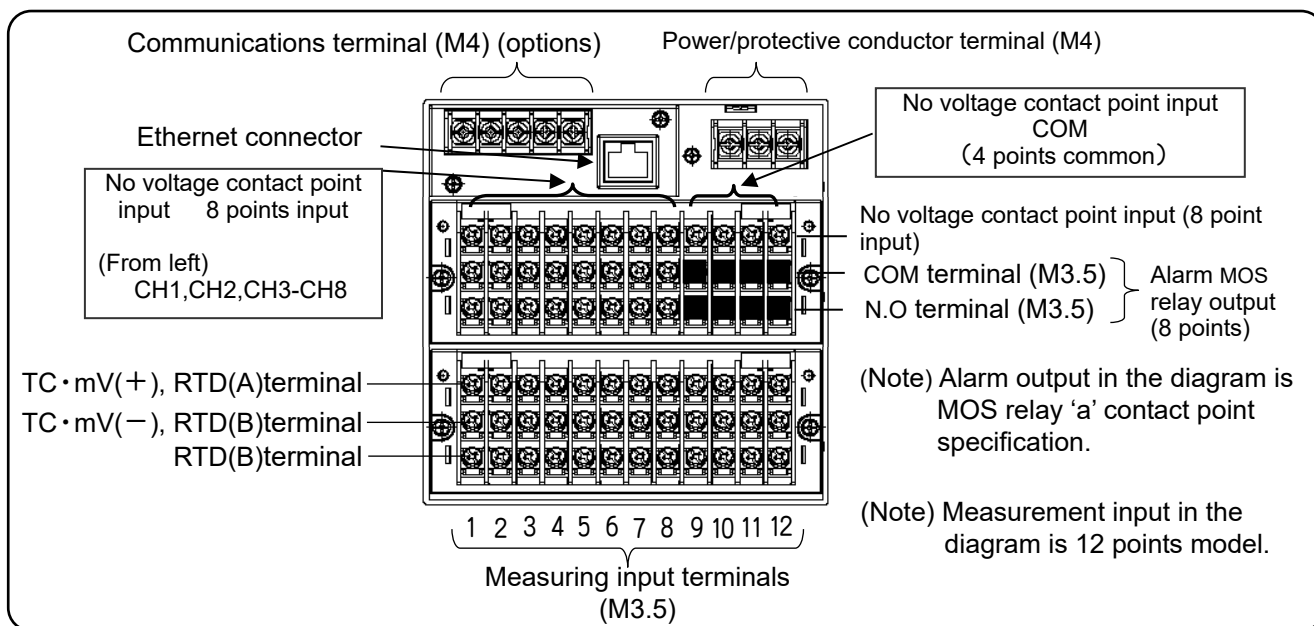
The following diagram shows the terminal board arrangement in which option (alarm relay output [12 points 'a' contact], communication interface) are mounted. Connector for Ethernet is a standard mounting.



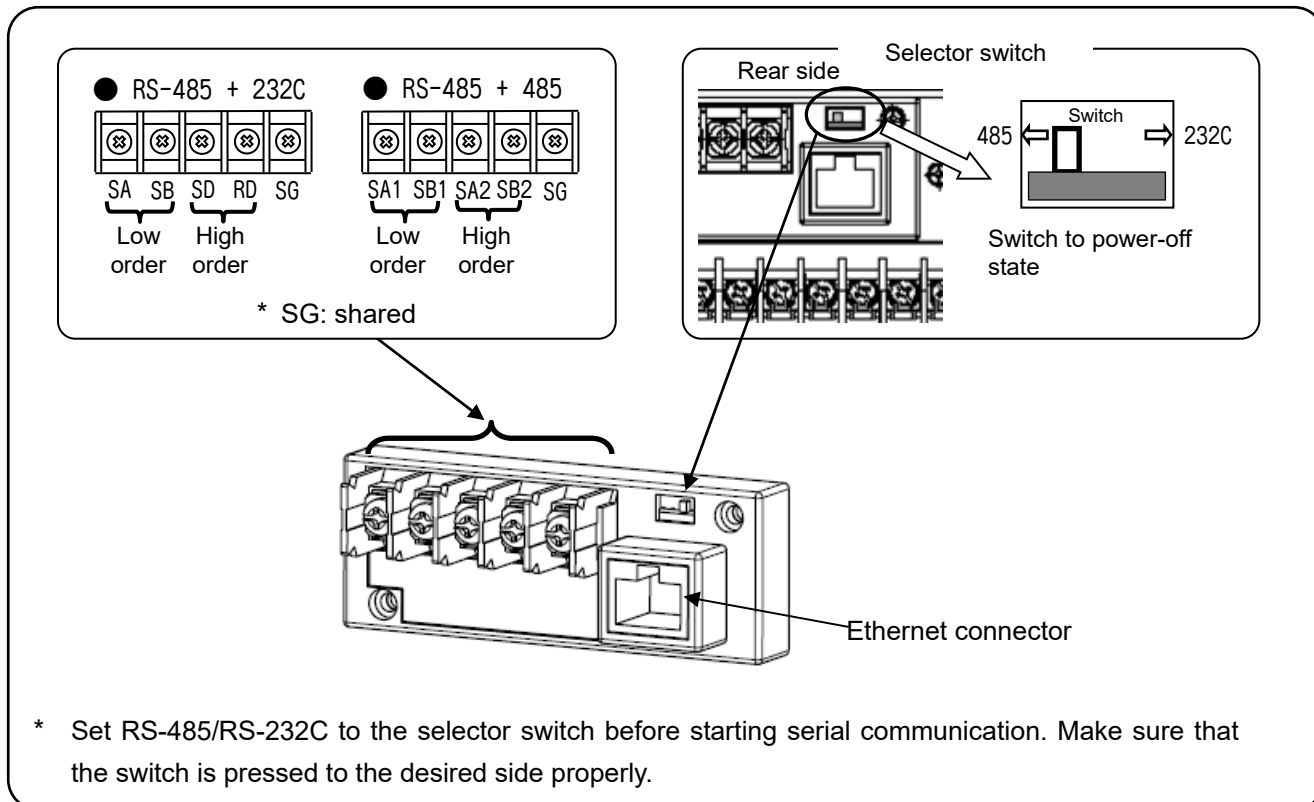
The following diagram shows the terminal board arrangement in which option (alarm relay output [6 points 'c' contact], communication interface) are mounted. Connector for Ethernet is a standard mounting.



Following figure is terminal board diagram for option (digital input [8 points] + alarm MOS relay output [8 points]) in KR2000, equipped with communication interface. Connector for Ethernet is a standard mounting.



Communication terminal (option)



⚠ Warning

■ Alert symbol marks (⚠) and places

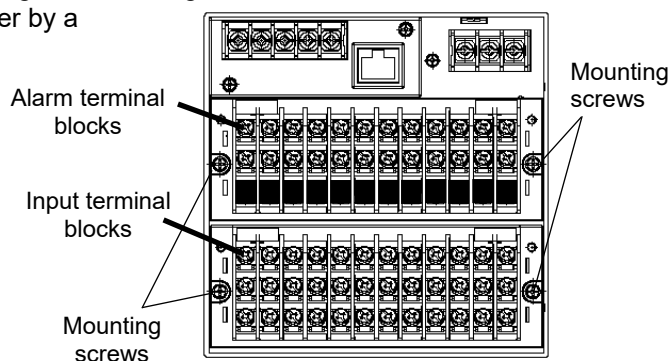
The alert mark (⚠) is pasted at danger places where may causes electric shock. (See the following table).

Name of terminals	Power terminals	Measurement input terminals	Mechanical relay 'c' contact alarm terminals	MOS relay, mechanical relay 'a' contact alarm terminals
Places marked with the symbol	Lower left of power terminals	Lower right of terminal cover	Lower right of terminal cover	Lower right of terminal cover

Reference ➤ Input terminal and alarm terminal blocks are removable

The input terminal block and alarm terminal block (including the contact terminal block) are removable for easy connections.

- (1) Each terminal block can be removed by removing two mounting screws.
- (2) Each terminal block is connected to the recorder by a connector.



⚠ Caution

■ Turn off the power supply in advance

For mounting or dismounting the terminal block, turn off the external power switch to prevent the electric circuits from being damaged.

■ Caution at removing and replacing

Pay attention not to touch or bend the connector pins when placing or removing each unit or when the unit is removed.

Remarks ➤ Replacement of thermocouple input terminal block

Thermocouple input terminal block cannot be replaced by terminal block of other instrument. If replaced measurement error occurs.

4.2 Precautions while connections

Observe the following cautions during connections for securing safety and reliability.

1) Power supply

Use a single-phase power supply having a stable voltage without any waveform distortion for the purpose of preventing wrong operations.

Warning

(1) A switch and an overcurrent protective device

Prepare a switch and an overcurrent protective device (3A) to the power supply for preventing an electric shock accident during connection work. This recorder is not provided with any replaceable fuse.

(2) Turn off the power supply before connections

Be sure to turn OFF the power supply before connecting cables to the power and the input/output terminals to prevent an electric shock.

2) Keep the input/output connections away from a high voltage power circuit

Don't place the input/output cables close or in parallel with any strong power circuits including power line. Place the cables 50 cm or more away from high voltage power circuits when they are placed close or in parallel to other circuits.

3) Keep the thermocouple input away from a heat source

For thermocouple 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.

4) Keep all connection cables away from noises

Keep all connection cables away from noise source as far as possible, otherwise unexpected malfunction may occur. Provide a solution if the cables cannot be separated from a noise source due to unavoidable circumstances.

Major noise sources	<ul style="list-style-type: none"> • Electromagnetic switch, etc. • Power line having waveform distortion • Inverter • Thyristor regulator
Counter measures	Insert noise filters between power terminals and input/output terminals. A CR filter is often used.

5) Use crimp style terminals

(1) Fix crimp style terminals to termination of connection cables for preventing the looseness or disconnection of terminals and a short-circuit failure between terminals.

(2) Use the crimp style terminals with insulation sleeve for preventing an electric shock.

6) Unused terminals

Don't use any unused terminals for relaying; otherwise the electric circuits may be damaged.

Warning

■ Secure the connected cables properly.

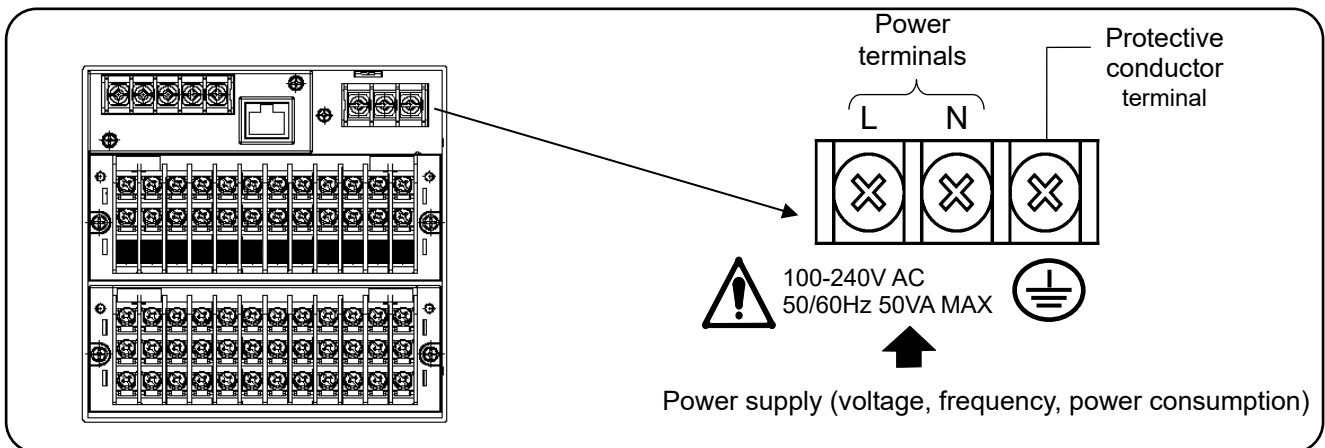
Secure the connected cables so as not to allow them to be hooked by a person or a substance, otherwise the connections may be cut and disrupted that may cause an electric shock or other accidents.

Kinds of terminals and termination

Terminal name	Screw diamet	Tightening torque	Termination (Unit: mm)
Power and protective conductor and communication terminal	M4	1.2N•m	<p>Type O</p> <p>Less than 8.5 More than 4.3 t:0.8</p> <p>With an insulation sleeve</p>
Terminal other than described above	M3.5	0.8N•m	<p>Type O Type Y</p> <p>Less than 8 More than 3.7 t:0.8 Less than 8 More than 3.7 t:0.8</p> <p>With an insulation sleeve With an insulation sleeve</p> <p>※Use Type O whenever possible.</p>

4.3 Connection of power and protective conductor terminals

1) Power and protective conductor terminals



Warning

■ Turn off the power supply

Be sure to turn off the power supply before connecting the cable to the power supply and protective conductor terminals to prevent an electric shock.

2) Connection of power terminals

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

Note) Use the cords approved by the following standards.

- (1) IEC 227-3
- (2) ANSI/UL817
- (3) CSAC22.2 No.21/49

3) Connection of protective conductor terminal

Be sure to connect this terminal to the protective conductor of the power supply facility. For this connection, use a cable terminated by the crimp style terminals with insulation sleeve.

- Grounding wire:
Copper wire 2 mm² or more (green/yellow)

Warning

■ mark at power terminals

A voltage of 100 to 240 V AC is applied to the power terminals after connection. Be sure to mount the power terminal cover to prevent an electric shock.

Remarks L/N indication of power terminals

This indication conforms to the CSA standard, Canada. The live side of the single-phase AC power supply is indicated as L, and the neutral side is indicated as N. Observe the L and N connections for obtaining satisfactory performance.

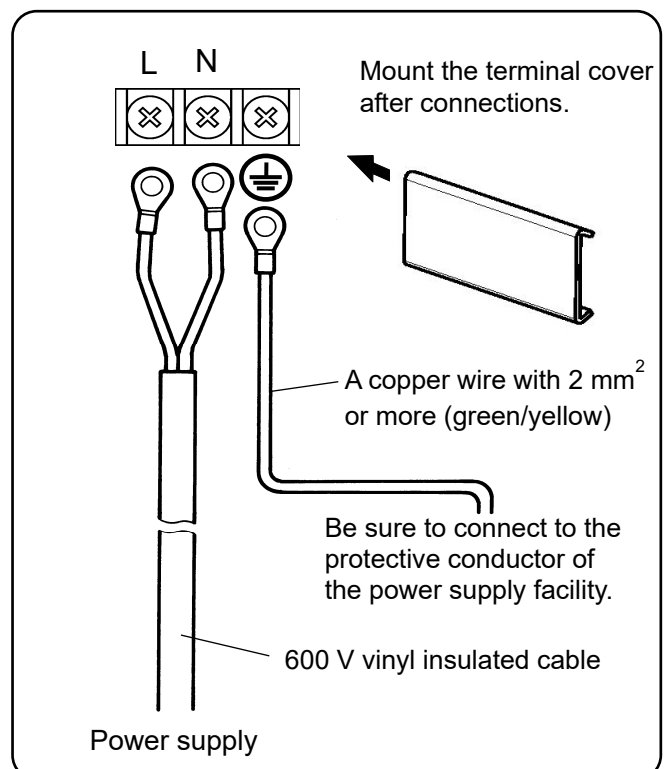
Caution

■ Be careful with the power voltage and noise

The power voltage of this instrument is indicated beside the power terminals.

Don't apply any voltage other than indicated; otherwise a malfunction may result.

If noise is generated at the power supply, provide a noise reduction transformer, etc.



4.4 Connection of measuring input terminals

1) Measuring input terminals

Be sure to turn off the power supply to prevent an electric shock.

- For the connections to the input terminals, use cables terminated by the crimp style terminals with insulation sleeve



Caution

■ Allowable input voltage

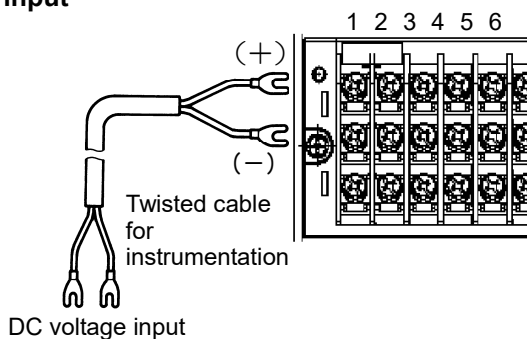
Input type	Allowable input voltage
Voltage, thermocouple input	$\pm 10\text{VDC}^*$
Resistance thermometer input	$\pm 6\text{VDC}$

* $\pm 60\text{ V DC}$ with channel settings to the $\pm 5\text{ V}$ or higher range.

2) Connections of DC voltage (current) input

Use twisted cables for instrumentation as the input cables for the purpose of suppressing noises. For current inputs, mount shunt resistors to the channels to be measured before connections.

● DC voltage (Current) input



Remarks

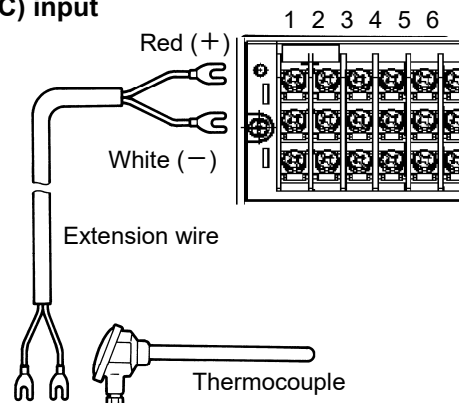
Isolation of measured input terminal

TC · mV(+), RTD(A) terminal and TC · mV(-), RTD(B) terminal are insulated each channels but RTD(B) terminal is short-circuited between channels. KR2P*0 is short-circuited between channel 1 to 4, 5 to 8, 9 to 12, and KR2P*1 is short-circuit all channel.

3) Connection of thermocouple (TC) inputs

Be sure to use thermocouple wires (or extension wires) to the input terminals of this recorder. If a copper wire is used halfway, a noticeable measuring error occurs. Don't use a pair of thermocouple wires in parallel with other instruments (controller, etc.), otherwise a malfunction may occur.

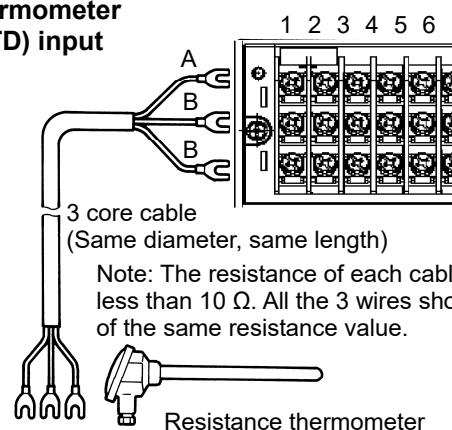
● Thermocouple (TC) input



4) Connection of resistance thermometer (RTD) input

Use a 3-core cable where each lead wire has an equal resistance value. Don't use one resistance thermometer in parallel with other instruments (controller, etc.).

● Resistance thermometer (RTD) input



Warning

■ ⚠ mark of measuring input terminals

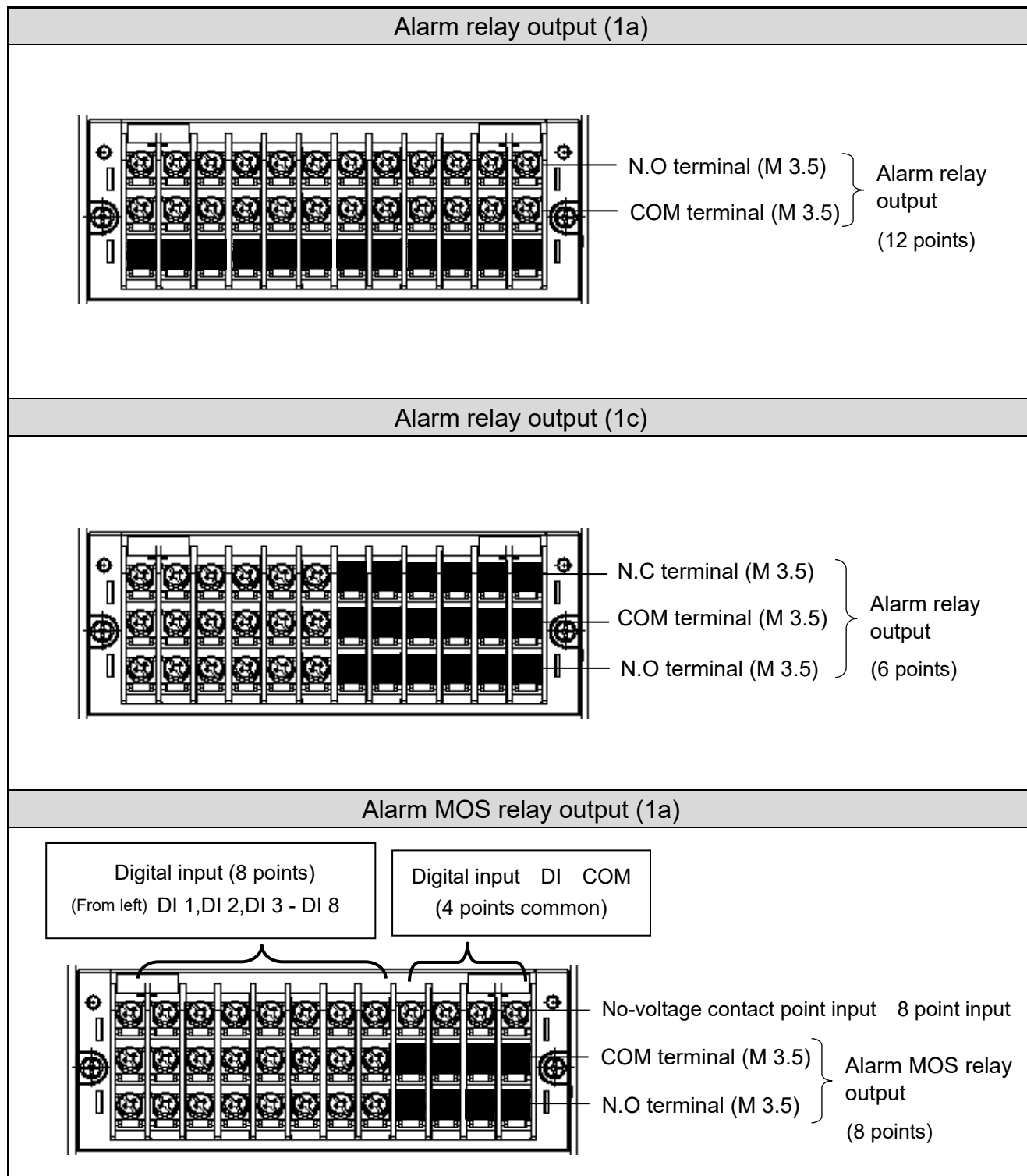
A high voltage may be applied to the measuring input terminals due to common mode noises. The allowable noise value is lower than 30 V AC or lower than 60 V DC. Make sure that the noises are lower than the allowable values. Mount the terminal cover after connections for the purpose of preventing an electric shock and to protect the input wires. In the case of thermocouple input, the mounting of the terminal cover can reduce the reference junction compensation error.

4.5 Connection of alarm output terminals (option)

This is for the recorder with alarm output terminals (option).

1) Alarm output terminal

The terminal arrangement depends upon the type of alarm output.



2) Connections

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

- (1) Connect cables to the load via a buffer relay.
- (2) Use cables with the crimp style terminals with insulation sleeves for the alarm output terminals.
- (3) If a voltage of more than 30 VAC or 60 VDC is to be applied to the output terminals, use type O crimp style terminals with insulation sleeves. Furthermore, use double-insulated wires (dielectric strength of 2300 VAC or more) for the signal wires on which a voltage of more than 30 VAC or 60 VDC is to be applied. For all other wires, use basic insulated wires (dielectric strength of 1390 VAC). Be sure to mount the terminal cover to prevent an electric shock.

Example of MOS relay and mechanical relay 'a' contact output	Example of mechanical relay 'c' contact output
<p>This recorder</p> <p>⌞ : Contact point protective element (It is recommended to mount this element on the a side)</p>	<p>This recorder</p> <p>⌞ : Contact protective element (It is recommended to mount this element on the a side)</p> <p>*N.C terminal - Open relay contact at alarm activation that is the reverse action to N.O terminal.</p>

Warning

■ mark of alarm output terminals

Connect a load not exceeding the specified contact capacity to the alarm output terminals. A buffer relay power supply is applied to the alarm output terminals after connections. Do not touch these terminals since an electric shock will occur. Be sure to mount the terminal cover after connections.

Caution

■ Take a safety measure

An alarm output of this recorder may become defective caused by wrong operation, failures, and other abnormal inputs. Take a safety measure against an output failure before use as occasion calls.

3) Precautions for connection

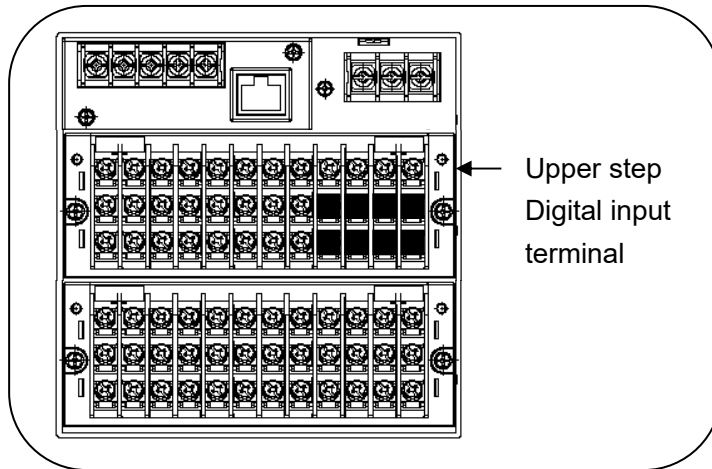
Be careful with the following cautions for connections.

Item	Contents														
Contact rating of MOS relay outputs	●Maximum voltage...240V (AC,DC) ●Maximum current...50mA (AC,DC) * Irrespective of load types (Minimum load)														
Contact rating of Mechanical relay outputs (Common to 'a' contact and 'c' contact)	<table><tr><th>Power supply</th><th>Resistive load</th><th>Inductive load</th></tr><tr><td>100 V AC</td><td>0.5 A</td><td>0.2 A</td></tr><tr><td>240 V AC</td><td>0.2 A</td><td>0.1 A</td></tr><tr><td>30 V DC</td><td>0.3 A</td><td>0.1 A</td></tr></table>	Power supply	Resistive load	Inductive load	100 V AC	0.5 A	0.2 A	240 V AC	0.2 A	0.1 A	30 V DC	0.3 A	0.1 A	(Minimum load) 100μA 100mVDC	
Power supply	Resistive load	Inductive load													
100 V AC	0.5 A	0.2 A													
240 V AC	0.2 A	0.1 A													
30 V DC	0.3 A	0.1 A													
Mounting of contact protective element Z	●Mount a contact protective element conforming to the buffer relay. The MOS relay is broken, if a signal exceeding the contact rating is applied even momentarily. ●To prevent a malfunction being caused by a light load, the most effective mounting position for the element is on the coil side of the buffer relay ('a' in the connection diagrams under (2) on 5.5)														
Selection of buffer relay	(1) Coil rating ... Less than the contact rating of output terminals (2) Contact rating ... More than twice the load current A coil surge absorption element built-in type relay is recommendable. Mount an additional buffer relay if a buffer relay satisfying the load rating is not available.														
Selection of contact protective element	Mount a contact protective element if a surge absorption element built-in buffer relay is not available. This element is generally composed of C (capacitor) and R (resistor). <Reference value of C·R> C:0.01μF (Rating around 1kV) R:100 to 150Ω (Rating around 1W)														

4.6 Connection of digital input terminals and function selection (option)

This is for the recorder with digital input terminals (option)

1) Digital input terminal



Remarks

Features of digital input terminal

- Voltage when the contact is open :
Approx. 5 V
- Current when contact short :
Approx. 2 mA

2) Connections

Turn off the power supply before connections to prevent an electric shock.

- (1) Apply a no-voltage contact signal to digital input terminals.
- (2) Use cables terminated by crimp style terminals with insulation sleeves for the digital input terminals.

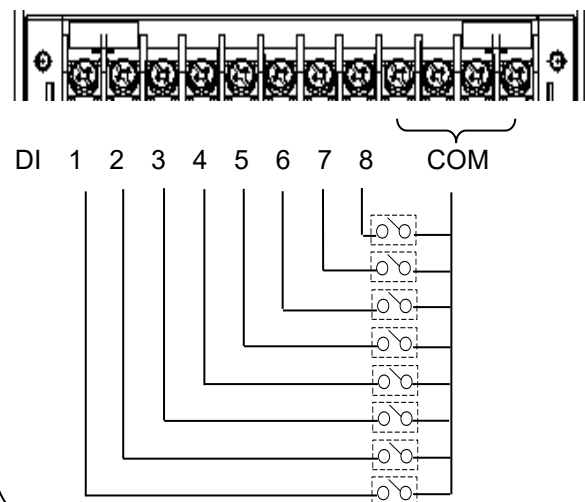


Caution

■ No voltage contact input

For the contact to be connected to the Digital input terminal, use a switch or relay driven at lower than 30 V AC or lower than 60 V DC, or manual contacts for very light loads.

■ Connection example



■ Function of the terminals

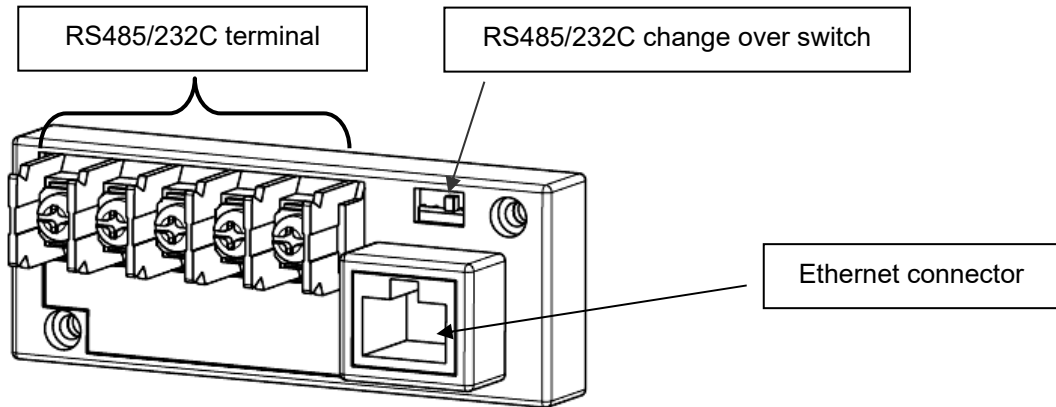
- | | |
|---------------------|---|
| (1) Digital input | ON/OFF (short/open) state can be measured. Select the range type as DI.
(Refer to Para.10.3 Input operation settings.) |
| (2) Pulse input | Used as the pulse input. Select the range type as Pulse (+) and Pulse (-).
(Refer to Para.10.3 Input operation settings.) |
| (3) Totalizer reset | The reset of totalizer is executed. When the digital input terminal specified becomes ON, the totalizer reset is executed.
(Refer to Para.10.7 Totalizer reset settings.) |
| (4) Marker | The writing of marker. The marker can be written on the trends when the digital input terminals become ON.
(Refer to Para. 10.9 Marker text settings.) |
| (5) File drive | The recording start/stop of data file in the internal memory is executed.
The recording starts or stops when the digital input terminals become ON or OFF.
(Refer to Para. 10.6 File settings.) |

* Each function requires a short circuit of 0.1 second or more between the COM terminal and each terminal.

4.7 Connection of communication I/F terminal (partly option)

The KR2000 can be communicated with a master unit via Ethernet and RS-232C or RS-485, and with a slave unit via RS-485.

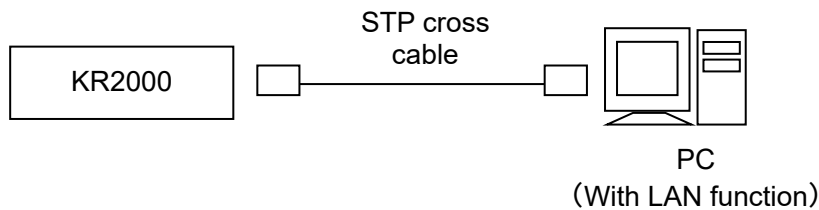
*RS-485/232C terminal and serial communication function are optional



1) In case of high order communications via Ethernet

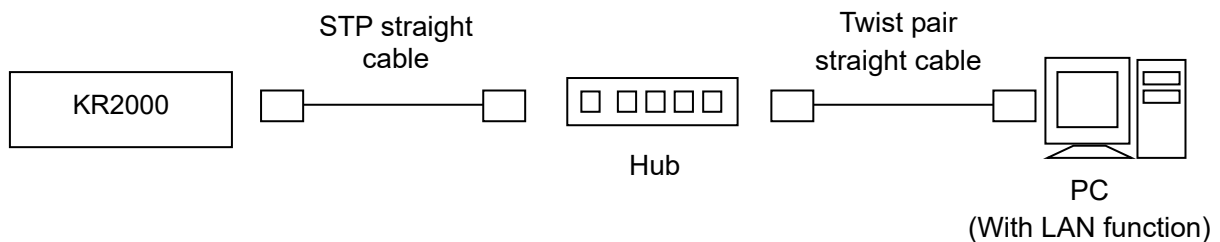
[In case of connection with a PC by 1 to 1]

To connect PC and KR2000 on one-to-one basis, use the STP crossover cable.

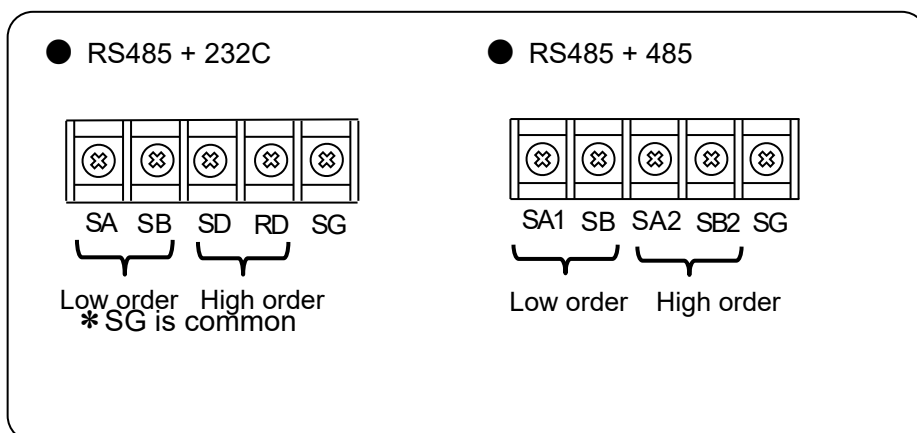


[In case of connections with PCs by N to N]

For the connection to multiple PCs or an existing LAN, use a switching hub and an STP straight cable between the hub and the Ethernet IF.



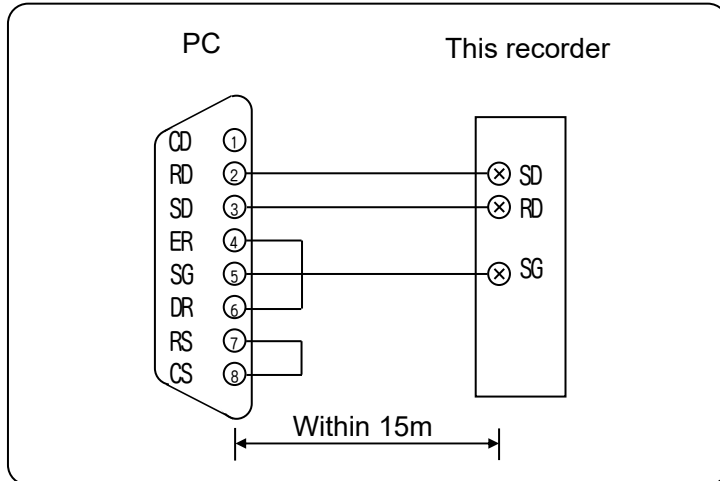
2) Types of communication terminal (option)



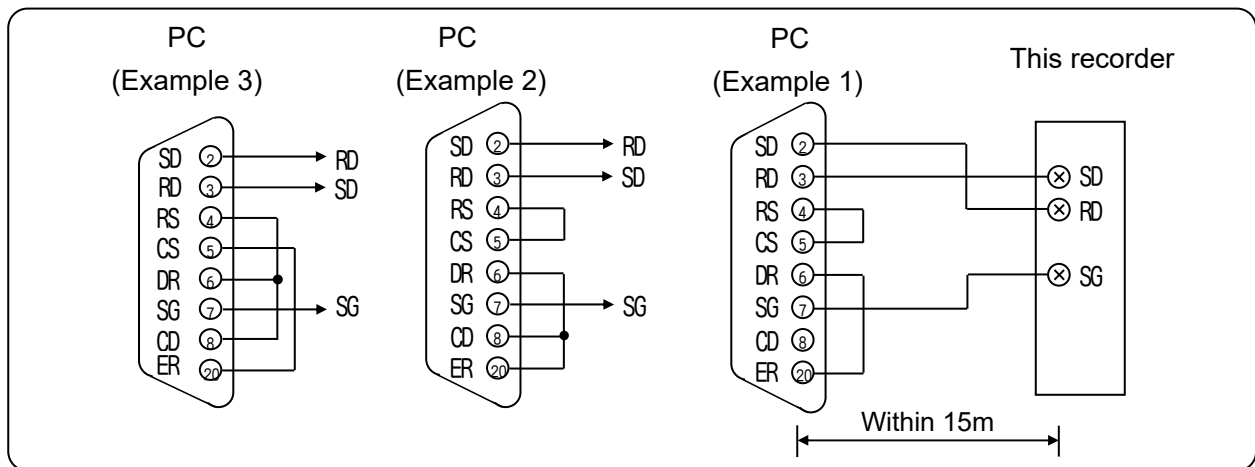
3) Connection of High order communication RS-232C

The communication terminals of this recorder are three terminals of SD, RD and SG and a control signal is not used. General personal computers use the control signal. Wiring processing for control signal in a connector depends upon how the control signal is used in a personal computer. For details, refer to the instruction manual for your personal computer.

