

Hybrid Recorder Model SR100 (Pen Type)

Instruction Manual Wiring/Installation



Thank you for purchasing your Azbil Corporation product. This manual contains information for ensuring the safe and correct use of the product. Those designing or maintaining equipment that uses this product should first read and understand this manual. This manual contains information not only for installation, but also for maintenance, troubleshooting, etc. Be sure to keep it nearby for handy reference.

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1. Introduction

Thank you for purchasing SR100 (Pen Type) with 100mm recording width.

This industrial use instrument records input signals to the chart paper and stores data into the SD card.

Mount this instrument on the indoor instrumentation panel etc. and record signals of temperature sensor, pressure gauge, hygrometer and flow meter. Reading signals of the recorder are thermocouple, resistance thermometer, DCmV and DCV. Make sure to read this instruction manual in advance to understand this unit well and prevent troubles from occurring. This manual is a "Wiring/Installation" Instruction manual.

Read the "General" Instruction manual from the CD-ROM provided when using the unit.

Request

- To the persons doing instrumentation, installation, and sales -

Make sure to provide this instruction manual to the person who uses the unit.

- To the users of this unit -

Store this instruction manual with care until you scrap the unit.

Also, write down the parameter contents set in the product and keep it for your record.

Product warranty period

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 and markings 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 caused by improper use or connection, or invalid repair or modification.
2. Failure 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 Azbil 's product itself. Therefore, we are not responsible for compensation for whatever the damage that is triggered by failure of our product.

Notice

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 our sales office.
4. Azbil is not responsible for any operation results of this software.

Trademark

1. Microsoft, Windows, Windows 7, Windows 8.1, Windows 10, and NET Framework are trademarks of Microsoft Corporation and the related company.
2. SD Memory Card is the trademark of Panasonic Corporation, SanDisk Corporation in USA, and TOSHIBA CORPORATION.
3. Other described company names and product names are trademarks and registered products of the respective companies.
4. Please note that the marks "TM" and "®" are omitted throughout this manual.

Warning

Perchlorate Material

This instrument uses battery with Perchlorate Material.

Special handling may apply, see

<http://www.dtsc.ca.gov/hazardouswaste/perchlorate>

■ Before use

Make sure to check the following before use after unpacking the unit. If you have any question, please contact your dealer or our nearest office.

1. Exterior check

Check that the appearance of the product has no damage.

2. Model code check

Check that the model code of the purchased product is correct.

◆ Model code label and application place

The label as follows is attached on the upper surface of the product case and the chassis.

Model code → SR- □□□□□□□□ □□ CHINO
Serial number → Y5-□□□□□□□□ □□ YYYMMDD
MADE IN JAPAN

"YYYMMDD" indicates the date of manufacture.

3. Accessories check

Check the following accessories attached to the product.

Item	Q'ty	Remarks
Instruction manual	1	CD-R
Instruction manual [Installation/Wiring]	1	Booklet
Bracket	1 set	For panel mounting
Terminal screw	5	M3.5, for input terminal (spares for missing)
Chart paper	1	81406088-001
Cartridge pen (Analog pen)	1 each	Red (1 st pen), Green (2 nd pen) Blue (3 rd pen), Brown (4 th pen)
Plotter pen (Digital pen)	1	Purple

In addition, if accessories are purchased additionally, those products may be attached.

Request

1. Do not drop the product while take it out of the box
2. When transporting the unit, pack in the dedicated package box, and put the box in an outer case with a bed of cushion.
With the consideration to the case above, it is recommended that the dedicated package box for the unit is stored.
3. When the unit is removed from the panel and not used for a long time, put it in the dedicated package box, and store it in a place with normal ambient temperature and less dust.

4. About attached chart paper

For the unit, the chart paper 81406088-001 (1 book) is available and attached. For the case that the chart paper is to be specified, various scales are available as follows.

Item	Item number	Printed scale (The following numbers are printed.)	Remarks
Folding chart 50 divisions	81406088-001	0,20,40,60,80,100	10 books 16m
Folding chart 40 divisions	81425048-004	0,10,20,30,40 0,20,40,60,80 0,50,100,150,200 The above 3 patterns are printed.	10 books 16m
Folding chart 50 divisions	81425048-001	0,10,20,30,40,50 0,20,40,60,80,100 0,40,80,120,160,200 The above 3 patterns are printed.	10 books 16m
Folding chart 60 divisions	81425048-002	0,10,20,30,40,50,60 0,20,40,60,80,100,120 0,50,100,150,200,250,300 The above 3 patterns are printed.	10 books 16m
Folding chart 70 divisions	81425048-003	0,2,4,6,8,10,12,14	10 books 16m
Folding chart 75 divisions	81425048-005	0,50,100,150	10 books 16m
Clean paper chart 50 divisions	81407115-001	0,20,40,60,80,100	10 books 12m

- * The chart paper has the same printed linear scale as the standard scale.
Therefore, it can be shared in regardless of input types (thermocouple, resistance thermometer, or others).
- * When using recording paper other than the genuine chart, operation is not guaranteed.

5. Restriction of digital recording/printing function

- (1) When the chart speed is set to 150mm/H or more, printing function for other than time line, power-on printing, data printing, list printing and setting change mark is disabled.
- (2) Printing is formed with dots of one pin. Therefore, if the power is turned off while characters are being formed, they cannot be formed correctly. This is not abnormal.

6. Service parts

For the unit, service parts are available as follows.

Item	Item number	Remarks
Cartridge pen (Analog pen) Red	SR-931CP000R	3 pieces
Cartridge pen (Analog pen) Green	SR-931CP000G	3 pieces
Cartridge pen (Analog pen) Blue	SR-931CP000B	3 pieces
Cartridge pen (Analog pen) Brown	SR-931CP000C	3 pieces
Plotter pen (Digital pen) Purple	81446296-001	3 pieces
SD card	512MB	SR-911SD0512
	1GB	SR-911SD1000
	2GB	SR-911SD2000
250Ω resistor	Accuracy ±0.02%	81401325
	Accuracy ±0.05%	81446642-001

2. For Safe Use

If the unit is used in a manner not specified by the manufacturer, the protection provided by the unit may be impaired. For safe use of the unit, please read and understand the following cautions.

2-1. Preconditions for Use



The unit is a component type general product to be used mounted on an indoor instrumentation panel. Avoid using under other conditions.

Use after the system safety is implemented such as fail-safe design and periodical inspection on the final product side. Also, for wiring/adjustment/operation of the unit, ask professionals with instrumentation knowledge to perform.

Furthermore, the person who actually uses the unit is required to read this instruction manual to fully understand various cautions and basic operation.



2-2. Symbol Mark

This instruction manual includes the following symbol marks. Make sure to fully understand the meaning of them.

Symbol mark	Meaning
 Warning	Cautions are explained to avoid causes for death or serious injuries of users.
 Caution	Cautions are explained to avoid causes for slight injuries of users or damages of the unit or peripheral devices.

2-3. Label

For safe use of the unit, the following labels are used.

Label	"Name" and place	Meaning
	"Alert symbol mark" Various terminals (back side)	Indicates the location which should refer to the manual in order to prevent an electric shock and injury.
	"Protective conductor terminal" Right side of power terminal (back side)	Terminal to be grounded to avoid electric shock
100 to 240V AC* 50/60Hz, 37VA	"Power source specification" Power conductor terminals	Specification of power (voltage range, frequency, and power consumption) used for the unit

*For one pen type.

