

CHINO

Graphic Recorder

KR2S/KR3S

【Wiring/Installation】

Instruction Manual

Thank you for purchasing the KR 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.

— Request to instrumentation engineers, constructors, and sale agents —
Make sure to deliver this instruction manual 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.

CHINO

PREFACE

Thank you for purchasing the KR 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.

Product warranty scope

This product is warranted for one year from the date of delivery. If it is damaged during the warranty period, when used normally based on the cautions in the instruction manual labels attached to the product, etc., it will be repaired without any charge (only in Japan). In the case, we are sorry to trouble you, but please contact your dealer or nearest our sales office.

However, in cases of the followings, it will be repaired at your expense even during warranty period.

1. Failure or damage caused by improper use or connection, or invalid repair or modification.
2. Failure or damage caused by fire, earthquake, wind or flood, thunderbolt, or other extraordinary natural phenomena, or pollution, salt, harmful gas, abnormal voltage, or use of unspecified power.
3. Replacement of parts or accessories that have reached the end of their life.

Furthermore, the term 'warranty' in this sense covers only a CHINO's product itself. Therefore, we are not responsible for compensation for whatever the damage that is triggered by failure of our product.

Important notes for users

1. No part of this manual can be reproduced or copied in any form without permission.
2. The contents of this manual may be altered without prior notice.
3. 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.
4. CHINO is not responsible for any operation results of this software.

Attention while unpacking

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

- 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.

Disposal

■ Disposal

Separate the box, plastic bags, and cushioning materials the recorder is packaged in according to the garbage collection method of the each community, and please cooperates to recycle.

Warning

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

Caution

Perchlorate Material

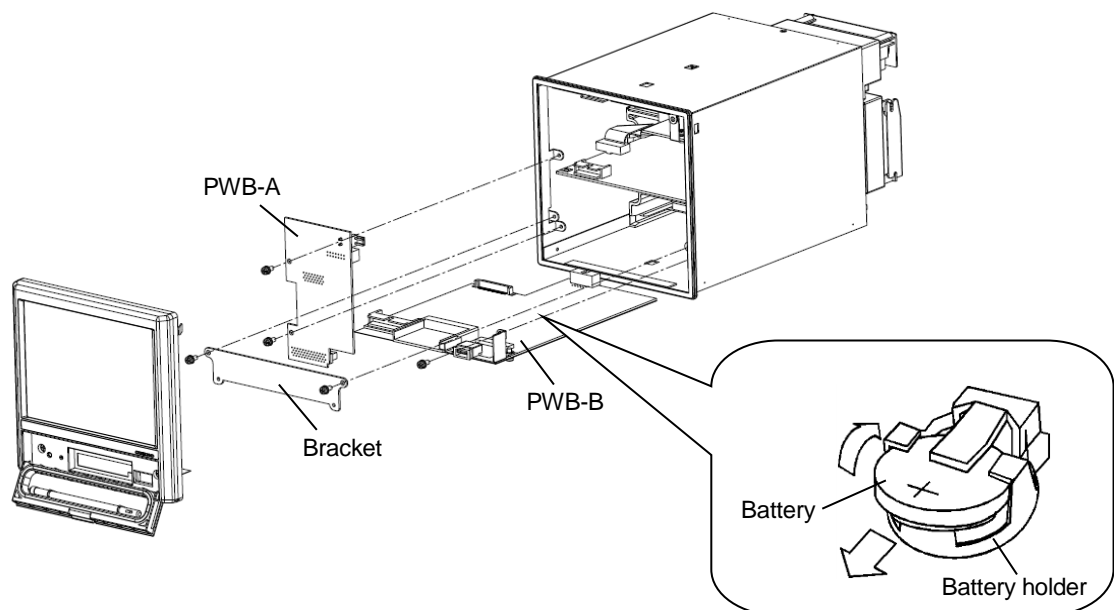
This instrument uses battery with Perchlorate Material. Special handling may apply, see <http://www.dtsc.ca.gov/hazardouswaste/perchlorate>

■ 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.

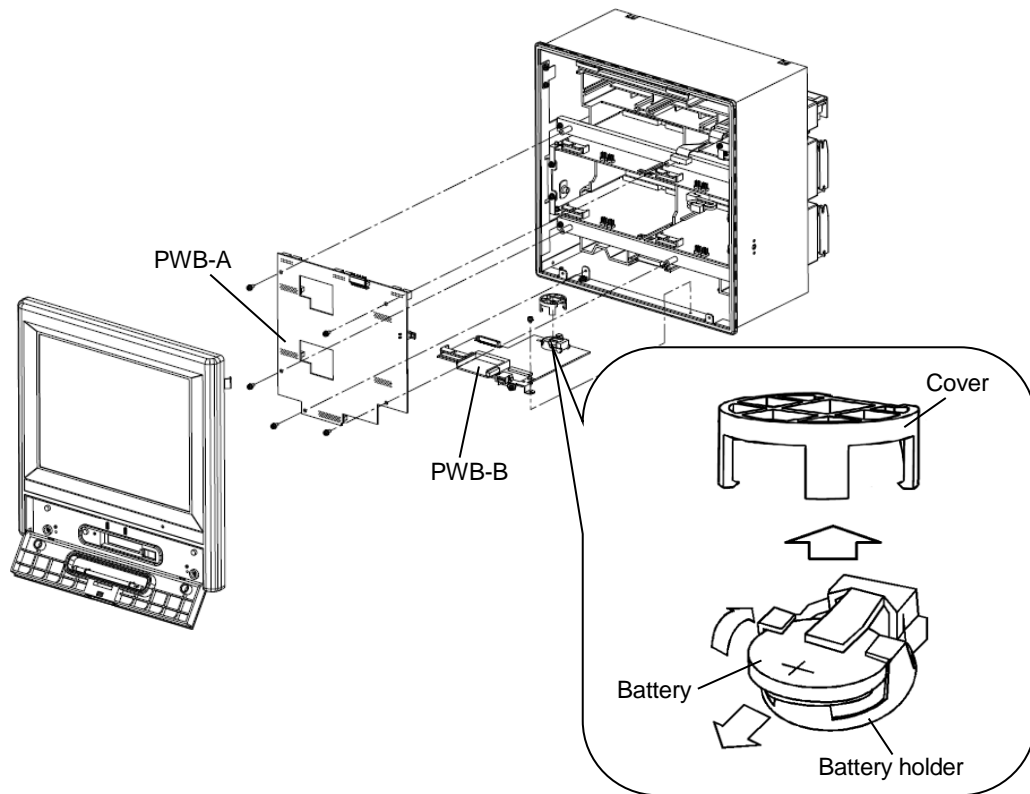
<KR2S>

- (1) Open the cover and remove the 2 retaining screws.
- (2) Pull the bottom of the front display panel toward you and lift up to remove the front display.
- (3) The front display is connected to PWB-B by 1 type of cable. Disconnect it.
- (4) Remove the 2 retaining screws holding Bracket and pull it out.
- (5) Remove the 2 screws holding PWB-A, and pull it toward you.
- (6) Remove the 1 screws holding PWB-B, and pulls it toward you.
- (7) 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.



<KR3S>

- (1) Open the cover and remove the 2 retaining screws.
- (2) Pull the bottom of the front display panel toward you and lift up to remove the front display.
- (3) The front display is connected to PWB-B by 1 type of cable. Disconnect it.
- (4) Remove the 2 screws holding PWB-A, and pull it toward you.
- (5) Remove the 1 screws holding PWB-B, and pulls it toward you.
- (6) The battery holder is attached to the topside of PWB-B. Since the cover is fixed with 4 hooks along side, unhook them for removing the cover. Lift the front of the battery with a tool having a nonconductive tip and pull the battery out of the holder.



■ Disposal of this recorder

This section describes disposal method of this recorder subjected to the condition stated in Directive on Waste Electrical and Electronic Equipment (hereinafter referred to as WEEE) [2002/96/EC]. This directive is valid only in European Union.

● Marking

This recorder is governed and constructed by WEEE [2002/96/EC] marking requirement. Attached label indicates that this electrical and electric equipment must not dispose as general household waste.



● Product category

With the reference to the equipment types in WEEE [2002/96/EC] ANNEX I, this recorder is classified as a "Monitoring and control instruments". Do not dispose as general household waste. When disposing discarded recorder, please contact local CHINO sales agent.

Table of Contents

PREFACE	1
Table of Contents	4
1 For safe use	5
1-1 Preconditions for use.....	5
1-2 Labels on this instrument	5
1-3 Symbols in this manual	5
2 Before use	8
2-1 Exterior check	8
2-2 Model check.....	8
2-3 Checking attachments.....	10
3 Installation	12
3-1 Mounting location	12
3-2 External dimensions	13
3-3 Method of mounting the panel	14
4 Connections	16
4-1 Terminal board arrangement.....	16
4-2 Precautions while connections.....	19
4-2-1 Power supply	19
4-2-2 Keep the input/output connections away from a high voltage power circuit	19
4-2-3 Keep the thermocouple input away from a heat source.....	19
4-2-4 Keep all connection cables away from noises.....	19
4-2-5 Use crimp style terminals.....	19
4-2-6 Unused terminals.....	20
4-3 Connection of power and protective conductor terminals	21
4-3-1 Power and protective conductor terminals	21
4-3-2 Connection of power terminals	22
4-3-3 Connection of protective conductor terminal	22
4-4 Connection of measuring input terminals	23
4-4-1 Measuring input terminals	23
4-4-2 Connections of DC voltage (current) input	23
4-4-3 Connection of thermocouple (TC) inputs.....	23
4-4-4 Connection of resistance thermometer (RTD) input.....	24
4-5 Connection of alarm output terminals (Option).....	25
4-5-1 Alarm output terminal.....	25
4-5-2 Connections.....	26
4-5-3 Precautions for connection	27
4-6 Connection of digital input terminals and function selection (Option)	28
4-6-1 No-voltage contact input terminal	28
4-6-2 Connections.....	29
4-6-3 Functions of terminals.....	29
4-7 Connection of communication I/F terminal (Option)	30
4-7-1 Connections of High order communication RS-485.....	30
4-7-2 Connections of low order communication RS-485.....	31
4-7-3 Ethernet wiring.....	32

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. If this instrument is used other than description of this document, protection provided by the instrument may be vitiated. Please read the following information carefully and be sure to observe the warnings and cautions in it.

1-1 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 (except for portable type).

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.

1-2 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.

1-3 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.



The nonobservance of information under this symbol may result in hazardous, critical or serious injury to the user.




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.

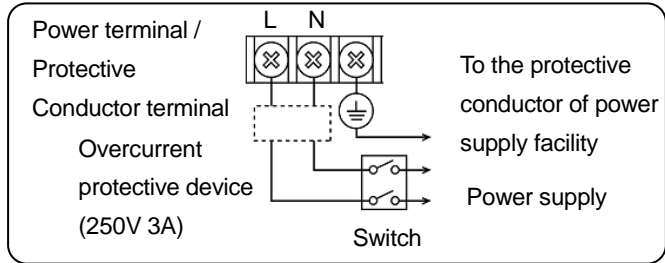


Warning

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.

◆ **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.