(1) Example of 9 pin connector

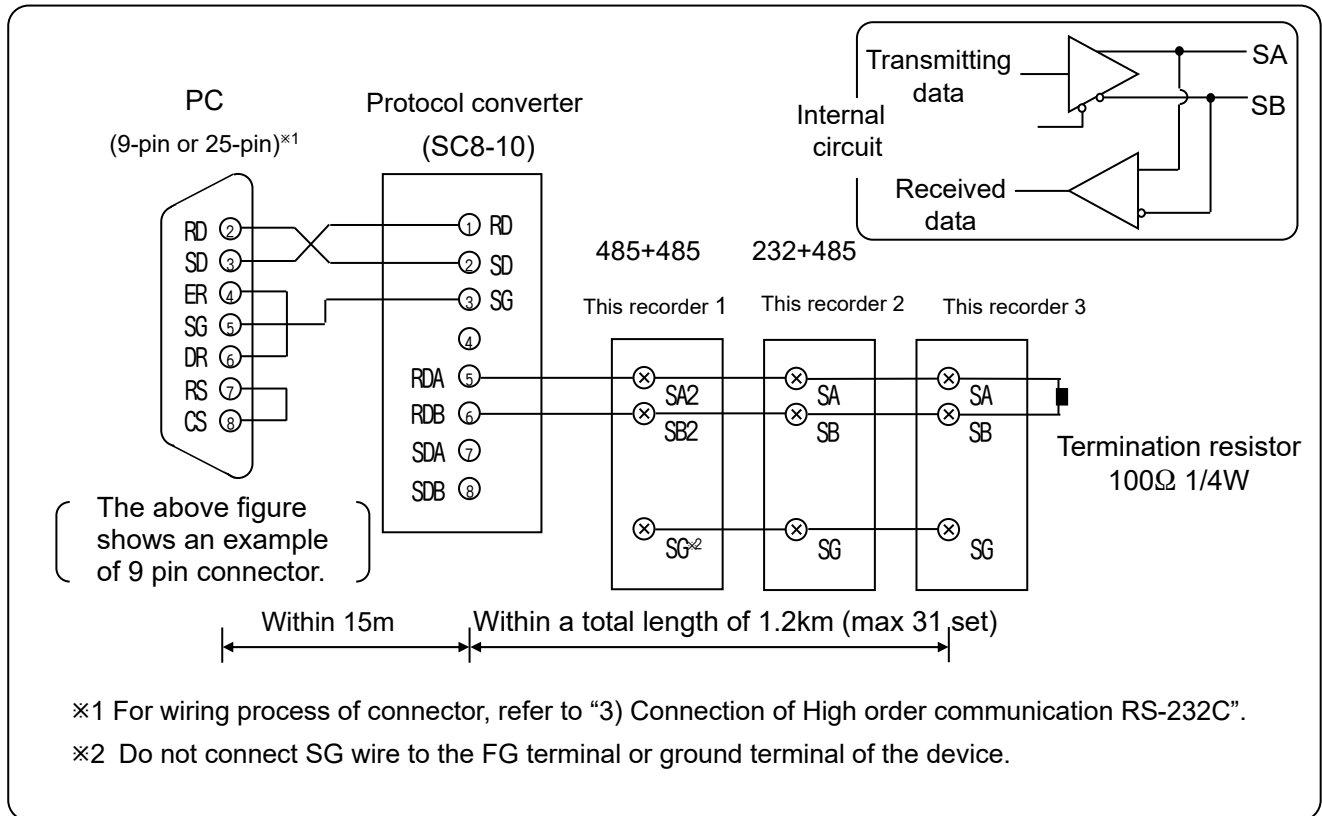


(2) Example of 25 pin connector



4) Connection of High order communication RS-485

The RS-485 communications interface is connected to a personal computer via a protocol converter (our Model SC8-10: sold separately). Three signals of SD, RD and SG are used between the protocol converter and a personal computer and a control signal is not used. Wiring process of connector similar to “3) Connection of High order communication RS-232C” on the previous page, is necessary.



Remarks Mounting termination resistor

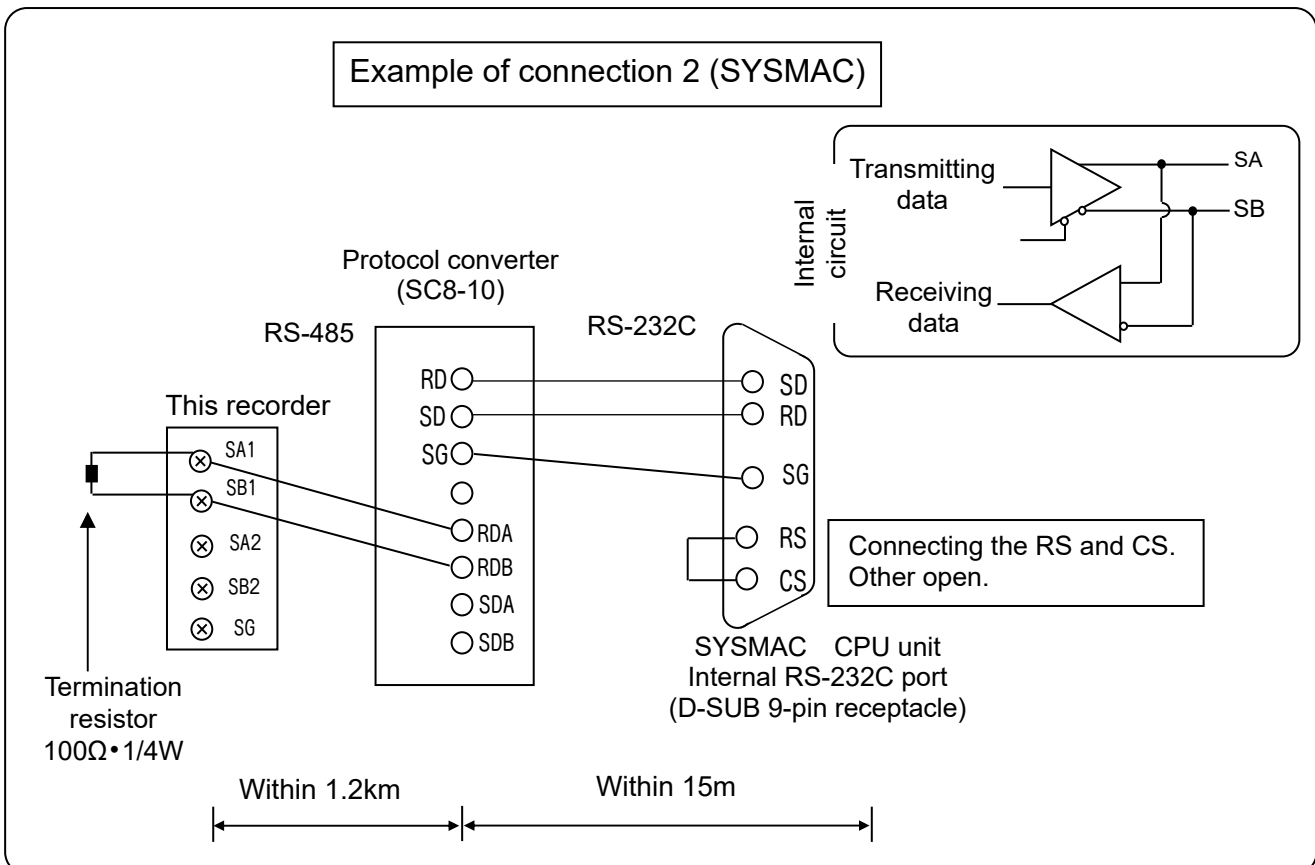
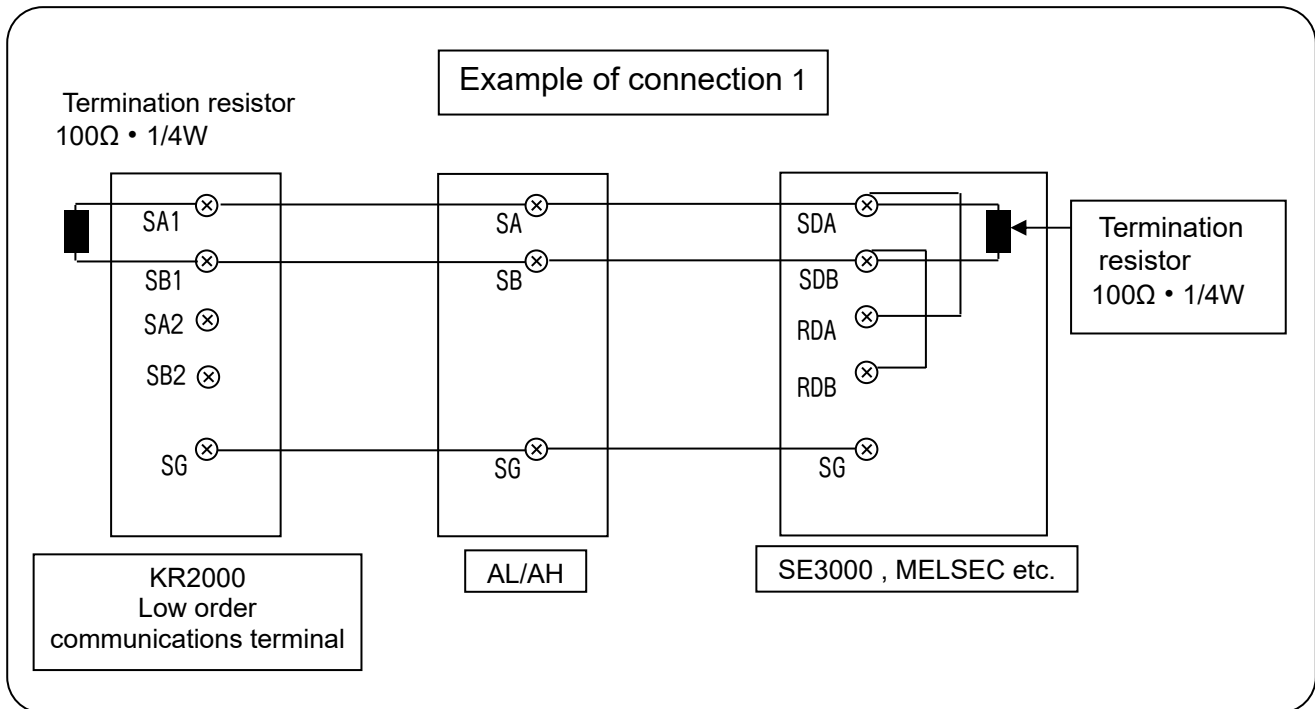
To ensure the transmission of data via RS-485 communications, mount a termination resistor at both ends of transmission lines.

(General metal film resistors will be fine. They are available from us, place an order.)

When the protocol converter (SC-8) is at an end of a transmission circuit, short the terminals of ④ and ⑤ of the unit to insert the termination resistor automatically.

5) Connection of Low order communication RS-485

Connect SA1, SB1 of KR2000 and SA, SB of low order connected instrument like the following figure. Refer to instruction manual of each instrument for detail method of low order instrument connection.



Remarks Mounting termination resistor

To ensure the transmission of data via RS-485 communications, mount a termination resistor at both ends of transmission lines.

(General metal film resistors will be fine. They are available from us, place an order.)

When the protocol converter (SC-8) is at an end of a transmission circuit, short the terminals of ④ and ⑤ of the unit to insert the termination resistor automatically.

5 Main features and functions

This instrument measures temperature and various industrial quantities for multiple channels, and displays the measurement result with various formats including real time trend graph, bar graph, and numeric value on the 5.6-inch TFT color LCD. Also, data stored in the internal memory can be copied and stored in USB memory when needed. You can analyze the copied data using the analysis software (ZAILA-P) specifically designed for our products. Security functions such as login control and audit trail are also provided.

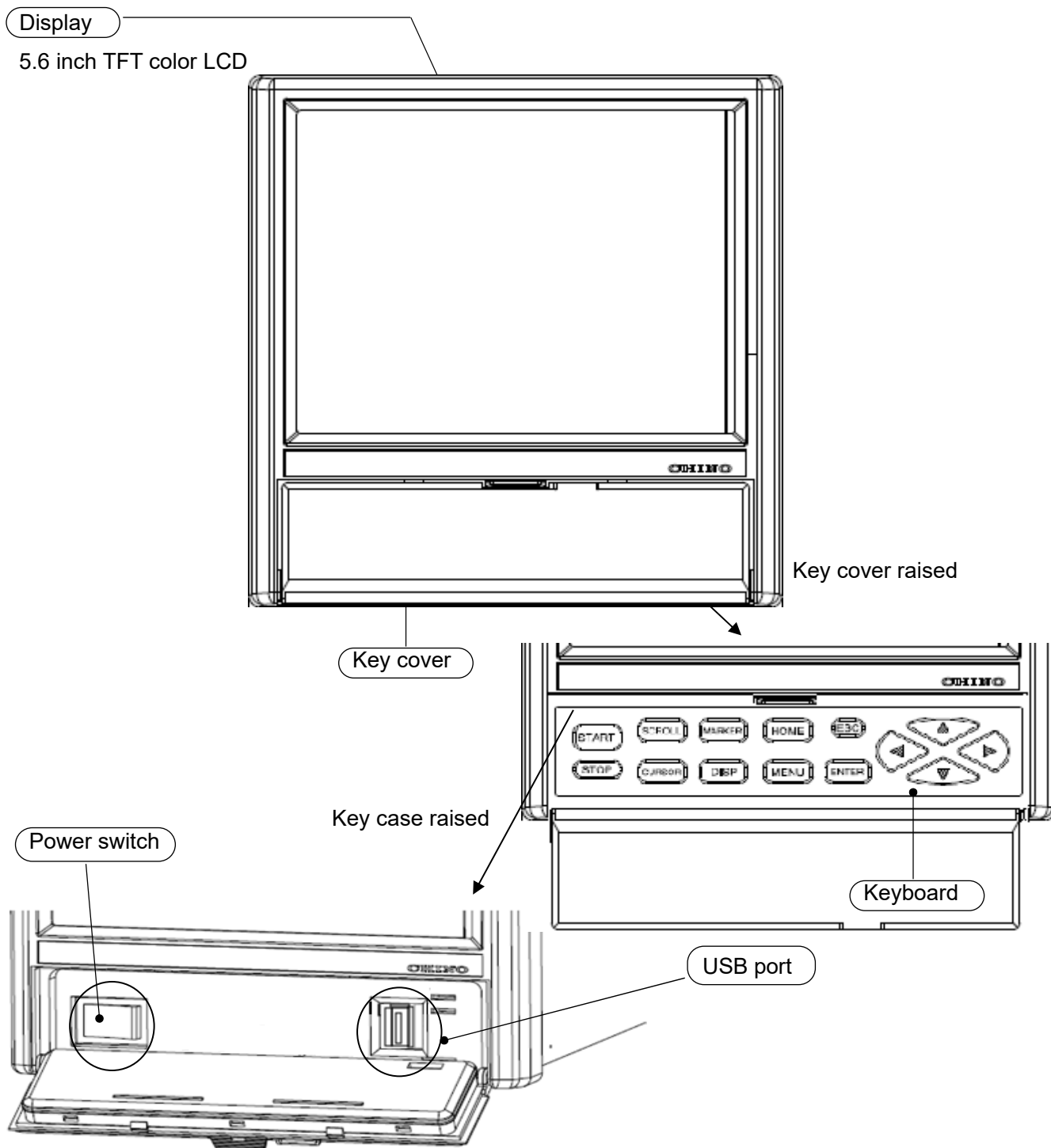
Easy management of measurement result	The monitoring of measurement results is easy since the data are displayed on various formats of screens. Also, recorded data can be stored in USB memory and replayed on a PC using our analysis software (ZAILA-P).
Various screen displays	Various types of screen display are available including real time trend, historical trend, bar graph and numeric value (in a table format). Selecting and combining different types of display is possible, and this enables you to conduct monitoring on the screen optimized for your need. The alarm display screen that shows a list of past alarm activations, marker list screen and audit trail screen are also available.
Recording condition settings	Start/stop of recording data can be set by arbitrary condition settings of key operation, alarm, clock settings, etc.
Memory function	Normally, data is stored in the internal memory. Stored data or setting files can be copied and stored in USB memory.
Analog recorder feeling	As the trend screen displays data on a chart with scale plates and pointers, the data can be monitored like analog recorder.
Security	Various security functions are available, such as login control, audit trail and setting history file. *Audit trail provides the information of date, content and user name regarding operations and changes made.
Marker function	Marker and marker text can be written on the trend screen being recorded. You can register marker texts in advance for easier operation. *Marker cannot be written to the data of previous files.
Easy system construction	Optional high/low order communication function enables communication with devices equipped with MODBUS protocol, without creating communication software. (MODBUS: The registered trademark of Schneider Electric SA)
Consumables not required	Since consumables like charts, pens and inks as used in recorders are not required, this recorder is clean and less time consuming.
Easy setup	Setting of each parameter is done by key operation selecting an item from the menu and setting it on the setting screen. This interactive manner of setting enables easy setup.
Software package is available	Data analysis can be executed easily on the PC as software package for data analysis is available. <ul style="list-style-type: none"> • ZAILA-P (analysis software)

Remarks

Display of audit trail —
 "Audit trail" and "Audit trail information" are abbreviated as "Audit" and "Audit info" respectively on the screen of this instrument.

6 Part names and functions

6.1 Name of the front panel and its major functions













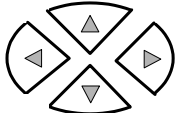
⚠ Caution

■ Front glass

- The front of display part is made by glass. To avoid injuries due to broken glass, do not blow the glass hard.
- Do not scratch or press the display with knives or other sharp objects.
- To remove dirt on the front side, wipe it gently with a soft cloth dampened with neutral detergent or alcohol.

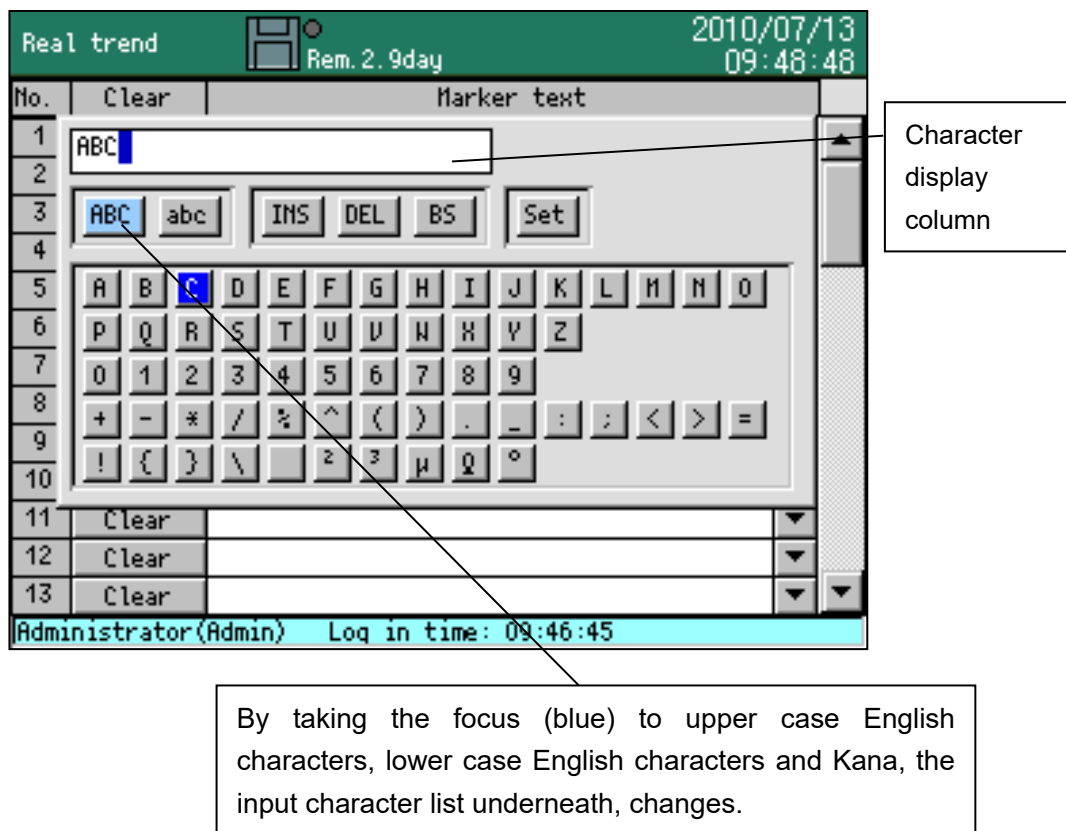
6.2 Name of keys and their functions

• Usage and functions of keys differ depending on the operation screen and the setting screen.

Key	Key of each screen and their major functions and methods of using	
	Operation screen	Setting screen
	The recording starts	Not used
	The recording stops	Not used
	Used for switching of the scroll mode and for moving to historical trend screen	Not used
	Used for switching the cursor mode in the historical trend screen	Not used
	Used to write a marker on the trend screen.	Not used
	Used to display the DISP menu.	A snapshot is taken by pressing this key for a long time.
	Used to display the specifications confirmation screen.	Used to exit the specifications confirmation screen.
	Used to display the setting screen.	Used to return to the previous screen.
	Used for canceling menus or for returning to a previous screen	Used to return from the setting screen to the operation screen or return to a previous screen.
	Used to enter a menu item or display the ENTER menu.	Used to open a selected menu or enter a numeric value, a character, etc. selected by the cursor. Also, used to store a parameter when the setting screen returns to the operation screen.
 Direction keys	Use to select a menu item or change a display group and a channel.	Used to move the cursor to the left, right, up and down.

6.3 Method of inputting the characters

- This screen is used for setting a tag name, a marker text character string and setting/entering a password.



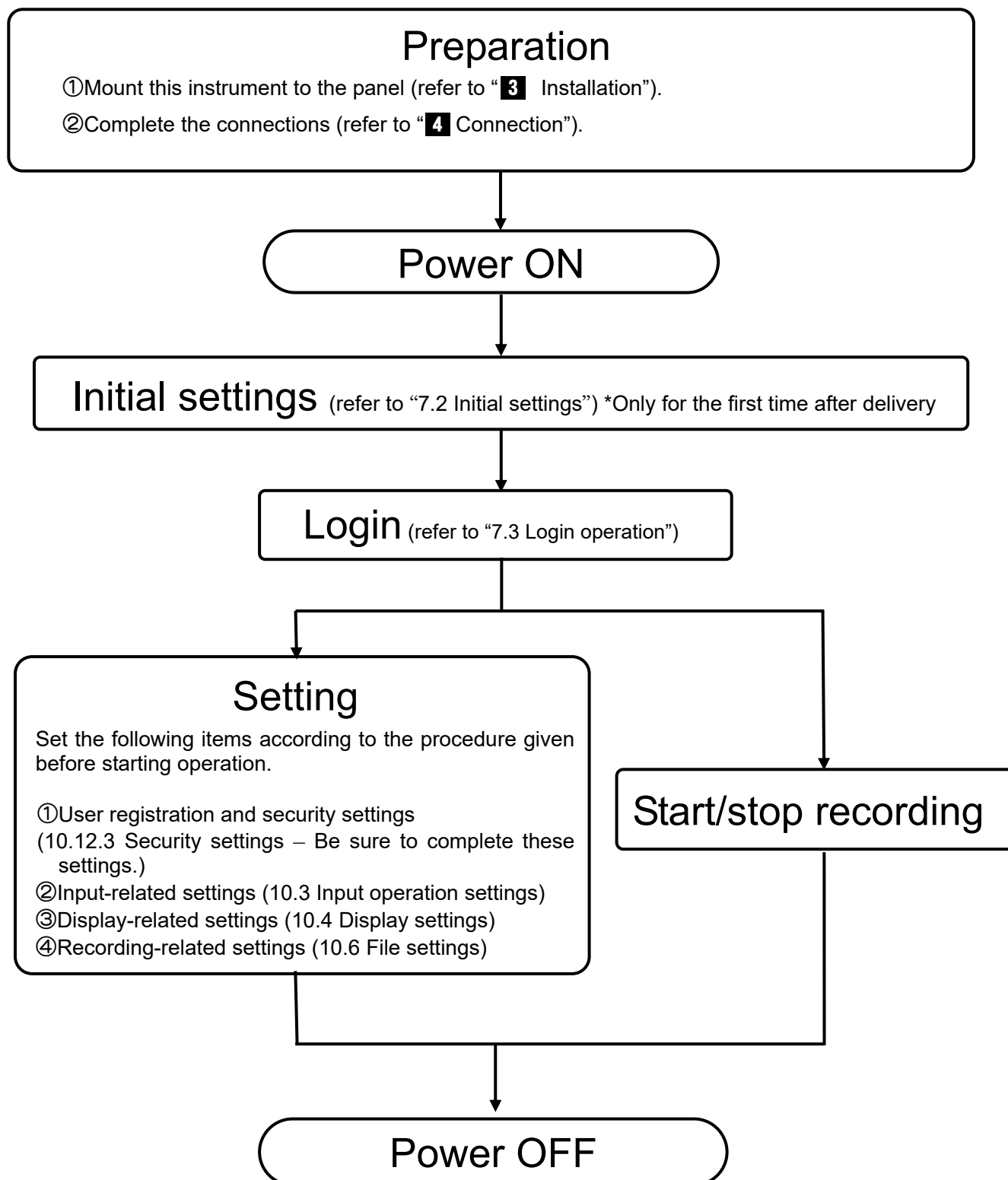
When character input screen is displayed, if down key of the direction key is clicked, after taking the focus (blue) to upper case English characters and kana etc. the focus moves to the below column. When the focus (blue) moves to the below column, move the focus using the arrow key up to the character to be entered and then click the **ENTER** key. Selected character is displayed in the character display column.

- ABC** Alphabet capital letters, symbols and numeric can be entered.
- abc** Alphabet small letters, symbols and numeric can be entered.
- INS** Insert or overwrite can be selected.
(Inserting and overwriting are switched each time this key is pressed.)
- DEL** A character selected on the character input column is deleted.
- BS** The character being one position before the character selected on the character input column, is deleted.
- Set** Inputted characters are entered. Inputted characters are also entered by pressing the **ENTER** key after moving the focus to the character input column.

7 Operation (Be sure to read section 1 to ensure safety.)

7.1 Operation procedure

Default values are set at factory before shipment. Be sure to set the following items before you start actual operation.



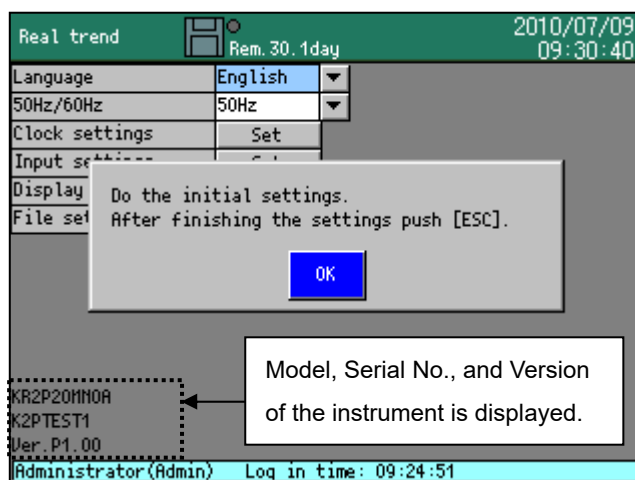
- There may be some pixels always kept illuminated or unilluminated on the LCD screen, and also there may be unevenness in brightness. However, these are not signs of malfunction since these cases can occur due to the nature of LCD.

7.2 Initial settings

When you first turn on the power after the delivery of the instrument or initializing the settings, the initial settings screen will be displayed. Set the following parameters which are the minimum requirements for operation.

- Language
- Power frequency 50Hz/60Hz
- Clock settings
- Input settings
- Display settings
- File settings

You can leave these items without setting. In this case, default settings will be effective.

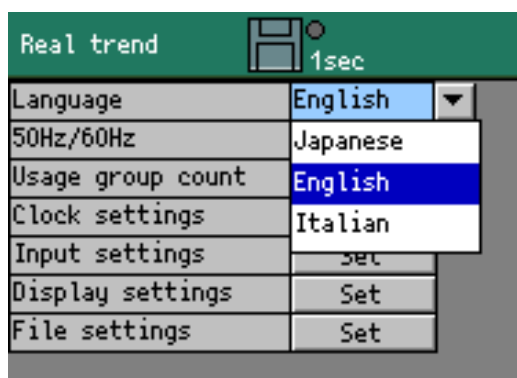


Press the **ENTER** key to delete the message and start the settings.

① Language setting

Move the cursor to the “Language” item with the direction key and press the **ENTER** key to show the pulldown menu.

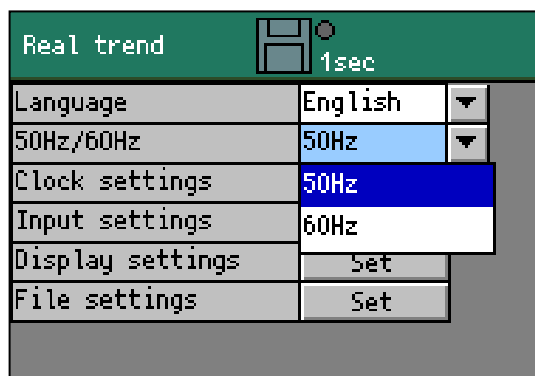
Select either “Japanese”, “English” or “Italian” from the pulldown menu and then press the **ENTER** key to set it.



② Power frequency setting

Move the cursor to the “50Hz/60Hz” item with the direction key and press the **ENTER** key to show the pulldown menu.

Select either “50Hz” or “60Hz” from the pulldown menu with the direction key and press the **ENTER** key to set it. Check the frequency of the power supply you use before setting this item.



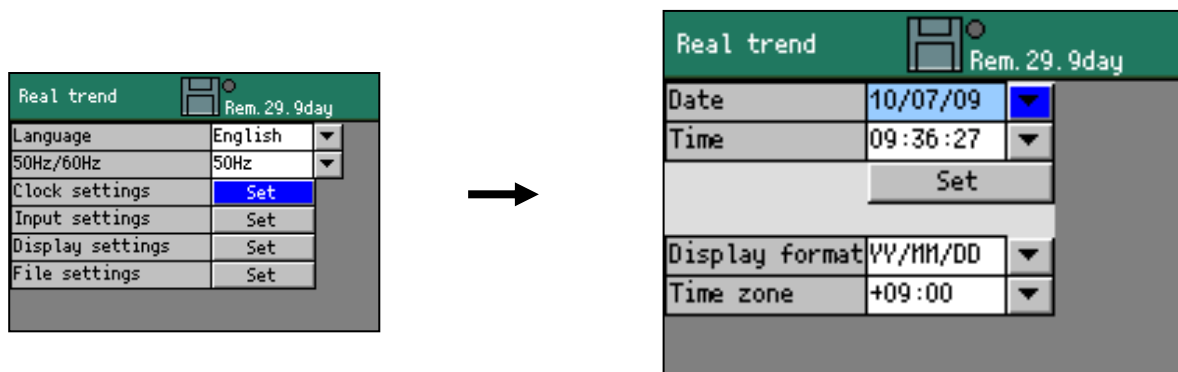
Reference About power frequency setting

This setting is used for input noise (power frequency) filtering.

Make sure to set this to 60Hz when you use the instrument in the 60Hz band and there is an influence of power frequency noise (setting to 60Hz may improve the noise removal characteristic).

③ Clock settings

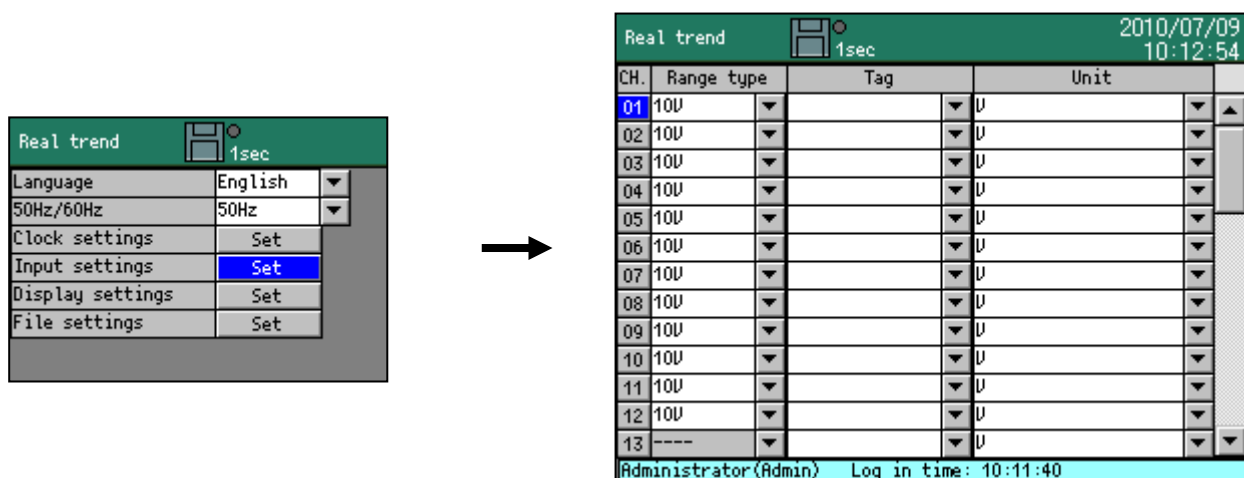
Move the cursor to the “Clock settings” item with the direction key and press the **ENTER** key to display the following clock settings screen.



*For detailed settings, refer to “10.12.1 Clock settings”.

④ Input settings

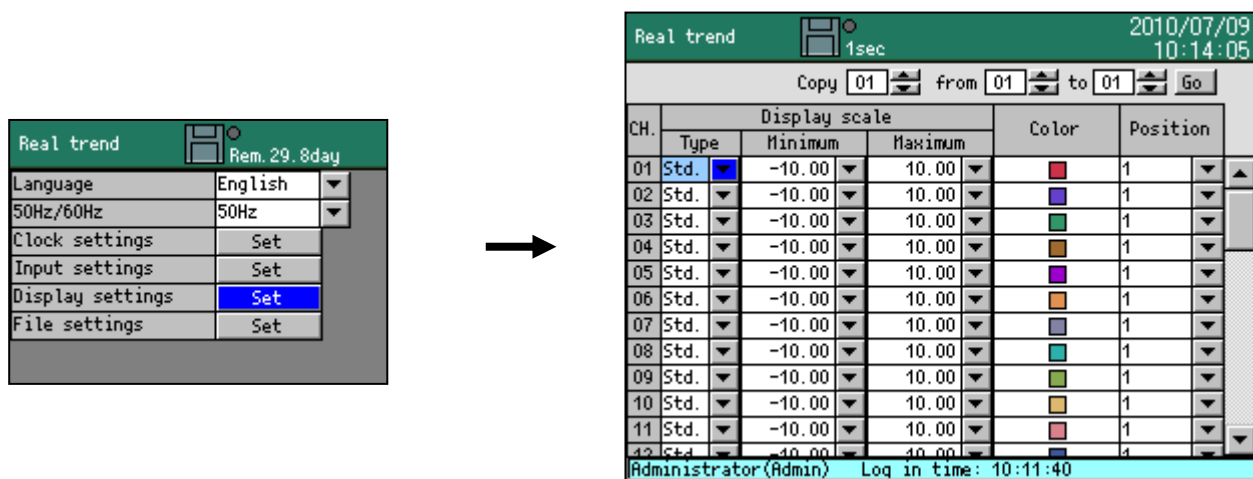
Move the cursor to the “Input settings” item with the direction key and press the **ENTER** key to display the following input settings screen.



*For detailed settings, refer to “10.3 Input operation settings”.

⑤ Display settings

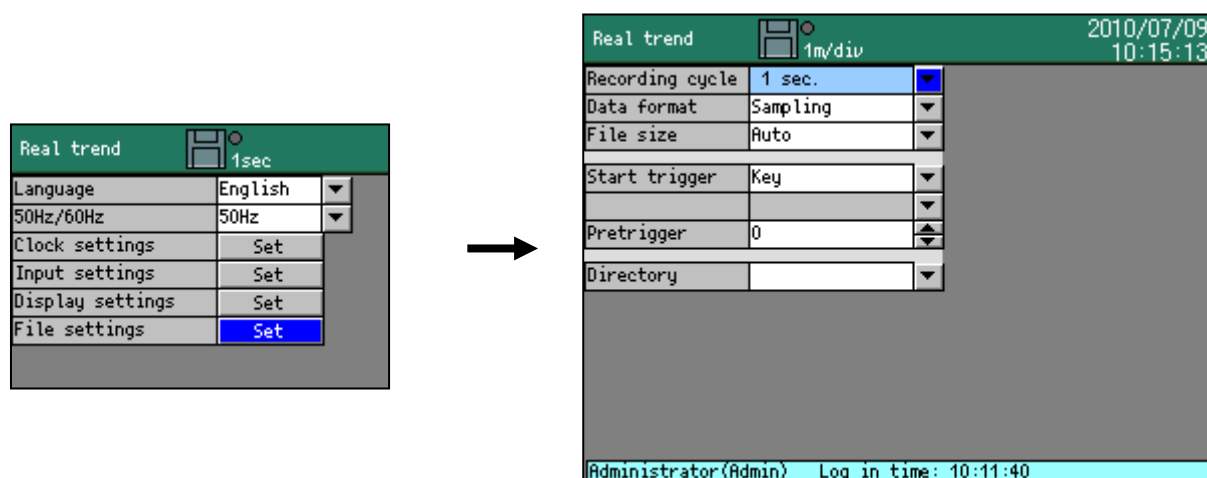
Move the cursor to the “Display settings” item with the direction key and press the **ENTER** key to display the following display settings screen.



*For detailed settings, refer to “10.4.1 Channel parameters”.

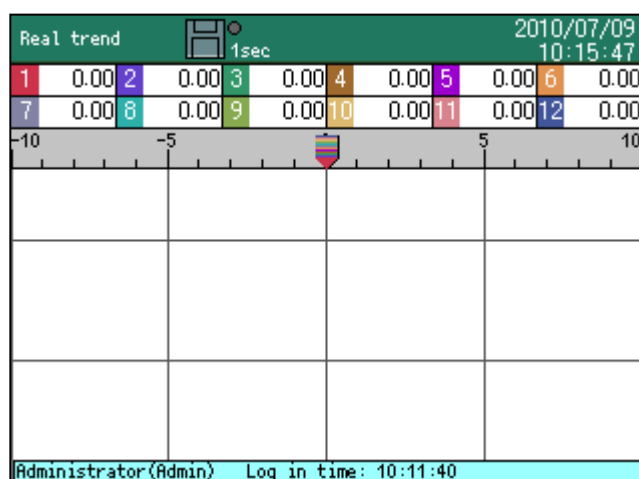
⑥ File settings

Move the cursor to the “File settings” item with the direction key and press the **ENTER** key to display the following file settings screen.



*For detailed settings, refer to “10.6 File settings”.

⑦ Press the **ESC** key to display the trend screen.



⑧ Proceed to the login operation (refer to “7.3 Login operation”).

7.3 Login Operation

7.3.1 Outline

This instrument is operated by two types of users: administrator user and general user. See the following table for details of each user.