2-4. Important Explanation



Warning

To avoid severe accidents, make sure to read and understand the following.

1. Switch and overcurrent protection device

This unit 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 unit in a location where the operator can access easily. Use a switch and an overcurrent protective device conforming to IEC60947-1 and IEC60947-3.

2. Be sure to ground this instrument

To avoid electric shock, before turning the power on, connect the protective conductor terminal of this recorder to the protective conductor of the power supply equipment, and do not remove it during use.

3. Before turning on the power supply

For safety, first check that the power source is within the range indicated on the power label, and then turn on the external power switch.

4. Avoid repair and modification

Avoid repair and modification with parts replacement by persons other than service personnel authorized by Azbil. Not only damage or malfunction of this recorder may occur, but also dangers such as electric shock may occur. In addition, the inner unit does not have to be pulled out in the normal use.

5. Use the unit following the instruction manual

For safe use, use the unit following the instruction manual. Please note that Azbil does not have any responsibilities for any claims for failures or damages occurred with abuse or misuse of this recorder.

6. Installing the safety device

Regarding the use of devices that anticipates a big loss due to failure of this unit, always install a safety device for preventing these losses and implement fail safe design in the final instrumentation. This product 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 abnormality occurs

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

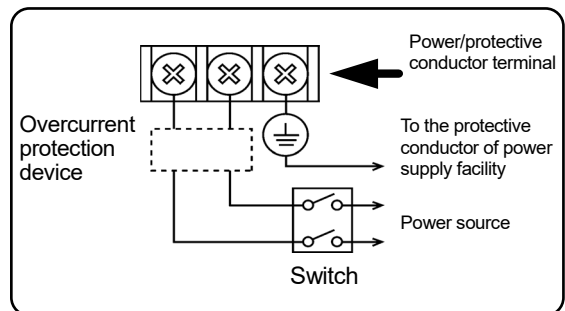
8. Do not put hands in this product

Do not put your hands or tools inside of this product. It may cause electric shock or injuries.

There is no operation such as pulling out an inner unit or using tools when using this product.

9. Do not look at light directly

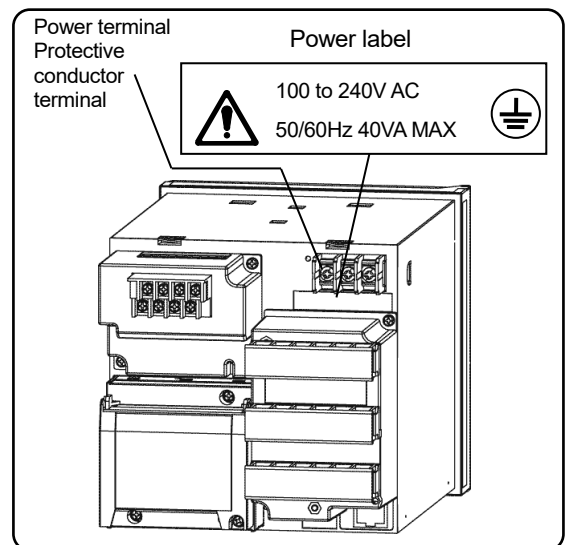
Do not look at the chart illumination directly.



Reference Fuse in power unit

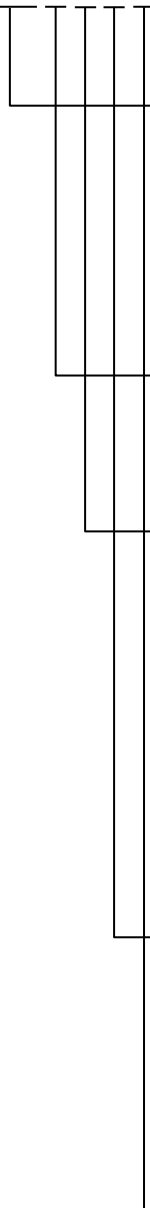
For safety, the fuse below is included in the power unit of the unit. It cannot be replaced.

Manufacturer: Daito Communication Apparatus Co., Ltd
Model: SBL32



3. Model Code List

SR-1□□□□□NNN



Input point

- 01: 1 pen
- 02: 2 pen
- 03: 3 pen
- 04: 4 pen

Power

- A: 100 to 240V AC

Communications

- N: None
- E: Ethernet
- R: RS232C
- A: RS422A/RS485
- Q: RS232C + RS485
- C: RS422A/RS485 + RS485
- G: Ethernet + RS422A/RS485 + RS485

Alarm output + remote contacts

- 0: None
- 2: 2 mechanical relay 'a' contact alarm outputs
- 4: 4 mechanical relay 'c' contact alarm outputs + 5 remote contacts
- A: 6 mechanical relay 'a' contact alarm outputs + 5 remote contacts

Addition

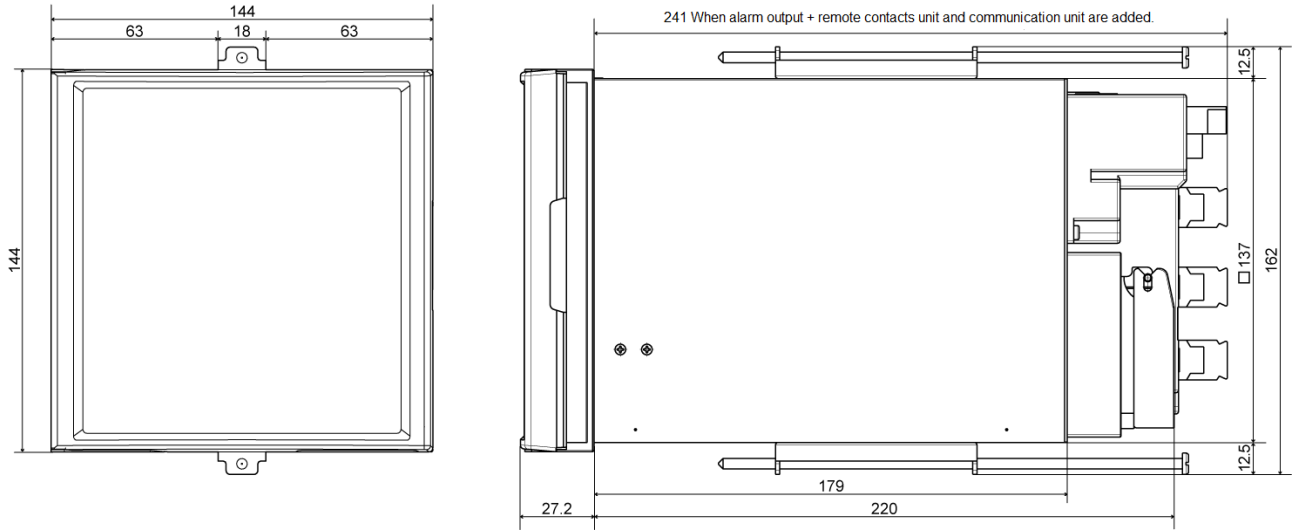
- 0: None
- D: With inspection results
- Y: With traceability certification
- T: Tropical treatment*¹
- B: With inspection results + tropical treatment*¹

*¹ Tropical treatment does not comply with the CE / UKCA marking.

4. Mounting and Wiring

4-1. External Dimensions

Dimensions below are with the mounting brackets.