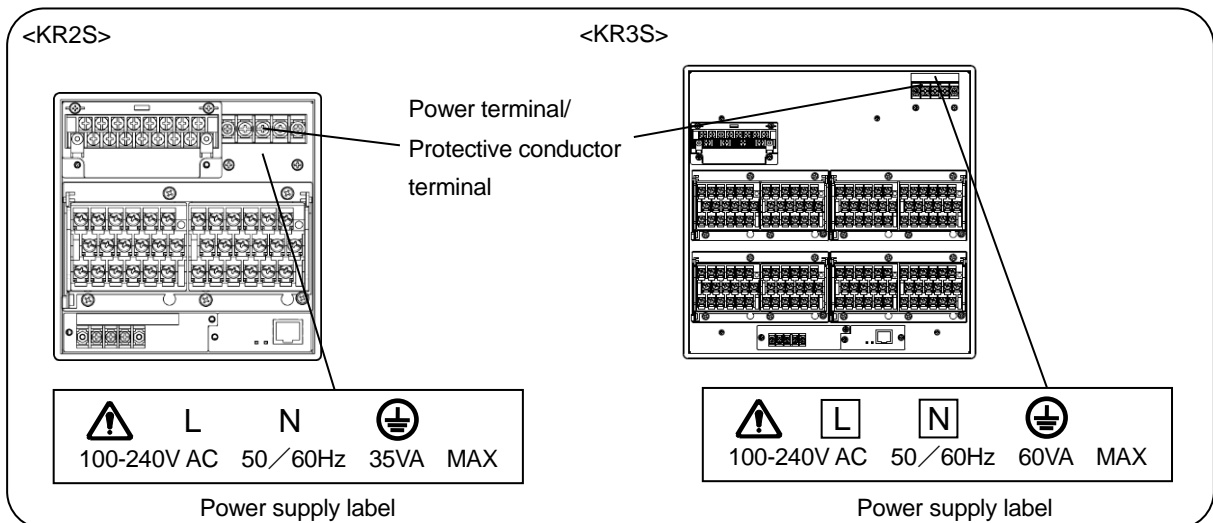


◆ **Be sure to ground this instrument**

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.

◆ **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.



◆ **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.

◆ **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.

◆ Installing the safety device

Regarding the use of devices that anticipates a big loss due to failure of this instrument, always install a safety device for preventing these losses and implement fail safe design in the final instrumentation. Do not use this instrument in important facilities related to, human life, atomic energy, aviation and space.

◆ 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.

Remarks	<p>■ Fuse in the power supply</p> <p>The following fuse is mounted in the power supply unit of this recorder for safety use. However, this fuse is not replaceable</p> <p><KR2S>Maker: Nippon Seisen Co., Ltd Model: SLT 250V 2.5A</p> <p><KR3S>Maker: Littelfuse, Inc Model: 215 250V T3.15AH</p>
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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.

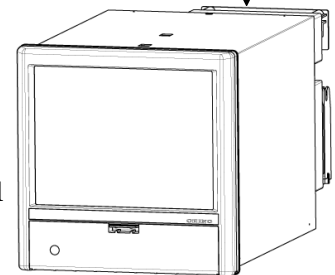
■ Model code

KR2S□P□□□□□□□□

Model (Check with model code.)

KR2S*P*****
Serial No. K*****

MADE IN JAPAN



Measurement point/ Measuring period

6: 6 points/1 sec.

2: 12 points/1 sec.

External Dimensions

-: Long type

S: Short type

Communication interface (Option)

N: None

E: Ethernet

R: Low/high order communications (RS-485)

G: Ethernet + low/high order communications (RS-485)

Alarm output, Contact input (Option)

0: None

2: Mechanical relay output (4 points 'c' contact)

7: No-voltage contact input (4 points)

8: Mechanical relay output (2 points 'c' contact) + No-voltage contact input (2 points)

Installation type

A: Panel mounting type

T: Portable type (Grip and rubber feet attached)

Other (Option)

Blank: None (Long type)

-NNN: None (Short type)

-1NN: Custom Graphic

<KR3S>

KR3S□□-□□□-□□□

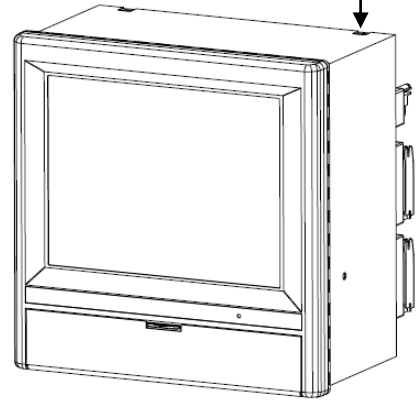
Model (Check with model code.)

KR3S**-***-***

Serial No.

K*****

MADE IN JAPAN



Measurement point/ Measuring period

- 21: 12 points/1 sec.
- 41: 24 points/1 sec.
- 61: 36 points/1 sec.
- 81: 48 points/1 sec.

Communication interface (Option)

- N: None
- E: Ethernet
- R: Low/high order communications (RS-485)
- G: Ethernet + low/high order communications (RS-485)

Alarm output, Contact input (Option)

- 0: None
- 2: Mechanical relay output (4 points 'c' contact)
- 7: No-voltage contact input (4 points)
- 8: Mechanical relay output (2 points 'c' contact) + No-voltage contact input (2 points)

Installation type

- A: Panel mounting type

Others (Option)

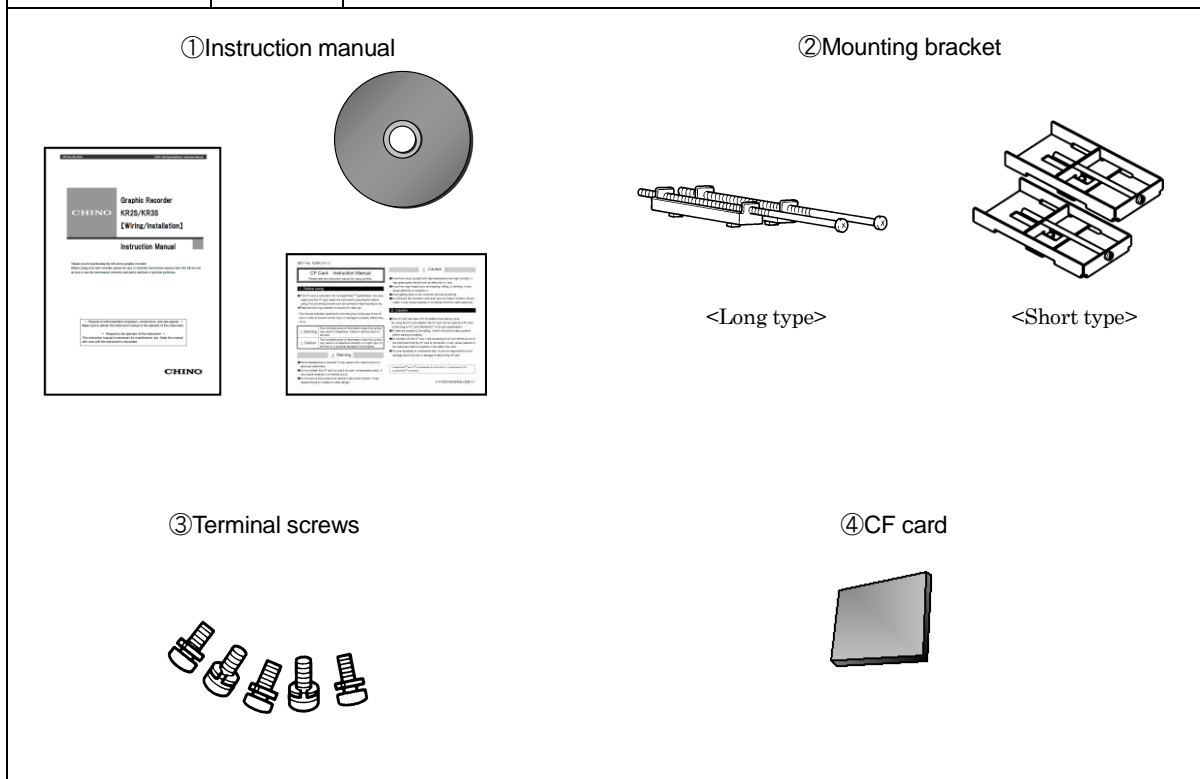
- NNN: None
- 1NN: Custom Graphic

2-3 Checking attachments

Package contains the following attachments. Please confirm.

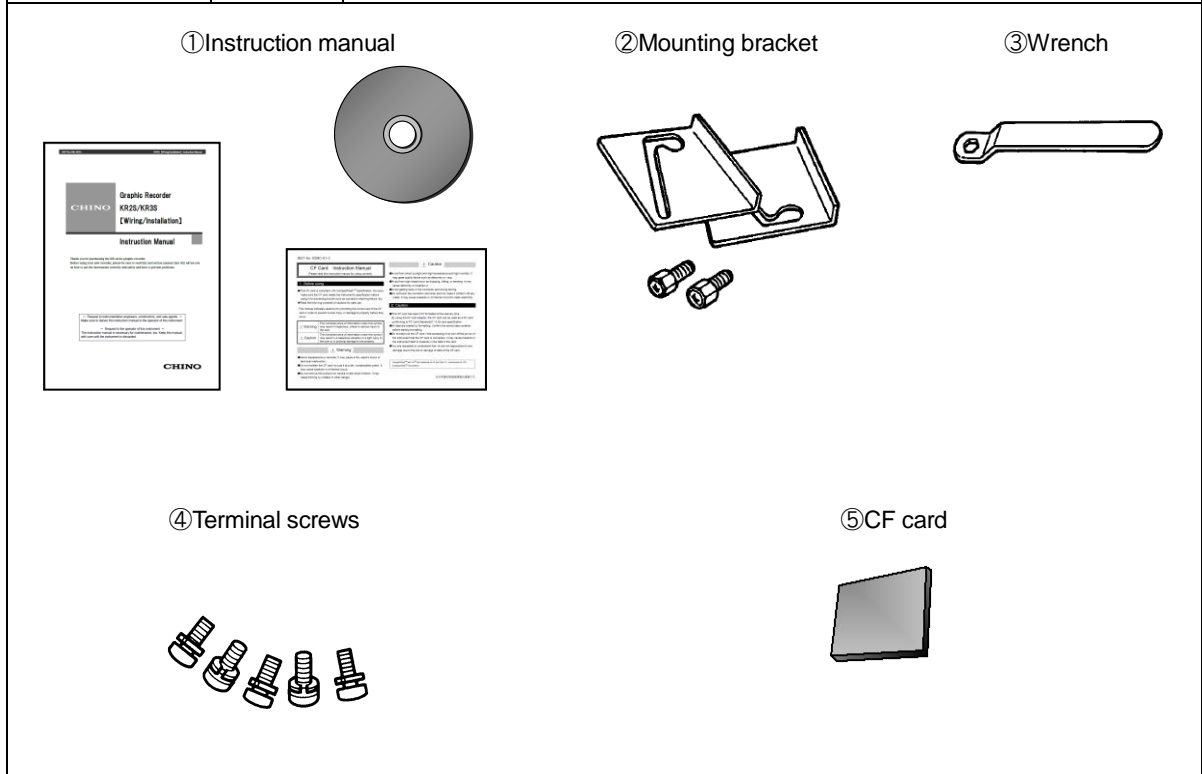
<KR2S>

Parts name	Quantity	Remarks
Instruction manual	1	INE-881□(General) CD-ROM
	(1 copy)	INE-883□(Communication interface) A4 Booklet
	1	RZMC-01-□(CF card)
Mounting bracket	2	For panel mounting
Terminal screw	5	M3.5 for measuring input terminals (Spares for missing)
CF card	1	RZ-CMC256(256MB)



<KR3S>

Parts name	Quantity	Remarks
Instruction manual	1	INE-881□(General) CD-ROM INE-883□(Communication interface)
	(1 copy)	INE-882□(Wiring/Installation) A4 Booklet
	1	RZMC-01-□(CF card)
Mounting bracket	2	For panel mounting
Wrench	1	
Terminal screw	5	M3.5 for measuring input terminals (Spares for missing)
CF card	1	RZ-CMC256(256MB)



3 Installation



Caution

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

3-1 Mounting location

In order to avoid unfavorable effects on the measurement accuracy and recording operation, install this recorder at the following locations.