User type	Operation	Max number of users	Main purpose of login
Administrator user	All settings and operations	5	Initial settings, change of security settings, significant setting change due to system change, etc.
General user	Limited settings and operations (Authority level can be set)	100	Regular operations such as changing settings for each operation, monitoring and handling recorded data.

*You must login to use this instrument with user ID and password. Login is not necessary for initial settings which you perform after the delivery of the instrument, but it will be required after completing the initial settings.

*User passwords should be kept confidential.

*Change a user password immediately if it is revealed (or potentially revealed) to anyone (refer to “7.7 How to change login password”).

***Make sure to complete user registration when you first turn on the instrument after delivery. Refer to “7.6 User registration” for procedure.**

7.3.2 Initial login (after delivery)

When you first login after the delivery of the instrument, you need to set a login password.

<Login steps>

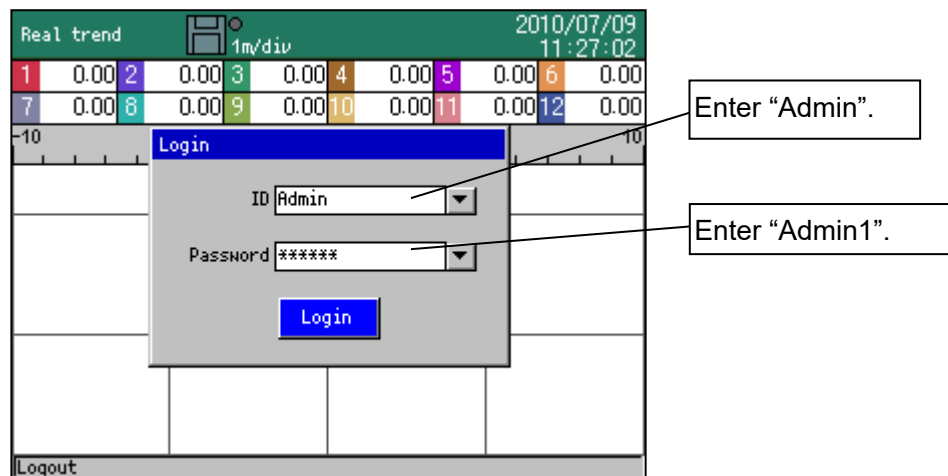
- ① Pressing any key displays the following login screen.

The screenshot shows a login interface on a device. At the top, there's a status bar with 'Real trend', a save icon, 'Rem. 29.9day', and the date/time '2010/07/09 11:26:04'. Below this is a grid of 12 data points, each with a colored number (1-12) and the value '0.00'. A 'Login' dialog box is overlaid in the center. It has a blue title bar, an 'ID' dropdown menu set to 'Admin', a 'Password' text field, and a 'Login' button. At the bottom left of the screen, there is a 'Logout' button.

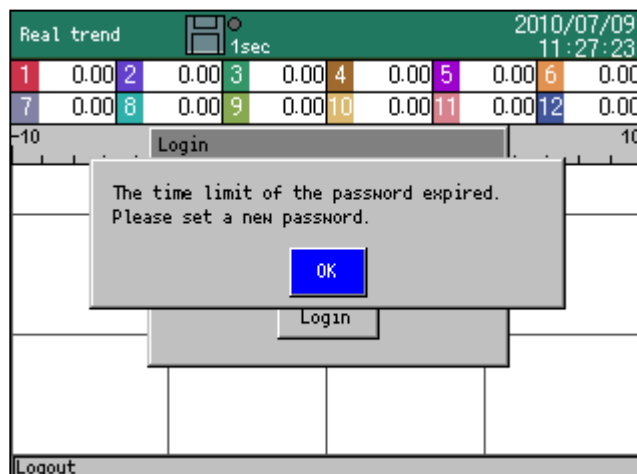
② Enter an administrator user ID and password.

Defaults are shown below.

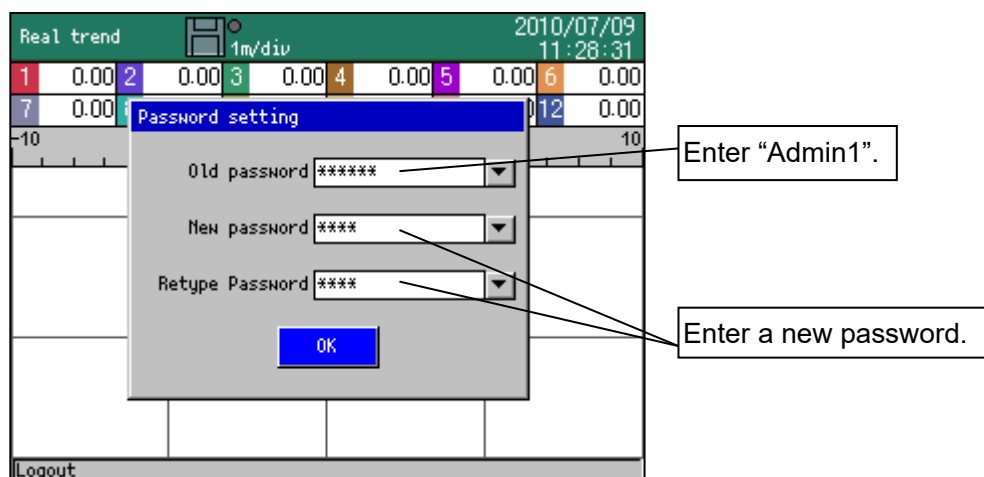
ID	Admin
Password	Admin1



When you press the **ENTER** key, the message "Please set a new password" will be displayed.



③ Enter a new login password and move the cursor to [OK] and then press the **ENTER** key.



- ④ Move the cursor to [Login] and press the **ENTER** key to login.

The screenshot shows a real-time trend monitoring interface. At the top, it displays 'Real trend' on the left, a disk icon and 'Rem. 29. 8day' in the center, and the date '2010/07/09' and time '11:28:46' on the right. Below this is a grid of 12 data points, each with a colored number and a value of '0.00'. A 'Login' dialog box is centered over the grid. The dialog has a title bar 'Login' and contains two input fields: 'ID' with the text 'Admin' and a dropdown arrow, and 'Password' with the text '****' and a dropdown arrow. Below these fields is a blue 'Login' button. At the bottom left of the interface, there is a 'Logout' button. The background of the interface has a scale from -10 to 10.

1	2	3	4	5	6
0.00	0.00	0.00	0.00	0.00	0.00
7	8	9	10	11	12
0.00	0.00	0.00	0.00	0.00	0.00

- ⑤ Proceed to user registration with reference to “7.6 User registration”.

Remarks About user registration

Register two or more administrator users. Keep the passwords secure and be careful not to forget them. In case that all the registered administrator users become unable to login (lock-out), an administrator user login will become impossible from that time forward. In this case, contact your nearest CHINO office.

7.3.3 Initial login (for newly registered user)

You need to set a login password for a newly registered administrator/general user. Refer to “7.6 User registration” for details.

<Login steps>

- ① Pressing any key in the logout status displays the following login screen.

Real trend 1sec 2010/07/09 12:57:05

1	0.00	2	0.00	3	0.00	4	0.00	5	0.00	6	0.00
7	0.00	8	0.00	9	0.00	10	0.00	11	0.00	12	0.00

Login

ID Admin

Password

Login

Logout

- ② Enter user ID and password.

Enter a password according to the tables below. See the table on the left for administrator user, and the table on the right for general user.

<Default passwords of administrator user>

	Default password
Administrator user 1	Admin1
Administrator user 2	Admin2
Administrator user 3	Admin3
Administrator user 4	Admin4
Administrator user 5	Admin5

<Default passwords of general user>

	Default password
General user 1	User1
General user 2	User2
:	:
:	:
General user 100	User2

Real trend 1sec 2010/07/09 12:57:54

1	0.00	2	0.00	3	0.00	4	0.00	5	0.00	6	0.00
7	0.00	8	0.00	9	0.00	10	0.00	11	0.00	12	0.00

Login

ID User1

Password User1

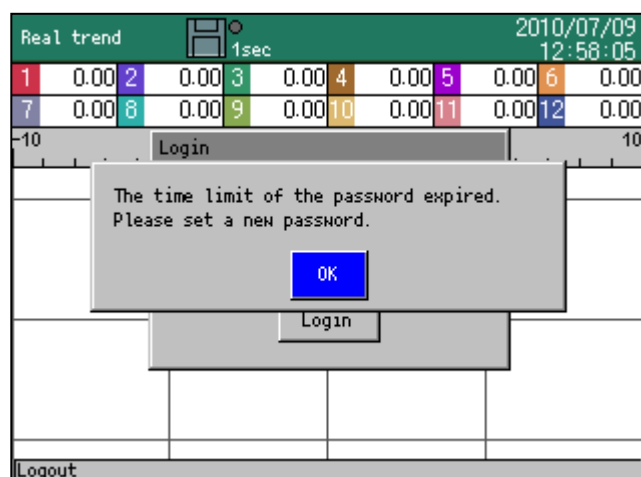
Login

Logout

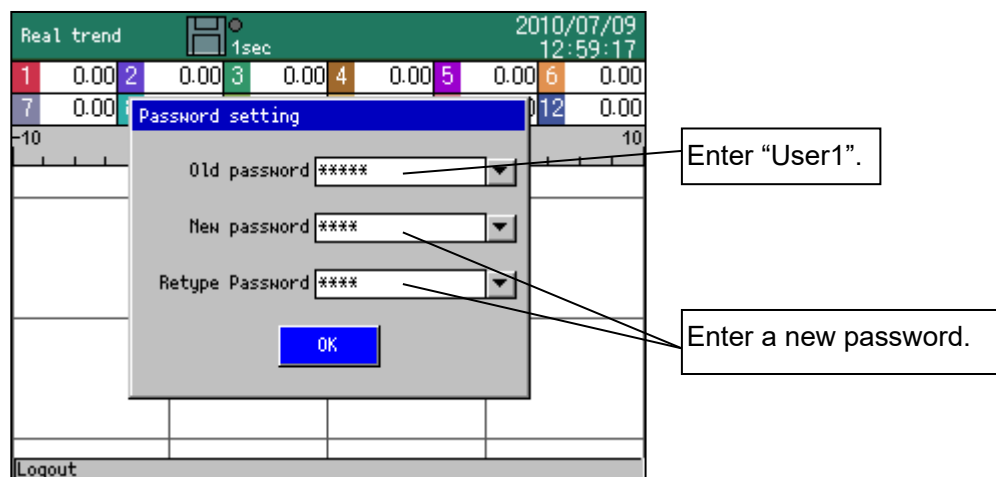
Enter a registered administrator/general user ID. In this example, “User1” is entered as the ID of the general user 1.

Enter a default password. In this example, “User1” is entered since the user ID is general user 1.

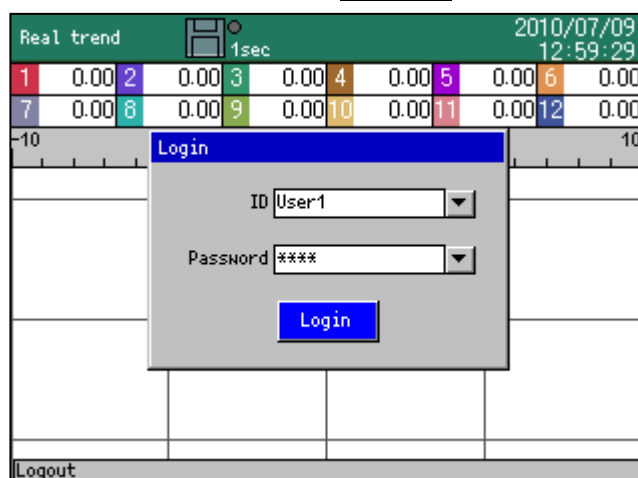
- ③ Move the cursor to “Login” and press the **ENTER** key. The message “Please set a new password” will be displayed.



- ④ Enter old and new passwords and move the cursor to “OK” and then press the **ENTER** key.



- ⑤ Move the cursor to “Login” and press the **ENTER** key to login.

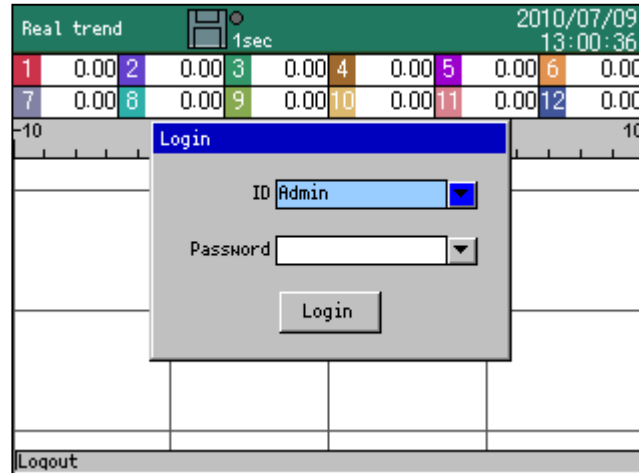


- ⑥ You can login with the normal steps from the next time (refer to “7.3.4 Normal login”).

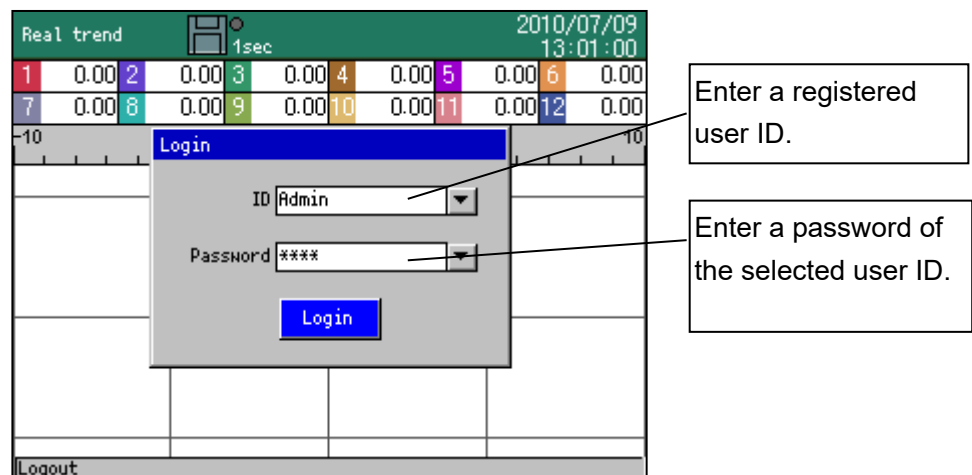
7.3.4 Normal login

<Normal login steps>

- ① Pressing any key displays the following login screen.



- ② Enter user ID and password.



- ③ Move the cursor to “Login” and press the **ENTER** key to login.

7.4 Start/stop operation of recording

[Start recording]

- Press the **START** key.

[Stop recording]

- Press the **STOP** key.

Reference Recorded data

This instrument is the protection specification, so the recorded data can't be overwritten.
When internal memory remaining space is insufficient, delete the recorded data.
Refer to "8.9 Recorded data screen".

7.5 Logout

- Press the **DISP** key and select "Logout" from the menu and then press the **ENTER** key.

7.6 User registration

7.6.1 Administrator user registration

- From the setting menu, select [System settings] - [Security settings] – [Administrator user settings] then press the **ENTER** key to display the following screen.
- You can register as an administrator user or initialize a password from this screen.
- Enter ID and full name.
- Refer to "7.3.3 Initial login (for newly registered user)" for login operation.

***Make sure to register two or more administrator users.**

***You cannot set previously used IDs and full names (up to 1000 previous IDs/full names).**

<Administrator user registration screen>

	ID	Full name	Password
1	Admin	Administrator	Clear
2	Admin2	Administrator2	Clear
3			Clear
4			Clear
5			Clear

Administrator(Admin) Log in time: 11:51:45

Initialize a password.
Refer to "7.7 How to change login password"
for password setting.

ID	Set a login ID required when you login to the instrument.
Full name	Set a user name displayed in the lower left of the screen.

<Administrator user default passwords>

	Default password
Administrator user 1	Admin1
Administrator user 2	Admin2
Administrator user 3	Admin3
Administrator user 4	Admin4
Administrator user 5	Admin5

Remarks About user registration

Register two or more administrator users. Keep the passwords secure and be careful not to forget them. In case that all the registered administrator users become unable to login (lock-out), an administrator user login will become impossible from that time forward. In this case, contact your nearest CHINO office.

7.6.2 General user registration

- From the setting menu, select [System settings] - [Security settings] - [General user settings] then press the **ENTER** key to display the following screen. You can register as a general user, initialize a password or set an authority level from this screen.
 - Enter ID, full name and authority level.
 - Refer to “7.3.3 Initial login (for newly registered user)” for login operation.
- *You cannot set previously used IDs and full names (up to 1000 previous IDs/full names).**

<General user registration screen>

ID	Full name	Authority	Password
1 User1	user	1	Clear
2 User2	user2	1	Clear
3		1	Clear
4		1	Clear
5		1	Clear
6		1	Clear
7		1	Clear
8		1	Clear
9		1	Clear
10		1	Clear
11		1	Clear
12		1	Clear
13		1	Clear

Administrator (Admin) Log in time: 11:51:45

Initialize a password. Refer to “7.7 How to change login password” for password setting.

ID	Set a login ID required when you login to the instrument.
Full name	Set a user name displayed in the lower left of the screen.
Authority	Set the functions used by general user (refer to “10.12.3 Security settings”).

<General user default password>

	Default password
General user 1	User1
General user 2	User2
:	:
:	:
General user 100	User100

7.6.3 User deletion

- From the setting menu, select [System settings] - [Security settings] – [Administrator user settings] or [General user setting] then press the **ENTER** key to display the following screen.
- Delete the ID name of the user you wish to delete.
 - *You cannot delete the ID of an administrator user who is currently logging in.

<General user registration screen>

	ID	Full name	Authority	Password
1	User1	user1	1	Clear
2	User2	user2	2	Clear
3			1	Clear
4			1	Clear
5			1	Clear
6			1	Clear
7			1	Clear
8			1	Clear
9			1	Clear
10			1	Clear
11			1	Clear
12			1	Clear
13			1	Clear

Administrator(Admin) Log in time: 15:34:53



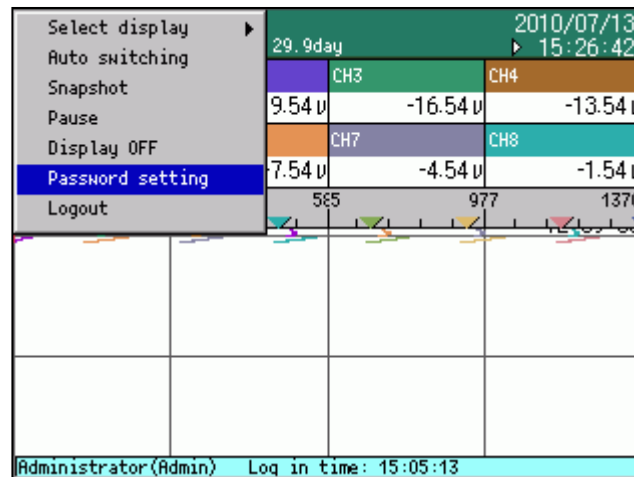
	ID	Full name	Authority	Password
1	User2	user2	2	Clear
2			1	Clear
3			1	Clear
4			1	Clear
5			1	Clear
6			1	Clear
7			1	Clear
8			1	Clear
9			1	Clear
10			1	Clear
11			1	Clear
12			1	Clear
13			1	Clear

Administrator(Admin) Log in time: 15:34:53

7.7 How to change login password

- ① Press the **DISP** key on the trend screen. Select [Password setting] from the menu and press the **ENTER** key.

<Trend screen>



- ② Enter the current password and a new password. After that, move the cursor to [OK] and press the **ENTER** key.

*If the password security is "High", combination of number, capital letters and small letters is necessary.

<Password setting screen>

Enter the current password.

The screenshot shows the 'Password setting' dialog box overlaid on the 'Real trend' screen. The dialog box has three input fields: 'Old password', 'New password', and 'Retype Password', each followed by a dropdown arrow. An 'OK' button is at the bottom. The background screen shows a table of voltage readings for five channels (CH1 to CH5). The bottom status bar indicates 'Administrator(Admin)' and 'Log in time: 15:05:13'.

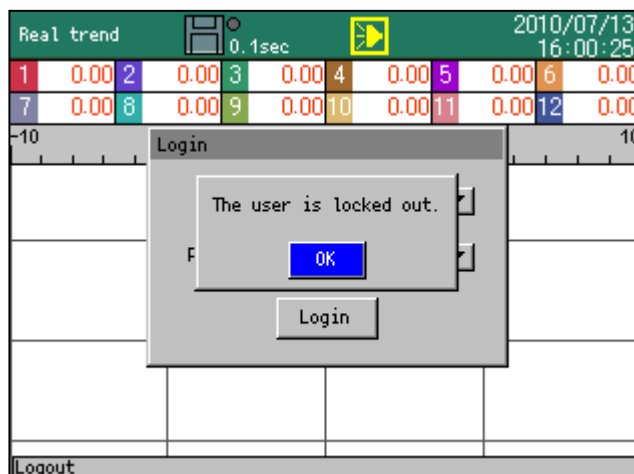
Channel	Row 1	Row 2	Row 3
CH1	-175		
CH2			
CH3			
CH4			
CH5	-2		

Enter a new password.

7.8 How to cancel lock-out

- If a failed login attempt exceeds the limit, further login attempts by the user will be blocked (lock-out)
*Threshold for login failure can be changed according to “10.12.3 Security settings”.

<Login screen (locked out)>



- To cancel lock-out, you need to login as an administrator user and clear the password of the user being locked out. After clearing the password, the default password will become effective.
*If an administrator user is locked out, another administrator user can cancel lock-out by taking the steps above.

<General user setting screen>

The user being locked out is highlighted in red.

Real trend

 5s/div 

2010/07/13
16:01:39

	ID	Full name	Authority	Password	
1	User1	user1	Atrty1	Clear	
2	User2	user2	Atrty1	Clear	
3			Atrty1	Clear	
4			Atrty1	Clear	
5			Atrty1	Clear	
6			Atrty1	Clear	
7			Atrty1	Clear	
8			Atrty1	Clear	
9			Atrty1	Clear	
10			Atrty1	Clear	
11			Atrty1	Clear	
12			Atrty1	Clear	
13			Atrty1	Clear	
Administrator(Admin) Log in time: 16:00:54					

Lock-out can be cancelled by clearing ([Clear]) the password.

8 Names and functions of operation screen

8.1 Common operations of the operation screen

(Using method of each key)

START

The recording is started and the data is stored in the internal memory when the recording conditions are met. When the recording conditions are not met, the instrument will be put into a standby state and will start recording when the conditions are met. If a deviation from the recording conditions occurs, the instrument will be put into a standby state.

STOP

The recording is stopped.

DISP

The DISP menu is displayed.

Menu item	Operation
Select display	Used to change the operation screen type.
Auto switching	Used to turn ON/OFF the automatic switching of channels. The switching becomes active by checking. When the automatic switching time is set to 0, this switching is not valid.
Snapshot	Used to store a hardcopy of screens into the internal memory.
Pause	Screen updates are stopped except status bar. When press any key, the screen is displayed again. All operations except describing of data recording and recording processing are performed during pause. When the DISP key is pushed in the Pause, the Snapshot is executed.
Display OFF	Used to turn off LCD display. The LCD is turned on again by pressing any of buttons.
Password setting	Used to open the password setting screen (refer to "7.7 How to change login password").
Save audit	Used to save audit file.
Logout	Used to logout.

HOME

The specifications confirmation screen is displayed.

MENU

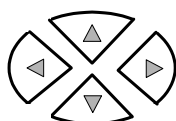
Various setting screens are displayed.

ENTER

Used to make a selected item effective, or display the ENTER menu on the trend screen.

ESC

The screen is returned to a previous screen. In case of the screens of the real time trend, the bar graph and the numerical display, the screens do not return to a previous screen.



For the vertical trend:

Display group is switched by up and down keys and display channel is switched by left and right keys.

For the horizontal trend:

Display channel is switched by up and down keys and display group is switched by right and left keys.

(Displayed data)

Measured data displayed on each screen

Measured data	Contents
(Numeric value)	The values are displayed based on the display scale settings of each channel. The values are displayed with the number of digits after decimal point of the maximum and minimum values of the display scale. When the type is "Exponent", the values are displayed in such exponential format as "1.2E+3". In this case, up to 2 digits after the decimal point of the significand can be set but only 1 digit is displayed depending on the screen.
BURN	Input signal of thermocouple input or resistance thermometer input is interrupted.
OVER	A value above the measurable high limit value (upper limit value + 5% of range) is inputted. Or calculated value is above the value that can be indicated (*).
UNDER	A value below the measurable low limit value (lower limit value - 5% of range) is inputted. Or calculated value is below the value that can be indicated (*).
CAL ER	Calculation error occurred.
RJ ERR	The recorder is abnormal

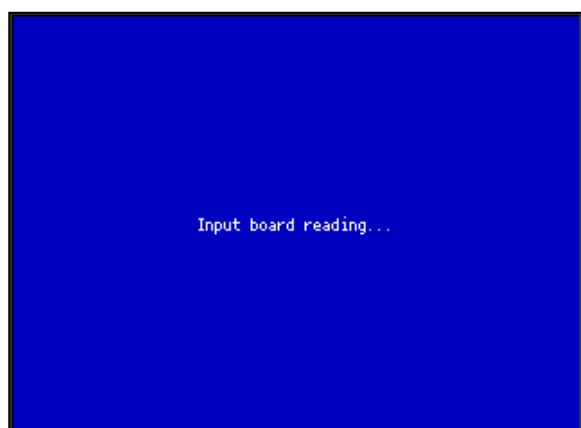
* Range that can be indicated for calculated result as follows.

- Display format is "standard"
Numeric value that exclude decimal point is within ± 30000 (Example: -30.000 to +30.000)
- Display format is "index"
1.00E-15 to 9.99E+15

Excluding the historical data displayed part of the historical trends and the dual trends, the current data (with 0.1 seconds interval) irrespective of the recording interval, etc. is displayed as the numeric displayed data. For slowing down the updating speed, change "Numeric value display update interval". (refer to "10.4.4 Common parameters")

*At power on

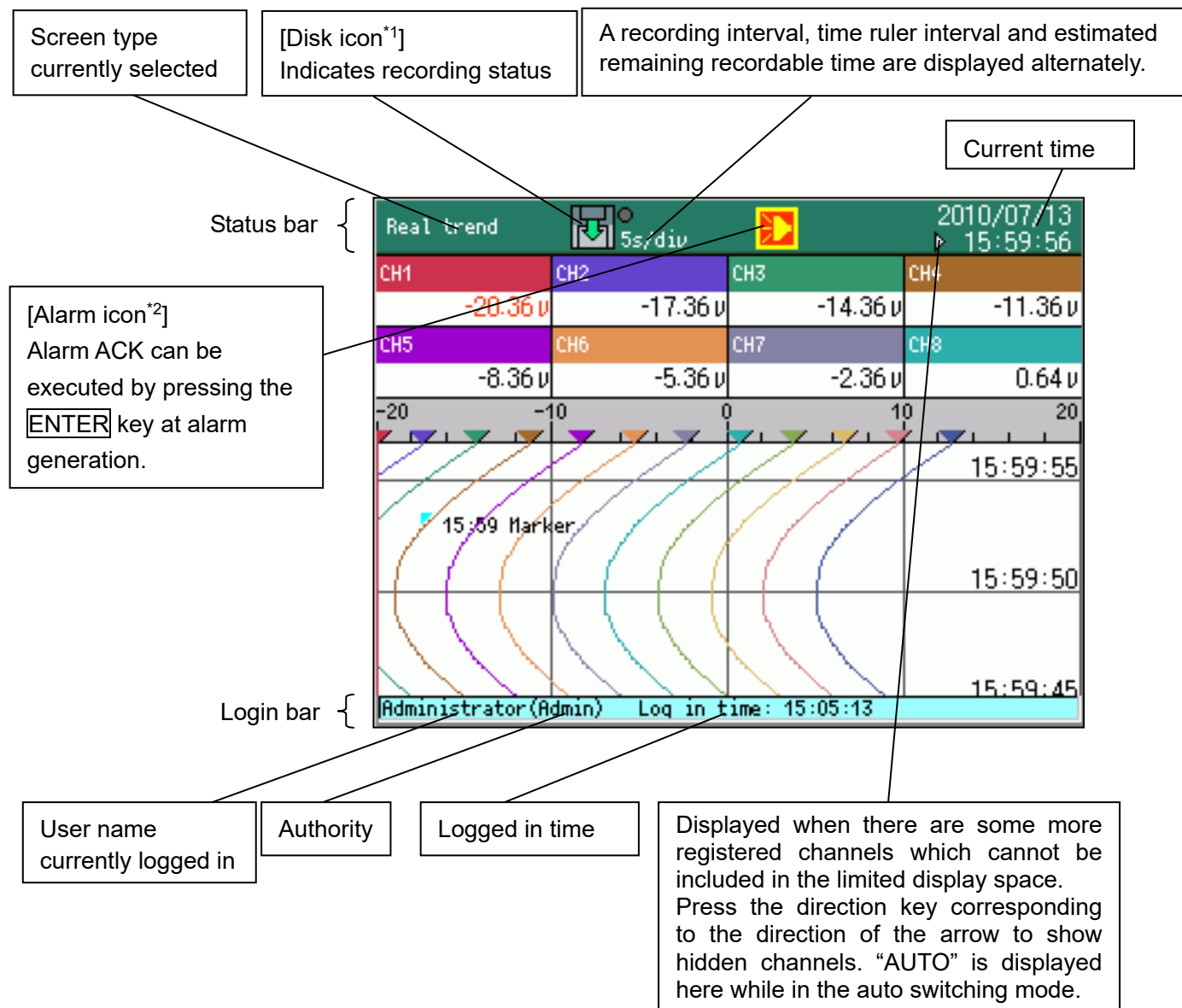
After the power is turned on, messages in the table below are displayed on the blue screen.



Message	Description
Initializing...	Setting file is being read.
Input board reading...	Model discrimination/communication check is being executed for an input device.
Input board writing...	Setting of an input device is being executed.
Reading File...	Measurement data is being read from internal memory.

8.2 Operation screen

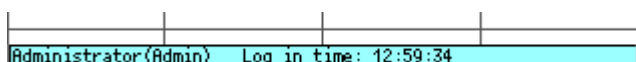
- The status bar and login bar are displayed always on the top and bottom of the screen respectively to show information such as the instrument status.
- Normally the background color is green, but it turns grey outside the scheduled period if you set a schedule (refer to “10.8 Schedule settings”).



(Color of login bar)

The color of the login bar is light blue in a login state, and gray in a logout state.

<At login>



<At logout>



*1 Disc icon



The arrow indicates the recording status.

Arrow	Status
Displaying vertically.	Recording
Blinking.	The [START] key was pressed but the recording is in the standby state since recording conditions are not established.
Not displayed.	Recording is stopped.

Background color is used to indicate the status of the internal memory.

Back color	Status
Gray	The remaining space of the internal memory is 11% or more.
Yellow	The remaining space of the CF card is less than 10%.
Red	The remaining space of the internal memory is 4 Mbytes or less.

The indicator lamp located at the upper right of the icon shows the access status to the internal memory.

Color	Status
Gray	No access is made to the internal memory.
Yellow	Writing to the internal memory starts within approx. 5 seconds.
Red	Accessing to the internal memory.

*2 Alarm icon



The icon shows the activation status and the confirmation status of alarms. To acknowledge alarm (ACK), press the [ENTER] key on the operation screen.

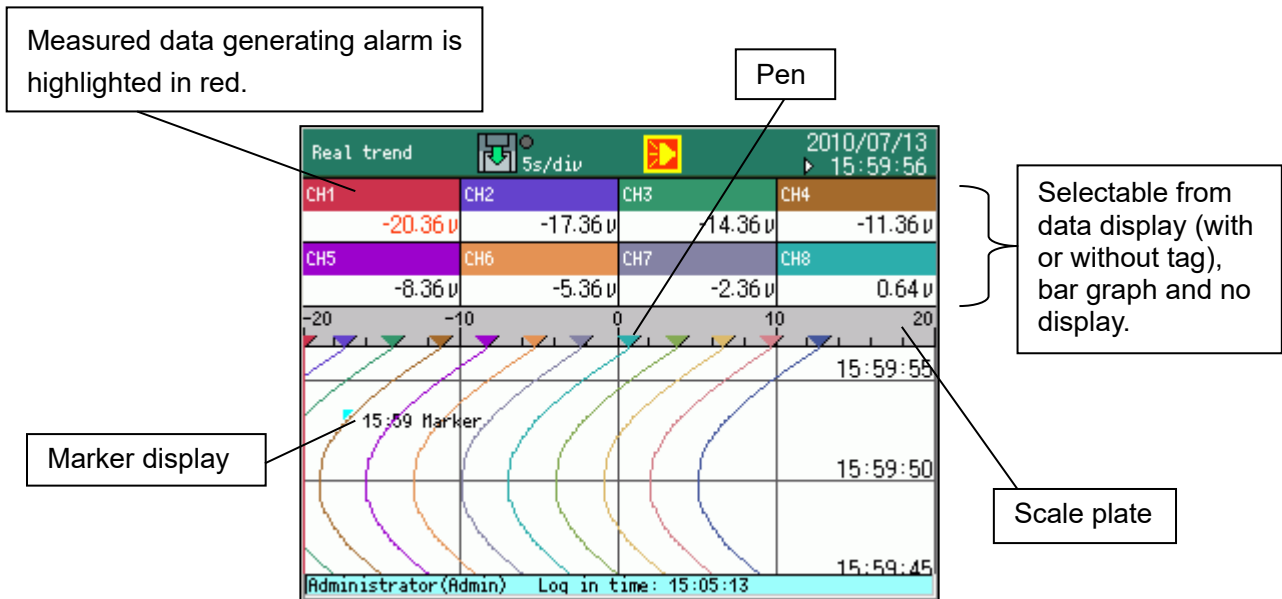
Icon status	Alarm status	Confirmation (ACK) status
Lit	Activated	Confirmed
Icon inside blinking	Activated	Not confirmed yet
Icon blinking	After released	Not confirmed yet
Not displayed	After released or not activated	—

8.3 Real time trend screen

- The trends of measured values can be seen like an analog recorder. The pens are displayed on the scale plates corresponding to the values of “Display position” parameters of each channel.
- When the same “display position” is set to multiple channels, the scale plate, trend and pen are displayed using the display scale of the channel of the smallest number.

[Display style]

- Press the **[DISP]** key and select [Real trend] from the menu.



Pressing the **[ENTER]** key displays the following menu.

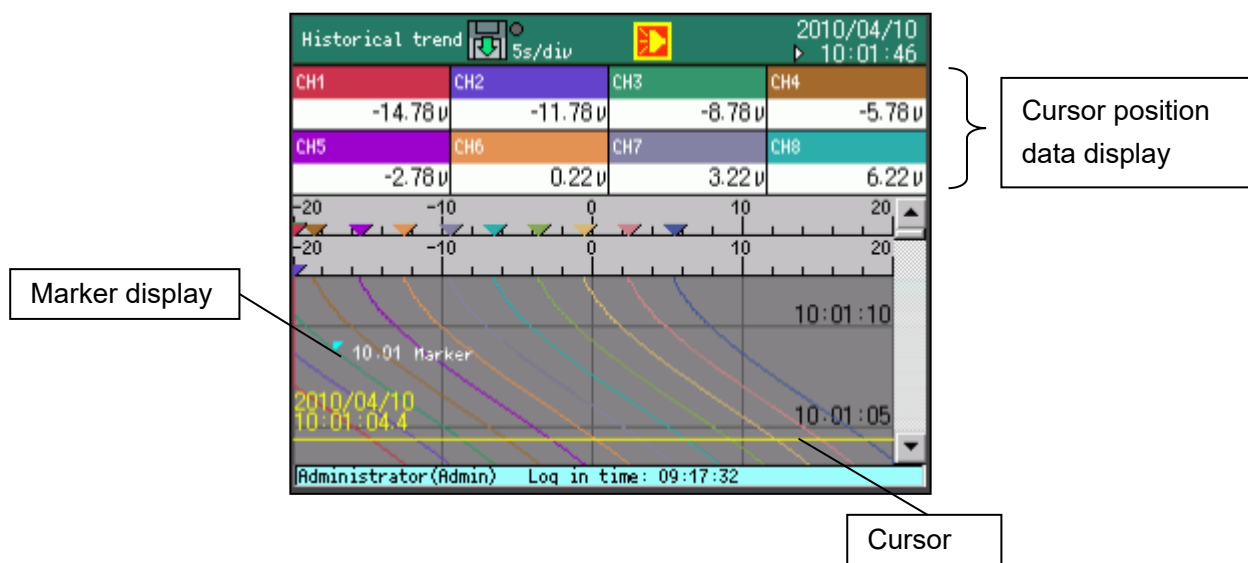
Menu item	Operation
Alarm ACK	Acknowledge alarm (displayed only when alarm is generated).
Magnify/reduce	Zoom in/out the trend display (from the same magnification to 1/60).

8.4 Historical trend screen

- Recorded data in the internal memory is displayed.
- A cursor can be displayed by pressing the **CURSOR** key, and it can be moved using the direction key. You can view a measured value at a specific time corresponding to the cursor position.

[Display style]

- Press the **DISP** key and select [Historical trend] from the menu, or press the **SCROLL** key on the real time trend screen. The latest data will be displayed.
- Press the **DISP** key and select a file from the [Recorded data] screen in the menu. The recorded data of the selected file is displayed.



Pressing the **ENTER** key displays the following menu.

Menu item	Operation
Alarm ACK	Acknowledge alarm (displayed only when alarm is generated).
Magnify/reduce	Zoom in/out the trend display (from the same magnification to 1/60).

When the data format of a display file is set to "highest/lowest", "H" and "L" are displayed in the upper right of the screen as shown in the right figure. This indicates that the currently displayed value is the highest value or lowest value.

Press the **HOME** key to switch it to another.

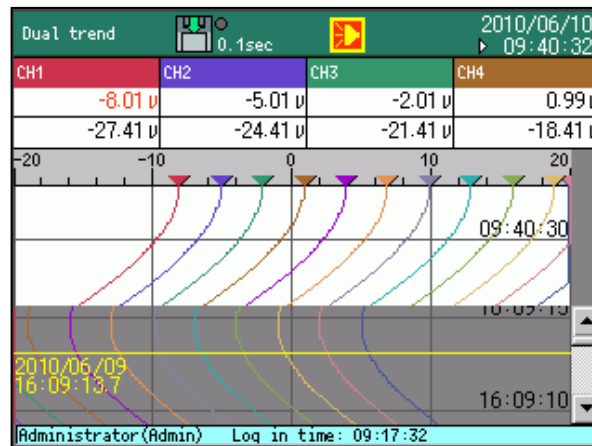


8.5 Dual trend screen

- This screen shows a real time trend and historical trend together, presenting a real time trend above a historical trend. Using this screen, you can compare current and past trends. In the data display section, current values are displayed above the historical values at a cursor position.
- Trends and pens are displayed as in the case of real time trend. However, only one scale plate is displayed without numeric values on it even when a multiple scale plate display has been set.