Unit: mm

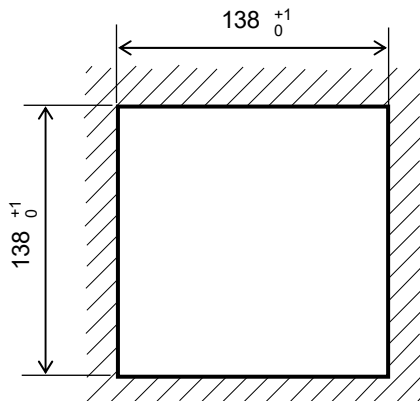
4-2. Mounting



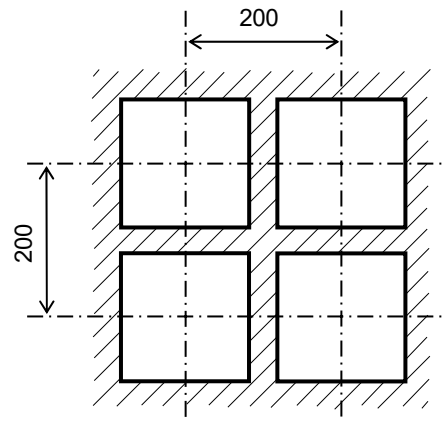
Caution

- (1) Use the recorder mounting on an indoor installed instrumentation panel.
- (2) Brackets can be attached to a panel of steel with thickness of 2 to 6mm or equivalent strength. Select thickness of a panel considering weight and depth of the unit with panel formation for actual use.
- (3) For mounting the recorder on the panel, be careful of injury by dropping it.

1. Panel cutout and mounting method

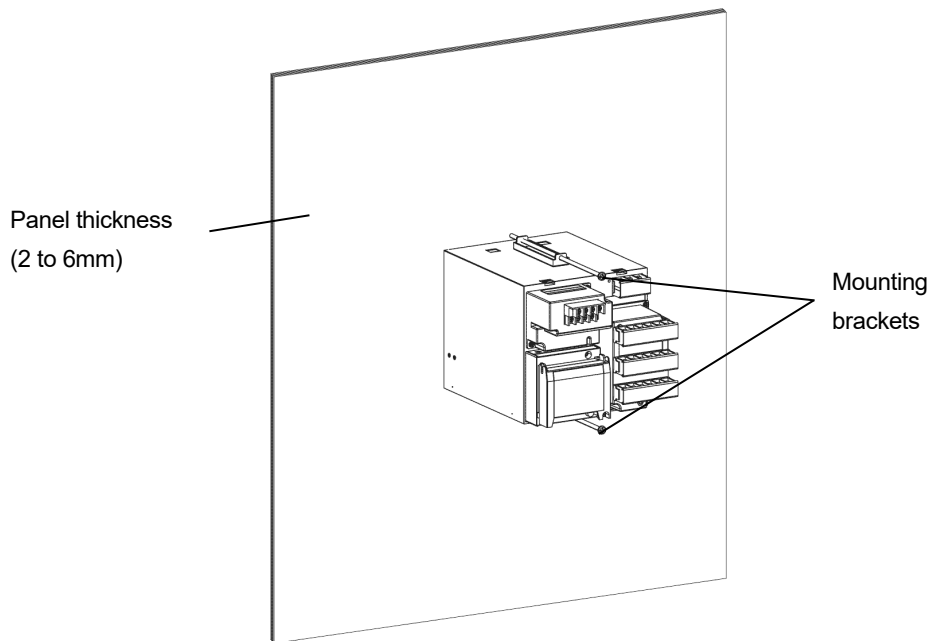


- Minimum interval on multiple units mounting



Unit: mm

- (1) Insert the unit into the panel cutout from the front of the panel.
- (2) Fix the unit to the panel with provided mounting screws (Tightening torque: 1.0Nm). Two screw holes are located on upper and bottom surface of the unit.



2. Mounting condition



Caution

To avoid accidents, make sure to read and understand the following.

Industrial environment

Select a location distant from sources of electric field or magnetic field and without mechanical vibration or shock.

- Overvoltage category II (EN standard)
- Altitude 2000m or less
- Pollution degree 2 (EN standard)
- Working place Indoor
- Short-term temporary overvoltage.... 1440V
- Long-term temporary overvoltage..... 490V

Normal operating condition

- Ambient temperature ... 0 to 50°C (20 to 65%RH, non-condensing)
- Ambient humidity 20 to 80%RH, non-condensing (5 to 45°C)
- Power voltage General specification: 100 to 240V AC $\pm 10\%$
- Power frequency General specification : 50/60Hz $\pm 2\%$

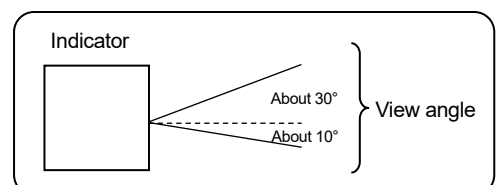
Atmosphere

- For safety, avoid a location with corrosive gas, explosive gas, flammable gas and combustible gas.
- Avoid a location with dust, smoke, or steam.

Mounting angle

- Lateral tilting 0 to 10°
- Longitudinal tilting Forward tilting: 0° Backward tilting: 0 to 30°
- View angle -10 to +30° with the horizon as the standard

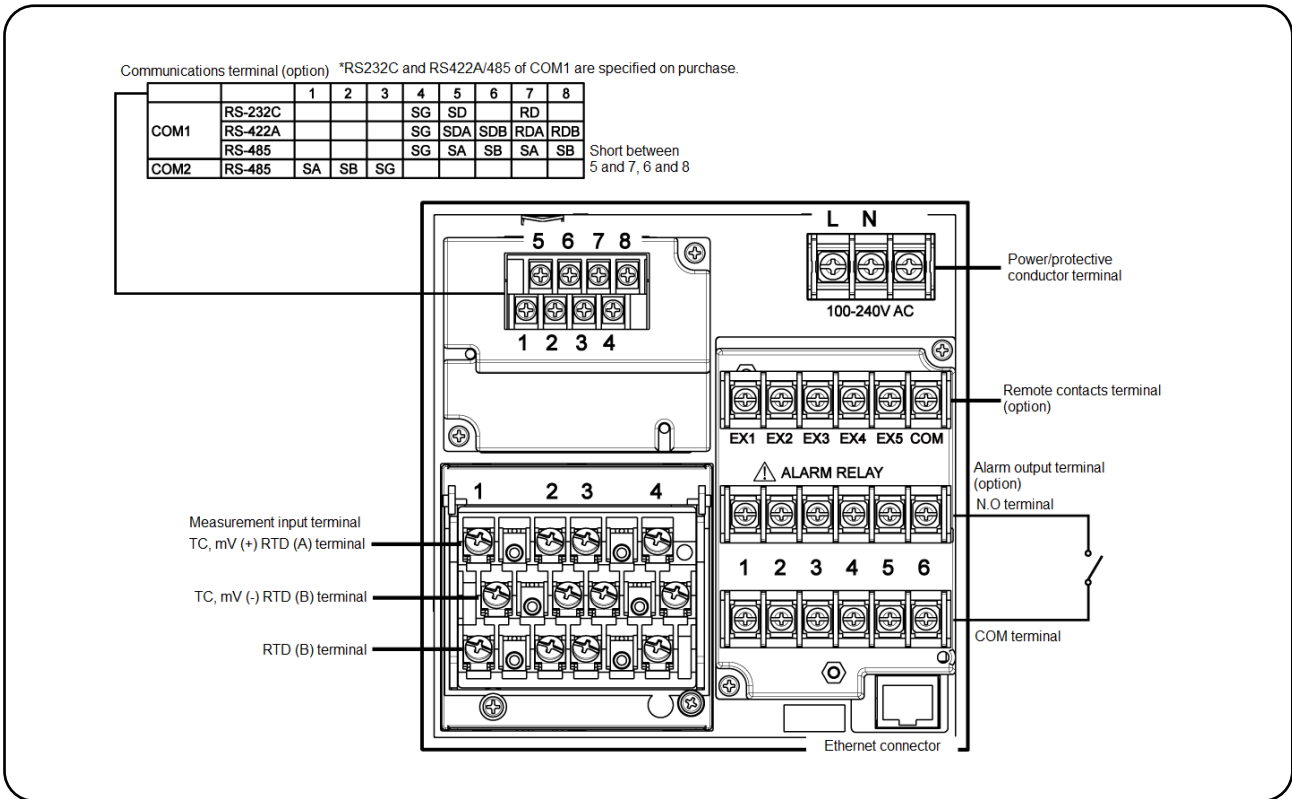
Angles other than the above affect the recording operation.