1. Industrial environment

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

- Over voltage categoryII (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 do not close an area around this 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 and explosive gases exist.
- Avoid a place with dust, smoke, vapors, oil, chemical, corrosive gas, saline, iron, conducting substance(carbon and iron), etc.

4. Mounting angle

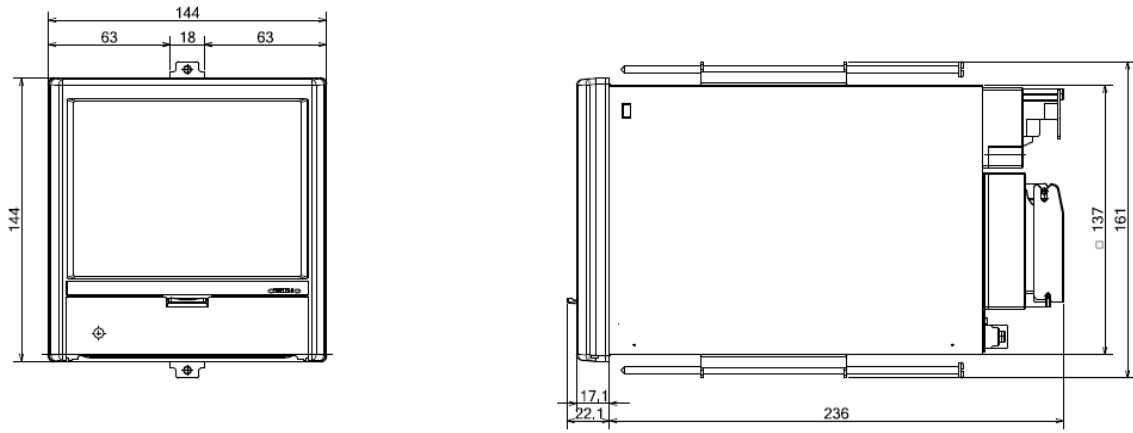
- Lateral tilting0°
- Longitudinal tiltingForward tilting: 0°, Backward tilting: 0-20°

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

3-2 External dimensions

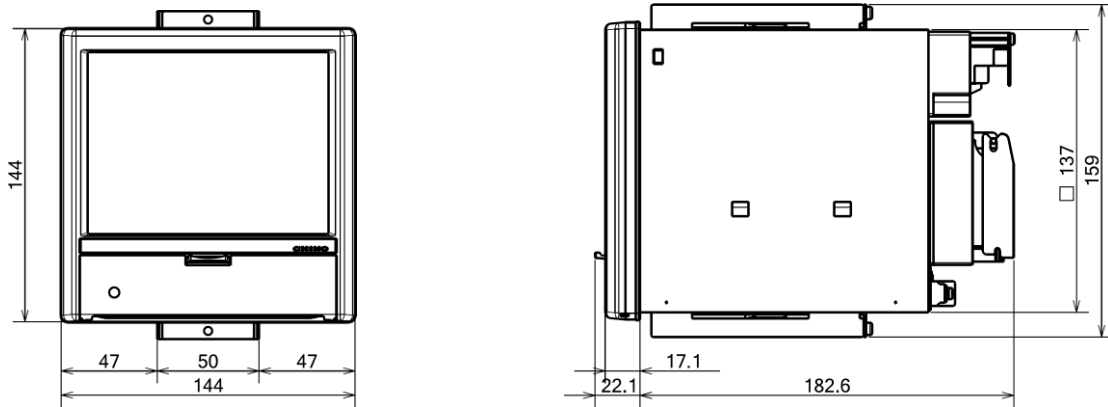
The following figure shows the dimensions of this recorder with its mounting brackets.

<KR2S□P-□□□> (Long type)



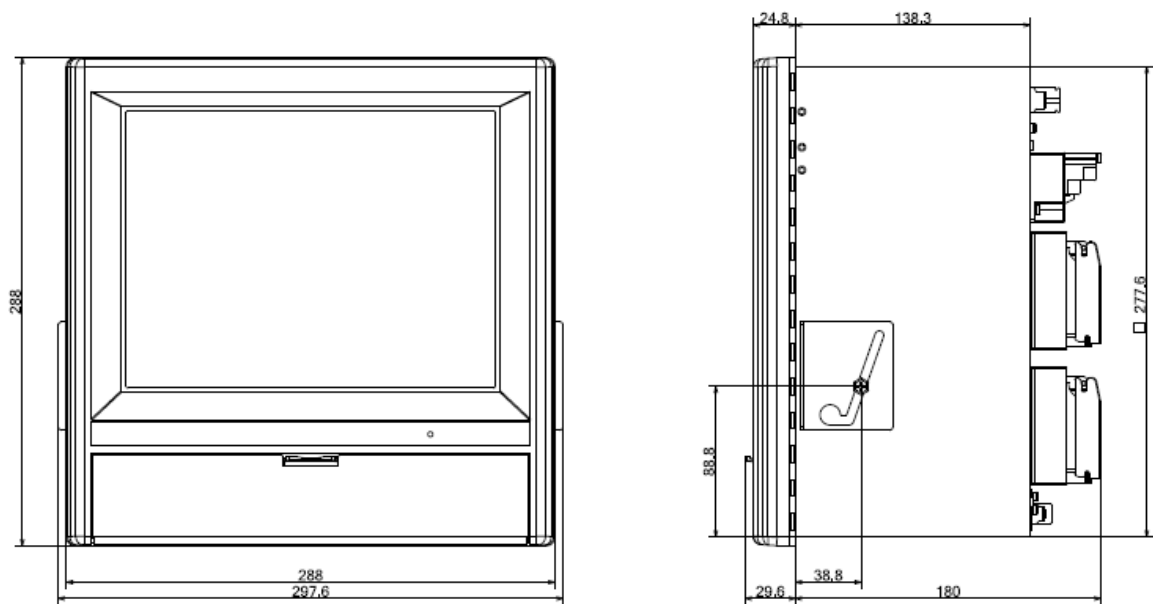
Unit : mm

<KR2S□PS□□□> (Short type)



Unit : mm

<KR3S>



Unit : mm

3-3 Method of mounting the panel



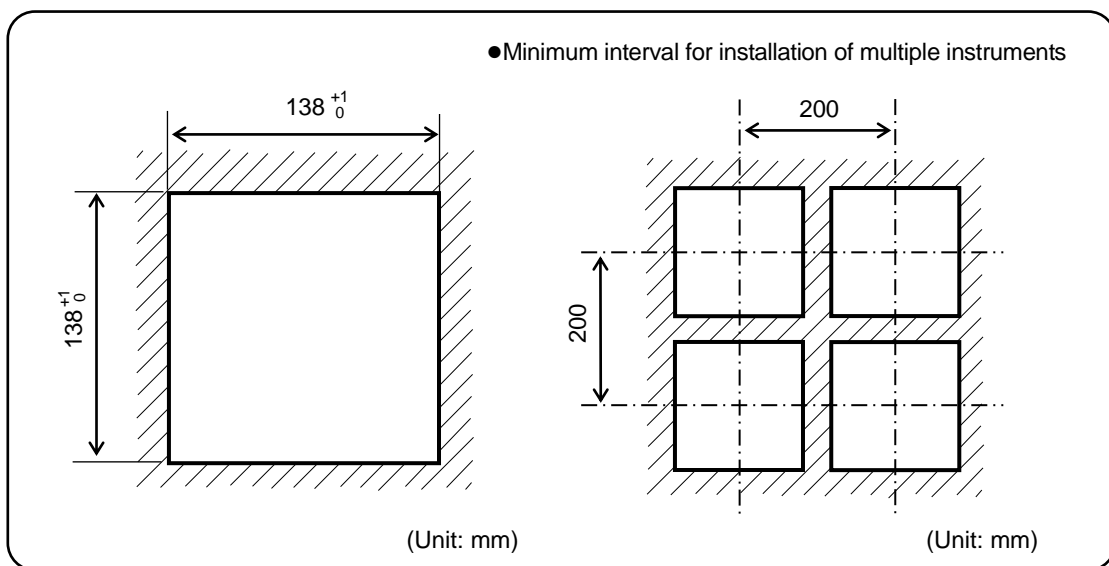
Caution

Mount on the panel and use

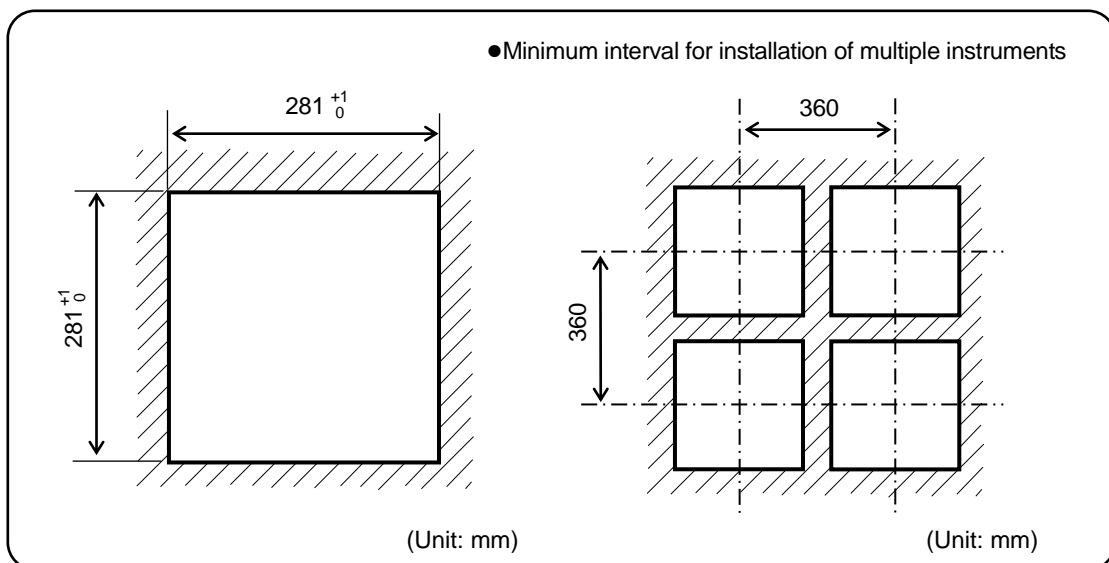
- This instrument has been designed to be mounted on an indoor instrumentation panel.
- Use a panel made of a steel plate of 2mm to 6mm in thickness or a panel equivalent in strength. Please consider the instrument's dimensions and its weight when you select the panel thickness along with the panel structure.
- When you attach this instrument to a panel, be careful of the injury by fall.