[Display style]

- Press the **DISP** key and select [Dual trend] from the menu.



Upper part: Current measured values
Lower part: Historical measured values at cursor position

Pressing the **ENTER** key displays the following menu.

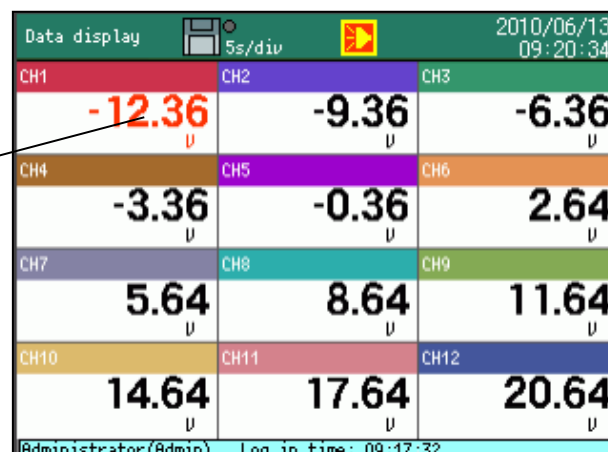
Menu item	Operation
Alarm ACK	Acknowledge alarm (displayed only when alarm is generated).
Magnify/reduce	Zoom in/out the trend display (from the same magnification to 1/60).

8.6 Numeric display screen

- This screen displays the "measured data of each channel" and "alarm activation status".
- The number of display data is decided by the preset "number of display frames" or "registered channels".(Number of display frames: 1, 2, 3, 4, 6, 8, 9, 10, 12, 21, 44)

[Display style]

- Press the **DISP** key and select [Data display] from the menu.



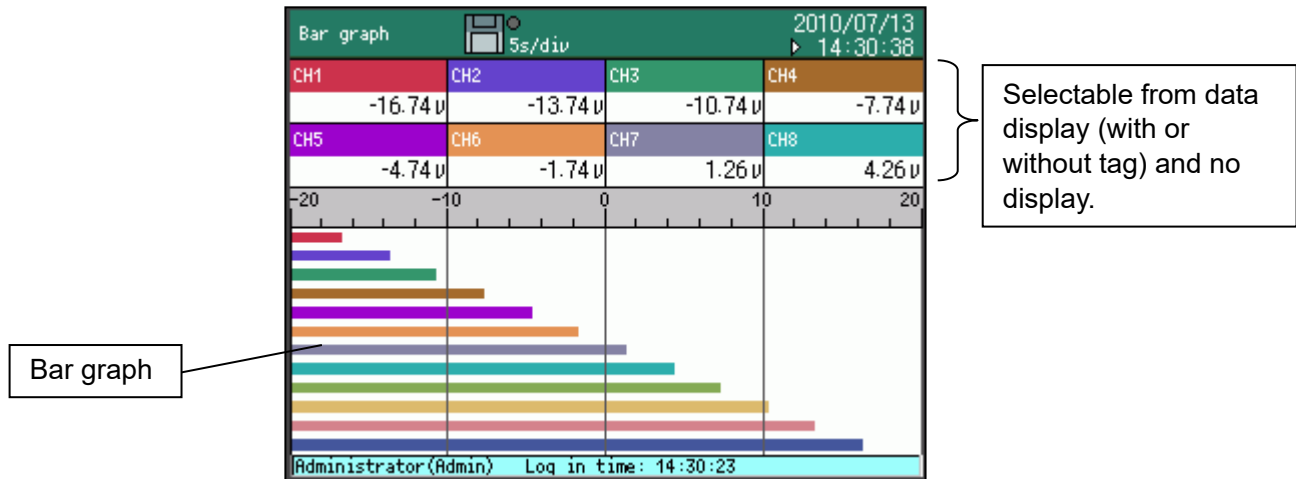
Measured data generating alarm is highlighted in red.

8.7 Bar graph screen

- The measured values of the channels are displayed with the bar graphs in real time and can be seen visually.
- The length of the bars and scale plates is displayed in the contents of the display scale with the smallest channel number in the group.

[Display style]

- Press the **[DISP]** key and select [Bar graph] from the menu.



8.8 Alarm display screen

- The alarms being activated are displayed as a list.
- Activation date/time, cancel date/time (cancelled alarms only), channels (tag names) and alarm types are displayed in the reverse chronological order (latest on the top).
- Maximum 1000 alarm data are recorded. When the alarm data exceeds 1000, the data are deleted in chronological order.

[Display style]

- Press the **[DISP]** key and select [Alarm display] from the menu.

Pressing the **[ENTER]** key jumps to the trend data of the selected alarm activation date. However, if no data is recorded for the day or no file is found, the trend data cannot be displayed.

Alarm display

Rem. 2.9day 2010/06/10 09:54:41

Activation time	Cancel time	CH	Type
06/10 09:54:21	06/10 09:54:29	CH6	AL1 Lower
06/10 09:54:19	06/10 09:54:31	CH5	AL1 Lower
06/10 09:54:18	06/10 09:54:32	CH4	AL1 Lower
06/10 09:54:16	06/10 09:54:34	CH3	AL1 Lower
06/10 09:54:15	06/10 09:54:36	CH2	AL1 Lower
06/10 09:54:13	06/10 09:54:38	CH1	AL1 Lower
06/10 09:53:50	06/10 09:53:58	CH6	AL1 Lower
06/10 09:53:48	06/10 09:53:59	CH5	AL1 Lower
06/10 09:53:46	06/10 09:54:01	CH4	AL1 Lower
06/10 09:53:45	06/10 09:54:03	CH3	AL1 Lower
06/10 09:53:43	06/10 09:54:04	CH2	AL1 Lower
06/10 09:53:41	06/10 09:54:06	CH1	AL1 Lower
06/10 09:53:19	06/10 09:53:25	CH3	AL1 Lower
06/10 09:53:17	06/10 09:53:27	CH2	AL1 Lower
06/10 09:53:15	06/10 09:53:29	CH1	AL1 Lower
06/10 09:53:13	06/10 09:53:31	CH4	AL1 Lower

Administrator(Admin) Log in time: 09:17:32

A selected line is highlighted in yellow.

8.9 Recorded data screen

- Files stored in the internal memory are listed in this screen. Start date and time, end date and time, the number of data and copied user name are displayed in reverse chronological order of files (most recent file comes first)
- Up to 3000 files can be displayed.

Remarks

For the case the number of files exceeds the display limit

If the number of files exceeds 3000, files are randomly displayed when the internal memory is refreshed (setting change or power ON/OFF).

To avoid this, be careful not to let internal memory even the number of files exceeds 3000.

*Recorder data remains in the internal memory even the number of files exceeds 3000.

*The time required for copying to USB memory becomes longer as the number of files increase.

To reduce the time for copying, keep the number of files small by deleting copied files regularly.

[Display style]

- Press the **DISP** key and select [Recorded data] from the menu.
- “Copied” is displayed for copied files.

Recorded data				2010/07/13 16:22:40
Start date and time	End date and time	Data count	Copy	
2010/07/13 16:21:22	2010/07/13 16:21:24	22		
2010/07/13 16:21:10	2010/07/13 16:21:19	92		
2010/07/13 16:20:55	2010/07/13 16:21:08	133		
2010/07/13 16:20:34	2010/07/13 16:20:53	195		
2010/07/13 16:20:28	2010/07/13 16:20:31	39	Copied	
2010/07/13 16:19:31	2010/07/13 16:20:06	355	Copied	
2010/07/13 12:59:49	2010/07/13 12:59:58	98	Copied	
Administrator(Admin) Log in time: 16:19:16				

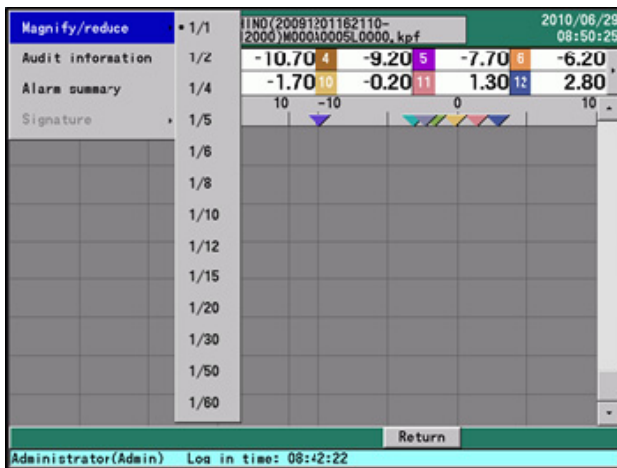
A selected line is highlighted in yellow.

“Copied” is displayed for copied files.

Pressing the **ENTER** key displays the following menu.

Menu item	Operation
Trend display	Display the trend of the selected file.
Delete	Delete the selected file. You cannot delete files which have not been copied.
FTP transmission	Transfer the selected file with FTP. When this is performed, “Copied” is displayed in the Copy column as in the case of file copy. *To transfer a file with FTP, you need to set a FTP client. Refer to “10.11.3 FTP client settings”.
Delete all copied fileless	Delete all copied files.
File information	Display file information.

(Trend display)



Operation item	Description
Magnify/reduce	Compresses the time axis of operating trend (Same magnification to 1/60)
Audit information	Displays date, contents and user name when operation is changed.
Alarm summary	Displays alarm as list display.
Signature	Refer to the 9.2 Digital signature.

(File information)

File information item	Description
Start date and time	Recording start date and time
End date and time	Recording end date and time
Interval	Recording interval
Data count	Number of recorded data
Instrument name	Name of this instrument
Serial number	Serial number of this instrument
Software version	ROM version
Setting file	Setting file name at recording
Sign1 – Sign4	User who signed a file and signed date

Save conditions of recorded data

When any of the following conditions is met, recorded data is stored in the internal memory.

1. When the recording is stopped by a deviation from the recording conditions, pressing the **STOP** key or turning OFF the power.
2. At preset save intervals
3. When the amount of data reaches the capacity limit of a file.

Maximum capacity of a file: 1920 Kbytes

(Calculating the maximum number of recordings to a single file)

The maximum number of recordings to a single file varies depending on the data amount and number of channels. It can be calculated using the following formula.

Maximum number of recordings = 1920 K (maximum capacity of file) / (data amount x number of channels)

(Data amount is normally 4 bytes but it becomes 6 bytes when the data format is set to "Highest/lowest". 1 Kbyte = 1024 bytes)

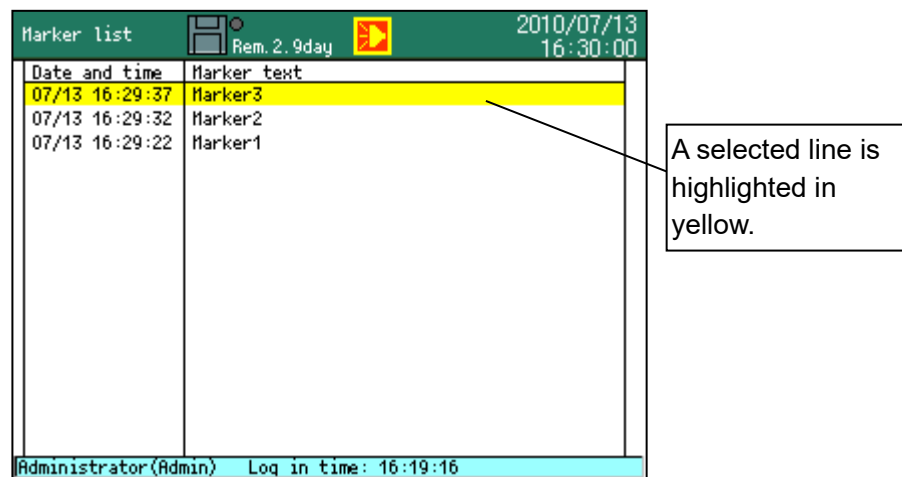
(Example) Using 12 channels (4-byte data): 40960 times of recording

8.10 Marker list screen

- The list of markers recorded on the trends is displayed.
- The date and time and the marker text are displayed in the reverse chronological order (latest on the top).
- Maximum 200 markers are recorded. When the recorded marker exceeds 200, the markers are deleted in chronological order.

[Display style]

- Press the **[DISP]** key and select [Marker list] from the menu.



Pressing the **[ENTER]** key displays the following menu.

Menu item	Operation
Trend display	The screen is jumped to the trend position of the marker of the selected row. When the file is not found, the screen cannot be jumped.
Delete	The marker of the selected row is deleted.
Delete all	All markers in the list are deleted.

8.11 Audit screen (memory)

Audit trails are listed in this screen. Audit trails are displayed in reverse chronological order (most recent data comes first). The maximum number of data is 2000. If it is exceeded, the data is deleted from the oldest.

[Display style]

- Press the **[DISP]** key and select [Audit (memory)] from the menu.

Date and time	Content	Name
2012/12/25 11:19:20	Insert CF	Administrator
2012/12/25 11:19:05	Pull out CF	Administrator
2012/12/25 11:03:39	Insert CF	Administrator
2012/12/25 11:02:14	Pull out CF	Administrator
2012/12/25 10:50:14	Login (HTML)	Administrator
2012/12/25 10:50:12	Login error (HTML)	Admin
2012/12/25 10:35:03	Snap shot	Administrator
2012/12/25 10:34:47	Snap shot	Administrator
2012/12/25 10:34:24	Set [System]	Administrator
2012/12/25 10:31:07	Set [System]	Administrator
2012/12/25 10:31:00	Snap shot	Administrator
2012/12/25 10:30:52	Snap shot	Administrator
2012/12/25 10:30:43	Snap shot	Administrator
2012/12/25 10:30:35	Snap shot	Administrator
2012/12/25 10:30:14	Set [System]	Administrator
2012/12/25 10:19:54	Log in time	Administrator(Admin)

Pressing the **[ENTER]** key displays the following menu.

Menu item	Operation
Audit information	Display a date, content and user name regarding operations and changes made. Display a setting file name only when a change is made in the file.

(Audit information)

Date and time	Content	Name
2012/12/25 11:51:45	Login (HTML)	Administrator
2012/12/25 11:51:23	Insert CF	Administrator
2012/12/25 11:51:10	Pull out CF	Administrator
2012/12/25 11:02:14	Pull out CF	Administrator
2012/12/25 10:50:14	Login (HTML)	Administrator
2012/12/25 10:50:12	Login error (HTML)	Admin
2012/12/25 10:35:03	Snap shot	Administrator
2012/12/25 10:34:47	Snap shot	Administrator
2012/12/25 10:34:24	Set [System]	Administrator
2012/12/25 10:19:54	Log in time	Administrator(Admin)

Audit information item	Description
Date and time	Date and time at which operation/change is executed
Content	Operation/change content
Name	User name who executes operation/change
Setting file *1	Name of a changed setting file
Sign level *2	Level of signature
Changes *3	Placement changed
Changed from	Set value before the change
Changed to	Set value after the change

*1 Displayed when a setting change is made.

*2 Displayed when a signature is used.

*3 Displayed when alarm setting is changed by a general user.

List of audit trails *General user must have the authority to be set.

Available user	Display items	Description
—	Power ON	Recorded at power on.
—	Power OFF	Recorded at power off.
Administrator/general	Login	Recorded at manual login.
Administrator/general	Login (Com)	Recorded at login with high order communication.
Administrator/general	Login (HTML)	Recorded at login with Web page.
Administrator/general	Logout	Recorded at manual logout.
Administrator/general	Logout (Com)	Recorded at logout with high order communication.
Administrator/general	Logout (HTML)	Recorded at logout with Web page.
Administrator/general	START	Recorded at recording start.
Administrator/general	STOP	Recorded at recording stop.
Administrator/general	Change date	Recorded when time is changed manually.
Administrator/general	Password setting	Recorded when password is changed.
Administrator/general	Sign	Recorded when signature is used.
Administrator/general	Scale adjustment	Recorded when scale is adjusted.
Administrator/general	Alarm ACK	Recorded when alarm ACK is executed.
Administrator/general	Write marker	Recorded when marker is written manually.
Administrator/general	File copy (to USB)	Recorded when setting file/recorded data is copied to USB memory.
Administrator/general	File copy (from USB)	Recorded when setting file is copied to the internal memory from USB memory.
Administrator/general	Snap shot	Recorded at snapshot save.
Administrator/general	FTP transmission	Recorded when recorded data transfer with FTP is completed.
Administrator/general	Delete file	Recorded when copied file is deleted from the recorded data/ setting history screens.
Administrator/general	Delete marker	Recorded when marker is deleted from the marker list.
Administrator	Change settings (Admin)	Recorded when administrator user changes and saves a setting.
Administrator	Set [Input operation]	Recorded when [Input operation settings] is changed.
Administrator	Set [Range type]	Recorded when range type of CH is changed.
Administrator	Set [Range min.]	Recorded when range lower limit of CH is changed.
Administrator	Set [Range max.]	Recorded when range upper limit of CH is changed.
Administrator	Set [Scale min.]	Recorded when scale lower limit of CH is changed.
Administrator	Set [Scale max.]	Recorded when scale upper limit of CH is changed.
Administrator	Set [Correction]	Recorded when sensor correction of CH is changed.
Administrator	Set [RJ]	Recorded when RJ of CH is changed.
Administrator	Set [Burn out]	Recorded when burn out of CH is changed.
Administrator	Set [Filter level]	Recorded when filter level of CH is changed.
Administrator	Set [Tag]	Recorded when tag of CH is changed.
Administrator	Set [Unit]	Recorded when unit of CH is changed.
Administrator	Set [Calculate]	Recorded when calculation usage of CH is changed.
Administrator	Set [Formula]	Recorded when formula of CH is changed.
Administrator/general	Set [Display]	Recorded when [Display settings] is changed.
Administrator	Set [Alarm settings]	Recorded when [Alarm settings] is changed.
Administrator	Set [Alarm:Type]	Recorded when alarm type is changed.
Administrator/general	Set [Alarm:Value]	Recorded when alarm setting value is changed.
Administrator	Set [Alarm:Ref. CH]	Recorded when alarm reference CH is changed.

Administrator	Set [Alarm:Deadband]	Recorded when alarm dead band is changed.
Administrator	Set [Alarm:Delay]	Recorded when alarm delay is changed.
Administrator	Set [Alarm:Relay]	Recorded when alarm relay is changed.
Administrator	Set [Alarm:AND/OR]	Recorded when alarm AND/OR is changed.
Administrator	Set [Alarm:Marker]	Recorded when alarm marker is changed.
Administrator/general	Set [Alarm:External judgement]	Recorded when alarm external judgement is changed.
Administrator	Set [File]	Recorded when [File settings] is changed.
Administrator	Set [Recording cycle]	Recorded when [Recording cycle] is changed.
Administrator	Set [Totalizer reset]	Recorded when [Totalizer reset settings] is changed.
Administrator	Set [Schedule]	Recorded when [Schedule settings] is changed.
Administrator	Set [Marker]	Recorded when [Marker text settings] is changed.
Administrator	Set [Network]	Recorded when [Network settings] is changed.
Administrator	Set [System]	Recorded when [System settings] is changed.
Administrator	Set [low order communication]	Recorded when low order communications settings are changed.
Administrator	Initialize settings	Recorded at initialization of settings.
Administrator	SNTP	Recorded when time synchronization is executed manually with SNTP.
Administrator	Totalizer reset	Recorded when totalizer reset is executed manually.
Administrator	Maker settings	Recorded when change is made in the maker settings.
General	Display setting	Recorded when general user changes and saves a display setting.
General	Alarm setting	Recorded when general user changes and saves an alarm set value.
General	Set recording cycle	Recorded when general user changes and saves the recording interval.
Administrator/general	Memory capacity error	Recorded at shortage of the internal memory.
Administrator/general	Write setting error	Recorded when history file cannot be saved in the internal memory at setting change.
Administrator/general	Recording error	Recorded when writing to or reading from the internal memory fails.
Administrator/general	Memory error	Recorded when writing to buffer memory fails.
Administrator/general	Input board err	Recorded when the built-in input board failure occurs.
Administrator/general	Marker error	Recorded when saving to the internal memory fails at marker writing.
Administrator/general	Login error	Recorded when invalid ID or password is entered at login.
Administrator/general	Login error(HTML)	Recorded when invalid ID or password is entered at login with Web page.
Administrator/general	Locked out	Recorded when the number of failed logins exceeds the limit.
Administrator/general	Locked out(HTML)	Recorded when the number of failed logins exceeds the limit, due to login error with Web page.
Administrator/general	Low order com err	Recorded when communication with low order devices is not established.
Administrator/general	Save audit	Recorded when audit file is saved.

8.12 Audit screen (file)

Displays audit file. List is displayed in reverse chronological order (newest is on top).

"Copied" is displayed for already copied setting file.

[Display style]

- Press the **DISP** key and select [Audit (file)] from the menu.

"Copied" is displayed for copied setting files.

Audit (file)		2012/12/25 10:34:43
File name	Copy	
audit_(20121221110312).kpa		
audit_(20121221105716).kpa		
audit_(20120906145156).kpa		
audit_(20120906143300).kpa		
audit_(20120906100101).kpa	Copied	
audit_(20120905113631).kpa		
audit_(20120905110701).kpa		
audit_(20121221162911).kpa		

Administrator(Admin) Log in time: 10:19:54

Tapping a line in the list displays the following menu.

Menu item	Operation
Open audit file	Displays contents of audit file.
Delete	Delete setting file of selected line. *Delete only copied file.
FTP transmission	File of the selected line is transferred by FTP The file is considered as a copy when transferred by FTP and "Copied" is displayed on the copy column. *FTP client settings is necessary for FTP transmission. Refer to the "10.11.3 FTP client settings".
Delete all copied files	Delete all the copied files.
Copying to the USB memory	Copy selected recorded data to the USB memory. (This is displayed only when USB memory is inserted)
File information	Displays file information.

(File information)

File information	
Start date and time	2012/12/21 10:05:06
End date and time	2012/12/21 11:03:11
Instrument name	
Serial number	
Software version	120829
Sign1	
Sign2	
Sign3	
Sign4	

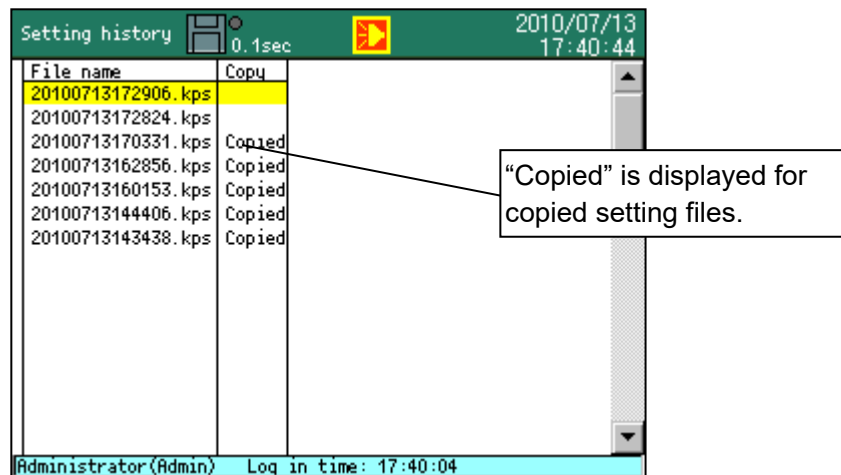
File information item	Operation
Start data and time	Data and time at which audited is started.
End data and time	Data and time At which audited is ended.
Instrument name	Instrument name of this instrument.
Serial number	Serial number of this instrument.
Software version	ROM version.
Sign1 to Sign4	User name, data and time at which signed to the file.

8.13 Setting history screen

- Histories of setting files are listed in reverse chronological order (most recent file comes first). This is created when a setting change is made.
- “Copied” is displayed for copied setting files. Files are named with their creation date.

[Display style]

- Press the **DISP** key and select “Setting history” from the menu.



Pressing the **ENTER** key displays the following menu.

Menu item	Operation
Delete	Delete a selected file. *Copied file only
Delete all copied filess	Delete all copied files.

9 Operation of each function

9.1 Marker writing

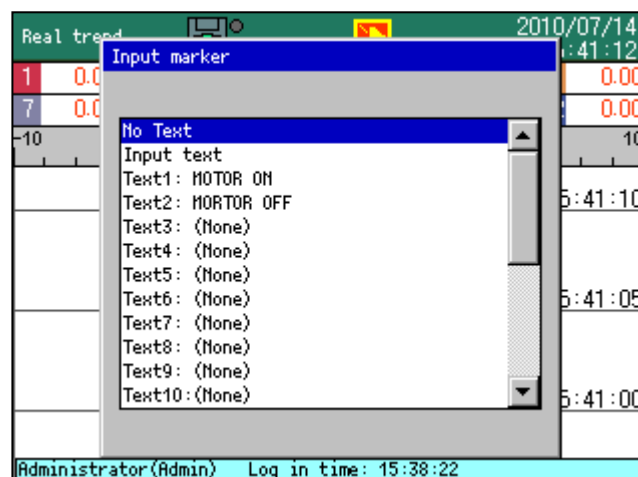
You can write a marker text to a trend graph which is being recorded.

*It is not possible to write a marker text to a saved data file.

[How to write]

Pressing the marker key displays the input marker screen as shown below. A selected text will be written to a trend graph at the time the marker key is pressed.

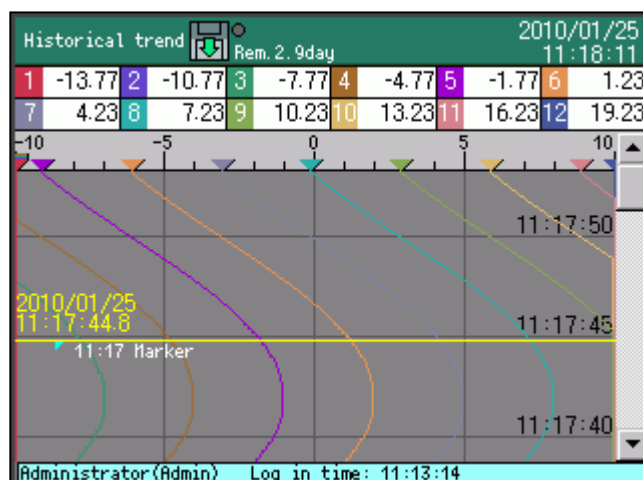
<Real time trend screen>



Item	Description
No text	Write only the time at which marker is written.
Input text	Write arbitrary entered characters.
Text1 - 50	Write a preset text (refer to "10.9 Marker text setting").

You can write a marker to a historical trend which belongs to the file currently being recorded. In this case, a marker is written to a cursor position.

<Historical trend screen>



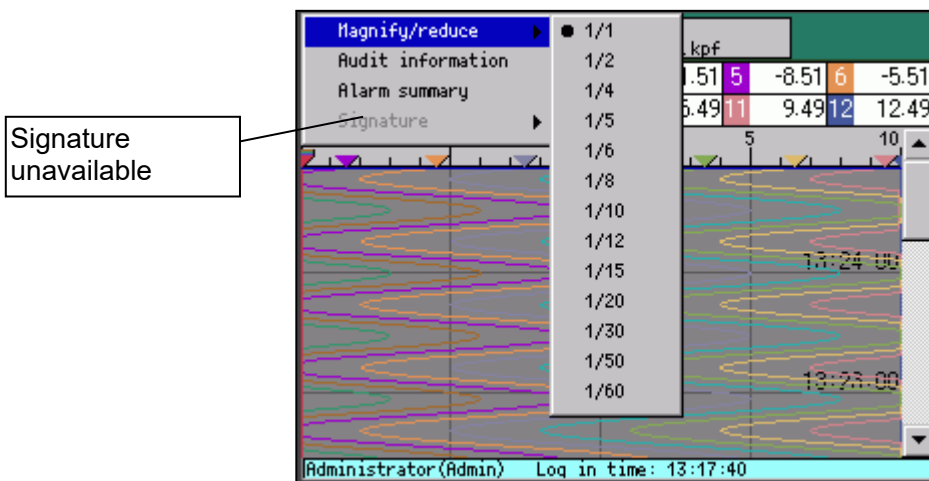
9.2 Digital signature

A digital signature can be placed on recorded data.

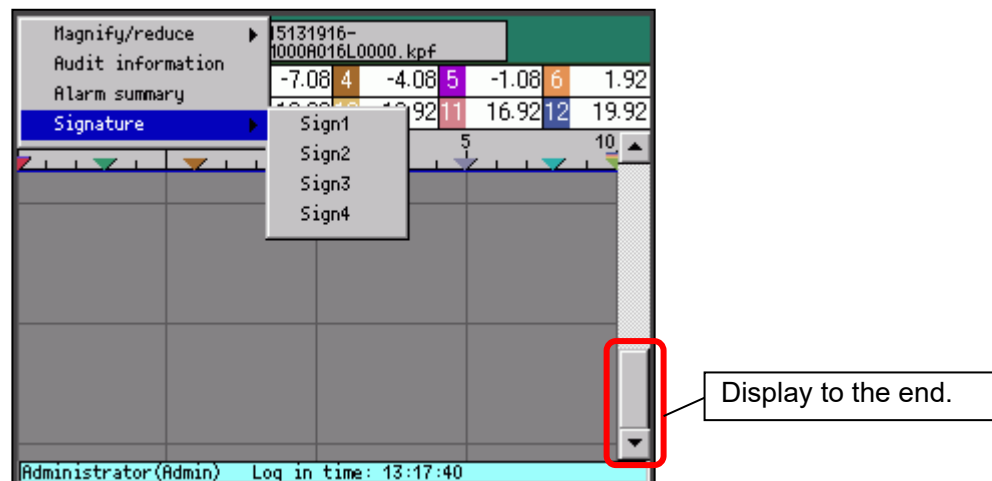
- Administrator user is allowed to use all levels of signature.
- General user can only use a specific level of signature registered by “User authority setting”.
- Signature must be placed in number order from level 1. For example, to place a signature of level 3, level 1 and level 2 signatures must be placed beforehand.
- You cannot cancel a signature placed.
- To select a signature, you need to scroll the trend data, [Audit information] and [Alarm summary] of the displayed data **down to the bottom**.

[How to sign]

- ① Display a recorded data you want to sign.
On the trend screen, press the **DISP** key and select a recorded data and then press the **ENTER** key.
After that, select the data you want to sign and press the **ENTER** key.
*Either a historical trend or dual trend will be displayed.
- ② Pressing the **ENTER** key on the displayed trend screen will bring the following screen.
*You cannot place a signature yet.

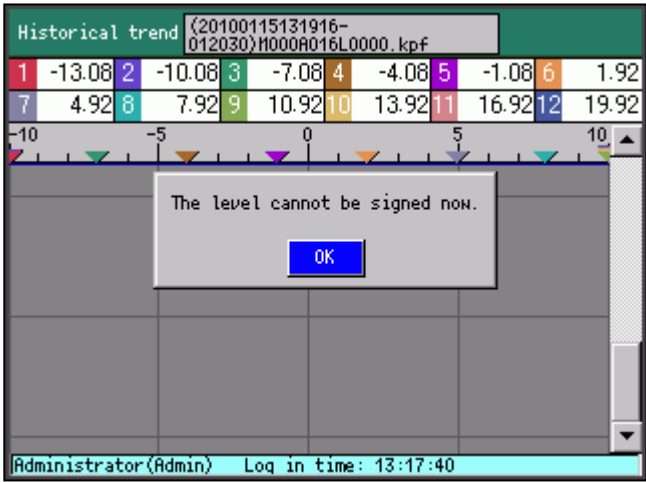


- ③ Signature becomes selectable when you scroll the trend data, audit information and alarm summary of the displayed data **down to the bottom**.
*You cannot cancel a signature.



*Signature must be placed in number order from level 1. For example, to place a signature of level 3, level 1 and level 2 signatures must be placed beforehand.

1 and level 2 signatures must be placed beforehand. When you try to place a level 3 signature before level 1 and level 2 signatures, it will be rejected with the following warning message display.



9.3 Data copy to USB memory

- You can copy a recorded data file, setting file, or snapshot file stored in the internal memory to USB memory (up to 8 Gbytes) by connecting it to the USB port of this instrument. Also, you can copy a setting file stored in USB memory to the internal memory.
- There are two ways to copy the data to USB memory: ① Copying from the menu screen and ② Copying from the operation screen.

*Not all USB memory operations are guaranteed.

*Do not use external media such as hard disk, ZIP, MO and optical disk. Connecting any of these to the instrument may damage the connected medium.

Remarks Time required for copying

A longer time may be required for copying depending on the data amount (it may take some hours in some cases).

Example:

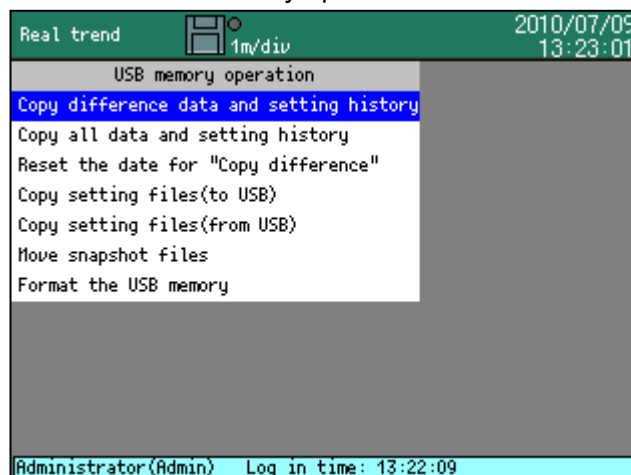
When you copy the data obtained from one-month operation with 12 channels, recording cycle set to 1 min and file size set to 24 hours to USB memory, it takes approx. 30 seconds to complete it.

*To reduce the time for copying, keep the number of files small by deleting copied files regularly.

① Copying from the menu screen

Press the **MENU** key and select [Memory operation] - [USB memory operation] from the menu, and then press the **ENTER** key to display the following screen.

<USB memory operation screen>



When you select an operation from the menu, the message "Please insert USB memory" will be displayed. The selected operation will be started when you insert USB memory to the instrument. When copying is completed, the message "Please pull out copy completion USB memory" appears. Press the **ENTER** key and disconnect USB memory.

*Do not disconnect USB memory before the message instructing to do so is displayed. It may cause data corruption.

When you select [Copy all data and setting history], [Copy setting files (to USB)] or [Copy setting files (from USB)], the message “Please select the copy action” will be displayed.

- Overwrite: If a file of the same name exists in a destination space, the file will be overwritten.
- Skip: If a file of the same name exists in a destination space, the file will be skipped without copying.
- Cancel: Copy is cancelled.

[USB memory operations]

Operation menu	Description
Copy difference data and setting history	Copy the recorded data obtained from the last copied time (reference time) to USB memory.
Copy all data and setting history	Copy all recorded data to USB memory. Select overwrite or skip.
Reset the date for “Copy difference”	Set the reference time for copying to the current time. *This should be executed while the lamp indicating access to the internal memory is off (disk access lamp is off).
Copy setting files (to USB)	Copy a setting file to USB memory. Select overwrite or skip.
Copy setting files (from USB)	Copy a setting file from USB memory. Select overwrite or skip.
Move snapshot files	Move all snapshot files stored in this instrument to USB memory. When this is executed, snapshots are removed from the instrument.
Format the USB memory	Execute a quick format of USB memory.

②Copying from the operation screen

When USB memory is inserted to the instrument while the operation screen is displayed, the recorded data obtained from the last copied time will be copied to USB memory automatically. Connection to the USB memory will be terminated when the copy is finished (same as “Copy difference data and setting history” described in (1) Copying from the menu screen in the previous page).

*Do not disconnect USB memory before the message instructing to do so is displayed. It may cause data corruption.

Warning

- **Never turn off the power during data accessing.**

If the power is turned off while a data file is being accessed, the data stored in the internal memory or USB memory may be destroyed and lost.

- **Do not disconnect USB memory during data accessing.**

If USB memory is disconnected from the instrument while a data file is being accessed, the data stored in the internal memory or USB memory may be destroyed and lost.

- **Make sure to disconnect USB memory after the message**

“Pull out USB memory” is displayed.

- **Use USB memory under appropriate operating temperatures.**

Connect USB memory observing its operating temperature range. You may fail to write to USB memory in an environment out of the appropriate temperature range.