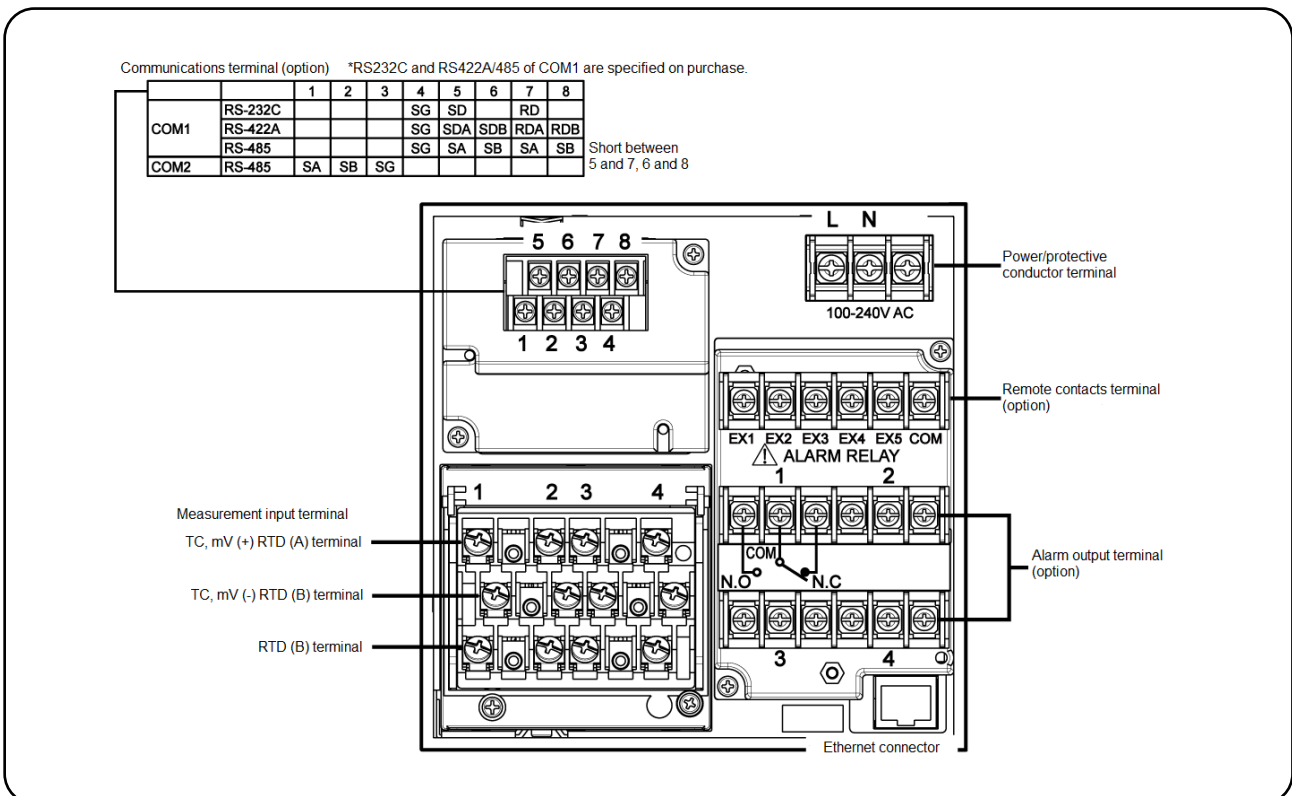
4-3. Wiring

1. Terminal board diagram

The figure below is a diagram of the terminal board with the option [Alarm relay output (6 points 'a' contact) + remote contact and communication interface].



The figure below is a diagram of the terminal board with the option [Alarm relay output (4 points 'c' contact) + remote contact and communication interface].

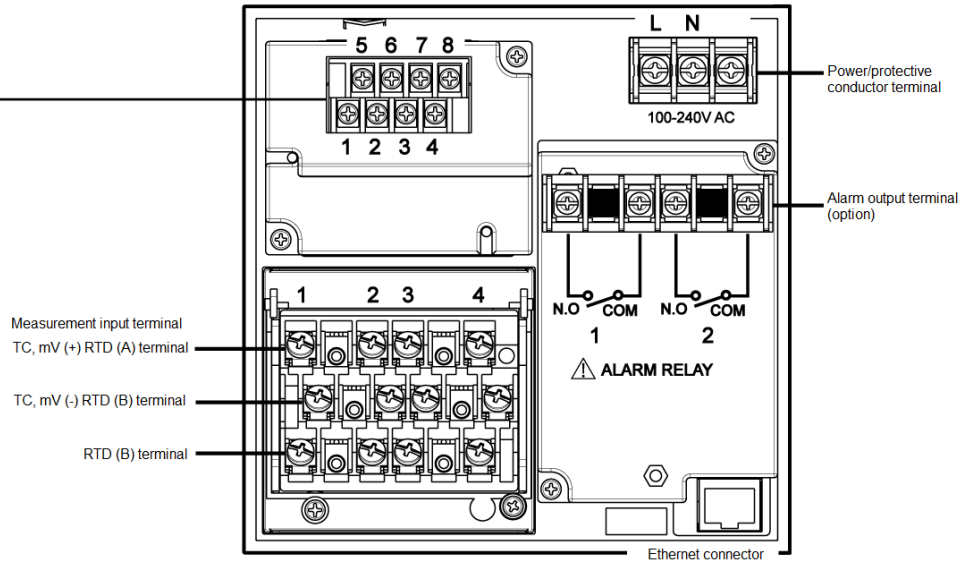


The figure below is a diagram of the terminal board with the option [Alarm relay output (2 points 'a' contact) and communication interface].

Communications terminal (option) *RS232 and RS422A/485 of COM1 are specified on purchase.


		1	2	3	4	5	6	7	8	
COM1	RS-232C					SG	SD		RD	
	RS-422A					SG	SDA	SDB	RDA	RDB
	RS-485					SG	SA	SB	SA	SB
COM2	RS-485	SA	SB	SG						

Short between
5 and 7, 6 and 8





Warning

■ Alert symbol mark () and location



Mark is attached to the location to which if human body touches, an electric shock may be generated.

Terminal name	Location of attached mark
Power terminal	Lower left of power terminal
Measurement input terminal	Upper left of terminal cover
Mechanical relay 'c' contact alarm terminal	Upper left of terminal cover
Mechanical relay 'a' contact alarm terminal	Lower left of N.O terminal

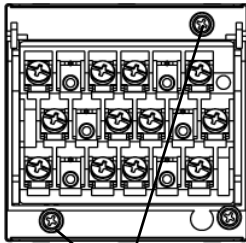
Reference

Input terminal block and alarm terminal block are removable.