1. Panel cutout size

<KR2S>



<KR3S>



2. Mounting method



Caution

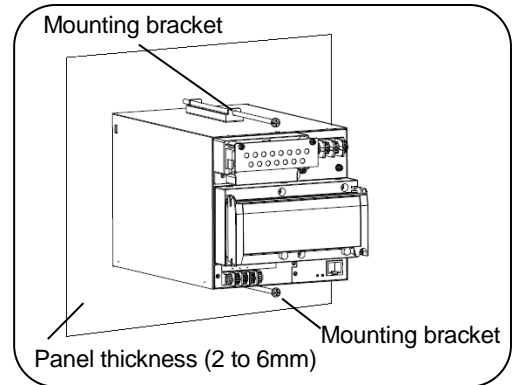
Tightening torque

- If tightening more than recommended tightening torque, changing shape of the case and damage of brackets may occur.

<KR2S>

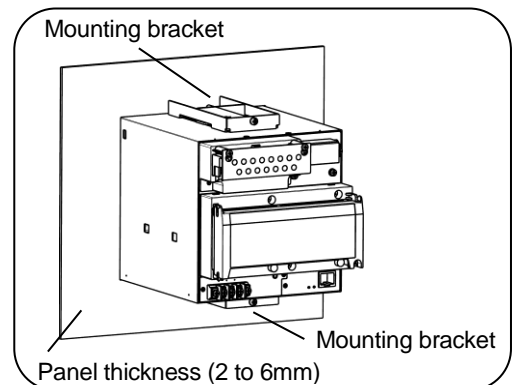
- (1) Insert this recorder into the panel cutout from the front of the panel.
- (2) <Long type>

Insert the mounting brackets into the holes of the top and bottom sides, and fix the instrument to the panel by tightening the screws using a Philips head screwdriver. Recommended tightening torque of screw is 1.0 N·m (when using Philips-head screwdriver).



<Short type>

Insert the brackets into the holes of front side on the top and bottom surface (or right and left surface) of the instrument and fix the instrument to the panel by tightening the screws using a Philips head screwdriver. Recommended tightening torque of screw is 0.6 to 0.8 N·m (when using Philips-head screwdriver).



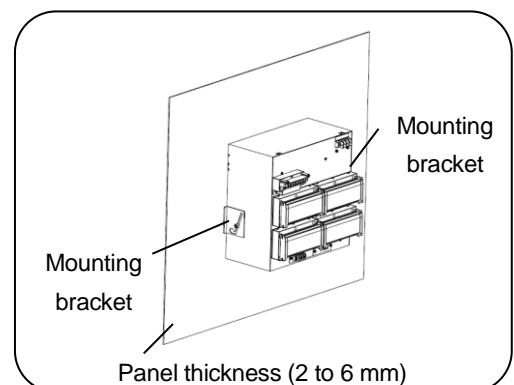
<KR3S>

- (1) Insert this recorder into the panel cutout part of an instrument panel.
- (2) Since there is a screw hole each (a total of two holes) in the right and left sides of this recorder, screw 2 fixing screws attached in two holes lightly.
- (3) Next, put the hexagon head of this screw to the circular hole of the mounting bracket and push the recorder to the instrument panel firmly (from front) while making the mounting bracket slide as shown in the figure. On this condition, tighten the fixing screw with the attached wrench or a Phillips screwdriver.

Note that the mounting brackets used at the right and left sides are different.

Recommended tightening torque of screw is 2.0 N·m (when using Philips-head screwdriver).

* Mounting work should be performed by two persons.

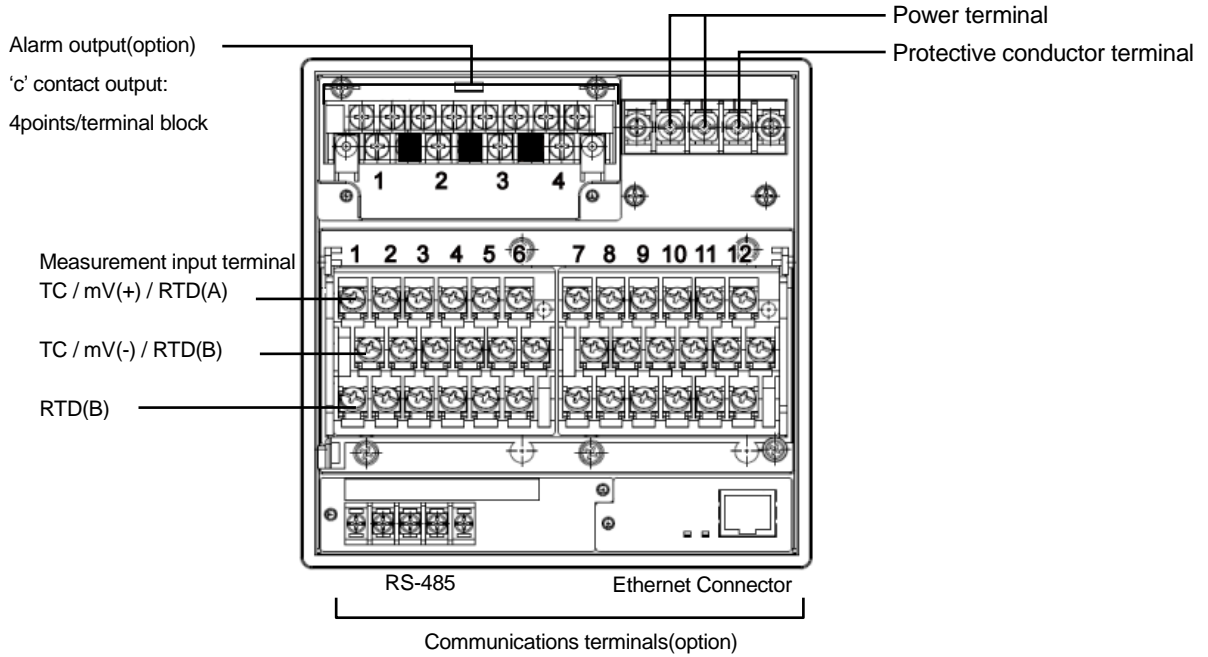


4 Connections

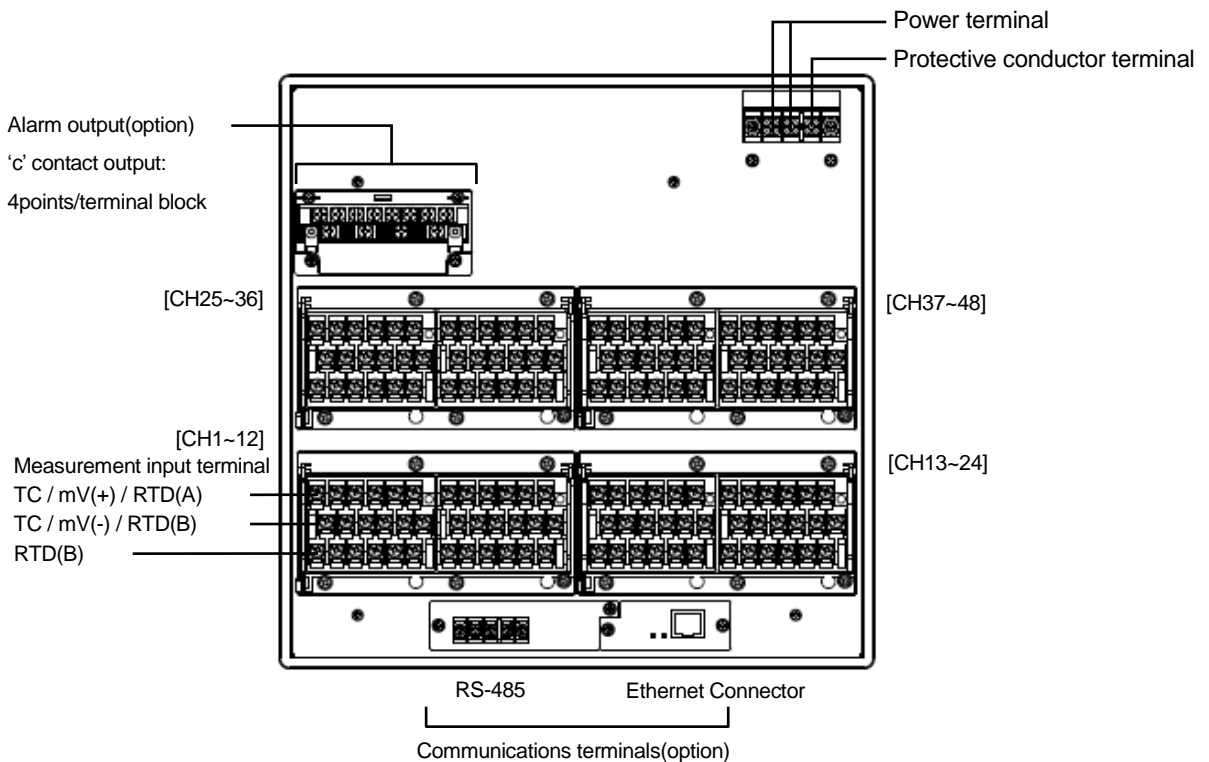
4-1 Terminal board arrangement

The following diagram shows the terminal board arrangements in which option (Mechanical relay output [4 points 'c' contact], communication interface) are mounted.