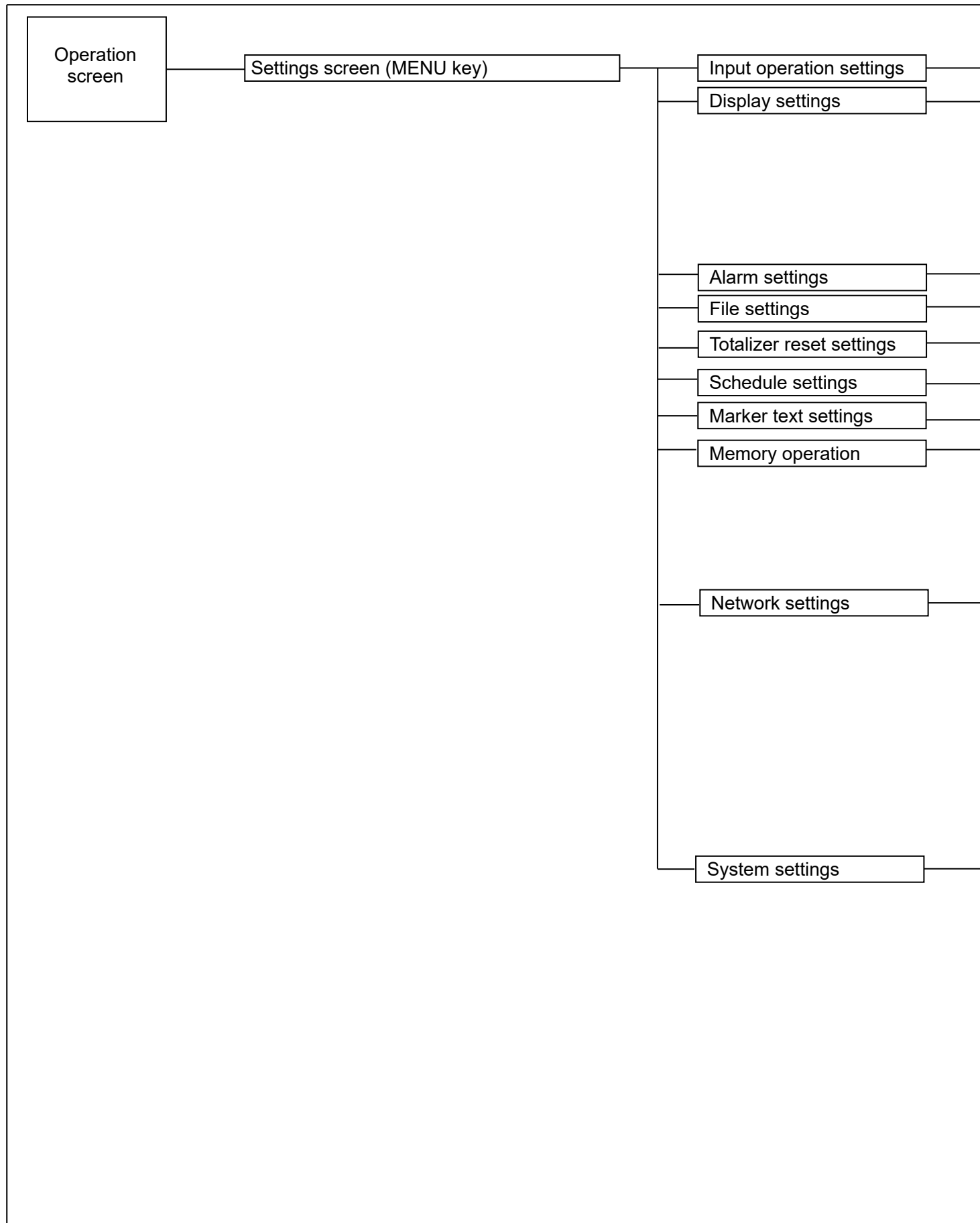
- **Avoid using USB memory in noisy environment**

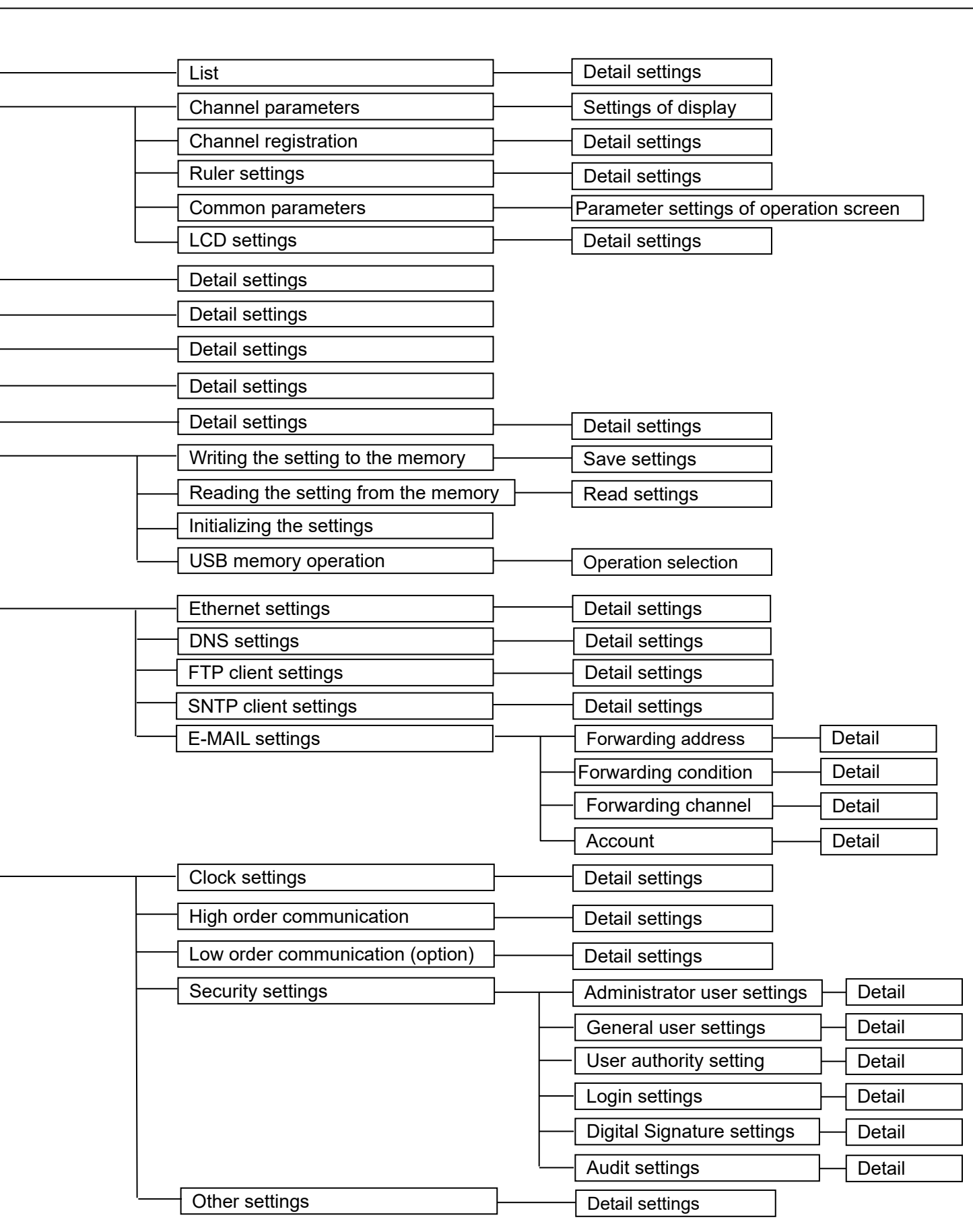
Writing to USB memory should be performed in a noise-free environment to avoid failure. You may fail to write to USB memory in a noisy environment.

MEMO

10 Various Settings

10.1 Settings flow chart

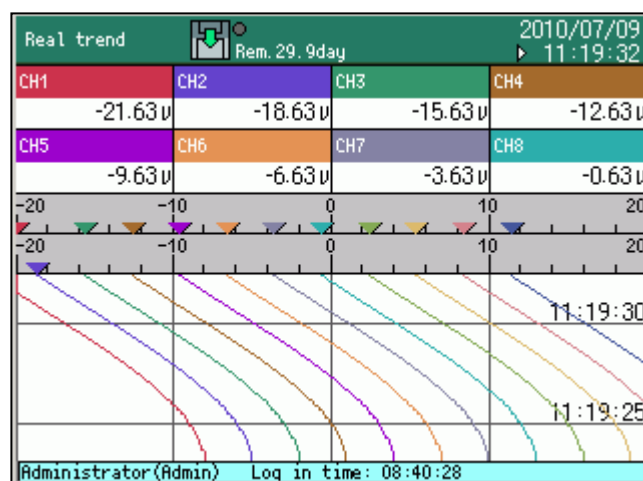




10.2 Setting Menu Items

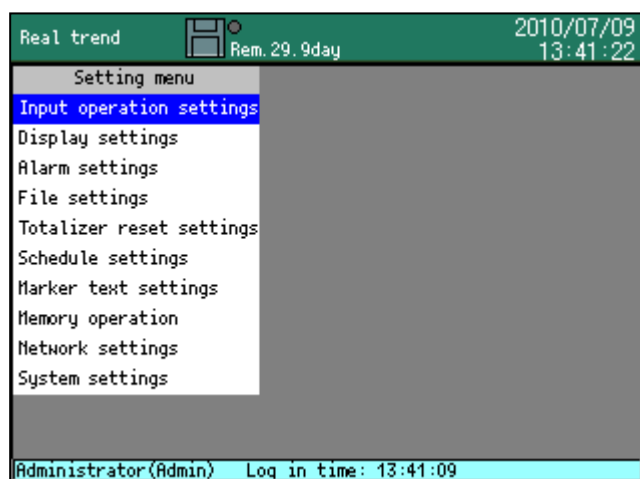
- Pressing the **MENU** key on the operation screen brings the setting menu screen.
- Setting menu differs between administrator user and general user. Also, general user's setting menu items vary depending on the authority level of the user (refer to "10.12.3 Security settings").

<Operation screen>



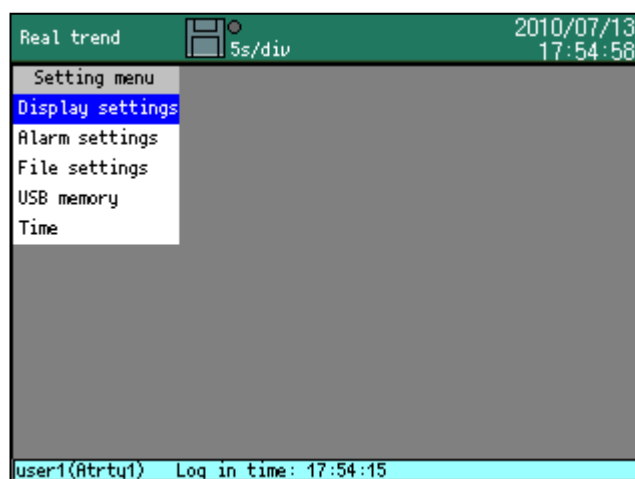
Press the **MENU** key

<Setting menu screen (Administrator user)>



All items of the setting menu are displayed for administrator user.

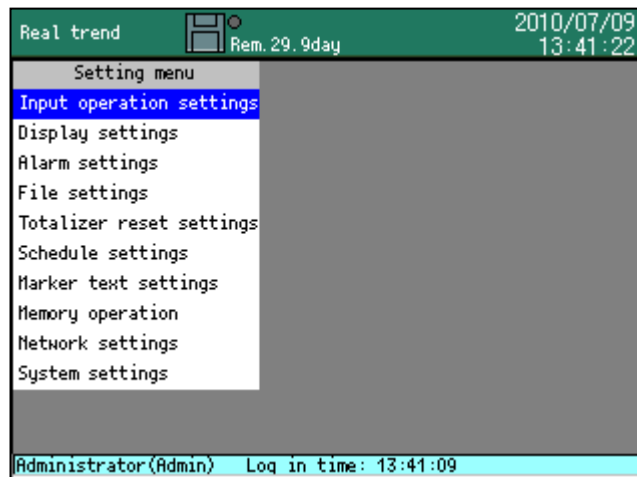
<Setting menu screen (General user)>



General user's setting menu items vary depending on the user authority level.

*When the auto logout time is reached during settings, the real time trend will be displayed automatically without reflecting the settings you made.

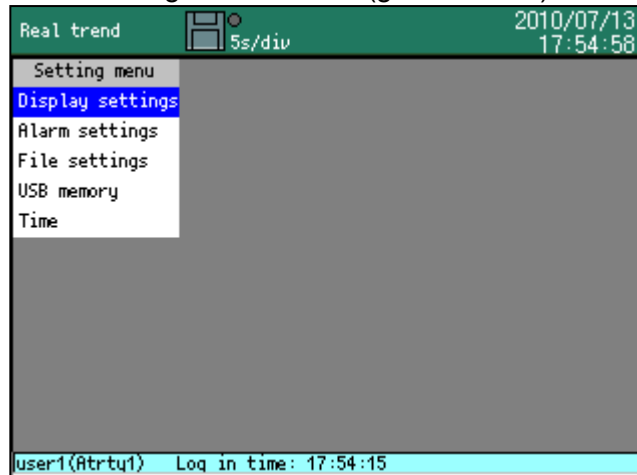
<Setting menu screen (Administrator user)>



List of setting menu items (administrator user)

Input operation settings	Refer to "10.3 Input operation settings".
Display settings	Refer to "10.4 Display settings".
Alarm settings	Refer to "10.5 Alarm settings".
File settings	Refer to "10.6 File settings".
Totalizer reset settings	Refer to "10.7 Totalizer reset settings".
Schedule settings	Refer to "10.8 Schedule settings".
Marker text settings	Refer to "10.9 Marker text settings".
Memory operation	Refer to "10.10 Memory operation".
Network settings	Refer to "10.11 Network settings".
System settings	Refer to "10.12 System settings".

<Setting menu screen (general user)>



*Menu items vary depending on the user authority level.

Setting menu items (General user)

Display settings	Refer to "10.4 Display settings".
Alarm settings	Refer to "10.5 Alarm settings".
File settings	Refer to "10.6 File settings".
USB memory	Refer to "10.10 Memory operation".
Time	Refer to "10.12.1 Clock settings".

*General user can change only some parts of the alarm and file settings.

10.3 Input operation settings

10.3.1 Setting contents

- Select [Input operation settings] from the setting menu and press the **ENTER** key to display the following screen.
- On this screen, you can set the channel-related items such as range and tag for each channel.

<Input operation settings screen>

Real trend		2010/07/09 13:42:10	
		Rem. 29. 9day	
CH.	Range type	Tag	Unit
01	10V		V
02	10V		V
03	10V		V
04	10V		V
05	10V		V
06	10V		V
07	10V		V
08	10V		V
09	10V		V
10	10V		V
11	10V		V
12	10V		V
13	----		V
Administrator(Admin) Log in time: 13:41:09			

*When low order communication (read) option is effective, the item for the low order communication registration is added. Please see “11.1 Low order communications (read)” also.

- By moving the focus a CH number and pressing the **ENTER** key, the detailed setting screen for this channel is displayed.

Real trend		2010/07/09 13:42:36			
		1sec			
CH. 01	Copy from 01 to 01 Go				
Range type	10V				
Range	-10.00	to	10.00		
Scale	-10.00	to	10.00		
Correction	0.00				
RJ	----	Filter level System settings			
Burn out	----				
Tag					
Unit	V				
Calculate	OFF				
Formula					
Administrator(Admin) Log in time: 13:41:09					

■ Setting range type

(Analog input) KR2P20, KR2P21: CH1-12, KR2P60, KR2P61: CH1-6

DC voltage	13.8mV, 27.6mV, 69mV, 200mV, 500mV, 2V, 5V, 10V, 20V, 50V
Thermocouple	K, E, J, T, R, S, B, N, W-WRe26, WRe5-WRe26, PR40-20, NiMo-Ni, CR-AuFe,Platinel2, U, L
Resistance thermometer	Pt100, JPt100, Pt50, Pt-Co

(Digital input) *For the optional digital input specified CH37-44

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

■ Setting the range

- Set the range. (It is decided by range type.)

■ Setting the scale

- Set the scale. (It is decided by range type.)

Number	Point
10.00	2

← This numeric value decides the position of the decimal point.

■ Setting sensor correction

- Set the a value (shift value) added to the input value.

■ Setting the RJ (Reference junction compensation)

- Set whether the RJ is internal or external.

■ Setting burn out

None	The burnout function is not used.
UP	Set to the upscale burnout.
DOWN	Set to the downscale burnout.

■ Setting the filter level

- The input filter level can be set from 0 to 3. 0 means no-filter, and 3 means the strongest filter. When [system settings] is selected, settings are following [system settings] – [other settings].

■ Setting the tag

- Set the tag name (Setting for displaying the tag name instead of channel number.) When the display of the data of a [Display settings]-[Common parameters] is set with tag, it is effective.

■ Setting the unit

- Set the engineering unit of its channel

■ Setting the usage of calculation

OFF	The input data are displayed and recorded as the measured data of its channel.
ON	The results processed by the calculation formula are displayed and recorded as the measured data of its channel.

■ Setting the formula

- When calculation usage is ON, set the formula of its channel.

■ Copying the parameter with copy function

CH. 01	Copy from 02	to 05	Go
--------	--------------	-------	----

- The above shows the setting for copying Ch 01 from Ch 02 to Ch 05. By selecting the [Go] and pressing the **ENTER** key, the parameters of Channel 01 are copied from Channel 02 to Channel 05.

10.3.2 Setting method of formula

Remarks

Alphabet of formula

Enter an alphabet of formula in capital letters.

The results are not calculated correctly when you enter an alphabet in small letters.

1) Formula types

• Mathematical calculation

Four arithmetic operations are performed.

	Symbol	Example	Remarks
Addition	+	$X+Y$	
Subtraction	-	$X-Y$	
Multiplication	*	$X*Y$	
Division	/	X/Y	
Reminder	%	$X\%Y$	
Exponential	^	X^Y	

* X, Y indicate the formula or the numeric value.

• Comparison calculation

The comparison calculation is performed and result is 1 (established) or 0 (not established)

	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	<=	$X<=Y$	

* X, Y indicate the formula or the numeric value.

• Logical operation

The logical operations for 1 or 0 are performed and the result is returned as 1 or 0.

	Symbol	Example	Remarks
Logical AND	AND	$X\text{AND}Y$	
Logical OR	OR	$X\text{OR}Y$	
Exclusive OR	XOR	$XX\text{OR}Y$	
Negation	NOT	$\text{NOT}(X)$	Put the object being negation in brackets

* X, Y indicate the formula or the numeric value.

* Express X and Y as 0 or 1.

• General calculation function

Function calculation is performed.

	Symbol	Example	Remarks
Round up after the decimal	CEL	$\text{CEL}(X)$	
Round down after the decimal	FLR	$\text{FLR}(X)$	
Absolute value	ABS	$\text{ABS}(X)$	
Square root	SQR	$\text{SQR}(X)$	
Power of e	EXP	$\text{EXP}(X)$	
Natural logarithm (base is e)	LOG	$\text{LOG}(X)$	
Common logarithm (bottom is 10)	LOG10	$\text{LOG10}(X)$	

* X indicates the formula or the numeric value.

- Channel data calculation functions

The function calculation is performed.

When an error data (OVER, UNDER etc.) is included in the measured data, it becomes "CAL ER".

	Symbol	Example	Remarks
Measured data	CH	CH(X)	X is channel No.
Calculation result data	PCH	PCH(X)	
Previous calculated result data	OCH	OCH(X)	Data at the previous scanning (before 0.1 seconds)
Totalizer	ITG	ITG(X)	Refer to 2) Totalizing operation
24-hour totalizing	ITG24	ITG24(X)	Refer to 2) Totalizing operation
F value	FV	FV(X#To#Z #R)	Refer to 3) F value
Relative humidity	RH	RH(D#W)	Refer to 4) Relative humidity
Dew-point temperature	DEW	DEW(T#H)	Refer to 5) Dew-point temperature
Moving average (an hour)	AVE	AVE(X#T)	Refer to 6) Moving average
Moving average (5 minutes)	AVEH	AVEH(X#T)	Refer to 6) Moving average
Past data (an hour)	OLD	OLD(X#T)	Refer to 7) Past data
Past data (5 minutes)	OLDH	OLDH(X #T)	Refer to 7) Past data
First-order lag filter	IIR	IIR(X#T)	Refer to 8) First- order filter
Increment per time	PLS	PLS(X#T)	Refer to 9) Increment per time

* X indicates channel number.

* When the channel data calculation is specified for executing with the settings of the designated channel number, the calculated results of the designated channel number are used. In addition, when the designated channel number is greater than the channel number for calculation, the calculation results obtained previously at the designated channel are used.

- System information acquisition function

	Symbol	Example	Remarks
Remaining internal memory	CF	CF(A)	A = unit of the memory 0: MB 1: Minute 2: Hour 3: Day
System error detection*	KRERR	KRERR()	System error detection 0: Normal 1: Error occurred
User lock-out detection	LOUT	LOUT()	User lock-out detection 0: Normal 1: Locked out

*System error: Data storage memory error (CP capacity error, malfunction, etc), temporary storage memory error, input board malfunction

- Other function

	Symbol	Example	Remarks
Wind display	AZI	AZI(A)	Refer to 9) Wind display

2) Totalizing operation

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

Do not use totalizing function more than two times in one formula. The results are not calculated correctly. The totalizing function can be used in calculations other than the totalizer.

Example : ~~ITG(1)+ITG(2)~~, ~~ITG24(1)-ITG(1)~~, ITG(1)/100

For the totalizer rest, refer to "10.7 Totalizer reset settings".

1. Standard totalizing operation

The totalized values are reset at the totalizer reset reference time or every interval.

Entering method of the formula

ITG(d)

d: Channel number to be totalized

Calculation contents

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

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 (before 0.1 seconds)

When error data (OVER, UNDER etc.) are included, calculation is not performed and the previous result are used.

2. 24-hours totalizing operation

The totalized values are reset only at the totalizer rest reference time or at every interval.

Entering method of the formula

ITG24(d)

d: Channel number to be totalized

The calculation contents are same as standard totalizing operation.

*Totalizer is performed every 0.1 seconds regardless of measurement cycle (either KR2P*0 and KR2P*1).

3) F value

Entering method of 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 following formula is used for the F-value calculation.

$$\int 10^A dt \quad \text{Provision: } A = (T - T_o) \div Z \quad T: \text{channel data to be calculated}$$

When T exceeds R, the F-value is reset to 0.

4) Relative humidity

Entering method of the formula

RH(D#W)

D: Dry bulb temperature, W: Wet bulb temperature

The following formula is used for the relative humidity calculation.

$$((B - 0.000662 \times 1013.0 \times (D - W)) \div A) \times 100$$

Provision: A: Dry bulb saturated water vapor pressure, B: Wet bulb saturated water vapor pressure

The following formula is used for the calculation of the saturated water vapor pressure

$$6.1121 \times E \times P ((17.502 \times T) \div (240.9 + T)) \quad T: \text{Humidity}$$

5) Dew-point temperature

Entering method of the formula

DEW (T#H)

T: Temperature data channel, H: Relative humidity channel

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

t: Temperature data

h: Relative humidity data

D: Dew-point temperature

$$\textcircled{1} K = t + 273.15$$

$$\textcircled{2} \text{In case of } t \geq 0$$

$$W = \text{EXP} \left(-5800.2206 / K + 1.3914993 + K \times (-0.048640239 + K \times (0.41764768\text{E-}4 - 0.14452093\text{E-}7 \times K)) \right) + 6.5459673 \times \text{LOG} (K) / 1000$$

$$\text{In case of } t < 0$$

$$W = \text{EXP} \left(-5674.5359 / K + 6.3925247 + K \times (-9.677843\text{E-}3 + K \times (0.62215701\text{E-}6 + K \times (0.20747825\text{E-}8 - 9.484024\text{E-}13 \times K))) \right) + 4.1635019 \times \text{LOG} (K) / 1000$$

$$\textcircled{3} S = W \times h / 100$$

$$\textcircled{4} P = S \times 1000$$

$$\textcircled{5} Y = \text{LOG} (P)$$

$$\textcircled{6} \text{In case of } P \geq 611.2$$

$$D = -77.199 + Y \times (13.198 + Y \times (-0.63772 + 0.071098 \times Y))$$

$$\text{In case of } P < 611.2$$

$$D = -60.662 + Y \times (7.4624 + Y \times (0.20594 + 0.016321 \times Y))$$

6) Moving average

Entering method of the formula

AVE (X#T)

AVEH (X#T)

X: Data channel number, T: Time series interval (second)

Mean value of past T seconds is calculated.

Difference between AVE and AVEH are the following.

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

7) Past data

Entering method of the formula

OLD (X#T)

OLDH (X#T)

X: Data channel number, T: Time in which go back (second)

Mean value of past T seconds is calculated.

Difference between OLD and OLDH are the following.

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

8) First-order lag filter

Entering method of the formula

IIR (X#T)

X: Data channel number, T: Time constant (second)

First-order calculate is performed in the data of channel X.

Contents of calculation

$$\{dt \div (dt+t)\} \times (x-d) + d$$

dt: Sampling cycle (0.1 seconds fixed), t: time constant, x: current value of channel X, d: previous calculation result

9) Increment per time

Entering method of the formula

PLS (X#T)

X: Data channel number, T: Unit time (second)

Calculate increment per unit time T. X is specified from the channel that is set totalizer or the channel that is selected pulse range in 37 to 44.

As for the PLS function, when the totalized value is reset excluding reset by the overflow at time etc. , the data when resetting it becomes illegal (To do the same processing as overflow reset internally). Please do the operation construction noting the resetting operation when using it.

10) Wind display

Entering method of the formula

AZI (A)

A: Wind data

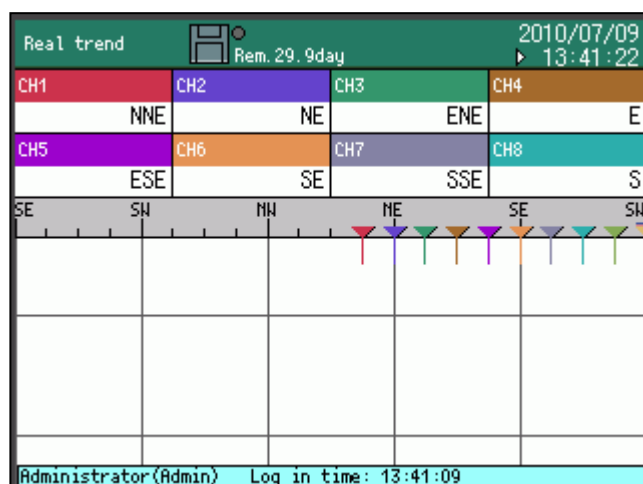
Display the compass point which is changed from direction.

Relation of the displayed direction of wind data is in the following list.

If A is fractional value, display closest direction. Example: 1.2 → NNE

A	Display
•	•
•	•
•	•
-3	WNW
-2	NW
-1	NNW
0	N
1	NNE
2	NE
3	ENE
4	E
5	ESE
6	SE
7	SSE
8	S
9	SSW
10	SW
11	WSW
12	W
13	WNW
14	NW
15	NNW
16	N
17	NNE
18	NE
•	•
•	•
•	•

In addition, scale plate which is registered channel that is used this calculation is displayed wind scale.



Display coordinate on the trend is same as normal numeric data.

11) Example of arithmetic expression where calculations are combined

- **(CH(1)*3-20)/6**

("Raw data of channel 1" X 3 – 20) ÷ 6

- **(CH(1)+CH(2))<300**

When the total of raw data of channel 1 and channel 2 is less than 300, it becomes 1.

- **ABS(CH(1))>=50**

When absolute value of channel 1 is 50 or more, it becomes 1.

- **(PCH(1)>=100)AND(PCH(2)<=50)**

When data of channel 1 is 100 or more and data of channel 2 is 50 or less, it becomes 1.

Remarks

Combination of functions

The following functions can not be used together. The results are not calculated correctly.

ITG, AVE, AVEH, OLD, OLDH, IIR

Example: AVE (OLD (1#10)#60) → NG

10.4 Display settings

10.4.1 Channel parameter

- Select [Display settings] - [Channel parameters] from the setting menu and press the **ENTER** key to display the following screen.
- You can set a display type or scale for each channel from this screen. A waveform color of graphs and display position can also be set.

<Channel parameters setting screen>

CH.	Type	Minimum	Maximum	Color	Position
01	Std.	-10.00	10.00	Red	1
02	Std.	-10.00	10.00	Blue	1
03	Std.	-10.00	10.00	Green	1
04	Std.	-10.00	10.00	Brown	1
05	Std.	-10.00	10.00	Purple	1
06	Std.	-10.00	10.00	Orange	1
07	Std.	-10.00	10.00	Dark Blue	1
08	Std.	-10.00	10.00	Teal	1
09	Std.	-10.00	10.00	Light Green	1
10	Std.	-10.00	10.00	Yellow	1
11	Std.	-10.00	10.00	Pink	1
12	Std.	-10.00	10.00	Dark Green	1

Administrator (Admin) Log in time: 13:41:09

■ Setting the display scale

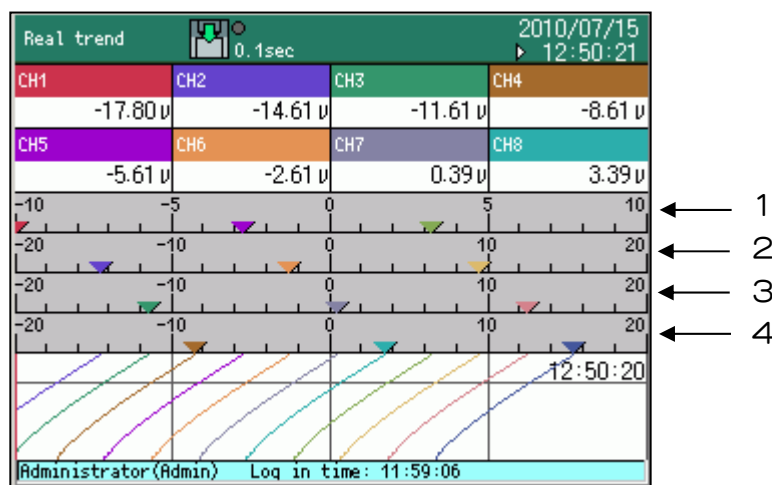
- The data are displayed on the screen with the setting contents of the display scale.

Item	Contents
Type	<p>“Standard”: Minimum and Maximum values can be set in the range of ± 30000. The screen is displayed in the standard format.</p> <p>“Exponent”: Minimum and Maximum values are set in the exponent format. The screen is also displayed in the exponent format. The significand of Min and Max values is 1 to 9.99 and the exponent part can be set in the range of ± 15.</p>
Minimum, Maximum	<ul style="list-style-type: none"> • In the trend display, the Minimum value is positioned at the extreme left (low) and the Maximum value is positioned at the extreme right (up) by coordinate calculation. () for horizontal direction When there are multiple channels displayed at the same position, the Minimum and Maximum values of the channel with the smallest number are displayed on the scale plate and the Minimum and Maximum values of each channel are used for the coordinate for each pen. • The Minimum and Maximum values are displayed with the number of digits after decimal point displayed in the screen.

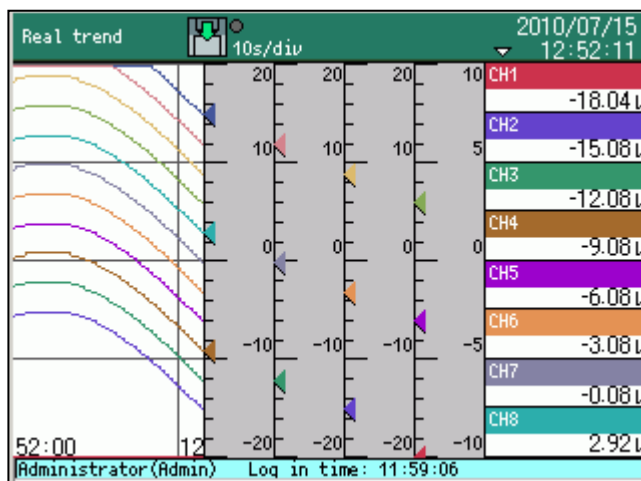
■ Setting the display position

- The display position (1, 2, 3, and 4) indicates the position of scale plate.

< For vertical trend graph >



< For horizontal trend graph >



4 3 2 1

■ Copy the parameter using the copy function

Copy 01 from 02 to 05 Go

- The above shows the setting for copying Ch 01 from Ch 02 to Ch 05. By selecting the [Go] and pressing the **ENTER** key, the parameters of Channel 01 are copied from Channel 02 to Channel 05. Colors are not copied.

10.4.2 Channel registration

- Select [Display settings] - [Channel registration] from the setting menu and press the **ENTER** key to display the following screen.
- On this screen, you can register channels to be displayed on a graph.
- If multiple groups are in use, display name becomes “Group parameter”.

When multiple groups are in use, setting of specified number at “group” on the upper left can be done.

<Channel registration screen>

■ Setting the registration name

- Set a registration name for a channel. A registered name is used as a file name of recorded data as well as used for screen display.

■ Setting the channel

- Set a channel to be registered. Setting a blank (pressing the down-arrow with “1” displayed or up-arrow with “44” displayed) cancels a registration.

■ Setting the trend display

- Selecting a channel and pressing the **ENTER** key switches the setting between “Y” and “N”. When “N” is set, trend data will not be displayed even if the channel is registered. However, the data will be recorded to a file.

■ Setting the trend line thickness

- Select a line thickness displayed on the trend data from 1, 3 and 5.

■ Setting the trip line

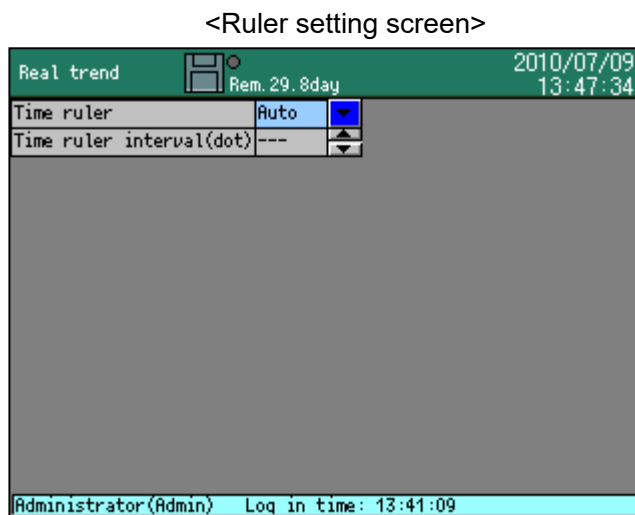
- Set a trip line (dashed line) displayed on the trend data.

Item	Description
Position	Set a display position of trip line within 0 to 99 % of the display width.
Color	Select a color of trip line from 12 types.
Size	Select a thickness of trip line from 1, 3 and 5.

10.4.3 Ruler settings

- Select [Display settings] - [Ruler settings] from the setting menu and press the **ENTER** key to display the following screen.
- You can set a scale interval on the ruler used for graphs from this screen.
- If multiple groups are in use, display name becomes “Group parameter”.

When multiple groups are in use, setting of specified number at “group” on the upper left can be done.



■ Setting the time ruler

- Select either “Auto” or “Manual”. When “Auto” is selected, ruler interval is decided automatically according to the preset recording interval.

■ Setting the time ruler interval

- Set a scale interval on the time ruler for trend graphs by specifying an even number from 12 to 510.
*This setting becomes effective when “Set” is selected for “Time ruler”.

10.4.4 Common parameters

- Select [Display settings] - [Common parameters] from the setting menu and press the **[ENTER]** key to display the following screen.
- On this screen, you can set various graph-related items including direction of graph and zone use.

<Common parameters setting screen>

Real trend		1sec	2010/07/09 14:02:42
Data display	No Tag	▼	
Trend direction	Vertical	▼	
Data display size adjustment	ON	▼	
Trend label	None	▼	
Scale text	ON	▼	
Bar graph direction	Horizontal	▼	
Base position of bargraph	00	▲▼	
Zone usage	OFF	▼	
Data display frame count	44	▼	
Screen auto switch period (second)	10	▲▼	
Data value updating interval	0.1 sec.	▼	
Dual trend synchronization	OFF	▼	
Administrator(Admin) Log in time: 13:57:40			

■ Setting the data display

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

No tag	With tag	Bar graph	None
--------	----------	-----------	------

■ Setting the trend direction

- Set the waveform direction to be vertical or horizontal.

■ Setting the data display size adjustment

- This is the function which automatically sizes up data display on the trend screen when registered channel numbers are small. In the following cases, data is displayed by larger font.

Data display	Trend direction	Number of the registered CH
No tag	Vertical	Less than 4
With tag	Vertical	Less than 5
No tag	Horizontal	Less than 7
With tag	Horizontal	Less than 5

■ Setting the trend label

- Set the label for displaying on the trend.

OFF	Channel	Tag
-----	---------	-----

■ Setting the scale text

- Set the scale plate to display the numerical values or not.

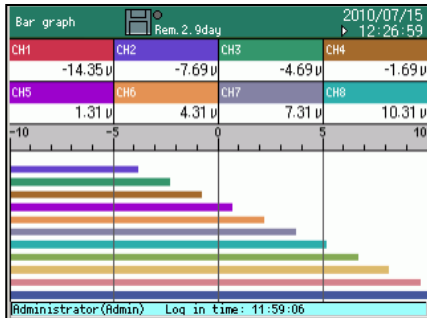
■ Setting the bar graph direction

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

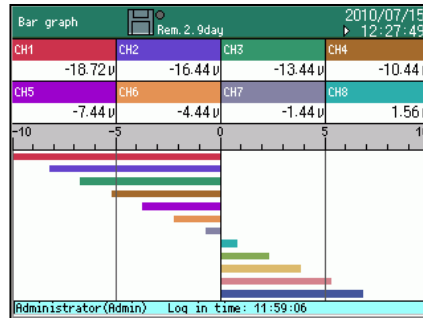
■ Setting the base position of the bar graph

- Set the base position of the bar graph from 0 to 100 on the bar graph screen. When the base position is 0, the bar is displayed based on leftmost (or bottommost). When the base position is 100, the bar is displayed based on rightmost (or uppermost).

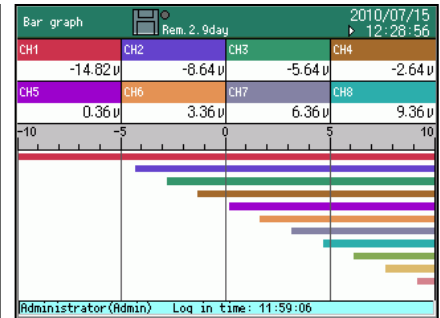
When the base position is 0



When the base position is 50



When the base position is 100



■ Setting zone usage*¹

- The display range of the measured/calculated data is called zone. When the zone is set to "ON", the display range can be divided into zones. The details are described in the next page.

■ Setting numeric display frame count

- Set the division number of the numeric display frame.

1	2	3	4	6	8	9	10	12	21	44
---	---	---	---	---	---	---	----	----	----	----

■ Screen auto switch period

- Set the switching period if the "Auto switching" has been set to ON with the DISP menu.

■ Numeric value update period

- Select the numeric value updating period of measured data to be displayed on the screen.

0.1 seconds	0.5 seconds	1 second
-------------	-------------	----------

■ Dual trend synchronization

- When previous file is opened by dual trend during 'ON', the file is scrolled as fast as real trend. When scroll end of the file, if there is continuous file, the file is opened automatically and scrolling is continued.

*1 Zone

The display range of the measured/calculated data is called zone. Since the data can be displayed by setting the zone for each channel, the data can be easily read by displaying the waveforms in separate zones.

<How to set>

Select [Display settings] - [Common parameters] from the setting menu and set [Zone usage] to "ON". After that, select [Display settings] - [Channel parameters] from the setting menu. The following screen will be displayed including the zone item.

<Channel parameters screen>













Real trend

Rem. 2.9day

2010/07/15

10:54:53

Copy 01 from 01 to 01 Go

CH.	Display scale			Color	Zone	Posi
	Type	Minimum	Maximum			
01	Std.	-10.00	10.00		1	1
02	Std.	-10.00	10.00		1	2
03	Std.	-10.00	10.00		1	3
04	Std.	-10.00	10.00		1	4
05	Std.	-10.00	10.00		1	1
06	Std.	-10.00	10.00		1	1
07	Std.	-10.00	10.00		1	1
08	Std.	-10.00	10.00		2	1
09	Std.	-10.00	10.00		1	1
10	Std.	-10.00	10.00		1	1
11	Std.	-10.00	10.00		1	1
12	Std.	-10.00	10.00		1	1

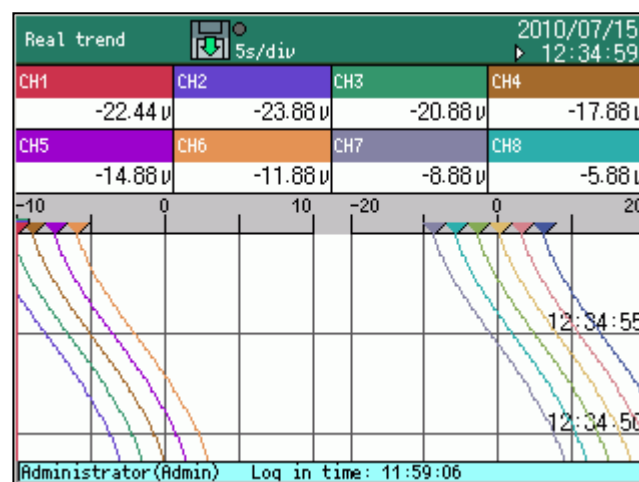
Administrator(Admin)

Log in time: 10:53:05

When zone is set to "1" or "2", the waveform display area on the trend screen is divided into two halves.