For easy wiring, the input unit, alarm output/remote contacts unit, and communication unit are removable.

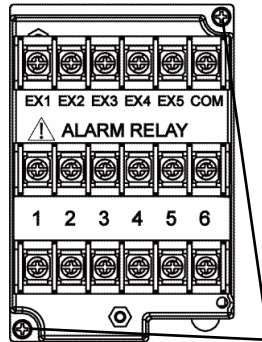
- (1) Every unit can be removed when two mounting screws are removed.
- (2) The recorder and each unit are connected with a connector.

[Input unit]



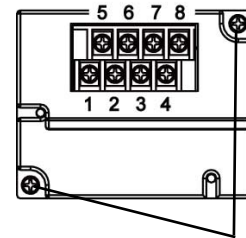
Mounting screws

[Alarm output/remote contacts unit]



Mounting screws

[Communications unit]



Mounting screws



Warning

■ Turn off the power and then remove/attach

Make sure to turn off the external power switch before units are removed/attached to prevent damages on electric circuits.



Caution

■ 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.

Note

Thermocouple input unit replacement


Only thermocouple input unit cannot be replaced with other instrument unit. If done so, measurement errors are generated.

2. Precautions on wiring

Precautions on wiring are described below. Observe them to maintain safety and reliability.

1) Feed power source

For the power source for the unit, use the single-phase power source with stable voltage and without waveform strain to prevent malfunctions.

 Warning	<p>(1) Switch and overcurrent protective device Add a switch and overcurrent protective device (250V, 3A) to the feed power source to prevent an electric shock on wiring. The unit has no replaceable fuse.</p> <p>(2) Connect after the power source is turned OFF When performing power and input/output wiring, make sure to turn OFF the feed power source to prevent an electric shock.</p>
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2) Separate from strong power circuits

For input/output wiring, avoid adjacency or parallel with strong power circuits such as power lines. Separate 50cm or more for adjacency or parallel.

3) Separate thermocouple input from heat sources.

To reduce reference junction compensation errors for thermocouple input, especially separate terminals from heat sources (heating body). Also, avoid radiation such as direct sunlight.

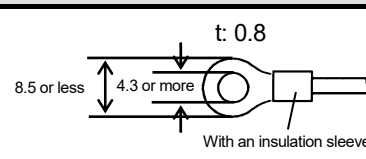
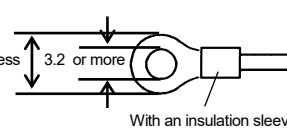
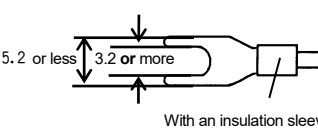
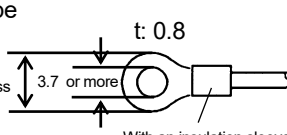
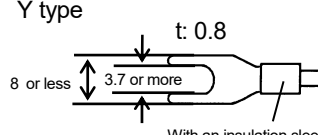
4) Separate from noise sources.

Separate from noise sources as much as possible. Unexpected troubles may occur. If separation from noise sources is disabled, implement countermeasures.


Main source	Countermeasures
<ul style="list-style-type: none"> • Electromagnetic switch or others • Power line with distortion of wave • Inverter • Thyristor regulator 	<p>Insert noise filters between power source and input/output terminals. CR filters are used in many cases.</p>

- 5) Use crimping terminals.
- (1) To prevent looseness or disconnection of terminals and short circuit between terminals, install crimping terminals to termination of connection cables.
 - (2) To prevent an electric shock, use crimping terminals with insulation sleeves.

Terminal Type and Termination Treatment

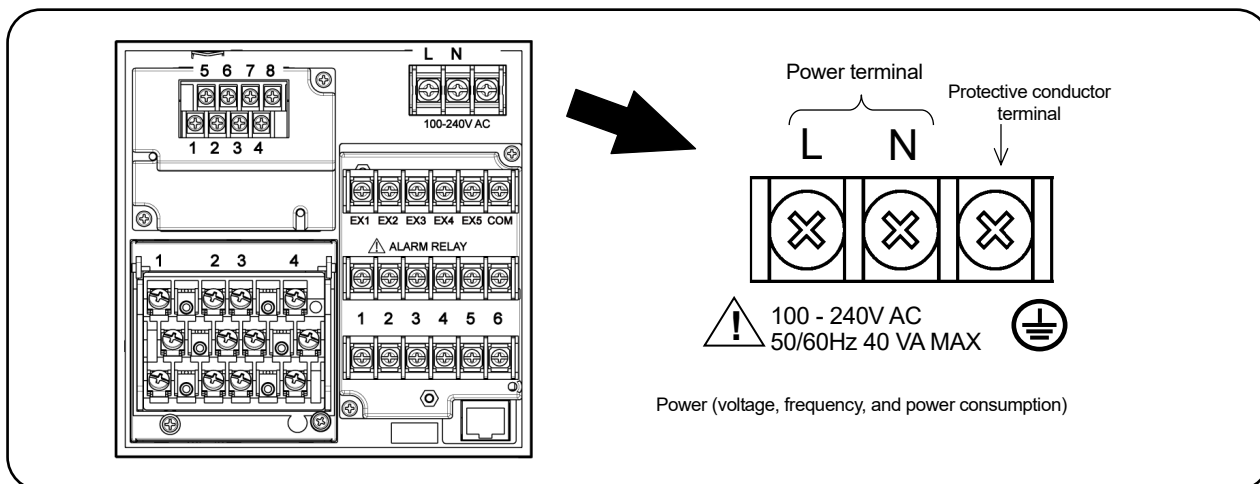
Terminal board	Diameter	Tightening torque	Termination treatment (Unit: mm)
Power/Protective conductor	M4	1.2Nm	<p>O type</p> 
Communications terminal	M3	0.5Nm	<p>O type</p>  <p>Y type</p>  <p>* Use O type as possible.</p>
Terminals other than the above	M3.5	0.8Nm	<p>O type</p>  <p>Y type</p>  <p>* Be sure to use O type for the alarm output terminals. * For other terminals, use also O type as possible</p>

- 6) Unused terminals
- Avoid using unused terminals for relaying. Electric circuits may be damaged.

 <p>Warning</p>	<p>■ Treat properly the wired cables.</p> <p>Treat surely wired cables not to get hung up on people and things. Disconnection of wiring with hanging up may cause an electric shock.</p>
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3. Power/protective conductor terminals wiring

1) Power/protective conductor terminals



	<p>Warning</p> <p>■ Turn OFF feed power source. Before power/protective conductor terminals wiring, make sure to turn off the feed power source to prevent an electric shock.</p>
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2) Power terminal wiring

Using 600V vinyl insulated cables (AWG 20 to 16) as the power line, install crimping terminals with insulation sleeves to the termination for wiring.

Note: Use the following standard cables.