<KR2S>

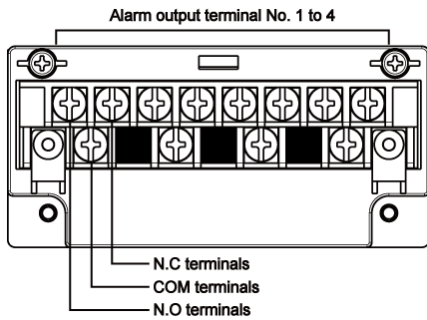


<KR3S>

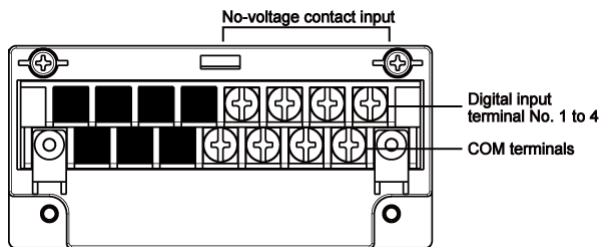


[Option terminal block]

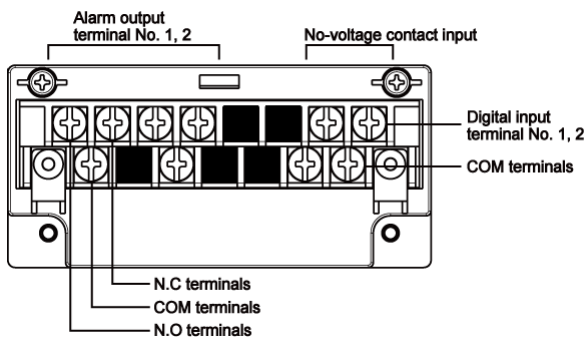
- Alarm relay output (4 points 'c' contact)



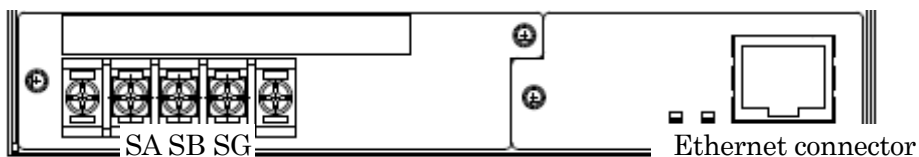
- No-voltage contact input(4 points)



- Alarm relay output (2 points 'c' contact) + No-voltage contact input(2 points)



- Communication terminals



Warning

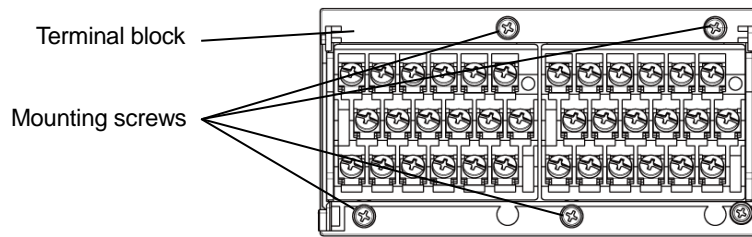
Alert symbol marks (⚠) and places
 The alert mark ⚠ is pasted at danger places where may causes electric shock. (See the following table).

Name of terminals	Places marked with the symbol	
	KR2S	KR3S
Power terminals	Lower left of power terminals	Upper of power terminals
Measurement input terminals	Upper left of terminal cover	Lower of Terminal cover
Mechanical relay 'c' contact alarm terminals	Lower left of terminal cover	Lower left of terminal cover

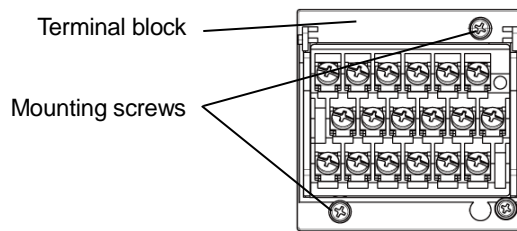
■ Input terminal block is removable

The input terminal block is removable for easy connections.

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




Input 12 points



Input 6 points

Reference

 Caution	<p>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.</p>
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Remarks	<p>■ Replacement of input terminal block Input terminal block cannot be replaced by other terminal block. If replaced measurement error occurs.</p>
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4-2 Precautions while connections

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

4-2-1 Power supply

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

Warning

- **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.
- **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.

4-2-2 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.

4-2-3 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.

4-2-4 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	Counter measures
<ul style="list-style-type: none"> ●Electromagnetic switch, etc. ●Power line having waveform distortion ●Inverter ●Thyristor regulator 	Insert noise filters between power terminals and input/output terminals. A CR filter is often used.

4-2-5 Use crimp style terminals

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

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

4-2-6 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.

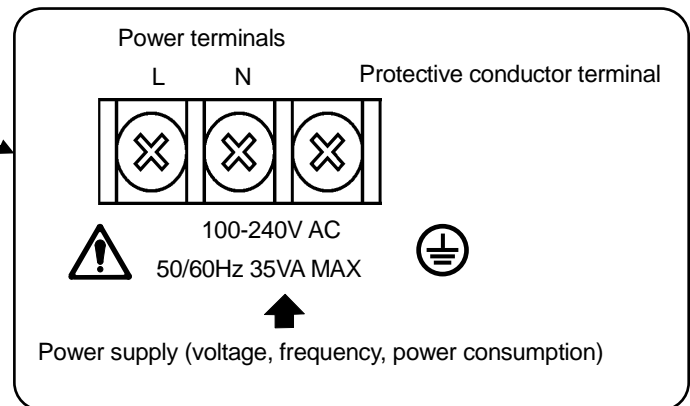
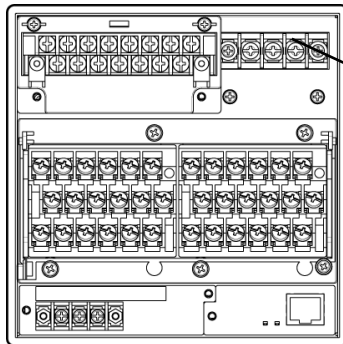
Kinds of terminals and termination

Terminal name	Screw diameter	Tightening torque	Termination (Unit: mm)
Power and protective conductor and communication terminal	M4	1.2N·m	<p>Type O</p> <p>Less than 8.0</p> <p>More than 4.3</p> <p>t:0.8</p> <p>With an insulation sleeve</p>
Input terminal	M3.5	0.8N·m	<p>Type O</p> <p>Less than 8.0</p> <p>More than 3.7</p> <p>t:0.8</p> <p>With an insulation sleeve</p>
			<p>Type Y</p> <p>Less than 8.0</p> <p>More than 3.7</p> <p>t:0.8</p> <p>With an insulation sleeve</p> <p>*Use Type O whenever possible.</p>
Alarm relay output, non-voltage contact input terminal	M3.5	0.8N·m	<p>Type O</p> <p>Less than 7.0</p> <p>More than 3.7</p> <p>t:0.8</p> <p>With an insulation sleeve</p>
			<p>Type Y</p> <p>Less than 7.0</p> <p>More than 3.7</p> <p>t:0.8</p> <p>With an insulation sleeve</p> <p>*Use Type O whenever possible.</p>
Communication terminal	M3	0.5N·m	<p>Type O</p> <p>Less than 6.2</p> <p>More than 3.2</p> <p>t:0.8</p> <p>With an insulation sleeve</p>
			<p>Type Y</p> <p>Less than 6.2</p> <p>More than 3.2</p> <p>t:0.8</p> <p>With an insulation sleeve</p> <p>*Use Type O whenever possible.</p>

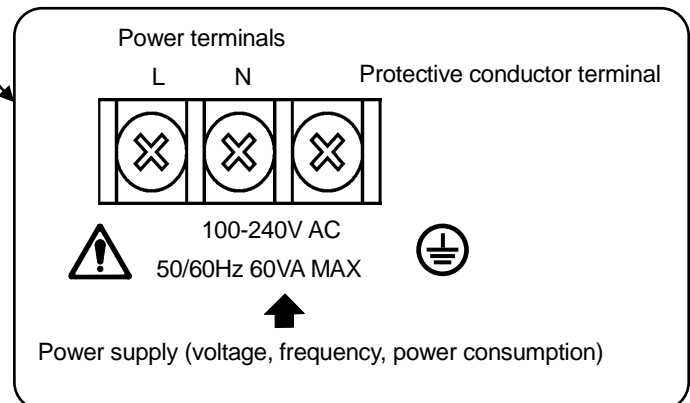
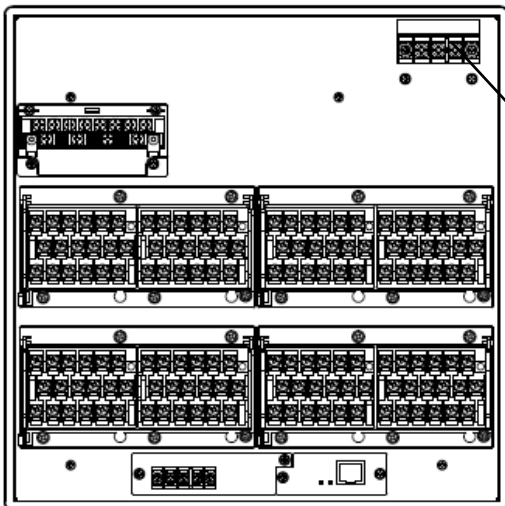
4-3 Connection of power and protective conductor terminals

4-3-1 Power and protective conductor terminals

<KR2S>



<KR3S>



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.

4-3-2 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) CSA C22.2 No.21/49

4-3-3 Connection of protective conductor terminal

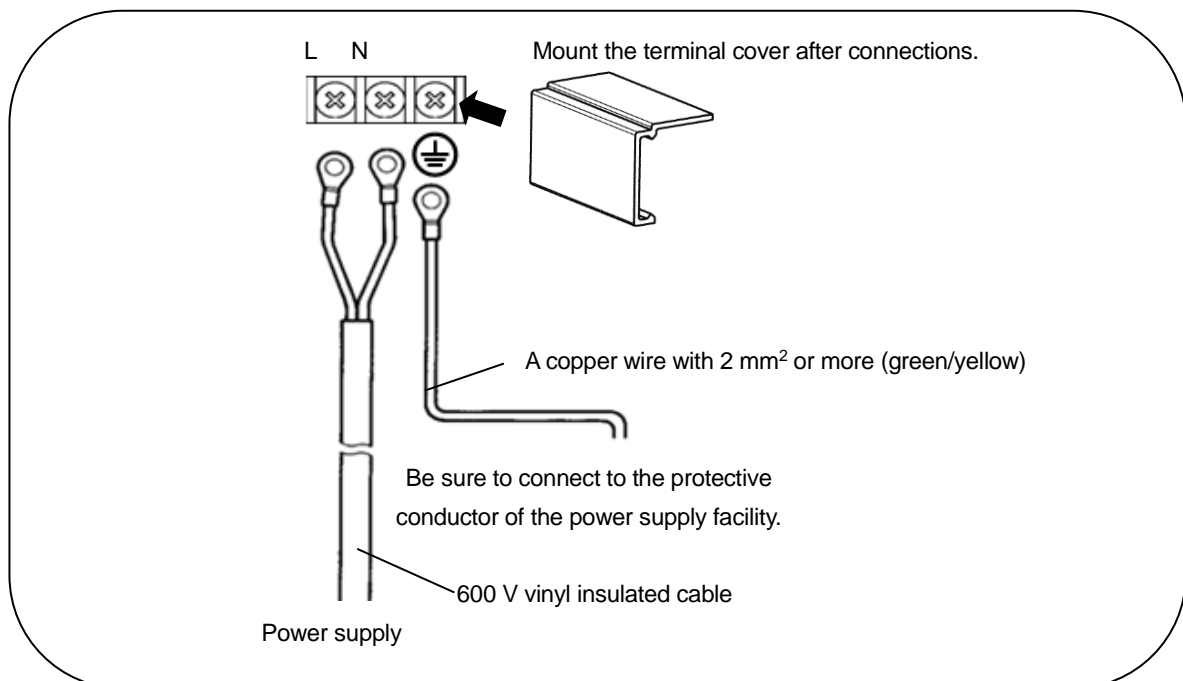
Be sure to connect this terminal to the protective conductor of the power supply facility. For this connection, use a cable terminated by the crimp style terminals with insulation sleeve.