Channels set to zone 1 are displayed in the zone 1, and channels set to zone 2 are displayed in the zone 2.

<Trend screen>



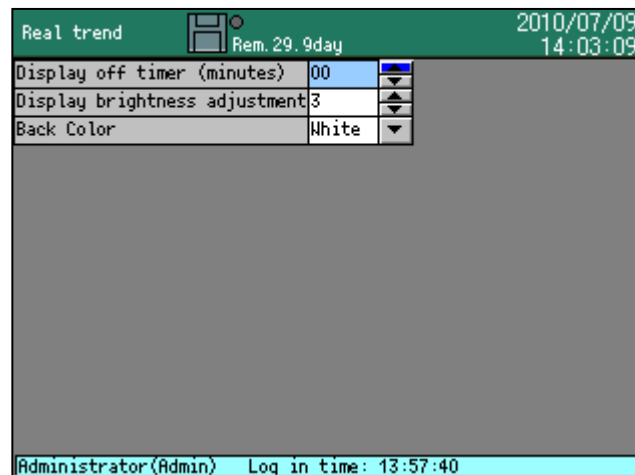
Zone 1

Zone 2

10.4.5 LCD settings

- Select [Display settings] - [LCD settings] from the setting menu and press the **ENTER** key to display the following screen.
- You can set the display off timer or brightness from this screen.

<LCD settings screen>



■ Setting the display off timer (minute)

- The display-off timer for the LCD can be set from 1 to 60 minutes.
- For canceling the display off, tap any key.
 - *Display is not turned off when time of "00" is set.
 - *If the alarm occurred when LCD display is OFF, LCD will light on. After the alarm is deactivated and after the set time is passed, LCD display will be OFF.

■ Setting the display brightness

- Select the brightness of the LCD backlight from 4 steps. 1 is the brightest and 4 is the darkest.

■ Setting the back color

- Select the back color of the screen from white or black.

10.5 Alarm settings

- Select [Alarm settings] from the setting menu and press the **ENTER** key to display the following screen.
- You can set an alarm activation condition for each channel from this screen.

<Alarm settings screen>

No.	Type	Value	Ref. CH	Deadband	Delay
AL1	None	0.00	01	0.00	0
AL2	None	0.00	01	0.00	0
AL3	None	0.00	01	0.00	0
AL4	None	0.00	01	0.00	0

No.	Relay	AND/OR	MARKER	External judgment
AL1	0	OR	0	None
AL2	0	OR	0	None
AL3	0	OR	0	None
AL4	0	OR	0	None

Administrator(Admin) Log in time: 17:49:30

■ Setting the alarm type and the value

- Set an alarm type and set threshold value.

See the alarm activation condition of each type below.

None	Alarm is not activated.		
Upper	Measured value reaches or exceeds the set value.	Lower	Measured value reaches or falls below the set value.
Diff. upper* ¹	Absolute value of difference between measured value and reference CH reaches or exceeds the set value.	Diff. lower* ¹	Absolute value of difference between measured value and reference CH reaches or falls below the set value.
Error	Measured value is not a numeric value (BURN, OVER, UNDER, CAL ER, or RJ ERR)		

■ Setting the reference CH

- Set the reference channel for the differential high limit alarm/differential low limit alarm.

■ Setting the dead band*²

- Set the alarm deadband between the alarm value and its release. (Refer to the next page.)

■ Setting the delay*³

- Set the delay time for the alarm.(0-3600 seconds)

The alarm is not output until the delay time has elapsed after the data exceeds the alarm value.

■ Setting the relay

*The alarm output terminal (option) is necessary for outputting alarms actually.

- The relays can be set regardless of whether the alarm output terminal is used.
- Set the relays with the alarm output terminal number 0 to 12. When 0 is set, the alarm is not outputted.

■ Setting the alarm output mode

AND	The relay becomes ON when all alarms set in one alarm output terminal are activated.
OR	The relay becomes ON when any of alarms set in one alarm output terminal is activated.

When both of “AND” and “OR” are set to one relay channel, the relay becomes ON when either of “AND” of all alarms set with “AND” or all “OR” of alarms set with “OR” is established.

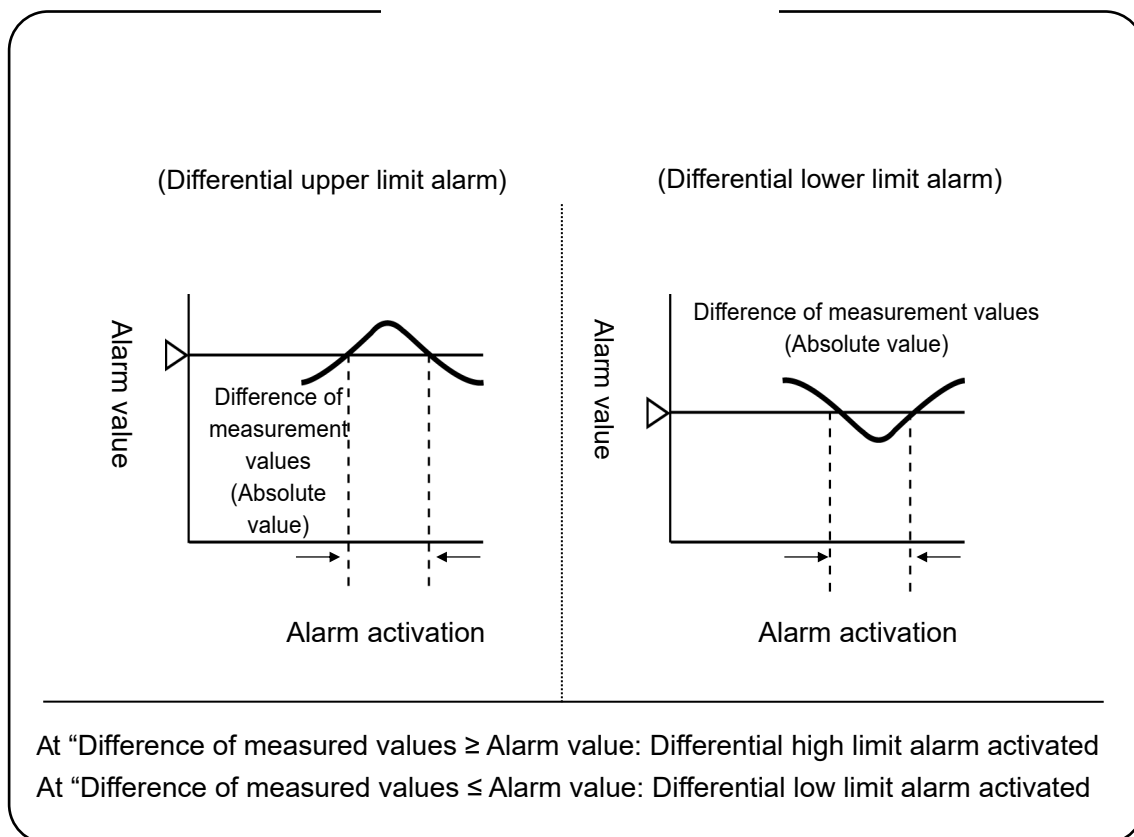
■ Setting the maker

- Set the automatically written maker on the trend for alarm activation. When 0 is set, the maker is not written.

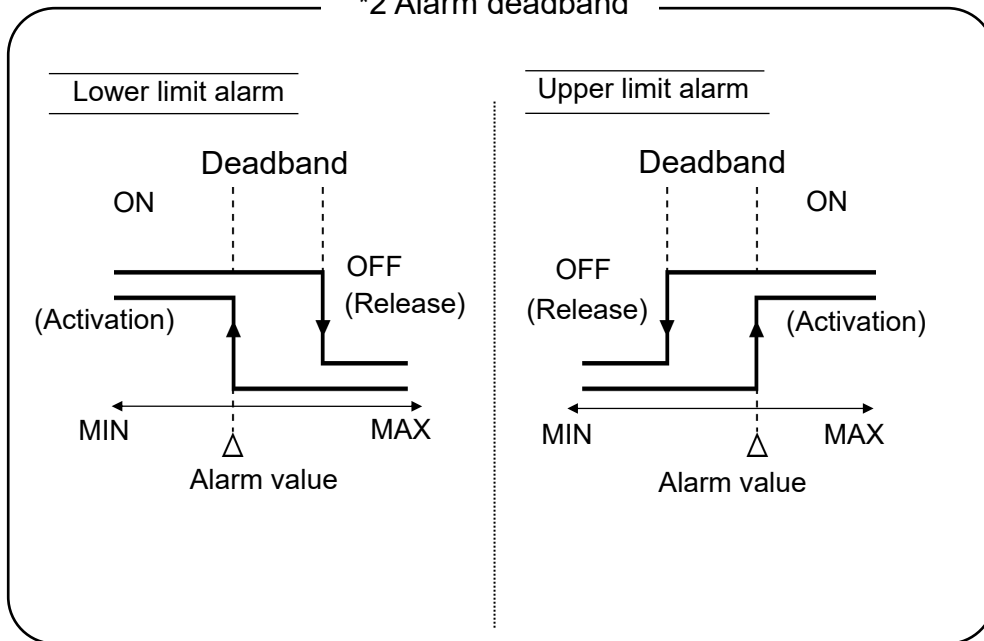
■ Setting the external judgement

- Set the channel number to judge whether to skip alarm judgment or not. If the value of the set channel is 1, skip alarm judgment. When the value becomes other than 1, it resets the delay timer and makes an alarm judgment.

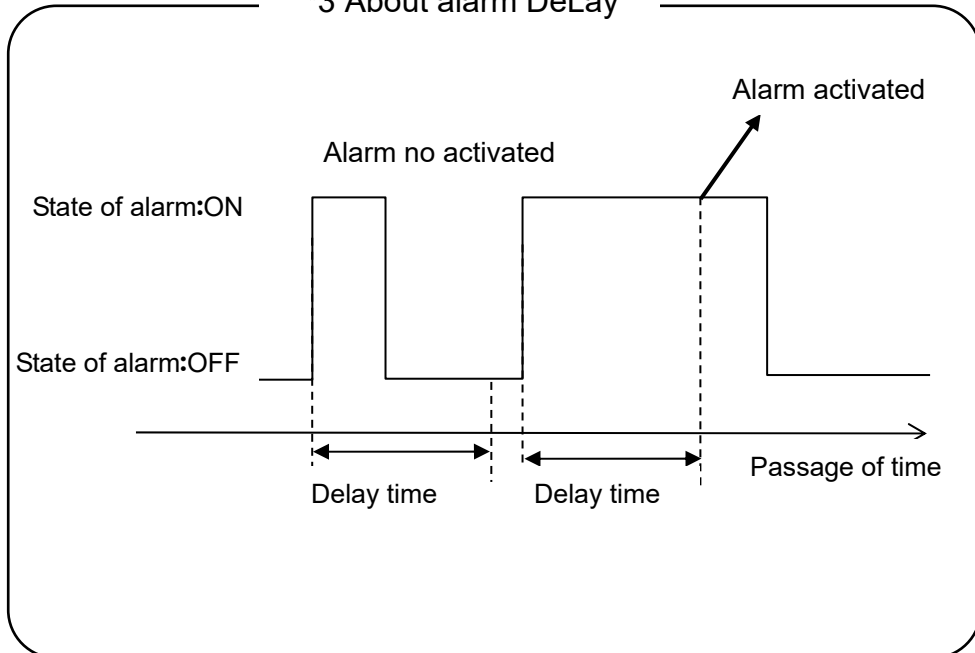
*1 Differential alarm



*2 Alarm deadband



*3 About alarm DeLay



10.6 File settings

- Select [File settings] from the setting menu and press the **ENTER** key to display the following screen.
- You can set various file-related items including recording cycle, condition for recording start/stop and destination folder name for recorded data.

<File settings screen>

■ Setting the recording cycle

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

- When the recording cycle is set to 0.5 or smaller (0.1 to 0.5 sec), up to 12 channels can be registered*1.
- When interval is set less than 0.5 seconds (0.1-0.5 seconds) at the KR2P61/2P21, input channel numbers become automatically 4 points. *2

*1 <Message window>

*2 <Message window>

■ Setting the data format

- The selected type of data within a recording cycle is recorded*¹.

Sampling	Record an instantaneous measured value obtained within a recording cycle.
Average	Record an average measured value obtained within a recording cycle.
Highest	Record the highest measured value obtained within a recording cycle.
Lowest	Record the lowest measured value obtained within a recording cycle.
Highest/lowest	Record the highest and lowest measured values obtained within a recording cycle* ² .

*¹ When the recording cycle is 0.1 seconds, the sampling is only selectable.

*² When the maximum/minimum is selected, the data size becomes 1.5 times larger.

■ Setting the file size

- Select the file size. When the preset file size (period) is reached, the file is completed and the subsequent data will be stored in another file. Also, a file is completed when recording is stopped before the preset file size (period) is reached or when the limit of file size is reached (refer to “8.9 Recorded data screen” – “Save conditions of recorded data”).

Minute	10 minutes, 15 minutes, 20 minutes, 30 minutes, 60 minutes
Hour	2 hours, 3 hours, 4 hours, 6 hours, 8 hours, 12 hours, 24 hours
Other	Auto, 1 week, 1 month

- With “Auto” selected, data is recorded until the file size upper limit is reached.
- Recording period is calculated using the followings as reference.
 For the case of “minutes” or “hours”: “Time 0:00”
 For the case of “1 week”: “Sunday 0:00”
 For the case of “1 month”: “1st 0:00”

■ Setting the start trigger

- Following operations start recording.

Key	Alarm	Digital input (option)
-----	-------	------------------------

Trigger type	Contents
Key	The recording starts with START key and stops with STOP key
Alarm	The recording starts when the alarm relay becomes ON. The instrument is put to the trigger standby state when the alarm relay becomes OFF When this item is selected, the relay terminal number can be selected. ※While writing data into internal memory, next recording cannot be started (trend remains in stop state).
Digital input (option)	The recording starts when the digital input terminal becomes ON. The instrument is put to the trigger standby state when the digital input becomes OFF. When this item is selected, the input terminal number can be selected. ※While writing data into internal memory, next recording cannot be started.

*When the start trigger is set to “Alarm” or “Digital input”, press the **START** key to put the instrument to the trigger standby state.

■ Setting the pretrigger (0 to 950)

- When the recording starts, the past data retroactive to the count set here are recorded.

Example: When the recording starts at 13:00:00 with the pretrigger “10” and the recording cycle “2 seconds”, the 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 data for the pretrigger are cleared, and the data in the interval specified here may not be enough. In this case, only the data being saved are added to the beginning of the file.

■ Setting the file saving cycle

- The cycle is for saving recorded data to internal data.
- In addition to this cycle, the recorded data is also saved when “Save conditions of recorded data” are met (refer to 8.9 “Recorded data screen”).

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

■ Setting the directory (Maximum length 16 characters)

- You can set a name of directory saved in USB memory.
- The hierarchy can also be specified. The delimiting symbol is “\” (backslash). Refer to “6.3 Method of inputting the characters”.

10.7 Totalizer reset settings

- Select [Totalizer reset settings] from the setting menu and press the **ENTER** key to display the following screen.
- On this screen, you can set a condition for resetting a totalized data to “0” for the case the totalizer is selected for operation in “Input operation settings” (refer to “10.3.2 Setting method of formula”). The reset target is “ITG” formula only. For “ITG24” formula, reset is executed at reference time only, not at every interval.

<Totalizer reset settings screen>

■ Setting method

- Select 'all channels' or 'individual channel'.

Setting method	Description
All channels	Reset setting is applied to all channels.
Individual channel	Reset setting is made individually for each channel.

■ Setting the channel

- When select 'individual channel', setting is performed to specified channel.

■ Executing the manual reset

- The totalized data is reset to 0 manually.

■ Setting the auto reset

- When the auto reset of totalizer is used, set it to ON. Set it to OFF when it is not used.

■ Base time and interval

- The totalizer reset is executed at the following time, Base time + (interval x n) n = 0, 1, 2, 3,

Example: When the base time is set at 0:00 and the interval is set at 04:00, the totalized value is reset at 0 o'clock, 4 o'clock, 8 o'clock, 12 o'clock, 16 o'clock and 20 o'clock.

■ Reset by digital input (option)

*When this instrument has not digital input option, this item is not displayed.

- The totalizer rest is executed when the specified digital input terminal becomes ON. Select “None” when it is not used.

10.8 Schedule settings

- Select [Schedule settings] from the setting menu and press the **ENTER** key to display the following screen.
- You can set a recording schedule from this screen. Even when the conditions set in the [File settings] are met, recording does not start out of the scheduled period specified in this screen.

<Setting the schedule screen>

Real trend		0.1sec		2010/07/09 14:21:35				
Schedule settings		No settings ▼						
Date settings		Date		Time				
Start date and time		05/01/01 ▼		00:00 ▼				
End date and time		05/01/02 ▼		00:00 ▼				
Day setting		Sun	Mon	Tue	Wed	Thu	Fri	Sat
Usage days		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Start time		00:00 ▼						
End time		00:00 ▼						
Administrator(Admin) Log in time: 13:57:40								

■ Setting the schedule

- Select it from No settings, date or day.
- By these settings, the following settings become enabled.

■ Setting the date

- Set the start date/time and the end date/time.

■ Setting the day

- Check the day for using.
- Set the start time and the end time.

10.9 Marker text setting

- Select [Marker text settings] from the setting menu and press the **ENTER** key to display the following screen. The displayed screen varies when the digital input (option) is used.
- On this screen, you can register up to 50 marker texts (30 characters maximum for each text) to be written to the trend at a time. You can also create a marker text at the time you write a marker to the trend. Refer to “9.1 Marker writing” for details.

<Marker text settings screen>

(Without digital input)

Real trend		2010/07/09 14:22:48
No.	Clear	Marker text
1	Clear	
2	Clear	
3	Clear	
4	Clear	
5	Clear	
6	Clear	
7	Clear	
8	Clear	
9	Clear	
10	Clear	
11	Clear	
12	Clear	
13	Clear	

Administrator(Admin) Log in time: 13:57:40

(With digital input)

Real trend		2010/07/09 14:25:09
Digital input type		Standard
No.	DI	Marker text
1	None	
2	None	
3	None	
4	None	
5	None	
6	None	
7	None	
8	None	
9	None	
10	None	
11	None	

Administrator(Admin) Log in time: 13:57:40

■ Selecting clear

- Selecting [Clear] deletes the marker text of the selected number.

■ Setting the marker text

- Selecting [▼] located beside the marker text field displays the character entry screen.

■ Setting the marker writing with digital input (option)

- The maker can be written on the trends with ON from the digital input terminal.

<Digital input --- Standard>

- When the input terminal designated for the [digital input] becomes ON, the corresponded maker is written on the trends.

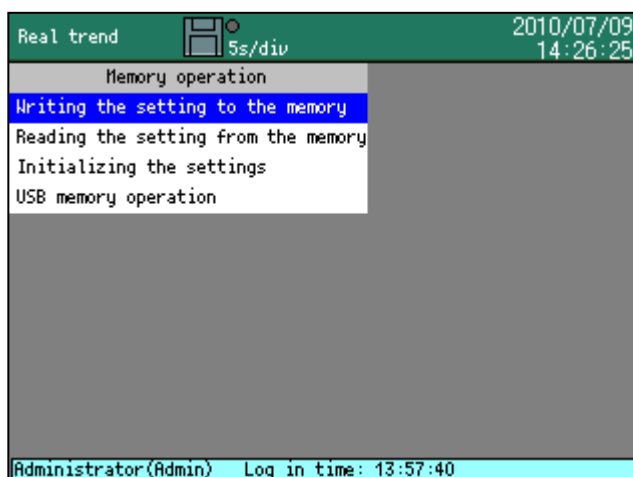
<Digital input --- Binary>

- Set the maker text number 1 to 50 by using the digital input terminal 1 to 7 (Binary expression of low bit at terminal 1 side and high bit at terminal 7 side).
- When terminal 8 is turned on under condition of the contact status of 1 to 50 at the terminal 1 to 7, the markers corresponding to the marker text numbers are written on the trends of the specified group.

10.10 Memory operation

- Select [Memory operation] from the setting menu and press the **ENTER** key to display the following screen.
- On this screen, you can save or read setting files of this instrument, or copy recorded data to USB memory.

<Memory operation screen>



■ Writing the setting to the memory

- Up to 100 setting files can be saved.
- Saved setting files are listed in Japanese alphabetical or alphabetical order.
- Select the file you want to save and press the **ENTER** key. When the file name entry screen is displayed, enter a file name and select "Set" and then press the **ENTER** key to save the setting.
 - * When you copy a setting file to USB memory, the file is saved in the "SETUP" folder with the extension ".krs" attached to it.

■ Reading the setting from the memory

- A setting file is read to overwrite the current setting.
- Saved setting files are listed in Japanese alphabetical or alphabetical order.
- Select the file number you want to read and press the **ENTER** key to start reading.

■ Initializing the settings

- All settings except the security setting are initialized.

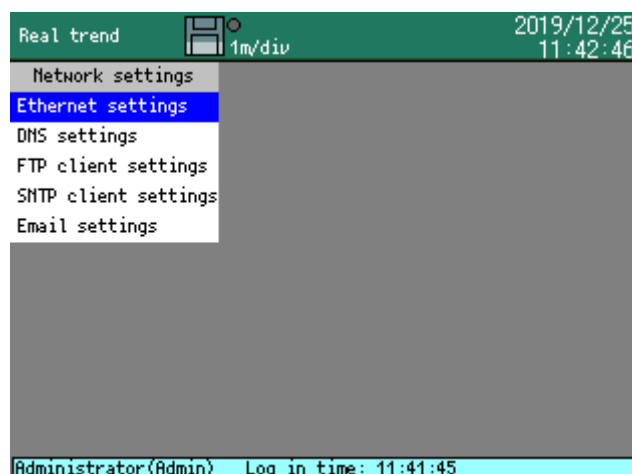
■ USB memory operation

- You can copy a recorded data file, setting file or snapshot file of this instrument to USB flash memory (up to 8 Gbytes) by connecting it to the USB port of this instrument. Also, you can copy a setting file stored in USB memory to the internal memory (refer to "9.3 Data copy to USB memory").
 - * Not all USB flash memory operations are guaranteed.
 - * Do not use external media such as hard disk, ZIP, MO and optical disk. Connecting any of these to the instrument may damage the connected medium.

10.11 Network settings

- Select [Network settings] from the setting menu and press the **ENTER** key to display the following screen.
- On this screen, you can configure the network settings for the instrument.

<Network settings screen>



Network setting items

Ethernet settings	Refer to “10.11.1 Ethernet settings”.
DNS settings	Refer to “10.11.2 DNS settings”.
FTP client settings	Refer to “10.11.3 FTP client settings”.
SMTP client settings	Refer to “10.11.4 SMTP client settings”.
Email settings	Refer to “10.11.5 E-mail settings”.

Warning

This product cannot be directly connected to the communication lines (including public wireless LAN) of telecommunications carriers (mobile communication companies, fixed communication companies, Internet providers, etc.).

When connecting this product to the Internet, be sure to connect via a router.

10.11.1 Ethernet settings

- Select [Network settings - [Ethernet settings] from the setting menu and press the **ENTER** key to display the following screen.
- On this screen, you can set an address to use this instrument on the Ethernet.

<Ethernet settings screen>

■ Setting the IP address

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

■ Setting the subnet mask

- Set the subnet mask of this recorder.

■ Setting the default gateway

- If there is router gateway like a router, etc. on the network, set default gateway address.

Example of usage in small scale network

When this recorder is used 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
KR2000 A	192.168.254.254	255.255.255.0
KR2000 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
• • •	• • •	• • •

10.11.2 DNS settings

- Select [Network settings] - [DNS settings] from the setting menu and press the **ENTER** key to display the following screen.
- You can configure the DNS server settings for this instrument. The DNS server is used to convert an address designated by the domain name into an IP address. Make sure to set the DNS server when you enter an address of servers such as FTP server, POP3 server and SMTP server by the domain name.

<DNS settings screen>

Real trend		0.1sec	2010/07/09 15:39:53
DNS ON/OFF	OFF		
Primary server IP	0. 0. 0. 0		
Secondary server IP	0. 0. 0. 0		
Administrator(Admin) Log in time: 15:39:27			

■ Setting the DNS to ON/OFF

- Select the DNS from ON (enabled) or OFF (disabled).

■ Setting the primary server IP and secondary server IP

- Enter the address of the DNS server. If the primary server is not found, use the address of the secondary server. When there is only one DNS server, it is no problem not to enter any address to the secondary server.

10.11.3 FTP client settings

- Select [Network settings] - [FTP client settings] from the setting menu and press the **ENTER** key to display the following screen.
- On this screen, you can configure the FTP client settings for this instrument.

<FTP client settings screen>

Real trend		0.1sec	2010/07/09 15:16:54
Server address			
Directory			
Login user name			
Login password			
PASV mode	OFF		
Auto Forwarding	OFF		
Retry mode	OFF		
Administrator(Admin) Log in time: 15:16:07			

■ Setting the server address

- Specify the address of the server for transferring the file. When the address is set with a name (〇〇.co.jp, 〇〇.com, etc.), not the IP address, make sure to set the DNS (Refer to “10.11.2 DNS settings”).

■ Setting the directory

- Set the directory for writing the file. If there is no directory, the automatic creation cannot be executed.

■ Setting the login user name

- Set the user name for logging into the FTP server.

■ Setting the login password

- Set the password for logging into the FTP server.

■ Setting the PASV mode

- Set to ON when the file is transferred with the PASV mode.

■ Setting the auto forwarding function

- Set to ON for transferring the file created automatically at the switching of the file for recording.

■ Setting the retry mode

- When FTP transmission is failed three times on 'OFF', error message is displayed on the screen and stop transfer. When retry mode is 'ON', try to transfer until succeeding. However, when transfer-waiting files become over 360, files after 360 are not transferred. When turns off the power of the instrument, transfer-waiting files are not transferred after tuning on the power.

10.11.4 SNTP client settings

- Select [Network settings] - [SNTP client settings] from the setting menu and press the **ENTER** key to display the following screen.
- On this screen, you can configure the SNTP client settings for this instrument.

<SNTP client settings screen>

Real trend		2019/12/25 11:43:11
SNTP ON/OFF	OFF	
SNTP server		
SNTP base time	00:00	
SNTP interval	24:00	
Refresh now	Refresh	

Administrator(Admin) Log in time: 11:41:45

■ Setting the SNTP to ON/OFF

- Set to “ON” when the automatic time synchronization by the SNTP is executed. If not executed, set to “OFF”.

■ Setting the SNTP server

- Specify the address of the SNTP server. When the address is set with a name (〇〇.co.jp, 〇〇.com, etc.), not the IP address, make sure to set the DNS (refer to “10.11.2 DNS settings”).

■ Setting the SNTP base time and interval

- The time synchronization is executed at the following time.
base time + (interval x n) n = 0, 1, 2, 3, ...

Example: In case that the “SNTP base time” is 0:00 and the “SNTP interval” is 04:00, the time synchronization by the SNTP is executed at 0 o'clock, 4 o'clock, 8 o'clock, 12 o'clock, 16 o'clock and 20 o'clock.

■ Refresh now

- When the [Refresh] button is tapped, the time synchronization with the SNTP server is executed.

Operation at the Time Adjustment

When the time is adjusted by the SNTP, the recorder operates as follows.

(While the recording stop)

The time is adjusted at the point.

(While the recording)

The time adjustment of 3 minutes or/and more is not executed. (Message display)

The time difference of less than 2 seconds is not executed.

In the case other than above, the time is adjusted to the changed value by the 5 milliseconds in 100 milliseconds.

10.11.5 E-MAIL settings

- Select [Network settings] - [Email settings] from the setting menu and press the **ENTER** key to display the following screen.
- On this screen, you can configure the e-mail settings for this instrument. This instrument can send e-mails at an occurrence of alarm or time event. Specify up to 8 forwarding addresses in advance. When an event (up to 8 events can be set) occurs, an e-mail is sent to the selected address.

<E-mail settings screen>

E-mail setting items

Forwarding address	Refer to "Setting the forwarding address" described below.
Forwarding condition	Refer to "Setting the forwarding condition" described below.
Forwarding channel	Refer to "Setting the forwarding channel" described below.
Account	Refer to "Setting the account" described below.

■Setting the forwarding address

- Selecting this item displays the following screen. You can specify up to 8 forwarding addresses on this screen.

<Forwarding address screen>

■ Setting the forwarding condition

- Selecting this item displays the following screen. On this screen, you can set up to 8 conditions for forwarding e-mails.

<Forwarding condition setting screen>

- **Selecting the condition number**

Up to 8 types of the e-mail forwarding condition can be registered. On this screen, set conditions for the number selected here.

- **Selecting forwarding condition**

Set the condition for forwarding the e-mail to the forwarding addresses.

Item	Contents
None	This condition is not used
Alarm activation time	The e-mail is forwarded when the alarm is activated at the specified channel.
Fixed interval	The e-mail is forwarded at every interval time based on the base time.

- **Starting CH, Ending CH**

These settings are effective then the “Alarm activated time” is selected in the forwarding condition. The e-mail is forwarded when the alarm is activated in the channels specified by the starting channel and the ending channel.

- **Standard time, interval**

These settings are effective then the “Fixed interval” is selected in the forwarding condition.

The e-mail is forwarded at the following time.

Base time + (interval x n) n = 0, 1, 2, 3, • • • .

Example: In case that the “Standard time” is 0:00, “Interval” is 04:00, the e-mail is forwarded at 0 o'clock, 4 o'clock, 8 o'clock, 12 o'clock, 16 o'clock and 20 o'clock.

- **Forwarding address**

Check the address for forwarding.

■ Setting the forwarding channel

- By selecting, the following screen is displayed.
- When the “Alarm activation time” is specified for the Forwarding condition, the e-mail is forwarded by writing the data of the channels, which are registered on this screen, into the message body. When no channel is selected, the e-mail is forwarded by writing the data of the alarm activation channels.
- When the “Fixed interval” is specified for the forwarding condition, the e-mail is forwarded by writing the data of the channels, which are registered on this screen, into the message body.

<Forwarding channel screen>

Real trend Rem. 2. 9day 2010/07/09 15:19:15

Condition (1-8) 1

01	02	03	04	05	06	07	08	09	10	11	12
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	14	15	16	17	18	19	20	21	22	23	24
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	26	27	28	29	30	31	32	33	34	35	36
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37	38	39	40	41	42	43	44				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

Administrator (Admin) Log in time: 15:16:07

- **Selecting a condition number**
Select the e-mail forwarding condition number for the settings.
- **Setting the forwarding data**
Check the channel numbers for attaching the data.

■ Setting the account

- Selecting this item displays the following screen.
- You can configure the SMTP (Simple Mail Transfer Protocol) settings on this screen.

<Account screen>

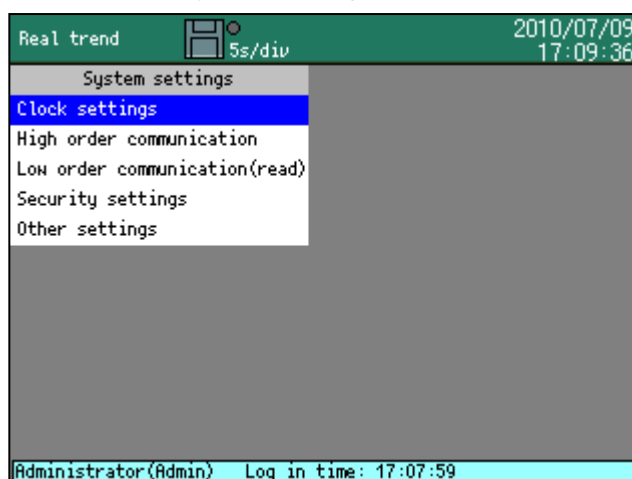
Real trend		2010/07/09
Rem. 2.9day		15:19:40
POP3 address		
SMTP address		
Sender address		
Account		
Password		
SMTP port number	25	
POP3 port number	110	
Administrator(Admin) Log in time: 15:16:07		

- **Setting the POP3 address**
This address is used when the SMTP server requires the POP3 authentication. Enter the address of the POP3 server. Do not enter anything when POP3 authentication is not required.
- **Setting the SMTP address**
Enter the address of the SMTP server.
- **Setting the sender address**
Enter the e-mail address obtained for this recorder. When this address is not correct, some SMTP servers do not accept the transmission of the e-mail.
- **Setting the account**
Enter the mail account for logging into the mail server.
- **Setting the password**
Enter the password for logging into the mail server.
- **Setting the SMTP port number**
Enter the port number of SMTP. Standard saver is 25.
- **Setting the POP3 port number**
Enter the port number of pop3. Standard saver is 110.

10.12 System settings

- Select [System settings] from the setting menu and press the **ENTER** key to display the following screen.
- On this screen, you can configure the system settings including clock, communication and user registration for this instrument.

<System settings screen>



System setting items

Clock settings	Refer to “10.12.1 Clock settings”.
High order communication	Refer to “10.12.2 High order communications settings”.
Low order communication	Refer to “12.1 Low order communications (read)” and “12.2 Low order communications (write)”. *Not displayed when the low order communication option is not used.
Security settings	Refer to “10.12.3 Security settings”.
Other settings	Refer to “10.12.4 Other settings”.

10.12.1 Clock settings

- Select [System settings] - [Clock settings] from the setting menu and press the **ENTER** key to display the following screen.
- You can set the clock of this instrument from this screen.

<Clock settings screen>

Real trend 1m/div 2009/11/09 13:45:02

Date	09/11/09	▼
Time	13:44:56	▼
Set		
Display format	YY/MM/DD	▼
Time zone	+09:00	▼

Administrator(Admin) Log in time: 13:38:29

■ Setting the date and time

- Enter date and time values as in the case of character entry.
- Pressing the [Set] key writes the setting to the internal clock. Press the [Set] key in accordance with the time signal.

■ Time adjustment by DI (Displayed at a pertinent option)

- When specified digital input is turned ON, if 'second' of the time is less than 30, second is 0 and if 'second' is more than 30, 'second' is 0 and add 1 to 'minute'.

■ Selecting the display format

- Select a format for date display.

YY/MM/DD	Year/Month/Day
MM/DD/YY	Month/Day/Year
DD/MM/YY	Day/Month/Year

■ Setting the time zone

- Set the time difference from Greenwich Mean Time (GMT). This setting is reflected to the sent time in the email header.

10.12.2 High order communications settings

- Select [System settings] - [High order communication] from the setting menu and press the **ENTER** key to display the following screen.
- You can set the high order communication for this instrument.

<High order communication screen>

■ Setting connecting method

Set the high order communication method.

<Connecting method selection screen>

List of connecting method

Login	Login is required to write the settings.
Select MAC	Permit communication only from the registered MAC address.
Any	Permit all communications.

LOGIN

It requires login operation (user ID/password registration) during communication.

*Only the login administrator can operate / change settings by high order communication.

*It is unnecessary when reading the data by high order communication.

Select MAC

It permits all communication from the registered MAC address by this unit.

You can register the MAC address up to 8.

*MAC address (Media Access Control address) is a unique ID number of each unit to discriminate each other on the Ethernet.

*You cannot communicate from the unregistered unit.

*If you changed the settings by high order communication, then that unit MAC address is saved on audit.

* If used the optional serial communication, then this limit is not applied.

<MAC address registration method>

Real trend 2011/03/19 15:38:36

Connecting method Select MAC Select MAC

TCP/IP

Port number 11111

Serial communication

Communication mode RTU

Instrument address 01

Bit Rate 9600bps

Communication character 8M1

Administrator(Admin) Log in time: 15:37:02

Move the cursor to [Select MAC] and press **ENTER** key to display MAC address registration screen.

Settings will be valid after you checked.

Real trend 2011/03/19 15:39:08

Rem. 13.2day

MAC address1	<input checked="" type="checkbox"/>	0123456789AB
MAC address2	<input type="checkbox"/>	000000000000
MAC address3	<input type="checkbox"/>	000000000000
MAC address4	<input type="checkbox"/>	000000000000
MAC address5	<input type="checkbox"/>	000000000000
MAC address6	<input type="checkbox"/>	000000000000
MAC address7	<input type="checkbox"/>	000000000000
MAC address8	<input type="checkbox"/>	000000000000

Administrator(Admin) Log in time: 15:37:02

Any

It permits all communication.

* If you changed the settings by high order communication, then user MAC address is saved on audit.

■ Setting the TCP/IP port number

- Set the port number for executing the high order communications by TCP/IP.
- When port number is set 502, it is possible to communicate by Modbus-TCP. When port number is set other than 502, this instrument communicates by own communication method.

When use our company's PC software such as CISAS, TRWIN, KIDS, or PASS for high order application, set the number except 502. When use the PC software corresponding commercial Modbus-TCP, set 502.

■ Setting the serial communication (Option)

- * When the instrument has not communication interface option, serial communication is not displayed.
- Set the following items according to the settings of the high order application.

Item	Description
Communication mode	Select the communication mode from [RTU] or [ASCII].
Instrument address	Set a value from 1 to 31
Bit rate	Select the bit rate from [9600bps] or [19200bps].
Communication character	Select the combination of the data bit, parity, and stop bit.

(Select a code from the following table)

Code	Character length	Parity	Stop bit
7E1	7 bits	Even number	1
7E2			2
7O1		Odd number	1
7O2			2
8N1	8 bits	None	1
8N2			2
8E1		Even number	1
8E2			2
8O1		Odd number	1
8O2			2

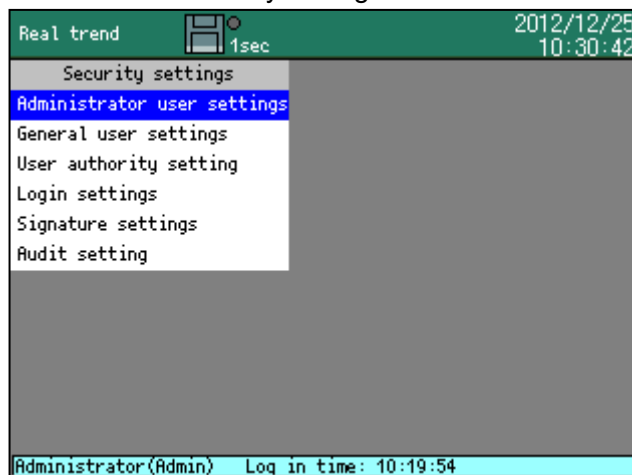
Remarks

Changing the setting by high order communication is available only when the KR is logout. If the KR is log on, then you cannot change the setting by high order communication. (It will reply error code to the setting change request.)