- (1) IEC 60227-3
- (2) ANSI/UL817
- (3) CSA C22.2 No.21/49

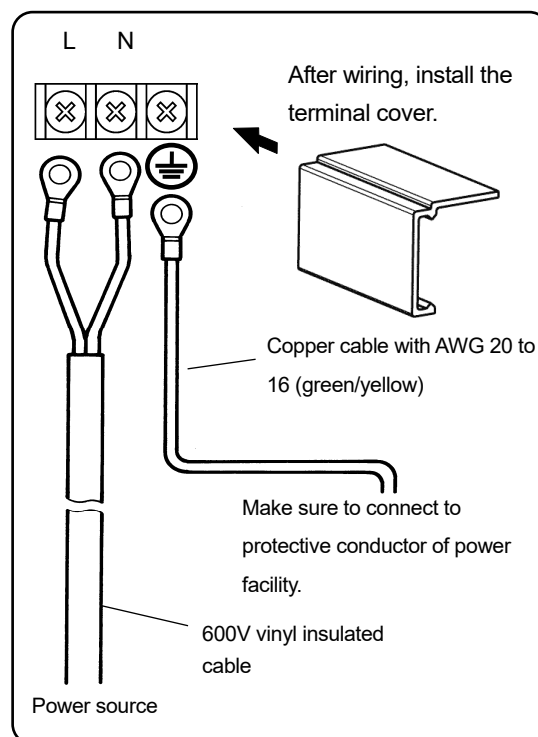
Note L/N display of power terminal

Display based on CSA standard in Canada. The live side of single-phase AC power supply is L, and the neutral side is N display. To get sufficient performance, observe the L/N wiring.

3) Protective conductor terminal wiring

Make sure to connect to the protective conductor of the power equipment. Install crimping terminals with insulation sleeves for wiring.

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



	<p>■ mark at power terminals</p> <p>After wiring the power terminals have power supply voltage applied. Make sure to install power terminal covers after wiring to prevent an electric shock.</p>
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	<p>■ Pay attention to power supply voltage and noise.</p> <p>The power supply voltage of the unit is indicated on power terminals. Applying power other than the indicated one causes accidents or malfunction. In addition, if the power has noise interference, implement countermeasures such as noise cut transformer installation.</p>
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4. Measurement input terminals wiring

- 1) Measurement input terminal
Turn OFF the feed power source before wiring to prevent an electric shock.
Install crimping terminals with insulation sleeves to input terminals for wiring.

- 2) DC voltage (current) input
Use instrumentation twisted cables for measures against noise as input cables.
For current input, connect the shunt resistor for current input to the channel to be measured before wiring.

- 3) Thermocouple (TC) input
Make sure to wire thermocouple cable (or compensation lead wire) to input terminals of the unit.
If a copper conductive wire is connected halfway, big measurement error will be generated.
In addition, avoid parallel connection of a pair of thermocouple wires with other instruments (controller or others) that cause troubles.

- 4) Resistance thermometer (RTD) input
To prevent measurement errors, use 3-core cables as the input cable in which lines have the same resistance.
In addition, one resistance thermometer cannot be connected in parallel with other instruments (a controller or others).

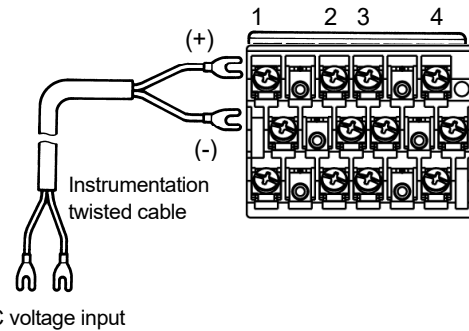
! Caution

■ Allowable input voltage

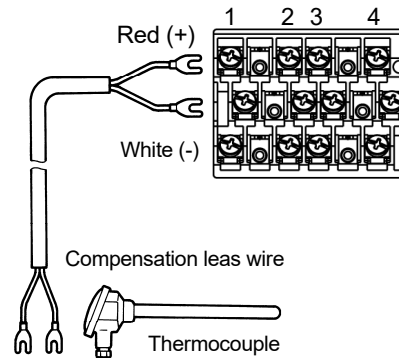
Input type	Allowable input voltage
Voltage, thermocouple input	$\pm 10\text{VDC}^*$
Resistance thermometer input	$\pm 6\text{VDC}$

* $\pm 60\text{VDC}$ for channels specified with $\pm 10\text{V}$ range or more
Maximum temporary overvoltage: $\pm 60\text{VDC}$