•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.
--	---

 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.
--	---

Remarks	<p>■ L/N indication of power terminals</p> <p>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.</p>
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4-4 Connection of measuring input terminals

4-4-1 Measuring input terminals

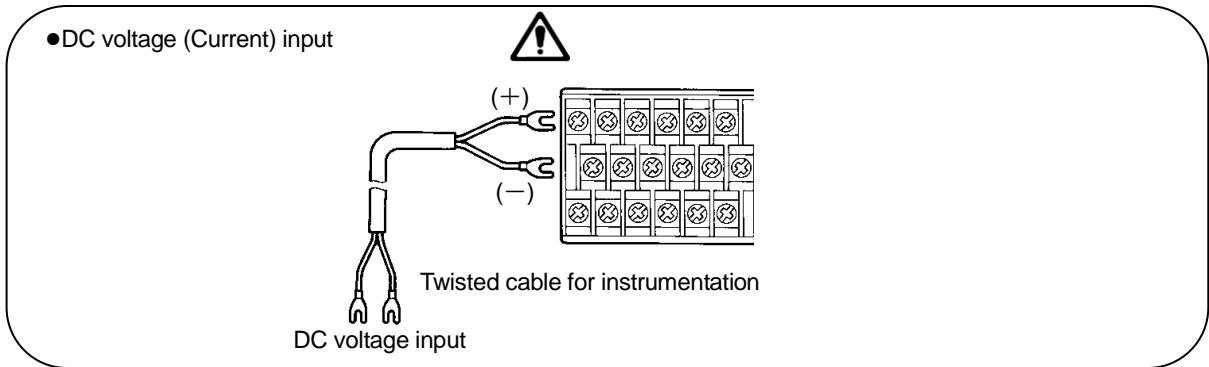
Be sure to turn off the power supply to prevent an electric shock.

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	$\pm 6\text{VDC}$
* $\pm 60\text{VDC}$ with channel settings to the $\pm 5\text{V}$ or higher range.		

4-4-2 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.

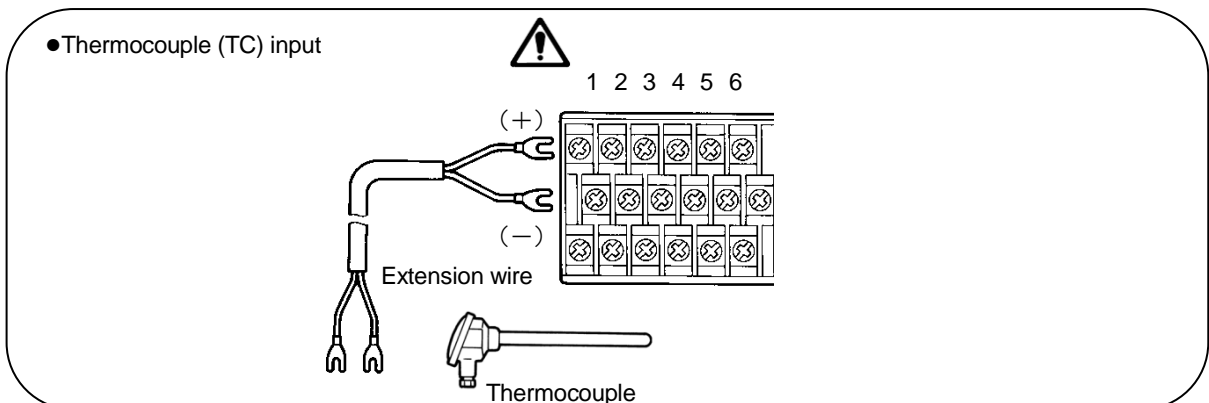


Remarks	<p>■ Isolation of measured input terminal</p> <p>TC / mV(+) / RTD(A) terminal and TC / mV(-) / RTD(B) terminal are insulated each channels but RTD(B) terminal is short-circuited between channels.</p>
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4-4-3 Connection of thermocouple (TC) inputs

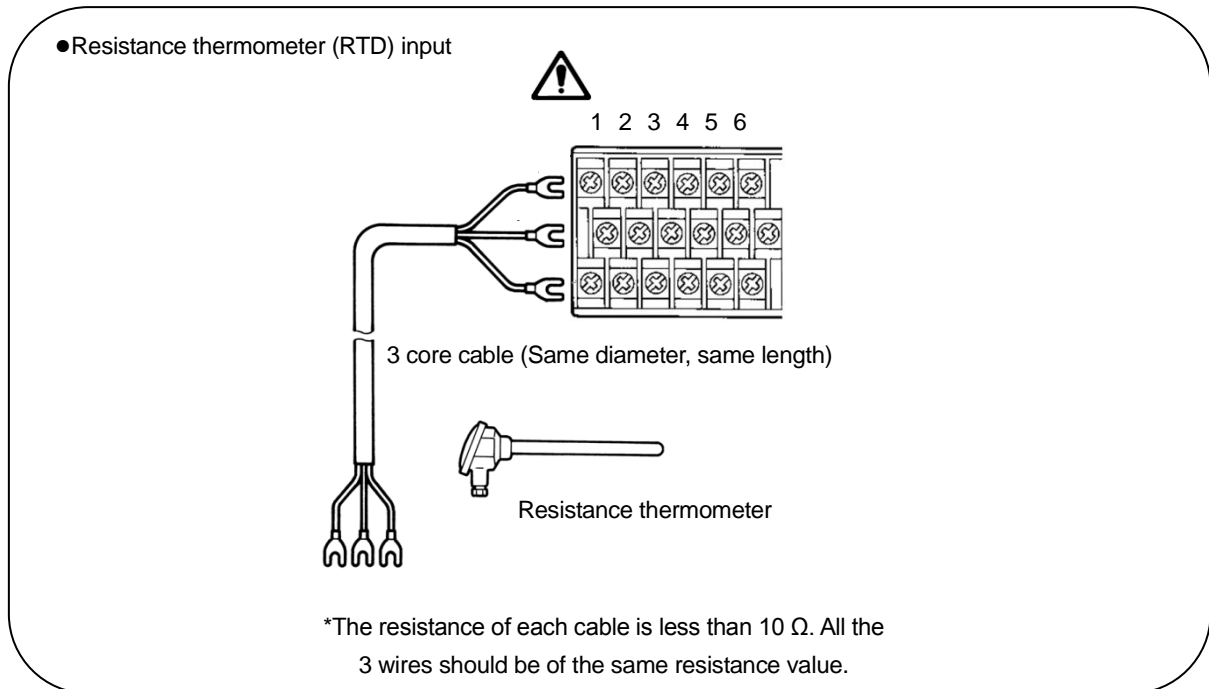
Be sure to use thermocouple wires (or extension wires) to the input terminals of this recorder. If a copper wire is used halfway, a noticeable measuring error occurs. If using a pair of thermocouple wire in parallel, it may have an influence on the measurement.

When it is necessary to operate the instrument in this situation, check for no influence while operating the instrument before using.



4-4-4 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.).



Warning



mark of measuring input terminals

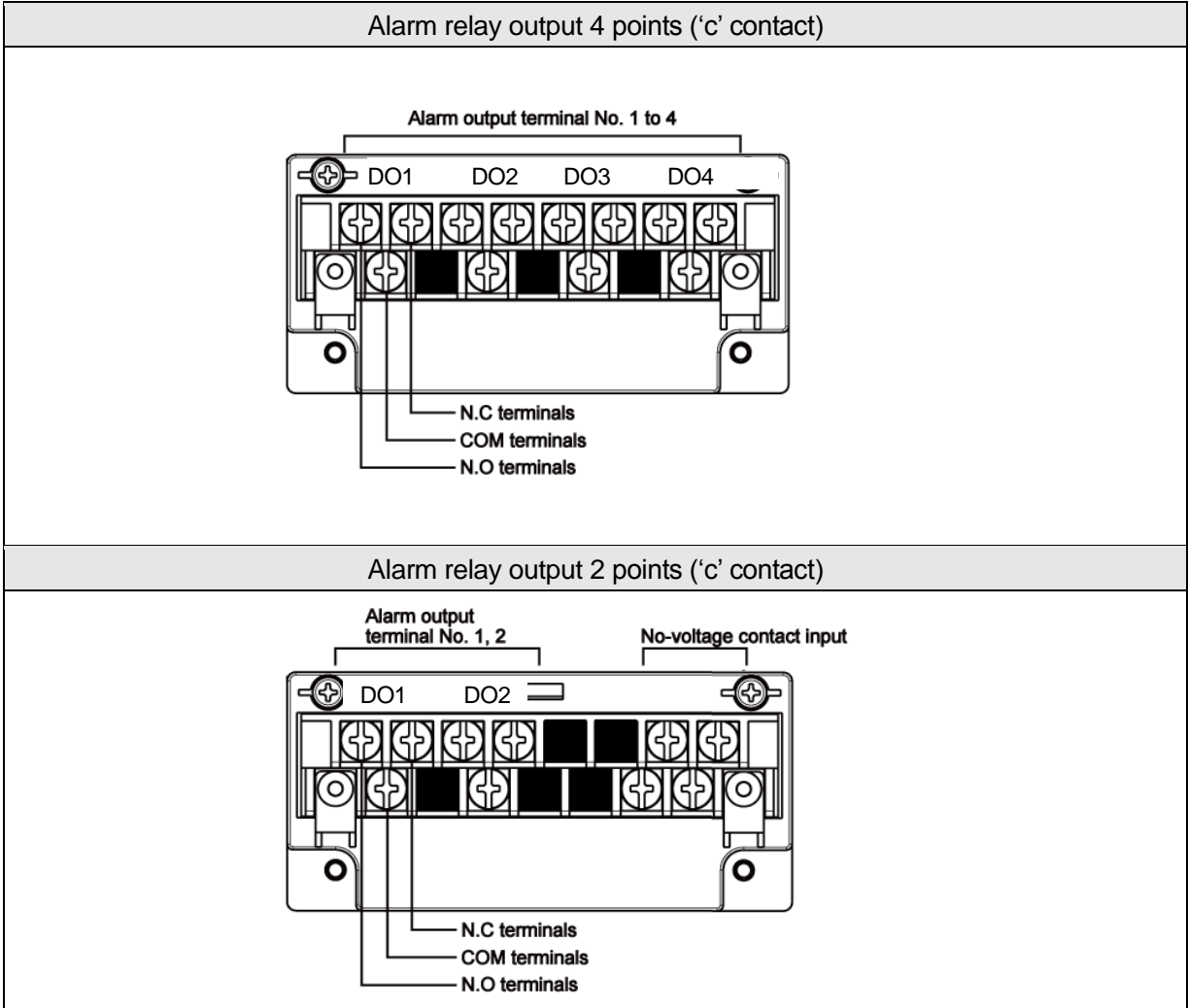
A high voltage may be applied to the measuring input terminals due to common mode noises. The allowable noise value is lower than 30 VAC or lower than 60 VDC. Make sure that the noises are lower than the allowable values. Mount the terminal cover after connections for the purpose of preventing an electric 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).