10.12.3 Security settings

- Select [System settings] - [Security settings] from the setting menu and press the **ENTER** key to display the following screen.
- On this screen, you can set security-related items including user registration, general user authority and login settings. The security settings can be performed by administrator user only.

<Security settings screen>



Security setting items

Administrator user settings	Refer to “Registering the administrator user” described below.
General user settings	Refer to “Registering the general user” described below.
User authority setting	Refer to “Setting the user authority” described below.
Login settings	Refer to “Setting the login” described below.
Signature settings	Refer to “Setting the signature” described below.
Audit settings	Refer to “Setting the audit” described below.

■ Registering the administrator user

- On this screen, you can register as an administrator user or initialize a password.

***Register two or more administrator users.**

***You cannot set previously used IDs and full names (up to 1000 previous IDs/full names).**

<Administrator user registration screen>

ID	Full name	Password
1 Admin	Administrator	Clear
2 Admin2	Administrator2	Clear
3		Clear
4		Clear
5		Clear

Administrator(Admin) Log in time: 17:07:59

Initialize a password.

ID	Set a login ID required when you login to the instrument.
Full name	Set a user name displayed in the lower left of the screen.

<Administrator user default passwords>

	Default password
Administrator user 1	Admin1
Administrator user 2	Admin2
Administrator user 3	Admin3
Administrator user 4	Admin4
Administrator user 5	Admin5

Remarks

About user registration

Register two or more administrator users. Keep the passwords secure and be careful not to forget them. In case that all the registered administrator users become unable to login (lock-out), an administrator user login will become impossible from that time forward. In this case, contact your nearest CHINO office.

■ Registering the general user

- On this screen, you can register as a general user, initialize a password or set authority.
- *You cannot set previously used IDs and full names (up to 1000 previous IDs/full names).**

<General user registration screen>

ID	Full name	Authority	Password
1 User1	user1	1	Clear
2 User2	user2	1	Clear
3		1	Clear
4		1	Clear
5		1	Clear
6		1	Clear
7		1	Clear
8		1	Clear
9		1	Clear
10		1	Clear
11		1	Clear
12		1	Clear
13		1	Clear

ID	Set a login ID required when you login to the instrument.
Full name	Set a user name displayed in the lower left of the screen.
Authority	Set the functions used by general user (refer to “Setting the user authority”).

<General user default password>

	Default password
General user 1	User1
General user 2	User2
:	:
:	:
General user 100	User100

■ Setting the user authority

- You can set the functions used by general user from this screen. Only the functions with marked checkbox can be operated by general user.

<Authority setting screen>

Function	Checkbox
Alarm ACK	<input checked="" type="checkbox"/>
START/STOP	<input checked="" type="checkbox"/>
MENU/HOME settings	<input checked="" type="checkbox"/>
DISP menu	<input checked="" type="checkbox"/>
Set clock	<input checked="" type="checkbox"/>
Delete file	<input checked="" type="checkbox"/>
Copy file	<input checked="" type="checkbox"/>
FTP transfer	<input checked="" type="checkbox"/>
Delete marker	<input checked="" type="checkbox"/>
Write marker	<input checked="" type="checkbox"/>
Signature 1	<input type="checkbox"/>
Signature 2	<input checked="" type="checkbox"/>
Signature 3	<input type="checkbox"/>
Signature 4	<input type="checkbox"/>

■ Setting the login

- On this screen, you can set login-related settings including an expiration date and login timeout.

<Login settings screen>

Real trend		Rem. 100.0day	2012/12/25 10:30:51
Password expire (day)	200		
Minimum password length	4		
Password security	Low		
Login timeout(min)	60		
Login error (times)	20		
Login method	List		
Last ID display	ON		

Administrator(Admin) Log in time: 10:19:54

Password expire (day)	Set an expiration date for a password. When the expiration date has passed, you need to reset a password (set value: 0 to 400 days). *Set this item to "0" for an indefinite period.
Minimum password length	Set the minimum length of a password (0 to 10 characters).
Password security	Set a password security (low/high). If set to "high", usage of capital letters (A to Z), small letters (a to z) and numbers (0 to 9) will be checked at the change of password.
Login timeout (min)	Set a time to execute an automatic logout (0 to 60 minutes). *Set this item to "0" for an indefinite period.
Login error (times)	Set the maximum limit of failed login attempt (0 to 20 times). If the maximum limit is exceeded, further login attempts by the user will be blocked (lock-out). To cancel lock-out, refer to "7.8 How to cancel lock-out". *Set this item to "0" for an unlimited login attempt.
Login method	Select either "List" or "Key input" as a method for entering a user ID on the login screen. Selecting "List" displays a list of registered IDs.
Last ID display	Select "ON" or "OFF" whether to display the last login User ID to the ID entry field of login screen.

■ Setting the signature

- On this screen, you can set a digital signature. To place a signature, refer to "9.2 Digital signature".
- Four levels (1 to 4) of signature are available.

<Signature settings screen>

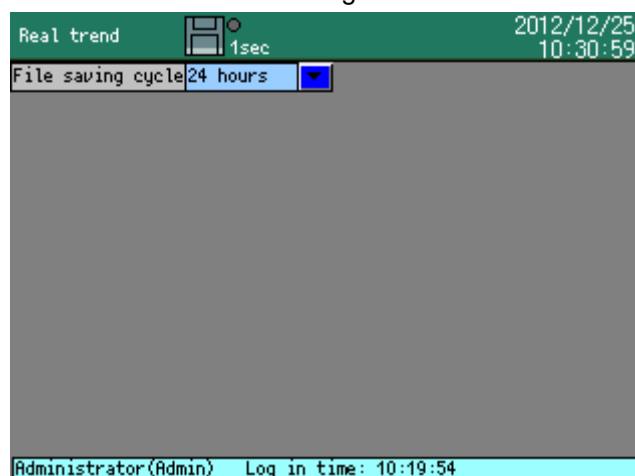
Real trend		5s/div	2010/07/09 17:17:00
Signature level name			
1	Sign1		
2	Sign2		
3	Sign3		
4	Sign4		

Administrator(Admin) Log in time: 17:07:59

■Setting the audit

- On this screen, you can set a file saving cycle of audit file.
- Saving cycle can be selected from “None”, “24 hours” and “1 month”.

<Audit setting screen>



10.12.4 Other settings

- Select [System settings] - [Other settings] from the setting menu and press the **ENTER** key to display the following screen.
- On this screen, you can configure various settings including the language used for this instrument, filter level, and communication type.

<Other settings screen>

Real trend		2012/12/25 10:30:34
Language	English	▼
Instrument name		▼
Usage group count	1	▼
Decimal point symbol	.	▼
50Hz/60Hz	50Hz	▼
Filter level	0	▲▼
Pen coordinates	Smoothness	▼
Communication type	High + low order (read)	▼

Administrator(Admin) Log in time: 10:19:54

■ Selecting the language

- Select the language from Japanese, English or Italian.

■ Setting the instrument name

- It is used in the subject for forwarding the e-mail. " Message from (instrument name)" is used as the subject.
- When it is in blank, the subject becomes "Message from Recorder".

■ Setting the usage group count

- Less the usage group count, longer the time to record to the internal memory.

■ Setting the decimal point

- Select ". (dot)", or ", (comma)" for the decimal point.

■ Setting 50Hz/60Hz

- Select the power frequency from 50Hz or 60 Hz.

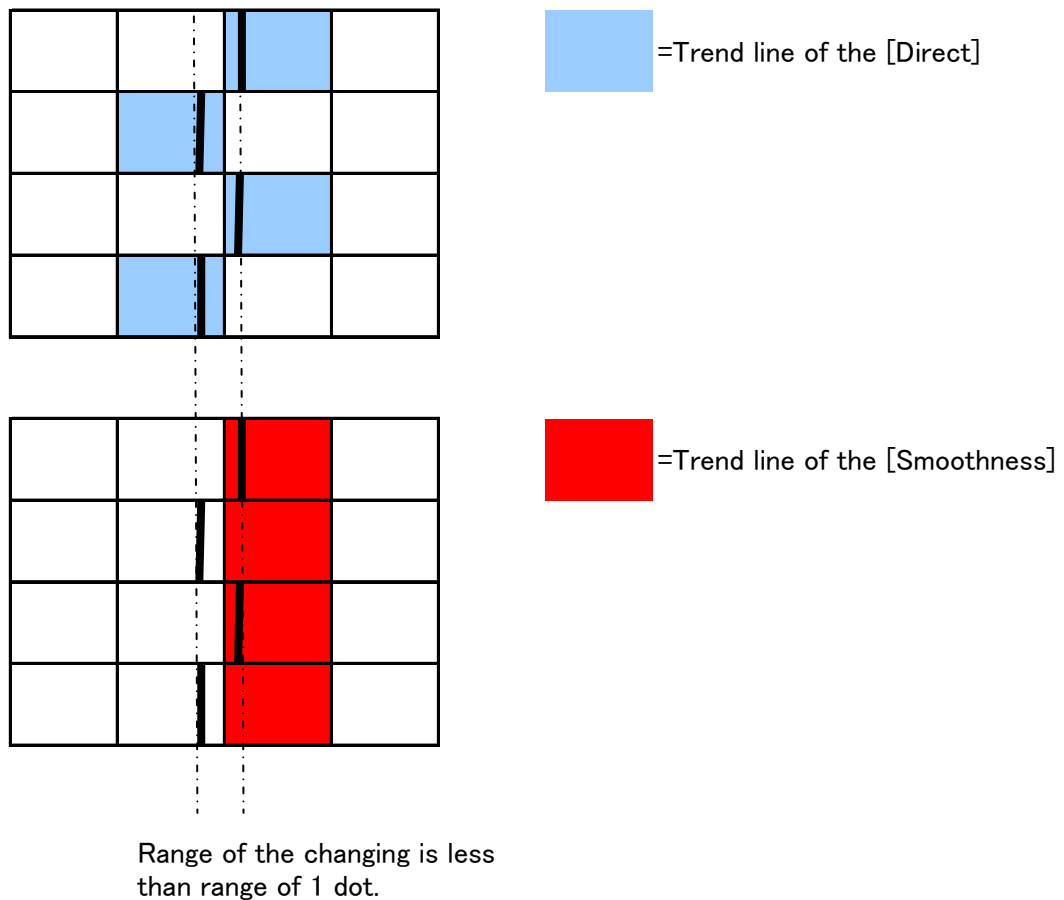
■ Setting the filter level

- The input filter level can be set from 0 to 3.
- 0 means no-filter, and 3 means the strongest filter.

■ Setting the pen coordinate

- Select the coordinates calculation way of trend from smoothness/direct.
- In case of selecting the [Smoothness], even if the trend coordinate is changed by changed data, the trend coordinate is not changed from previous value until changing of the data exceed equivalent of 1 dot on the trend. When data is changed less than equivalent of 1 dot of trend coordinate, trend line does not swing.
- When select the [Direct], the trend coordinate from data is drawn directly.

(Example of drawing for [Direct] and [Smoothness])



■ Select communication type (option)

- Select the communication type from [High + low order (read)] or [High + low order (write)]. Each communication types are following.

High + low order (read)	Record the data in PLC and input data of the product of our company that is connected low order.
High + low order (write)	Transfer the input data of KR2000 to PLC.

11 Setting/displaying on web screen

11.1 Setting and displaying from the web screen

You can input to the recorder, set and display data related to the record from the web browser.

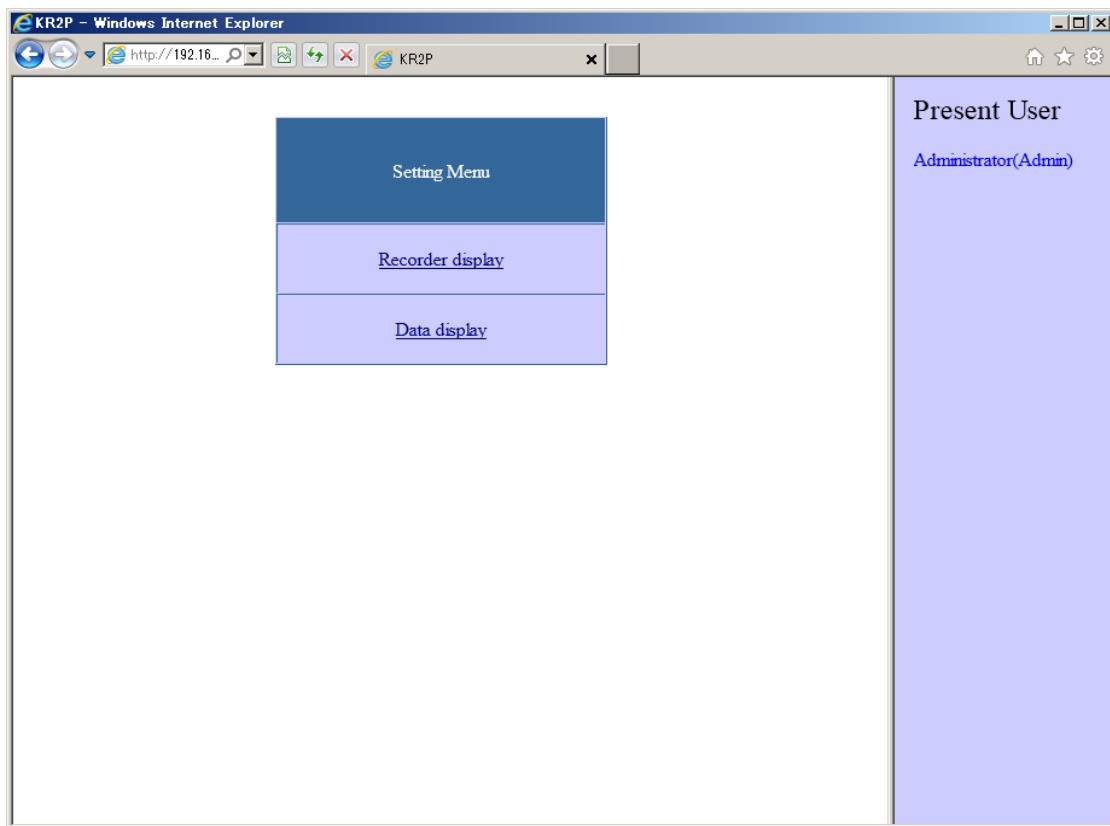
11.1.1 Top page

Following screen is displayed by accessing IP address of recorder from the web browser (figure below is of the Internet Explorer) and after the password authentication.

User name and password to use for the password authentication are user name and password of currently logged in.

Logged in user name is displayed on the right side of the screen.

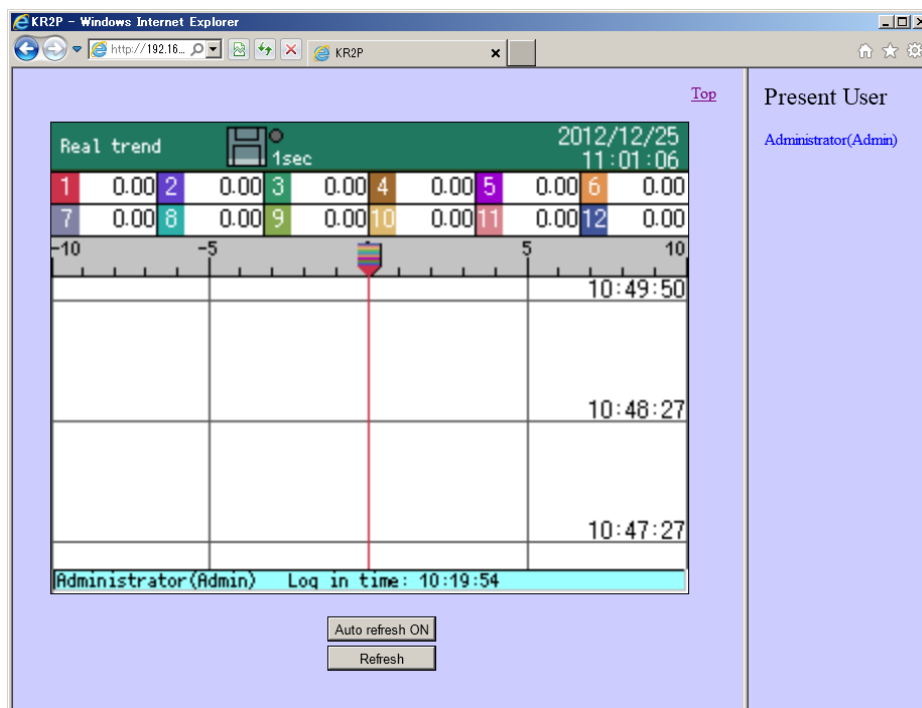
Clicking on the link displays from the top “Recorder Display” to display same screen as the recorder on the web browser and “Data Display” for displaying each recording channel data.



11.1.2 Recorder display

It displays same display contents as this recorder. It uses graphic file so it takes longer time to read the screen than other screen.

Clicking on the “Refresh” button reloads current display again. Clicking on the “Auto refresh ON” refreshes the screen about 1 min. interval. If you desire to stop the auto refresh, click on the “Auto refresh OFF”.



11.1.3 Data display

Display 128 channels data of recorder with tag name and unit. Screen of acquisition data fix display and display of reloading data about 10 sec. intervals can be selected. Link click from the top page moves acquisition data fix screen which fixes data at displaying. Click link “Start auto refresh” on the bottom of the screen to move to the auto refresh screen. To move to the fix screen while in the auto refresh display, click link “Stop auto refresh”.

Channel number Tag Data Unit

01		0.00	V	23		0.00	V
02		0.00	V	24		0.00	V
03		0.00	V	25		0.00	V
04		0.00	V	26		0.00	V
05		0.00	V	27		0.00	V
06		0.00	V	28		0.00	V
07		0.00	V	29		0.00	V
08		0.00	V	30		0.00	V
09		0.00	V	31		0.00	V
10		0.00	V	32		0.00	V
11		0.00	V	33		0.00	V
12		0.00	V	34		0.00	V
13		0.00	V	35		0.00	V
14		0.00	V	36		0.00	V
15		0.00	V	37		0.00	V
16		0.00	V	38		0.00	V
17		0.00	V	39		0.00	V
18		0.00	V	40		0.00	V
19		0.00	V	41		0.00	V
20		0.00	V	42		0.00	V
21		0.00	V	43		0.00	V
22		0.00	V	44		0.00	V

Start auto refresh

12 Low order communications (read)

12.1 Low order communications (read)

12.1.1 Outline

***When use low order communications, set communication type to [High + low order (read)] (Refer to “10.12.4 Other settings”).**

- Low order communications are functions that this recorder works as a master unit (high order instrument) communications and reading data of the other instruments which are connected as slave units (low order instruments) assigned for input channel of this recorder and then displaying and recording the data. This recorder and low order instruments communicate by serial communication of RS-485 communication standard compliance.
- The “range”, “scale”, “RJ”, and “burn out” settings can be set for lower order instrument.^{*1}
- Data requirement for each instrument is approximately 1 second (all points per 1 instrument).^{*2} When connect 16 instruments to low order side, data renewal period is approximately 16 seconds.^{*3}

^{*1} LT230, LT350/370, LT830, JU, JW has only data collective function, not setting.

^{*2} Data renewal time is different depending on regulated points only JW.

- | | |
|---------------------|---|
| Less than 10 points | : number of connection lower-order communication instrument x 1 (second) |
| 10-13 points | : number of connection lower-order communication instrument x 2 (seconds) |
| More than 13 points | : number of connection lower-order communication instrument x 3 (seconds) |

^{*3} Except JW

^{*4} Data of following PLC made of Mitsubishi Electric can be read.

- MELSEC AnACPU series
- MELSEC QnACPU series
- MELSEC QnASCPU series
- MELSEC QCPU series
- MELSEC FX series

It is necessary to change the setting of MELSEC to being checksum.
Need the communication unit etc. that is corresponded communication control procedure model 4.

Following devices can be inputted.

- D0000 to D1023
- M0000 to M2047

^{*5} Data of following PLC made of Omron can be read.

- The instrument which is corresponded SYSMAC C mode command communication.

Following channels can be inputted.

- Data memory (DM) area: D0000 to D9999
- CIO (input and output relay etc.) area: 0 to 6143

When communicate with PLC of Omron, need line convertors (SC8-10) same as the number of PLC (Refer to “4.7(5) Connection of Low order communication RS-485”).

—Instrument can be connected low order side—

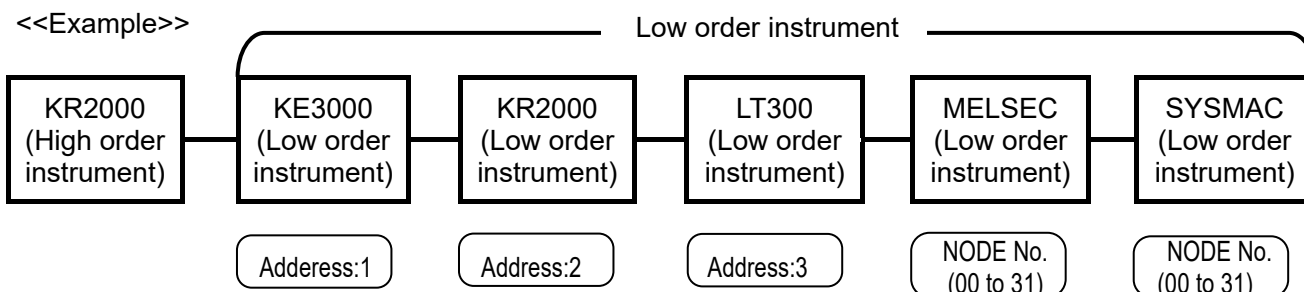
1. BR
2. AL3000/4000
3. AH3000/4000
4. SE3000
5. KE3000
6. LE5000
7. KR2000/3000, KR2S/3S, KR2D/KR3D
8. LT230
9. LT350/370
10. LT450/470
11. LT830
12. DB1000/2000/600
13. DP1000G
14. KP1000/2000
15. JU
16. JW
17. MELSEC series ^{*4}
18. SYSMAC series ^{*5}

■ Lower-order communication (read) outline

- Model: KR2P□□MQ□□
- Connection quantity: Maximum 16
- Maximum input points*: 30 points (KR2P6□)/24 points (KR2P2□)
^{*Possible to register on CH7 (KR2P6□) or from CH13 to CH36 (KR2P2□) of the recorder.}
- Data renewal period: approximately 1 second per 1 instrument.*
^{* Display of renewal may delay in this instrument depending on the condition of data renewal or communication response delay of low order side instrument.}
- Communication time out: approximately 1 second for each instrument (no retry). Retain the data of last value.*
^{*When communication time out is occur for the 60th times in a row, display and record “UNDER”.}

12.1.2 Procedure of connection setting to low order instrument

- After connecting between low order communication terminal of this recorder and low order instruments, set this recorder (high order instrument) and low order instruments following the procedure.
- For details of connection, refer to “4.7 Connection of communication I/F terminal” and the installation/connection manual of each device (Terminal resistance is installed to the instrument which is set one end or both ends of standard communication line, however terminal resistance is not installed depend on the environment.).




































































12.1.3 Setting of low order instrument

- (1) Set communication address (instrument number) of low order instrument from 1 to 16 without overlap (Node number of PLC is optional number which is not overlapping).
- (2) Set communication of each low order instrument by specification of below. See instruction manual of each instrument for setting method.

Baud rate	9600 bps
Length of data	8 bit
Stop bit	1 bit
Parity	None

12.1.4 Register to the instrument (product of our company)

- (1) Press the **Menu** key in operation screen of the instrument, and select “system setting” → “low order communication (read)” in the list, then press the **ENTER** key. (Display “lower communication (read)” only in lower communication (read) option product)
- (2) Select appropriate name*1 of the model from a list of “model”. Register low order instrument corresponding each communication address (instrument number) 1 - 16 to COM1-COM16.
- (3) Register points to “input points” *2*3

Real trend					 1sec		2015/12/15 14:35:24	
	Model		Input points	PLC node	Top address	Read count		
COM1	KE		12				10	
COM2	KR2/3		6				10	
COM3	DB		1				10	
COM4	AL/AH		6				10	
COM5	DB		2				10	
COM6	DB		2				10	
COM7	----		----				1	
COM8	----		----				1	
COM9	----		----				1	
COM10	----		----				1	
COM11	----		----				1	
COM12	----		----				1	
COM13	----		----				1	
COM14	----		----				1	
COM15	----		----				1	
COM16	----		----				1	
Administrator/Admin Log in time: 14:34:32								

- ◆ Example of setting
- COM1: KE/12points
 - COM2: KR2/6points
 - COM3: DB/1point
 - COM4: AL/6points
 - COM5: DB/2points
 - COM6: DB/2points

*1 Name of instrument which is displayed on the list is displayed convenient.

On the list	Model of our company
SE3	SE3000
AL/AH	AL3000/AH3000, AL4000/AH4000
KR2/3	KR2000/KR3000, KR2S/KR3S, KR2D/KR3D
LE5	LE5000
LT2/3/8	LT230/LT350/370/LT830
LT4	LT450/470
DB	DB1000/2000/600
DP-G	DP1000G
KP	KP1000/2000

*2 Data of LT (each series), JU, and JW is assigned like below for CH data.

JW	
CH01	Voltage level (average)
CH02	Current value (average)
CH03	Electric value
CH04	None assigned
CH05	Voltage level (between U phase and V phase)
CH06	Current value (U phase)
CH07	Load resistance value (U phase)
CH08	Voltage level (between V phase and W phase)
CH09	Current value (V phase)
CH10	Load resistance value (V phase)
CH11	Voltage level (between W phase and U phase)
CH12	Current value (W phase)
CH13	Load resistance value (W phase)
CH14	Initial resistance value (U phase)
CH15	Initial resistance value (V phase)
CH16	Initial resistance value (W phase)

JU	
CH01	Voltage level
CH02	Current value
CH03	Electric value
CH04	Load resistance value

*3 The data of LT, DB, and DP is allocated in KR2000 as CH data.

		Model name						
CH / Parameter		LT8	LT2	LT3	LT4	DB	DP-G	KP
CH01	PV	○	○	○	○	○	○	○
CH02	SV	○	○	○	○	○	○	○
CH03	MV1	○	○	○	○	○	○	○
CH04	MV2	○	○	○	○	○	○	○
CH05	Execution SV	×	○	○	○	○	○	○
CH06	EV1	×	○	○	○	○	○	○
CH07	EV2	×	○	○	○	○	○	○
CH08	EV3	×	×	○	○	○	○	○
CH09	EV4	×	×	×	○	○	○	○
CH10	P	×	○	○	○	○	○	○
CH11	I	×	○	○	○	○	○	○
CH12	D	×	○	○	○	○	○	○
CH13	Execution No.	×	○	○	○	○	×	×

○ : The display is possible、 × : UNDER display

12.1.5 Register to the instrument (PLC)

- (1) Select “system setting” → “low order communications (read)” on the menu screen of the recorder.
* “low order communication (read)” is displayed when the recorder has low order communication (read) option.
- (2) Select the name of the model from the list of “model”. Then register PLC on each COM1 to COM16.
- (3) Register administrate address of the recorder on “top address” and “read address”.

Model	Input points	PLC node	Top address	Read count
COM1 HELSEC	----	0	D0000	10
COM2 HELSEC	----	1	D0000	10
COM3 HELSEC	----	2	D0000	10
COM4 HELSEC	----	3	D0000	10
COM5 HELSEC	----	4	D0000	10
COM6 HELSEC	----	5	D0000	10
COM7	----	----	----	1
COM8	----	----	----	1
COM9	----	----	----	1
COM10	----	----	----	1
COM11	----	----	----	1
COM12	----	----	----	1
COM13	----	----	----	1
COM14	----	----	----	1
COM15	----	----	----	1
COM16	----	----	----	1

Administrator(Admin) Log in time: 14:34:32

12.1.6 Register CH number of low order instrument

- (1) Press the **MENU** key at the operation screen of the recorder, and select “input computation programming” on the list.
- (2) Move the focus to “input type” of CH which is registered low order instrument, and press the **ENTER** key.
Select model which is registered “12.1.4 Register to the instrument (product of our company)”
“12.1.5 Register to the instrument (PLC)” from the displayed list, and press the **ENTER** key.
- (3) Set CH number of low order instrument which is resisted “CH” column of third row.

CH.	Input type	CH.	Tag	Unit
13	----	1		V
14	----	1		V
15	COM1(KE)	1		V
16	COM2(KR2/3)	1		V
17	COM3(LT2/3/8)	1		V
18	COM4(AL/AH)	1		V
19	----	1		V
20	----	1		V
21	----	1		V
22	----	1		V
23	----	1		V
24	----	1		V
25	----	1		V

Administrator(Admin) Log in time: 08:55:55

Remarks

About input setting of low order instrument

When a model that registers by the low order communication setting and an actual connected model have the difference, the selection item of the input kind of might not be normally displayed. Please use externals where there is no difference in connected model and the main body setting.

12.1.7 Input setting of low order instrument (CHINO products only)

- (1) Move the focus to “input computation programming” of “CH” of the left side, press the **ENTER** key. Display detail setting screen like below.

Real trend 2010/07/13 09:04:48
Rem. 2.9day

CH. 13 COM1(KE)-CH1 Copy from 13 to 13 Go

Range type 10V
Range -10.00 to 10.00
Scale -10.00 to 10.00
Correction 0.00
RJ ----
Burn out ----

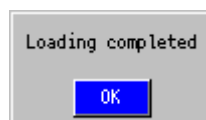
Tag
Unit U
Calculate OFF
Formula

Load Send Load all Send all

Administrator\Admin Log in time: 08:55:55

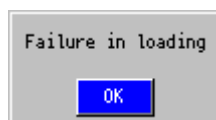
- (2) Move the focus to [Load] for getting setting contents of relevant CH of low order instrument, and press the **ENTER** key. Move the focus to [Load all] for getting setting contents of all registered points, and **ENTER** key.

Following message is shown when input of setting contents is done normally.



Press the **ENTER** key for returning.

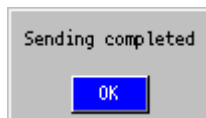
If the input is incorrect, the following message is displayed.



Press the **ENTER** key for returning, and move the focus to [Load] button, then press the **ENTER** key again. When message of “Loading completed” is not shown, communication is not normal. Check the setting and connection of this instrument and low order instruments again.

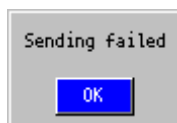
- (3) When changing the setting from this recorder for appropriate CH of low order instrument, perform following procedure. (The instrument which is not change the setting is not displayed [Send], [Send all] button.)

When change the setting only displayed CH, move the focus to [Send], and press the **ENTER** key. In case of changing and setting of all needed CH, move the focus to [Send all] after finishing the change of all setting, then press the **ENTER** key. Following message is shown when input of setting contents is done normally. After sending contents of setting is complete, the following message is displayed.



Press the **ENTER** key for returning.

If the input is incorrect, the following message is displayed.



Press the **ENTER** key for returning, and move the focus to [Send], then press the **ENTER** key again. When message of "Sending completed" is not shown, communication is not normal. Check the setting and connection of this instrument and low order instruments again.

- (4) After finish the setting of CH press the **ESC** key and save the setting.

- (5) After setting of the above procedure, start data acquisition.

12.2 Low order communications (write)

12.2.1 Outline

***When use low order communications, set communication type to [High + low order (write)]. (Refer to “10.12.4 Other settings”)**

- Low order communications (write) has the function that communicate for high order instrument and write measurement and calculation data of this recorder to connected low order instrument. This recorder and low order instruments communicate by serial communication of RS-422A or RS-485 communication standard compliance.

—Instrument can be connected low order side—

1. MELSEC series*¹
2. SYSMAC series*²

*¹ Data of following PLC made of Mitsubishi Electric can be read.

- MELSEC AnACPU series
- MELSEC QnACPU series
- MELSEC QnASCPU series
- MELSEC QCPU series
- MELSEC FX series

Need the communication unit etc. that is corresponded communication control procedure model 4.

Following devices can be inputted.

- D0000 to D1023
- M0000 to M2047

*² Data of following PLC made of Omron can be read.

- The instrument which is corresponded SYSMAC C mode command communication.

Following channels can be inputted.

- Data memory (DM) area: D0000 to D9999
- CIO (input and output relay etc.) area: 0 to 6143

When communicate with PLC of Omron, need line convertors (SC8-10) same as the number of PLC (Refer to “4.7(5) Connection of Low order communication RS-485”).

■ Low order communications (write) specification outline

- Model: KR2P□□MQ□□
- Connection quantity: Maximum 5
- Maximum writing points*: 44
*Possible to write all channels data of this instrument.
- Data renewal period: Approximately 1 second per 1 instrument*
*Display of renewal may delay in this instrument depending on condition of data renewal or communication response delay of low order side instrument.
- Communication time out: Approximately 1 second for each instrument *(no retry).
*When the instrument include communication time out and has communication error for 60th times,, display error message.

12.2.2 Register to the instrument

- (1) Select “system setting” → “low order communications (read)” on the menu screen of the recorder
 *“low order communication (write)” is displayed when the recorder has low order communication (write) option.
- (2) Select the name of the model from the list of “model”. Then register PLC on each COM1 to COM5.
- (3) Register address which is written from this recorder on “top address” and “write count”.
- (4) Register top channel of source of write on “top CH”.

Real trend		Rem. 2.9day		2010/07/13 09:11:42		
	Model	PLC node	Top address	write count	Top CH	
COM1	MELSEC	1	D0000	10	1	
COM2	SYSMAC	2	D0000	5	11	
COM3	----	0		0	0	
COM4	----	0		0	0	
COM5	----	0		0	0	

Administrator(Admin) Log in time: 08:55:55

On the setting of the above,

COM1: Write the data of CH1 to 10 of KR to “D0000 to D0009” of MELSAC of PLC node “1”.

COM2: Write the data of CH11 to 15 of KR to “D0000 to D0004” of SYSMAC of PLC node “2”.

13 Scale adjustment

To maintain the measuring accuracy, it is recommended to adjust this instrument every year.

Adjustment Name	Description
Zero-span adjustment	<p>Execute the adjustment by inputting the zero and span of each measurement range.</p> <p>*As for this container, the AD converter and one KR2P*1 every four channels do the input process to KR2P*0 with one AD converter every 12 channels. Therefore, both six point input specifications and the input specifications of 12 points input and adjust 0 and the span of each range three times once twice for 12 point specification as for KR2P*0 in case of six point input specification to KR2P*1.</p>

*The sensor correction (shift of value) for each channel can also be performed (Refer to “10.3 Input operation settings”).

13.1 Adjustment environment

Items	Reference conditions
Ambient temperature	23°C ± 2°C
Ambient humidity	50% ± 10%
Power voltage	100V AC ± 1%
Power frequency	50Hz or 60Hz ± 0.5%

13.2 Preparation of tools

Tools	Input types			Remarks
	DC voltage	Thermocouple	Resistance	
DC voltage current generator	○			Accuracy: Better than ±0.05%
Reference junction compensator		○		0°C ± 0.2°C
Thermocouple for test		○		Same type of thermocouple as input type
Standard variable resistor			○	Accuracy: Better than ±0.05%
3-core copper wire			○	Same resistance value per core

13.3 Before adjustment

- (1) Attach the terminal board cover and turn power on.
- (2) Take the warm-up time for more than 30 minutes until this recorder is stabilize. (The ideal warm-up period is more than 1 hour.)

Remarks About Adjustment

The check and adjustment of measured values need careful cautions for the adjustment work besides tools such as standard tools and reference conditions.
When the check and adjustment of measured values are required, contact your local CHINO's sales agent.

13.4 Connection

Connections depend upon the input types. Connect tools such as standard tools to the measuring input terminals to be adjusted.

Caution

■ **Turn off the power source before connections**

Turn off the power source before connections for preventing electric shock.

<KR2P*0 used>

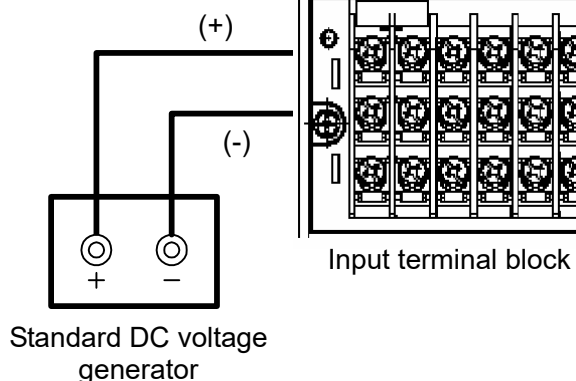
(1) DC voltage input

The terminal 2, 5, and 11 on each input terminal unit are used for adjustment.

To perform an adjustment, connect to the terminal 2, 5 and 11 at the same time as shown in the right figure.

The CH 1-4, CH 5-8 and CH 9-12 are adjusted through the terminal 2, terminal 5, and terminal 11 respectively.

* Only the terminal 2 and 5 are used for an adjustment for the 6-channel specification.



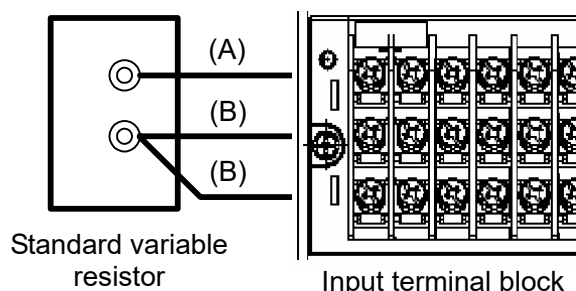
(2) Resistance thermometer input

The terminal 2, 5 and 11 on each input terminal unit are used for adjustment.

To perform an adjustment, connect to the terminal 2, 5 and 11 as shown in the right figure.

The CH 1-4, CH 5-8 and CH 9-12 are adjusted through the terminal 2, terminal 5 and terminal 11 respectively.

* Only the terminal 2 and 5 are used for an adjustment for the 6-channel specification.