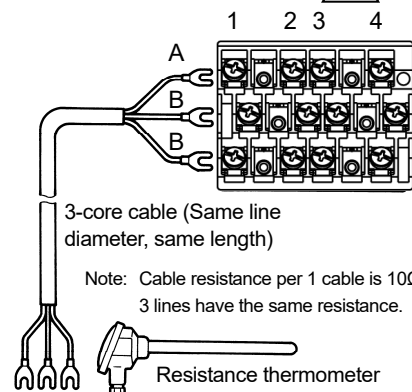
● DC voltage (current) input



● Thermocouple (TC) input



● Resistance thermometer (RTD) input

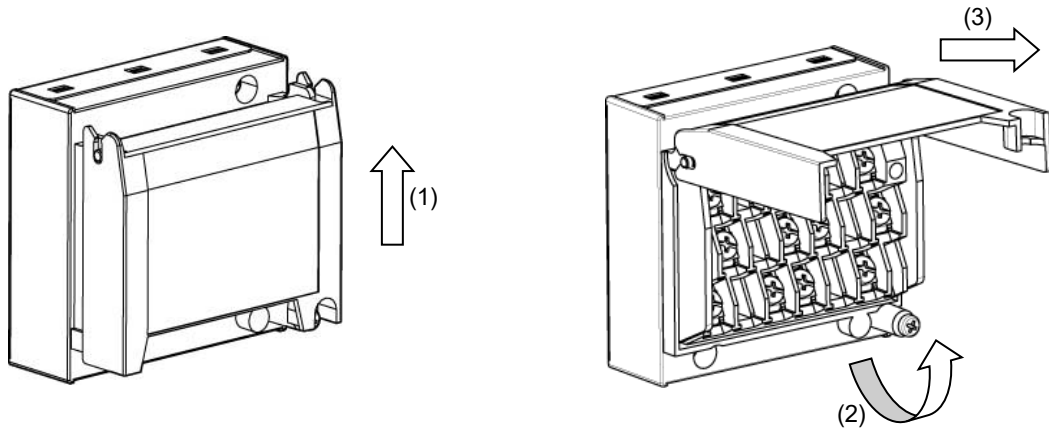


Warning

■ ! mark on measurement input terminals

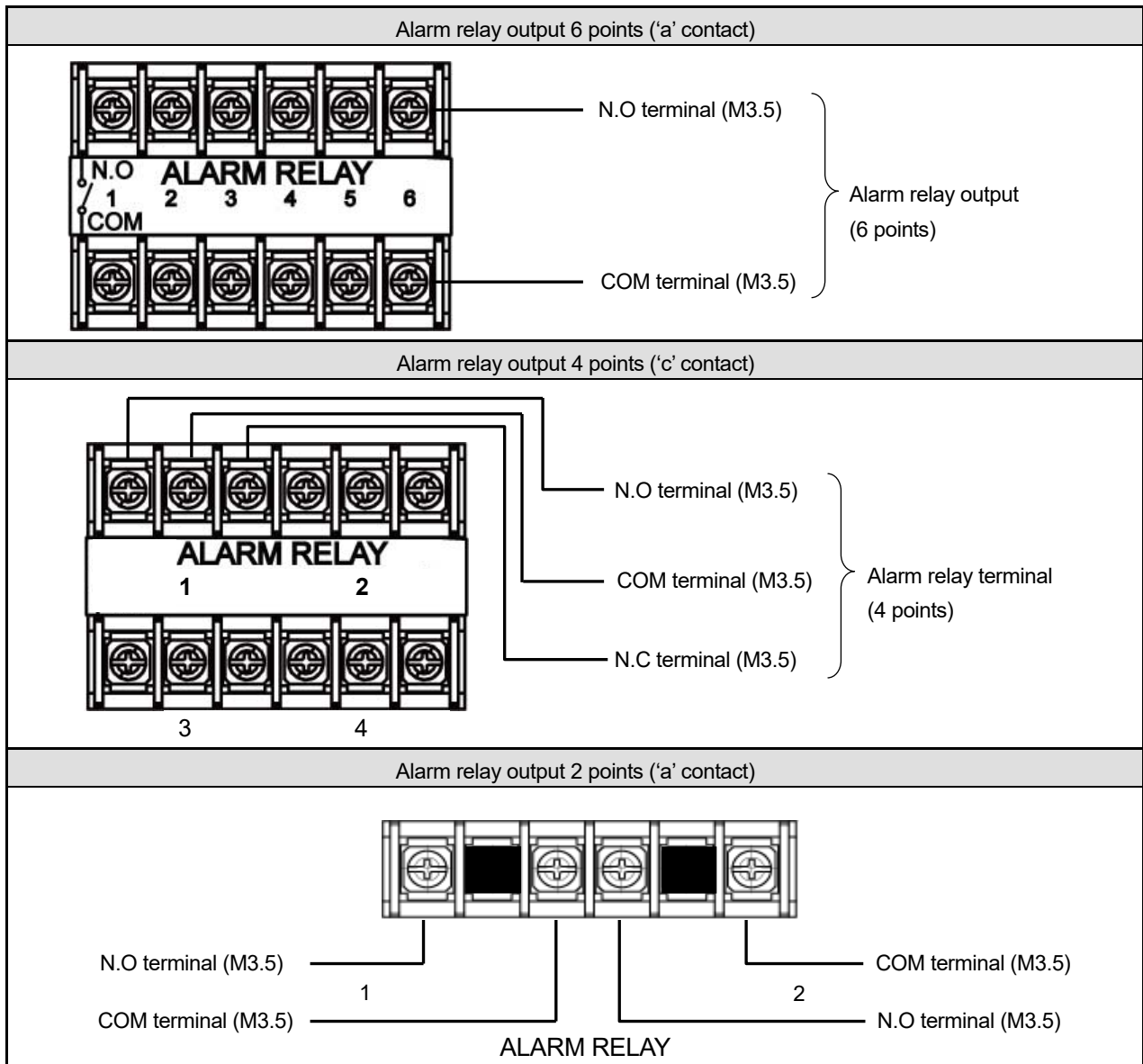
High voltage may be applied to the measurement input terminals due to common mode noise. Allowable noise value is 30VAC or 60VDC or less. Check that the voltage is equal to or less than the allowable value. Do not use the instrument for measurements on mains circuits. Install terminal covers after wiring to prevent an electric shock and protect input cables. For thermocouple input, installing terminal covers reduces reference junction compensation errors.

- 5) Input unit terminal cover mounting/removing
 - (1) Raise the cover to the direction of the arrow.
 - (2) Turn to the direction of the arrow.
 - (3) Pull it out to the direction of the arrow to remove.



5. Alarm output terminals wiring (option)

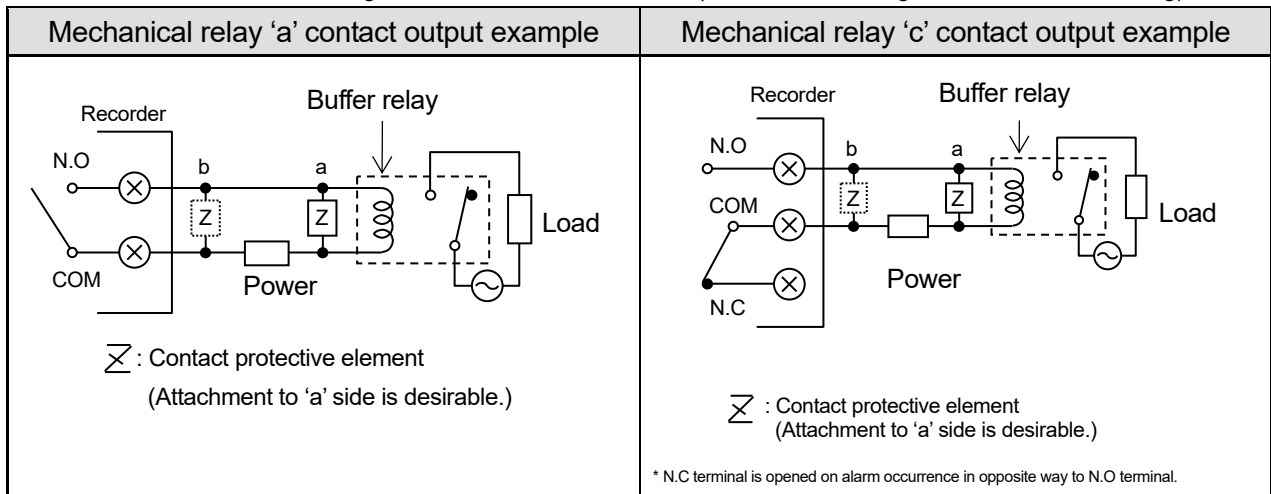
- 1) Alarm output terminals
The terminal configuration depends on the output specification.




2) Wiring

Turn OFF the feed power source and the power source for buffer relay before wiring to prevent an electric shock. Use the cable of AWG 20 to 16.

- (1) Wire the cable to the load via the buffer relay.
- (2) To the alarm output terminals, type O crimp style terminal with insulation sleeve which is connected to double insulated signal wire should be connected. (Refer to 4-3. Wiring, 2. Precautions on wiring)





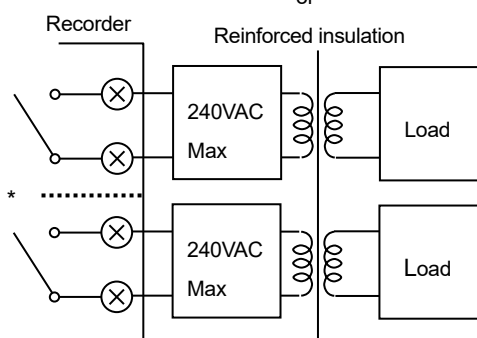
Warning

■ ⚠ mark on alarm output terminals

Maximum of 240VAC can be connected to the alarm output terminals of this unit.


Basic insulation (dielectric strength 1500V) is carried out between the alarm output channels, however, from the malfunction etc. 240VAC may be output to each alarm output terminals. Double insulation or reinforced insulation to the outside circuit connected to an alarm output terminal should be set and industrial environment should be overvoltage category I.

Double insulation
or
Reinforced insulation



*Basic insulation between output channels

A buffer relay power supply is applied to the alarm output terminals after connections and so creates a risk of electric shock if touched. Terminal cover must be mounted after connection. Moreover, safety measures to the outside circuit should be set



Caution

■ Implement safety measures.

The alarm output of the unit may generate output failure with wrong operation, failure, abnormal input, or others. Double insulation or reinforced insulation in outside circuit side of all the channels should be set in any system for safety ensuring.