4-5-1 Alarm output terminal

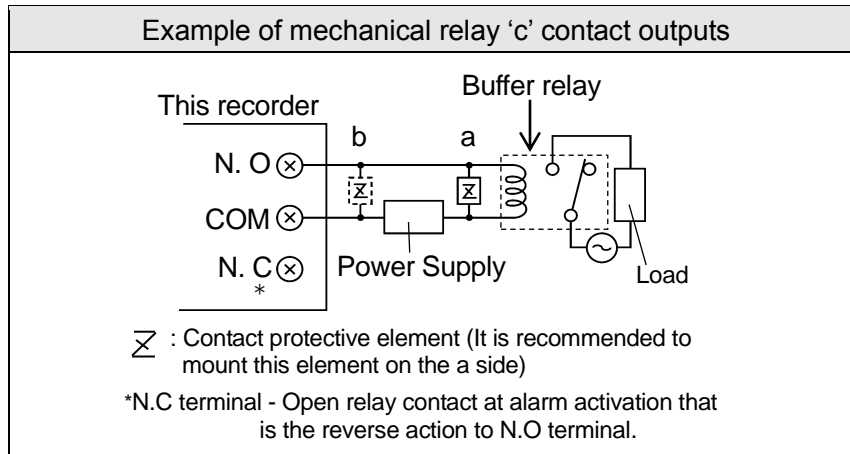
The terminal arrangement depends upon the type of alarm output.



4-5-2 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. Only one crimp style terminal is allowed to connect to the terminal.



Warning



mark of alarm output terminals

Connect a load not exceeding the specified contact capacity to the alarm output terminals. If the voltage more than 30VAC/60VDC is to be applied to the alarm output terminal, use type O crimp style terminal with an insulation sleeve to connect double-insulated wires (dielectric strength of 2300 VAC or more) for the signal wires and for the other signal wire use basic insulated wires (dielectric strength of 1390 VAC), If the voltage more than 30VAC/60VDC is to be applied to either alarm output terminal of channel, use double-insulated wires or reinforced insulation for external circuit of all the channels. 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.

4-5-3 Precautions for connection

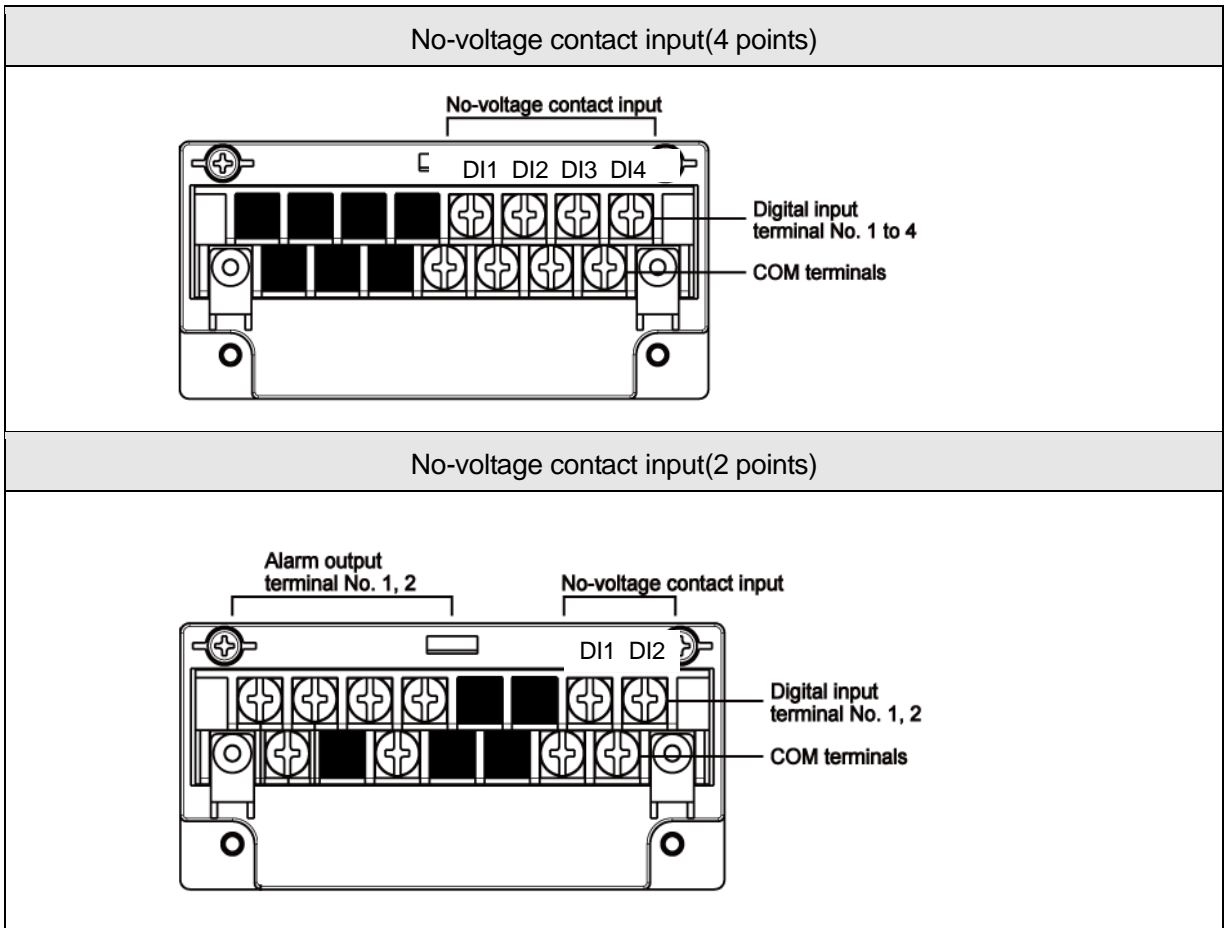
Be careful with the following cautions for connections.

Item	Contents												
Contact rating of Mechanical relay outputs ('c' contact)	<table border="1" data-bbox="587 331 1139 524"> <thead> <tr> <th data-bbox="587 331 770 409">Power supply</th> <th data-bbox="770 331 954 409">Resistive load</th> <th data-bbox="954 331 1139 409">Inductive load</th> </tr> </thead> <tbody> <tr> <td data-bbox="587 409 770 450">100V AC</td> <td data-bbox="770 409 954 450">3A</td> <td data-bbox="954 409 1139 450">1.5A</td> </tr> <tr> <td data-bbox="587 450 770 490">240V AC</td> <td data-bbox="770 450 954 490">3A</td> <td data-bbox="954 450 1139 490">1.5A</td> </tr> <tr> <td data-bbox="587 490 770 524">30V DC</td> <td data-bbox="770 490 954 524">3A</td> <td data-bbox="954 490 1139 524">1.5A</td> </tr> </tbody> </table> (Minimum load) 100mA 5VDC	Power supply	Resistive load	Inductive load	100V AC	3A	1.5A	240V AC	3A	1.5A	30V DC	3A	1.5A
Power supply	Resistive load	Inductive load											
100V AC	3A	1.5A											
240V AC	3A	1.5A											
30V DC	3A	1.5A											
Mounting of contact protective element Z	<ul style="list-style-type: none"> ●Mount a contact protective element conforming to the buffer relay. The relay is broken, if a signal exceeding the contact rating is applied even if 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 (refer to "4-5-2 Connection" example of mechanical relay 'c' contact outputs diagrams) 												
Selection of buffer relay	<p>(1) Coil rating.....Less than the contact rating of output terminals</p> <p>(2) Contact rating ...More than twice the load current</p> <p>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.</p>												
Selection of contact protective element	<p>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).</p> <p><Reference values of C • R> C: 0.01 μF(Rating about 1 kV) R:100 to 150 Ω(Rating about 1 W)</p>												

4-6 Connection of digital input terminals and function selection (Option)

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

4-6-1 No-voltage contact input terminal



Remarks	<ul style="list-style-type: none"> ■ Features of digital input terminal Voltage when the contact is open. : Approx. 5 V Current when the contact is short. : Approx. 2 mA
---------	--

4-6-2 Connections

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

Apply a no-voltage contact signal to digital input terminals.

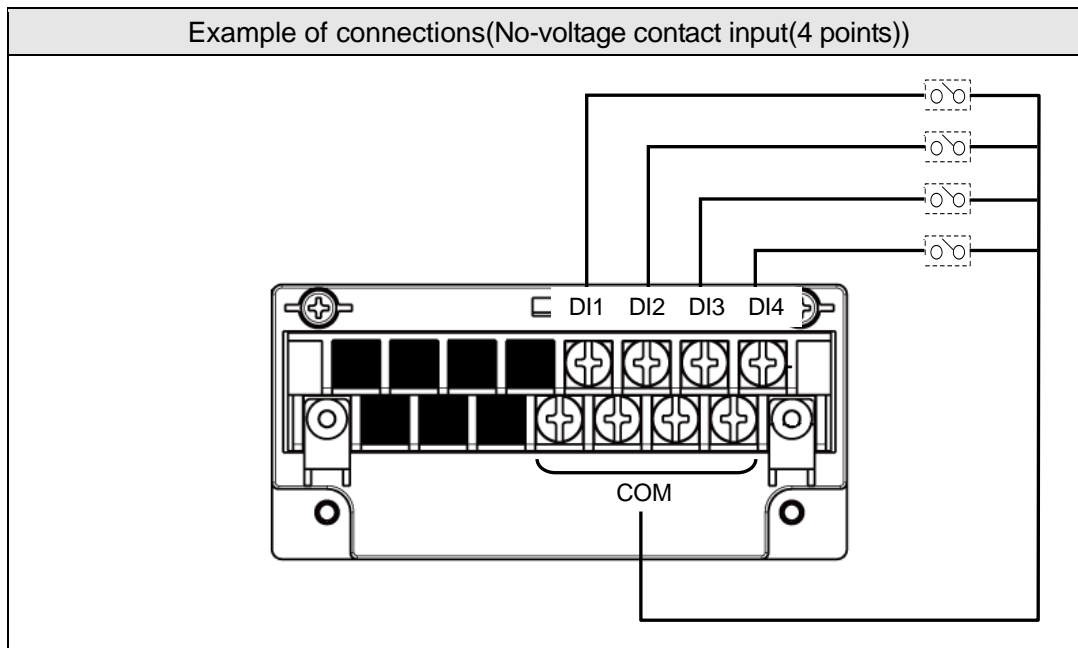
Use cables terminated by crimp style terminals with insulation sleeves for the digital input terminals.



Caution

No-voltage contacts

For the contacts to be connected to the Digital input terminals, 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.



4-6-3 Functions of terminals

Digital input ON/OFF (short/open) state can be measured. Select the range type as DI.
(Refer to '【General】9-1 input operation settings'.)

Pulse input Used as the pulse input. Select the range type as Pulse (+) and Pulse (-).
(Refer to '【General】9-1 input operation settings'.)

Totalizer reset The reset of totalizer is executed. When the digital input terminal specified becomes ON, the totalizer reset is executed.
(Refer to '【General】9-6 Totalizer reset settings'.)

Marker The writing of marker. The marker can be written on the trends when the digital input terminals become ON.
(Refer to '【General】9-8 Marker text settings'.)

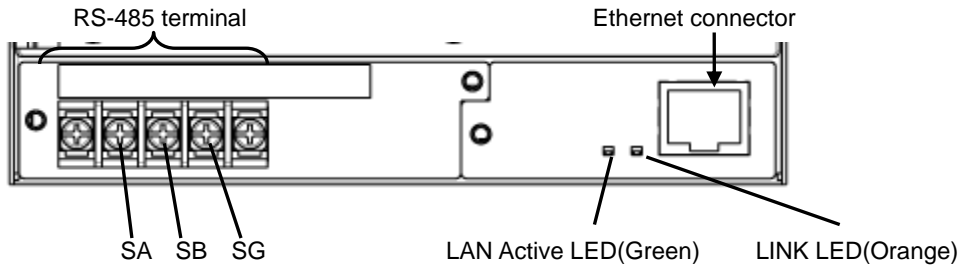
File drive The recording start/stop of data file in the internal memory is executed.
The recording starts or stops when the digital input terminals become ON or OFF.
(Refer to '【General】9-5 File settings'.)