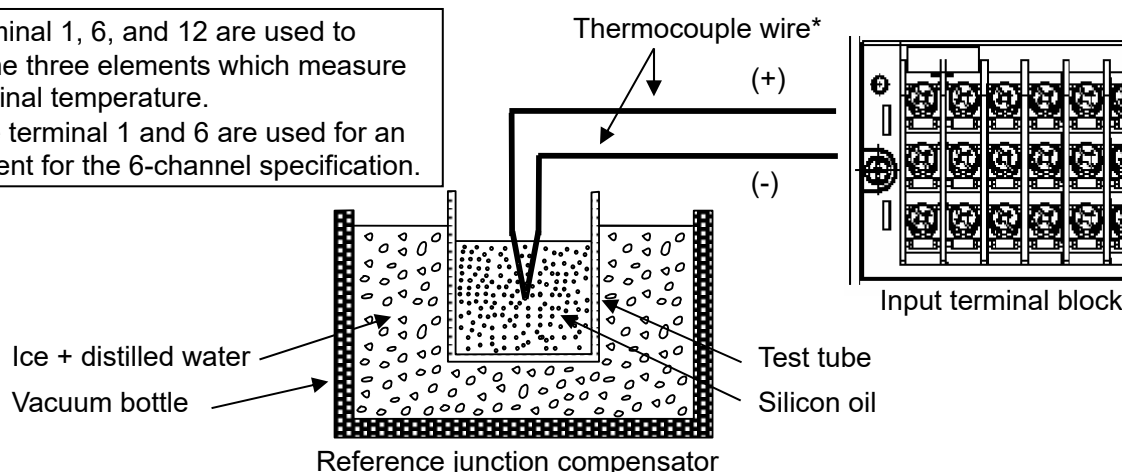
(3) Thermocouple input

The terminal 1, 6, and 12 on each input terminal unit are used for adjustment.

To adjust the thermocouple, connect to the terminal 1, 6, and 12 as shown in the below figure.

■ The terminal 1, 6, and 12 are used to adjust the three elements which measure the terminal temperature.

■ Only the terminal 1 and 6 are used for an adjustment for the 6-channel specification.



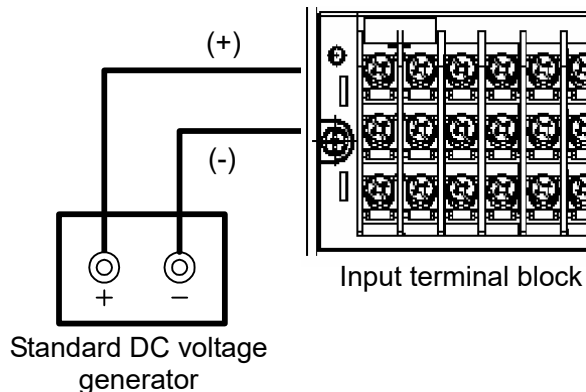
*The electromotive force of the thermocouple input becomes small by the electromotive force equivalent to the temperature at terminals. The instrument itself compensates for its value. This is called the reference junction compensation. The input for the adjustment is entered with the reference electromotive force (0°C at reference). Accordingly, the reference junction compensator is used for reducing the reference junction compensated value.

<KR2P*1 used>

(1) DC voltage input

The terminal 2 is used for adjustment.
To perform an adjustment, connect to the terminal 2 as shown in the right figure.

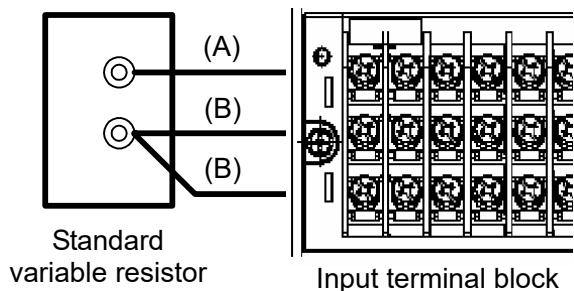
The CH 1-12 (CH 1-6 for the 6-channel specification) are adjusted through the terminal 2.



(2) Resistance thermometer input

The terminal 2 is used for adjustment.
To perform an adjustment, connect to the terminal 2 as shown in the right figure.

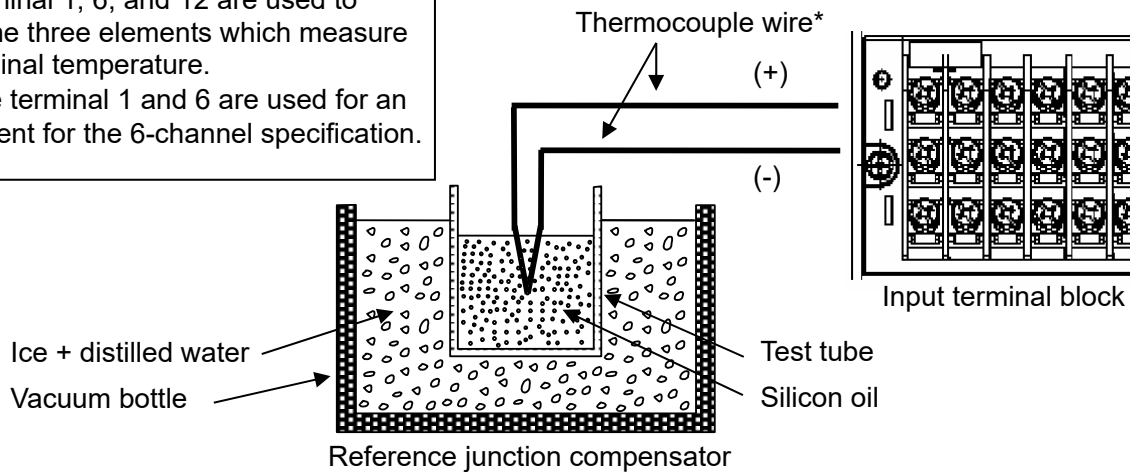
The CH 1-12 (CH 1-6 for the 6-channel specification) are adjusted through the terminal 2.



(3) Thermocouple input

The terminal 1, 6, and 12 on each input terminal unit are used for adjustment.
To adjust the thermocouple, connect to the terminal 1, 6, and 12 as shown in the below figure.

- The terminal 1, 6, and 12 are used to adjust the three elements which measure the terminal temperature.
- Only the terminal 1 and 6 are used for an adjustment for the 6-channel specification.




*The electromotive force of the thermocouple input becomes small by the electromotive force equivalent to the temperature at terminals. The instrument itself compensates for its value. This is called the reference junction compensation. The input for the adjustment is entered with the reference electromotive force (0°C at reference). Accordingly, the reference junction compensator is used for reducing the reference junction compensated value.

13.5 Adjustment method (Zero and span adjustment)

- By pressing the **MENU** key on the operation screen and then pressing **HOME** key more than 5 seconds, the following adjustment screen is displayed.
- On this screen, you can perform a scale adjustment for each channel by entering a zero and span points. Select the range you want to adjust and press the **ENTER** key to enter the adjustment mode.
- The displayed data shows the AD count values after an adjustment.

<Zero/span adjustment screen (KR2P*0)>

Real trend		 5s/div		2010/07/13 09:20:09			
Range		Zero			Span		
6.9mV	Go CLR	0	0	0	25000	25000	25000
13.8mV	Go CLR	0	0	0	25000	25000	25000
27.6mV	Go CLR	0	0	0	25000	25000	25000
55.2mV	Go CLR	0	0	0	25000	25000	25000
69mV	Go CLR	0	0	0	25000	25000	25000
200mV	Go CLR	0	0	0	25000	25000	25000
500mV	Go CLR	0	0	0	25000	25000	25000
2V	Go CLR	0	0	0	25000	25000	25000
5V	Go CLR	0	0	0	25000	25000	25000
10V	Go CLR	0	0	0	25000	25000	25000
20V	Go CLR	0	0	0	25000	25000	25000
50V	Go CLR	0	0	0	25000	25000	25000
Pt150	Go CLR	0	0	0	25000	25000	25000
Administrator(Admin) Log in time: 09:19:37							

[Adjustment of the DC voltage input range]

Connect as shown in “13.4 Connection (1) In case of the DC voltage input”.


<How to set>


- In case of the KR2P*0, connect to the CH2, CH5, CH11 all together, and execute the adjustment by inputting the voltage for the adjustment range.
- In case of the KR2P*1, connect to the CH2, and execute the adjustment by inputting the voltage for the adjustment range.

(1) Select “Go” at the range to be adjusted and press the **ENTER** key.

■ Adjustment screen of KR2P*0

■ Adjustment screen of KR2P*1

Real trend		 0.1sec		2010/07/13 09:20:31			
Range		Zero			Span		
6.9mV	Go CLR	0	0	0	25000	25000	25000
13.8mV	Go CLR	0	0	0	25000	25000	25000
27.6mV	Go CLR	0	0	0	25000	25000	25000
55.2mV	Go CLR	0	0	0	25000	25000	25000
69mV	Go CLR	0	0	0	25000	25000	25000
200mV	Go CLR	0	0	0	25000	25000	25000
500mV	Go CLR	0	0	0	25000	25000	25000
2V	Go CLR	0	0	0	25000	25000	25000
5V	Go CLR	0	0	0	25000	25000	25000
10V	Go CLR	0	0	0	25000	25000	25000
20V	Go CLR	0	0	0	25000	25000	25000
50V	Go CLR	0	0	0	25000	25000	25000
Pt150	Go CLR	0	0	0	25000	25000	25000
Administrator(Admin) Log in time: 09:19:37							

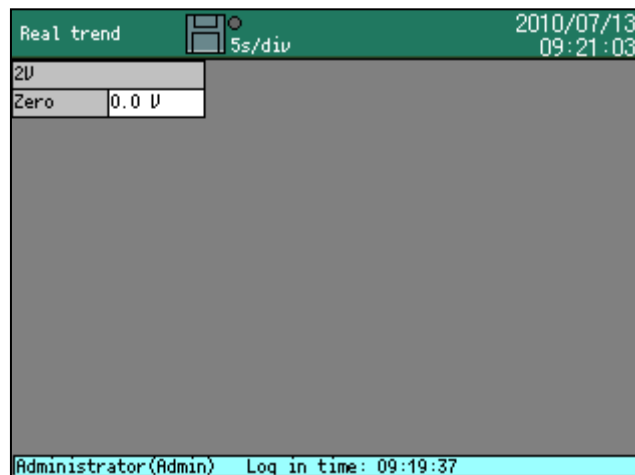
Real trend		 5s/div	2010/07/13 09:30:15	
Range		Zero	Span	
6.9mV	Go CLR	0	25000	
13.8mV	Go CLR	0	25000	
27.6mV	Go CLR	0	25000	
55.2mV	Go CLR	0	25000	
69mV	Go CLR	0	25000	
200mV	Go CLR	0	25000	
500mV	Go CLR	0	25000	
2V	Go CLR	0	25000	
5V	Go CLR	0	25000	
10V	Go CLR	0	25000	
20V	Go CLR	0	25000	
50V	Go CLR	0	25000	
Pt150	Go CLR	0	25000	
Administrator(Admin) Log in time: 09:19:37				

(2) Since the window indicating the voltage value for inputting is displayed, input its value to this recorder.

(3) Adjust the zero point.

(Example) For the adjustment of the $\pm 2V$ range

- Input the voltage of 0V with the DC standard voltage generator.

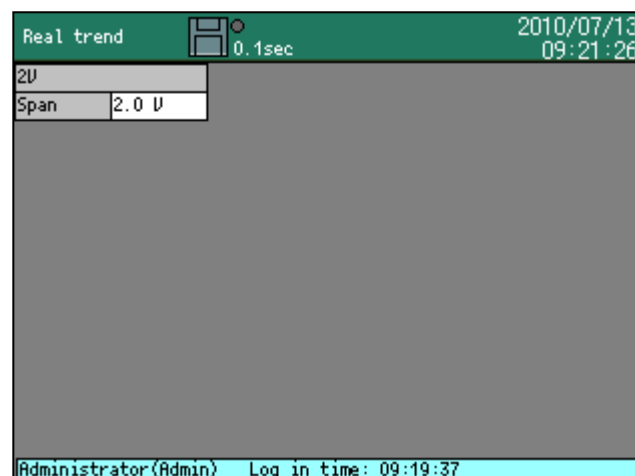


(4) After inputting the zero point for about 5 seconds, press the **ENTER** key.

(5) Adjust the span point.

(Example) For the adjustment of the $\pm 2V$ range

- Input the voltage of +2V with the DC standard voltage generator.



(6) After inputting the span point for about 5 seconds, press the **ENTER** key.

(7) After the adjustment of the span point, the screen is returned to the adjustment screen for all ranges.

(8) Repeat from (1) to (6) for the adjustment of other ranges.

(9) When the adjustments are completed, press the **ESC** key to return to the menu screen.

[Adjustment of resistance thermometer input range]

Connect as shown in “13.4 Connection (2) In case of the resistance thermometer input”.

<How to set>

- In case of the KR2P*0, execute the adjustment by inputting the resistance value for the adjustment range of each channels of CH2, CH5, and CH11.
- In case of the KR2P*1, execute the adjustment by inputting the resistance value for the adjustment range of CH2.

(1) Select “Go” at the range to be adjusted, and press the **ENTER** key.

■ KR2P*0 adjustment screen

Real trend		0.1sec	2010/07/13 09:23:02	
Range	Go	CLR	Zero	Span
6.9mV	Go	CLR	0	25000
13.8mV	Go	CLR	0	25000
27.6mV	Go	CLR	0	25000
55.2mV	Go	CLR	0	25000
69mV	Go	CLR	0	25000
200mV	Go	CLR	0	25000
500mV	Go	CLR	0	25000
2V	Go	CLR	0	25000
5V	Go	CLR	0	25000
10V	Go	CLR	0	25000
20V	Go	CLR	0	25000
50V	Go	CLR	0	25000
Pt150	Go	CLR	0	25000
Administrator(Admin) Log in time: 09:19:37				

■ KR2P*1 adjustment screen

Real trend		Rem. 2.9day	2010/07/13 09:30:42	
Range	Go	CLR	Zero	Span
6.9mV	Go	CLR	0	25000
13.8mV	Go	CLR	0	25000
27.6mV	Go	CLR	0	25000
55.2mV	Go	CLR	0	25000
69mV	Go	CLR	0	25000
200mV	Go	CLR	0	25000
500mV	Go	CLR	0	25000
2V	Go	CLR	0	25000
5V	Go	CLR	0	25000
10V	Go	CLR	0	25000
20V	Go	CLR	0	25000
50V	Go	CLR	0	25000
Pt150	Go	CLR	0	25000
Administrator(Admin) Log in time: 09:19:37				

(2) Since the window indicating the resistance value for inputting is displayed, input its value to this recorder.

(3) Adjust the zero point.

(Example) For the adjustment of the Pt150 range

- Input the resistance of 100Ω with the standard variable resistor.

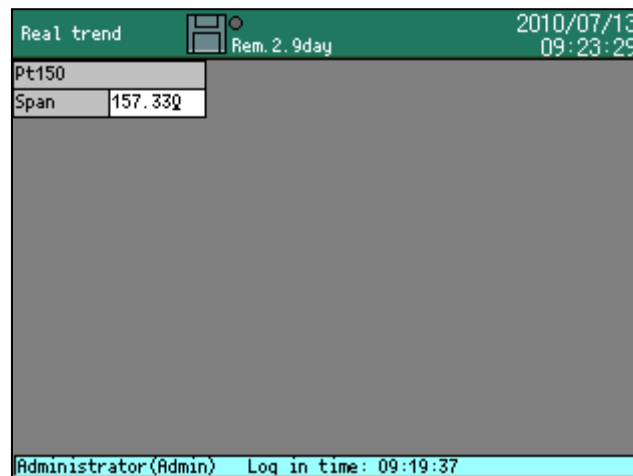
Real trend		5s/div	2010/07/13 09:23:21	
Pt150				
Zero		100.00Ω		
Administrator(Admin) Log in time: 09:19:37				

(4) After inputting the zero point for about 5 seconds, press the ENTER key.

(5) Adjust the span point.

(Example) For the adjustment of the Pt150 range

- Input the resistance of 157.33Ω with the standard variable resistor.



(6) After inputting the span point for about 5 seconds, press the ENTER key.

(7) After the adjustment of the span point, the screen is returned to the adjustment screen for all ranges.

(8) Repeat from (1) to (6) for the adjustment of other ranges.

(9) To return to the setting menu, press the **[ESC]** key twice after adjusting a range for CH2, CH5, or CH11 on KR2P*0, or press the **[ESC]** key twice after adjusting a range for CH2 on KR2P*1. When the channel to be adjusted is kept being open, the adjustment at this channel is not performed.

[Adjustment of thermocouple input range...Adjustment of the reference junction compensation (RJ0°C)]

Remarks

After the adjustment of the DC voltage input range, execute the adjustment of the thermocouple input range. If the adjustment of the DC voltage input range is performed after the adjustment of the thermocouple input range, the adjustment results are influenced.

Connect as shown in “13.4 Connection (3) In case of the thermocouple input”. Execute the adjustment by connecting the thermocouple for adjusting to each of the CH1, CH6 and CH12 terminals.

<How to set>

- (1) Before moving to the adjustment screen, set the input of the CH1, CH6 and CH12 terminals to the followings.
(Refer to “10.3.1 Setting contents”).

Range type	Thermocouple connected
Range	Set 1 for the decimal point position of the range setting value. Recommendation: Measuring range of which the reference range is $\pm 13.8\text{mV}$ and the display resolution becomes 0.1°C (Refer to “16 Specifications ○Measuring Range, Accuracy Rating and Display Resolution”).)
RJ	Internal
Burnout	None

- (2) Select “Go” at the range of RJ0°C on the adjustment screen, and press the ENTER key.

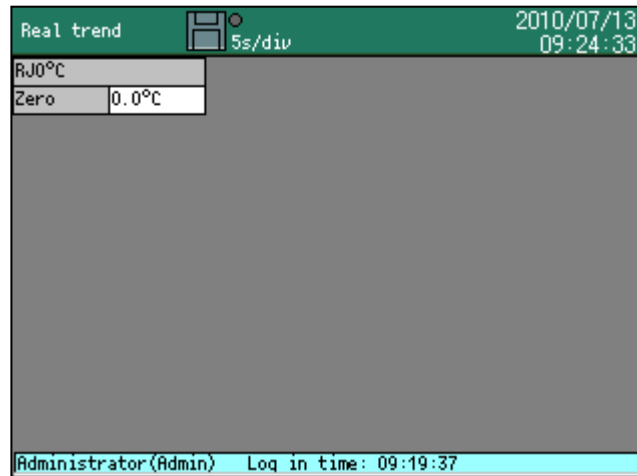
■ Adjustment screen of KR2P*0

Real trend		0.1sec		2010/07/13		09:24:07	
Range	Zero	Span					
55.2mV	Go CLR	0	0	0	25000	25000	25000
69mV	Go CLR	0	0	0	25000	25000	25000
200mV	Go CLR	0	0	0	25000	25000	25000
500mV	Go CLR	0	0	0	25000	25000	25000
2V	Go CLR	0	0	0	25000	25000	25000
5V	Go CLR	0	0	0	25000	25000	25000
10V	Go CLR	0	0	0	25000	25000	25000
20V	Go CLR	0	0	0	25000	25000	25000
50V	Go CLR	0	0	0	25000	25000	25000
Pt150	Go CLR	0	0	0	25000	25000	25000
Pt300	Go CLR	0	0	0	25000	25000	25000
Pt850	Go CLR	0	0	0	25000	25000	25000
RJ0°C	Go CLR	0	0	0	---	---	---
Administrator(Admin) Log in time: 09:19:37							

■ Adjustment screen of KR2P*1

Real trend		5s/div		2010/07/13		09:31:04	
Range	Zero	Span					
55.2mV	Go CLR	0	25000				
69mV	Go CLR	0	25000				
200mV	Go CLR	0	25000				
500mV	Go CLR	0	25000				
2V	Go CLR	0	25000				
5V	Go CLR	0	25000				
10V	Go CLR	0	25000				
20V	Go CLR	0	25000				
50V	Go CLR	0	25000				
Pt150	Go CLR	0	25000				
Pt300	Go CLR	0	25000				
Pt850	Go CLR	0	25000				
RJ0°C	Go CLR	0	0	0	---	---	---
Administrator(Admin) Log in time: 09:19:37							

(3) After about 30 seconds passed, press the ENTER key.



(4) After adjustment, the screen is returned to the adjustment screen for all ranges.

(5) When an adjustment is completed, press the **ESC** key twice to return to the setting menu.

Remarks

- When the input to this recorder was wrong or some inconvenience occurred, try to execute the scale adjustment again.
- When select the [CLR] button and press the **ENTER** key on the adjustment screen, the adjustment data are cleared and returned to the default data set at the factory.

14 Guideline of parts replacement interval

It is recommended to exchange parts periodically as preventive maintenance for using this recorder under good conditions for a long time

Warning

For replacing parts, ask the service personnel authorized by CHINO. Otherwise, this instrument may not recover properly and also accident may occur.
Contact your local CHINO's sales agent to perform parts replacement.

[Operating Conditions]

The reference of the parts exchange intervals is under the following standard conditions. The intervals become shorter if environmental conditions are worse than the standard conditions.

Items	Conditions
Temperature	20 to 25°C
Humidity	20 to 80%rh
Operation time	8 hours/day
Corrosive gas	Not existed

Items	Conditions
Others	1) A place without dust, moisture or oily smoke 2) A place without vibrations or shocks 3) A place where the operation is not adversely affected

[Reference of Parts Replacement Intervals]

Part name	Reference of exchange	Remarks
Power supply unit	5 years	At the ambient temperature of 25°C
LCD	3 years	*
Keypad	5 years	
Relay (For mechanical alarm output)	70,000 times	Resistance load (Less than the rated contact rating)
	20,000 times	Inductive load (Less than the rated contact rating)
Lithium battery	5 years	

*When the LCD reduces its brightness to half, exchange it. The reduction of brightness differs depending on the usage conditions.

The replacement interval can be extended by using the screen saver function(display off timer) or by setting the brightness control small(refer to "10.4.5 LCD settings").

15 Troubleshooting

Troubleshooting methods are shown by symptoms. Read corresponding symptom items.

1. Not working

Check	Causes and remedial measures
1) Check if power is supplied to power terminals	Turn on the external source power supply.
2) Check if the power supply is as specified	Feed power supply as specified (100 to 240 VAC 50/60Hz).
3) Check if connections to power terminals are correct.	Connect the cable to power terminals (L, N) correctly.
4) POWER switch is not turned ON.	Turn ON the POWER switch.
5) Try turning off and on the external source power supply.	

2. Abnormal measurement

Symptoms	Causes and remedial measures
1) Measured values unstable	<ul style="list-style-type: none">•Check measuring terminals for looseness.•Check if the input signal is unstable.
2) An error occurs	<ul style="list-style-type: none">•Check if the input signal is correct.•Check if extension wire is connected to input terminals. (Thermocouple input only)•Check input value, if error found, perform adjustment with reference to Adjustment (refer to “13 Scale adjustment”).
3) Influences by ambient temperature (Thermocouple input only)	<ul style="list-style-type: none">•Check if the terminal cover is mounted

When problem cannot be solved

If problem cannot be solved by performing the troubleshooting, contact your sales agent or CHINO with information of

1. Model, 2. Serial No., 3. Description of problem, 4. Other notes.

When the instrument need to repaire, underdatnd the following before having it repaired.

The data of internal memory may be deleted during repairing.

Backup the data to USB memory before having the instrument repaired. We are not responsible for the lost or damaged data.

16 Specifications

■ General Specifications

Rated power voltage: 100-240 VAC, 50/60 Hz
(Universal power supply)

Power consumption: 50VA MAX

Operating conditions:

- Reference operating condition
 - ... Ambient temperature/humidity range
21 to 25°C 45 to 65%rh
 - Power voltage 100 VAC $\pm 1\%$
 - Power frequency 50/60 Hz $\pm 0.5\%$
 - Attitude Left/Right 0° □□ Forward tilting 0° Backward tilting 0°
 - Warm-up time: 30 minutes or more
- Normal operating condition
 - ... Ambient temperature/humidity range
0 to 50°C, 20 to 80%rh
 - Power voltage 90 to 264 VAC
 - Power frequency 50/60 Hz $\pm 2\%$
 - Attitude Left/Right 0° Forward tilting 0° Backward tilting 0° to 20°
- Transportation condition,
 - ... In the packed condition on shipment from the factory
 - Ambient temperature/humidity range
-20 to +60°C, 5 to 90%rh (no dew condensation)
 - Vibrations 10 to 60 Hz, less than 0.5 G
 - Impact Less than 40 G
- Storage condition,
 - ... Ambient temperature/humidity range
-20 to 60°C, 5 to 90% rh (no dew condensation)

Power failure protection:

FLASH memory and SRAM stores the setting.
A FLASH memory stores the data.
A lithium battery backs ups the clock and parameter RAM for more than 5 years (provided that the daily operating hours is longer than 8 hours).

Insulation resistance:

Between secondary and protective conductor terminals
..... More than 20 MΩ at 500 VDC

Between primary and protective conductor terminals
..... More than 20 MΩ at 500 VDC

Between primary and secondary terminals
..... More than 20 MΩ at 500 VDC

Between alarm output (mechanical relay) and other secondary terminal
..... More than 20 MΩ at 500 VDC

Dielectric strength:

Between secondary and protective conductor terminals
..... 1 minute at 500 V AC

Between primary and protective conductor terminals
..... 1 minute at 1500 V AC

Between primary and secondary terminals
..... 1 minute at 2300 V AC

**Primary terminals: Power terminals(L and N), alarm output terminals

Secondary terminals: Input terminals, digital input terminals, communication terminals

Case assembly material: Door flame.....ABS resin
Case and power supply material...Steel

Color: Door frame..... Black (Equivalent to Munsell N3.0),
Case.....Gray (Equivalent to Munsell N7.0)

Weight: Approx. 2.2 kg(with 12 inputs and full option)

Outside dimensions: 144H x 144W x 230.3D (233.4D with

communication, alarm and digital input options)

Panel-cut dimensions: 138 x 138

Mounting: Panel mounting

Clock accuracy: ± 2 minutes per 30 days (excluding errors due to power ON/OFF under the reference operating conditions.)

Terminal screws: Power terminal.....M4.0

Protective conductor terminal.....M4.0

Input terminals.....M3.5

Alarm output terminals.....M3.5

Digital input terminal.....M3.5

Communication terminals.....M4.0

■ Supported standards

EMC directive: EN61326-1 conformity (CE/ UKCA)
ClassA

*During the test, the reading corresponding to ± 1 mV may fluctuate.

Low voltage directive: EN61010-1(CE/ UKCA)

EN61010-2-030 conformity(CE/ UKCA)

Overvoltage category: II

Pollution degree: 2

Environmental regulations: RoHS (CE/ UKCA)

Environmental regulations standards:

EN IEC 63000 conformity

(Monitoring and control instruments including industrial monitoring and control instruments.)

Dust/splash-proof: IEC60529 IP65 (front part) compliance

*Portable type (grip and rubber feet attached) does not conform to CE/ UKCA mark.

■ Input Specifications

Measuring points: KR2P60, 2P61...6 points,

KR2P20, 2P21...12 points

Input types: Universal

DC voltage... ± 13.8 mV, ± 27.6 mV, ± 69.0 mV, ± 200 mV, ± 500 mV, ± 2 V, ± 5 V*, ± 10 V*, ± 20 V*, ± 50 V*
(× With built-in shunt resistors)

DC current... Available by adding external shunt resistor

T/C... B, R, S, K, E, J, T, N, NiMo-Ni, CR-AuFe, PtRh40-PtRh20, C(WRe5-WRe26), W-WRe26, Platinel II, U, L

RTD... Pt100, JPt100, Pt50, Pt-Co

Range setup: Setting of input types and ranges by key operation.

The measuring range is selected automatically according to the set range.

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

Accuracy rating: See table of inputs.

Temperature drift: $\pm 0.01\%$ of full scale/ °C [Other input types than the resistance thermometer inputs are converted into the reference range (see the Accuracy Rating table)]

Sampling rate: KR2P60...0.1 second / 6 points

KR2P20...0.1 seconds / 12 points

KR2P61...0.3 second / 6 points

KR2P21...0.3 second / 12 points

**When less than 1 second is set the recording interval at KR2P61, KR2P21, sampling rate is 0.1 second / 4 points.

**internal processes (alarm judgment, computation etc.) are performed 0.1 seconds cycle.

Reference junction (RJ) compensation accuracy:

K, E, J, T, N, Platinel II ...Maximum $\pm 0.5^{\circ}\text{C}$
 R,S,NiMo-Ni,CR-AuFe, C(WRe5-WRe26),
 W-WRe26, U, LMaximum $\pm 1.0^{\circ}\text{C}$

(The above errors 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.
 Up-scale burnout, down-scale burnout or burnout disabled can be selected for each input.

Allowable signal source resistance:

Thermocouple inputs (burnout disabled), DC voltage inputs (max. $\pm 2\text{ V}$)Less than 1 K Ω
 DC voltage inputs (± 5 to 50 V) ...Less than 100 Ω
 Resistance thermometer inputs (Pt100, JPt100)
 ... Less than 10 Ω per wire -- common for 3 wires

Input resistance:

Thermocouple input ... Approx. 1 M Ω
 DC voltage input..... $\pm 2\text{ V}$ or less: Approx. 1M Ω
 $\pm 5\text{ V}$ to $\pm 50\text{ V}$: Approx. 1M Ω

Maximum input voltage:

Thermocouple inputs (burnout disabled),
 DC voltage inputs (max. $\pm 2\text{ V}$) Maximum $\pm 10\text{ V}$ DC
 DC voltage inputs (± 5 to $\pm 50\text{ V}$) Maximum $\pm 60\text{ V}$ DC
 Thermocouple inputs (burnout enabled),
 resistance thermometer inputs Maximum $\pm 6\text{ V}$ DC

Measuring current :

Resistance thermometer inputs ... Approx. 1mA

Maximum common mode voltage: 30V AC

Dielectric strength between channels:

1000V AC or more between each channel
 High strength semiconductor relay used
 (B terminal of resistance thermometer is shorted inside between channels)

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

Series mode rejection ratio: Minimum 50dB (50 or 60Hz)

However, when it contains a thing for the signal and the peak value of the noise is equal to or less than 1.5 times the standard range.

■Recording Specifications

Internal memory: 512 MB (standard specification)

Recording cycle:

Second	0.1, 0.2, 0.5, 1, 2, 3, 5, 10, 15, 20, 30 sec
Minute	1, 2, 3, 5, 10, 15, 20, 30, 60 min

(Caution): When set less than 0.5 seconds (0.1-0.5 seconds) to the recording cycle at KR2P61/2P21, input channel number is automatically 4 points.

Recordable time(Estimate):

Recording points	Recording cycle		
12 points	0.1 sec	1 sec	1 min
	12 day	4 months	Over 10 yrs

Recording data:

- Measured data Registered name, recording start date/time, recording cycle, measured data, alarm data, maker text
- Programmed parameters All parameters

Recording measured data: 4-byte binary/1 data

(Recording maximum and minimum value 6 byte/1 data)

Recording into internal memory:

*The following conditions can be selected.

- Key operations
- Trigger signals (alarm activation)
- Start/end by day and time

*Pre-triggering recording available with the key operations and trigger signals

Pre-triggering measuring count =950 data

*Recording cycle can be programmed for each file

Memory usage display:

The amount of memory used in each file is displayed on the operation screens by icon.

External memory: USB flash memory

(FAT16, FAT32 formatted)

* Operation of all USB flash memories is not guaranteed.

■Display Specifications

Display: 5.6-inch TFT color LCD

(316x234 dots: 111.36mmX83.52mm)

Trend display colors: 12 colors (selectable)

Operation screens:

Screens are switched with the **[DISP]** Key, scroll key and **[ENTER]** key.

• Trend screens:

One of the Real-time Trend, Historical Trend or Dual Trend displays can be selected.
 (scale plate and pointer displays) Vertical or horizontal orientation selectable. Data display enabled or disabled selectable. Scrolling available.

• Bar graph screen...Data display enabled or disabled selectable.

• Data screen... (Data + Tag + Engineering unit + Alarm activated status)

• Alarm summary screen: Current alarm output status + alarm log (Channel, level, alarm event time)

Skipping: A channel can be set to skip display on the trend/data display screen.

Scrolling: On the Historical Trend screens, previous data can be referred with the cursor operation.

- Historical Trend...Entire Memory file area
- Dual Trend...Enables on the historical trend screen only.

Display (Historical Trend): Historical data is displayed by specifying a file.

Data logging is continued.

* Display by scrolling or by time specified.

Data search (Historical Trend):

Historical trend display by selecting from alarm display, marker list

Marker display: Marker can be displayed on the real-trend screen by the key operation or by digital input and stored in a message data file.

× Pre-registration of marker text

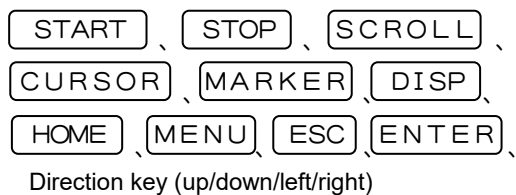
(Maximum 50 texts, Maximum 30 characters / Text).

Display updating interval: Same as storing interval

LCD saver: When no key is operated for the specified period of time, the back-light is OFF. The period can be set from 1-60 minutes..

■ Programming/Operation Specifications

Key types: 14



■ Alarm Specifications

Number of alarms that can be set: Up to 4 alarms/channel

Alarm types: Upper limit, lower limit, differential higher limit,
differential lower limit,error

Alarm memory: Stores alarm event/cancellation time, alarm
types

* Storage of latest 200 common channels

Alarm output (Option): 12 points ("a" contact)
6 points ("c" contact)

○ Measuring Range, Accuracy Rating and Display Resolution

Note) For the accuracy under the reference operation condition and for thermocouple inputs (internal RJ), the reference junction compensation accuracy is not included.

Thermocouple						Resistance thermometer						
Input type	Measurement range	Reference range	Accuracy rating	Display resolution		Input type	Measuring range	Reference range	Accuracy rating	Display resolution		
Thermocouple	K	-200.0 to 300.0 °C	±13.8 mV	±0.1% ±1digit	0.1 °C	DC Voltage	-13.80 to 13.80 mV	±13.8 mV	±0.1% ±1digit	10 μV		
		-200.0 to 600.0 °C	±27.6 mV		0.1 °C		-27.60 to 27.60 mV	±27.6 mV		10 μV		
		-200 to 1370 °C	±69.0 mV		1 °C		-69.00 to 69.00 mV	±69.0 mV		10 μV		
	E	-200.0 to 200.0 °C	±13.8 mV		0.1 °C		-200.0 to 200.0 mV	±200.0 mV		100 μV		
		-200.0 to 350.0 °C	±27.6 mV		0.1 °C		-500.0 to 500.0 mV	±500.0 mV		100 μV		
		-200 to 900 °C	±69.0 mV		1 °C		-2.000 to 2.000 V	±2 V		1 mV		
	J	-200.0 to 250.0 °C	±13.8 mV		0.1 °C		-5.000 to 5.000 V	±5 V		1 mV		
		-200.0 to 500.0 °C	±27.6 mV		0.1 °C		-10.00 to 10.00 V	±10 V		10 mV		
		-200 to 1200 °C	±69.0 mV		1 °C		-20.00 to 20.00 V	±20 V		10 mV		
	T	-200.0 to 250.0 °C	±13.8 mV		0.1 °C		-50.00 to 50.00 V	±50 V		10 mV		
		-200.0 to 400.0 °C	±27.6 mV		0.1 °C	Resistance thermometer	Pt100	-140.0 to 150.0 °C	160 Ω	±0.15% ±1digit	0.1 °C	
	R	0 to 1200 °C	±13.8 mV		1 °C			-200.0 to 300.0 °C	220 Ω	±0.1% ±1digit	0.1 °C	
		0 to 1760 °C	±27.6 mV		1 °C		-200.0 to 850.0 °C	400 Ω	±0.1% ±1digit	0.1 °C		
	S	0 to 1300 °C	±13.8 mV		1 °C		JPt 100	-140.0 to 150.0 °C	160 Ω	±0.15% ±1digit	0.1 °C	
		0 to 1760 °C	±27.6 mV		1 °C			-200.0 to 300.0 °C	220 Ω	±0.1% ±1digit	0.1 °C	
	B	0 to 1820 °C	±13.8 mV		1 °C		-200.0 to 649.0 °C	400 Ω	±0.1% ±1digit	0.1 °C		
		N	-200.0 to 400.0 °C		±13.8 mV		0.1 °C	Pt50	-200.0 to 649.0 °C	220 Ω	±0.1% ±1digit	0.1 °C
	-200.0 to 750.0 °C		±27.6 mV		0.1 °C		Pt-Co	4.0 to 374.0 K	220 Ω	±0.15% ±1digit	0.1 K	
	-200 to 1300 °C		±69.0 mV		1 °C	Pt100: IEC751(1995), JIS C1604-2013						
	W-WRe26	0 to 2315 °C	±69.0 mV		1 °C	JPt100: JIS C1604-1981						
	C(WRe5-WRe26)	0 to 2315 °C	±69.0 mV		1 °C	JIS C1606-1989						
	PtRh40-PtRh20	0 to 1888 °C	±13.8 mV		1 °C	Pt50: JIS C1604-1981						
	NiMo-Ni	-50.0 to 290.0 °C	±13.8 mV		0.1 °C	O Exception of accuracy rating						
		-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 °C	±13.8 mV	0.1 °C									
Platinel II	0.0 to 350.0 °C	±13.8 mV	0.1 °C									
	0.0 to 650.0 °C	±27.6 mV	0.1 °C									
	0 to 1395 °C	±69.0 mV	1 °C									
U	-200.0 to 250.0 °C	±13.8 mV	0.1 °C									
	-200.0 to 500.0 °C	±27.6 mV	0.1 °C									
	-200.0 to 600.0 °C	±69.0 mV	0.1 °C									
L	-200.0 to 250.0 °C	±13.8 mV	0.1 °C									
	-200.0 to 500.0 °C	±27.6 mV	0.1 °C									
	-200 to 900 °C	±69.0 mV	1 °C									

K, E, J, T, R, S, B, N: IEC584, JIS C1602-1995
 U (Cu-CuNi), (Fe-CuNi): DIN43710
 W-WRe26, PtRh40-PtRh20, NiMo-Ni, CR-AuFe,
 PlatinelII: ASTM
 C(WRe5-WRe26): JIS C1602-2015

○ Exception of accuracy rating

Input range	Measuring range	Accuracy rating
K, E, J, T, L	-200 to 0 °C	±0.2%±1digit
R, S	0 to 400 °C	±0.2%±1digit
B	0 to 400 °C 400 to 800 °C	Not specified ±0.15%±1digit
N, U	-200 to 0 °C	±0.3%±1digit
W-WRe26	0 to 100 °C 100 to 400 °C	±4%±1digit ±0.5%±1digit
PtRh40-PtRh20	0 to 300 °C 300 to 800 °C	±1.5%±1digit ±0.8%±1digit
CR-AuFe	0 to 20 °C 20 to 50 °C	±0.5%±1digit ±0.3%±1digit
Pt100	700 to 850 K	±0.15%±1digit
Pt-Co	4 to 50 K	±0.3%±1digit

*The indication equivalent to 1mV may vary under the test environment by EMC directives.

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