- 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 (Option)

The KR can be communicated with a master unit (high order instrument) via Ethernet and RS-485, and with a slave unit (low order instrument) via RS-485.

*Ethernet and RS-485 communication function are optional.



4-7-1 Connections of High order communication RS-485

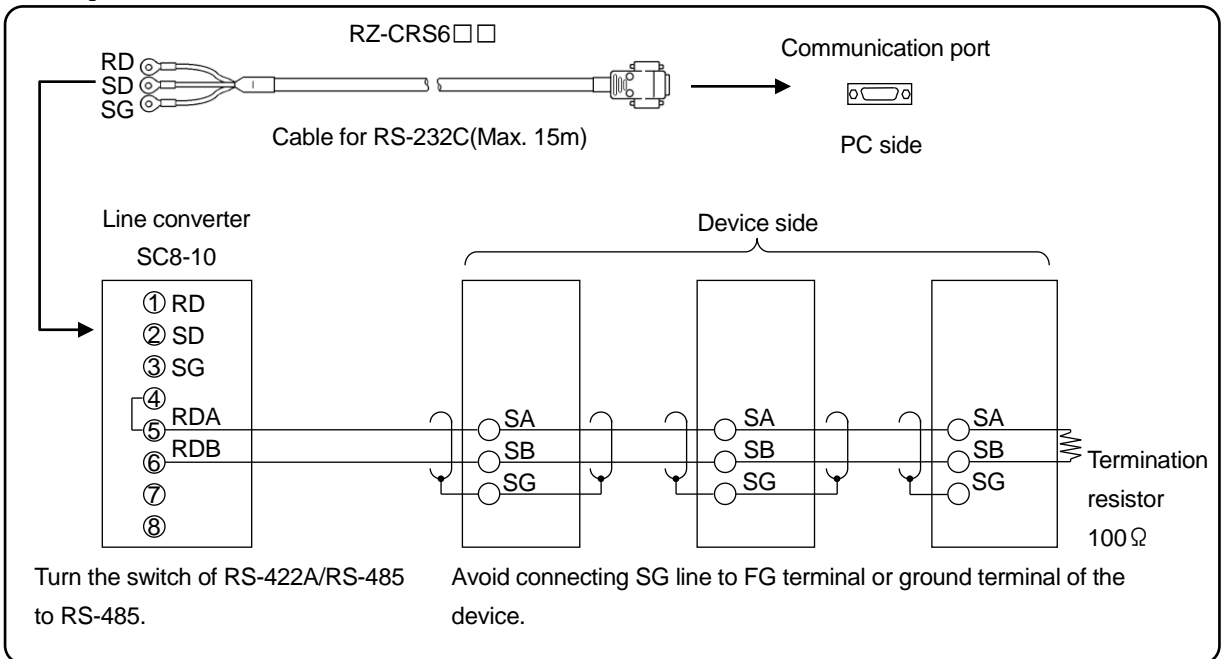
PC and multiple devices are connected with RS-485. A line converter is required.

RS-485 cables within 1.2km of total extension and up to 31 devices can be connected.

Install a resistor of 100Ω to the last edge of the transmission line device side.

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

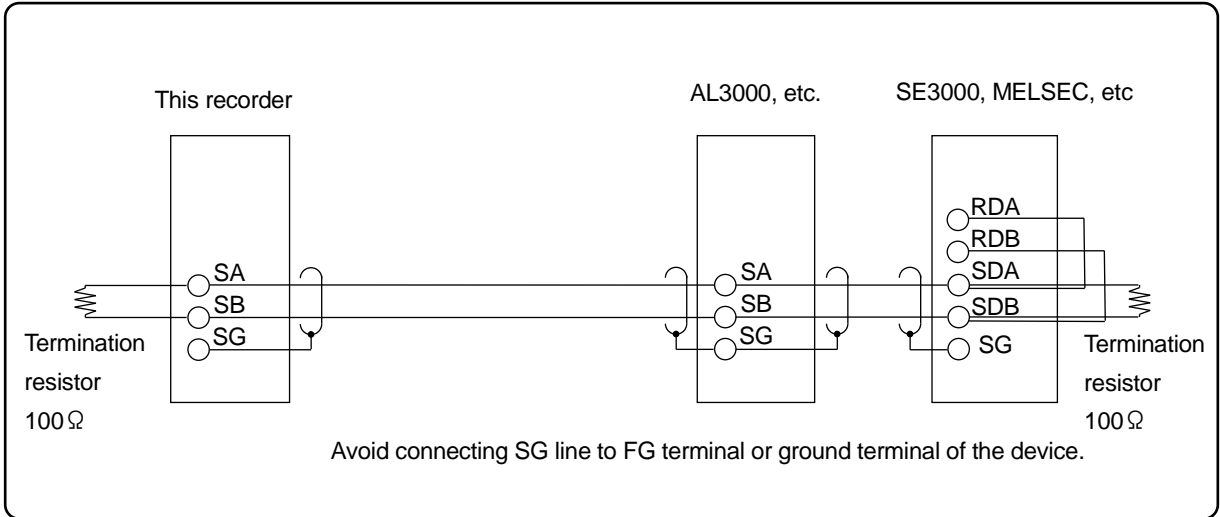
Example of terminal connection



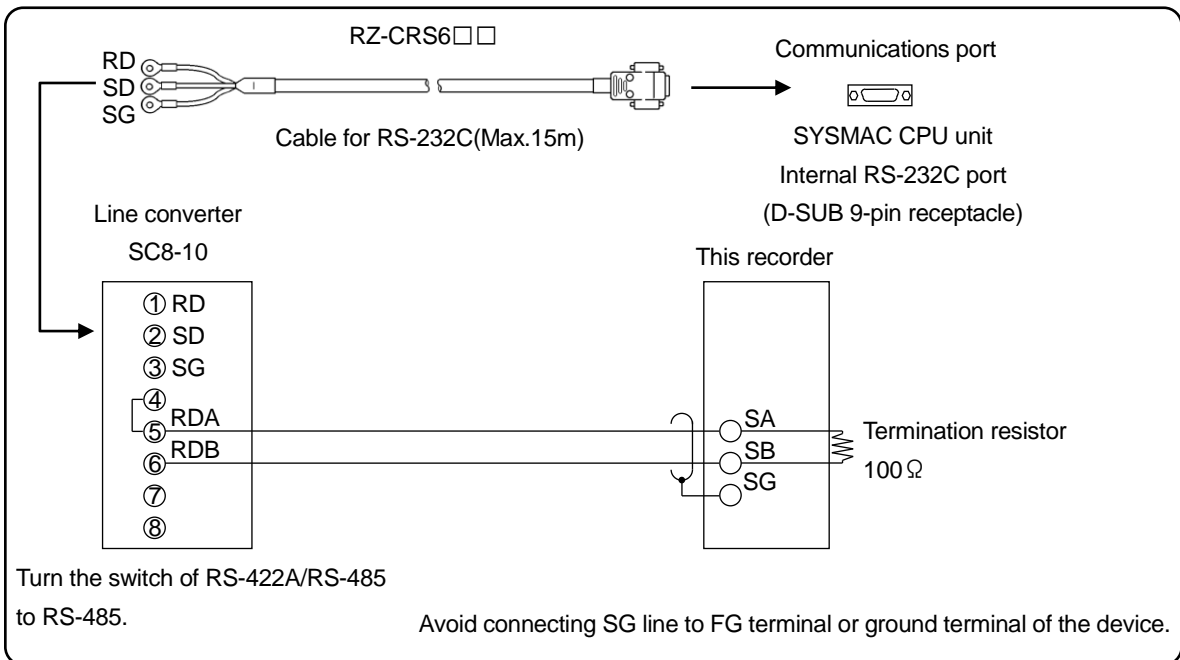
4-7-2 Connections of low order communication RS-485

Connect SA1, SB1 of this recorder 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.

Example of terminal connection 1

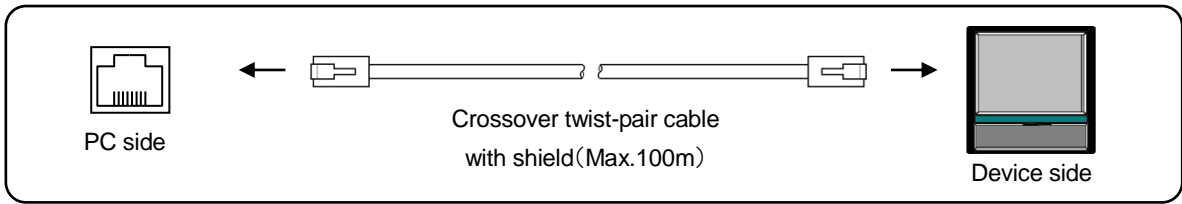


Example of terminal connection 2(SYSMAC)

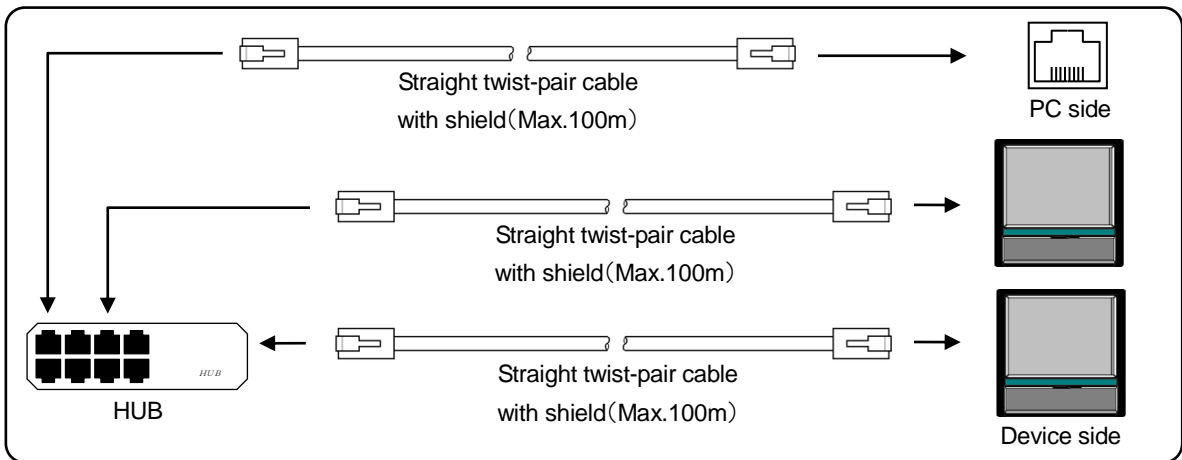


4-7-3 Ethernet wiring

- ① Example of connection between PC and Ethernet devices(one-to-one connection)



- ② Example of connection between PC and HUB/Ethernet devices(one-to-N connection)



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