3) Precautions on wiring

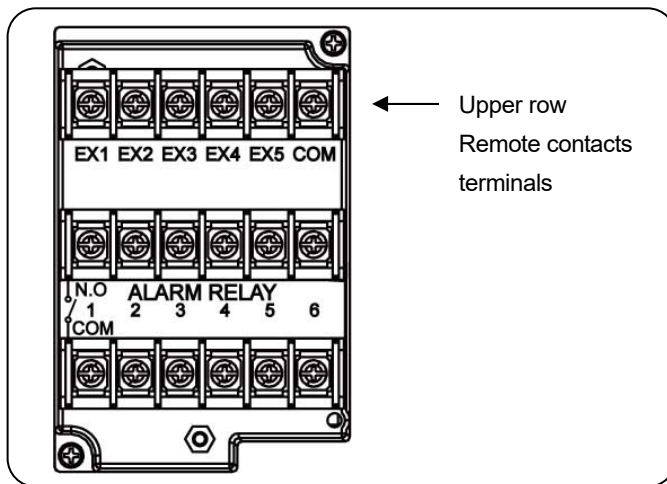
The following are precautions on wiring.

Item	Description			
Mechanical relay output specification contact capacity (Common to 'a' contact and 'c' contact)	Power supply	Resistance load	Inductive load	(Minimum load) 100 μ A100mVDC
	100VAC	2A	1A	
	240VAC	2A	1A	
	30VDC	2A	1A	
Contact protective element Z installation	<ul style="list-style-type: none"> ● Install the contact protective element which fits the buffer relay. ● It is effective to install the element to the coil side of the buffer relay (see the figure of mechanical relay 'a' contact output example) and prevents wrong operation with light load. 			
Selection of buffer relay	<ul style="list-style-type: none"> ● Coil rating: Contact capacity or less of output terminals ● Contact rating: Double of load current or more <p>In addition, the coil surge absorption element built-in type relay is recommended. If there is no buffer relay which meets the load rating, implement another stage of buffer relay.</p>			
Selection of contact protective element	<p>If there is no surge absorption element built-in buffer relay, install this element.</p> <p>The element of C/R (capacitor + resistor) is general.</p> <p><C/R standard> C: 0.01μF (Rating about 1kv) R: 100 to 150Ω (Rating about 1W)</p>			

6. Remote contacts terminals wiring and operation selection (option)

Only with remote contacts terminals (option).

1) Remote contacts terminals



Note Characteristics of contact input terminals

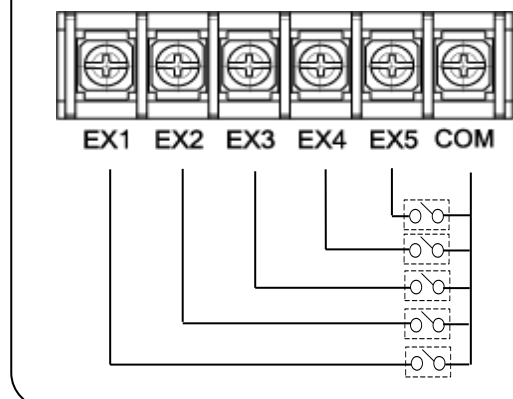
- Voltage on contact open: About 5V
- Current on contact short: About 10mA

2) Wiring

Turn OFF the feed power source before wiring to prevent an electric shock.

- (1) Use no voltage contact signals to be given to the remote contacts terminals.
- (2) Install crimping terminals with insulation sleeves to remote contacts terminals for wiring.

■ Wiring example





Warning

■ No voltage contact

For contacts connected to the remote contact terminals, only the circuit of secondary side which is reinforced from primary side or treated double insulation is able to be connected. Use switches or relays driven with voltage level 30VAC or 60VDC or less or manual contacts which support light load.

Reference

Remote contact

■ Remote contact enabled operation name

- (1) Recording ON/OFF and three chart speed selection (two terminals of EX1 and EX2 are used)
- (2) Messages (No. 01 and 02) selection and printing execution (two terminals of EX1 and EX2 are used)
- (3) Messages (No. 01 to 05) selection and execution (four terminals of EX1 to EX4 are used)
- (4) Digital data printing (arbitrary one terminal)
- (5) List printing (No. 1 to 3) (arbitrary one terminal for each)
- (6) Integration reset (arbitrary one terminal)
- (7) Messages No. 01 to 20 printing execution (each arbitrary one terminal)
- (8) Time correction execution (arbitrary one terminal)

Each function requires short-circuit for one second or more between COM terminal and each terminal.

■ Operation allocation

Setting of allocation of operations to each terminal (EX1 to EX10) is required.

■ Name of operations which require setting

- (1) Recording ON/OFF and three chart speed selection (See general 8-7. Chart Speed Setting.)
- (2) Message selection and printing execution (See general 8-13. Message Printing 1 Settings.)

3) Operation for which terminal No. is decided automatically

ON: Short-circuit OFF: Open

Operation name	Terminal contact signal																																				
(1) 3 chart speed selection	<p>3 chart speed setting other than the setting here is required. (See general 8-7. Chart Speed Settings.)</p> <table border="1"> <thead> <tr> <th rowspan="2">Recording ON/OFF and 3 chart speed selection</th> <th rowspan="2"></th> <th colspan="2">Between COM and EX□ terminals</th> </tr> <tr> <th>EX1</th> <th>EX2</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Recording ON</td> <td>CS1</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>CS2</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>CS3</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td colspan="2">Recording OFF</td> <td>ON</td> <td>ON</td> </tr> </tbody> </table> <p>Chart recording must be ON.</p>	Recording ON/OFF and 3 chart speed selection		Between COM and EX□ terminals		EX1	EX2	Recording ON	CS1	OFF	OFF	CS2	ON	OFF	CS3	OFF	ON	Recording OFF		ON	ON																
Recording ON/OFF and 3 chart speed selection				Between COM and EX□ terminals																																	
		EX1	EX2																																		
Recording ON	CS1	OFF	OFF																																		
	CS2	ON	OFF																																		
	CS3	OFF	ON																																		
Recording OFF		ON	ON																																		
(2) Message printing (No.01 and 02)	<p>Message setting other than the setting here is required. (See general 8-13. Message Printing 1 Settings.)</p> <table border="1"> <thead> <tr> <th>Message No. 01</th> <th>COM and EX1</th> <th rowspan="2">For trigger 1 sec.or more</th> </tr> </thead> <tbody> <tr> <td>Message No. 02</td> <td>COM and EX2</td> </tr> </tbody> </table> <p>At the point when the trigger signals (1 second or more) are given, the selected message is printed. Message printing with key is available.</p>	Message No. 01	COM and EX1	For trigger 1 sec.or more	Message No. 02	COM and EX2																															
Message No. 01	COM and EX1	For trigger 1 sec.or more																																			
Message No. 02	COM and EX2																																				
(3) Message printing (No. 01 to 05)	<p>Message setting other than the setting here is required. (See general 8-13. Message Printing 1 Settings.)</p> <table border="1"> <thead> <tr> <th rowspan="2">Message</th> <th colspan="4">Between COM and EX□ terminals</th> <th rowspan="2">For trigger 1 sec.or more</th> </tr> <tr> <th>EX1</th> <th>EX2</th> <th>EX3</th> <th>EX4 *</th> </tr> </thead> <tbody> <tr> <td>No.01</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td></td> <td rowspan="5"> </td> </tr> <tr> <td>No.02</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td></td> </tr> <tr> <td>No.03</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td></td> </tr> <tr> <td>No.04</td> <td>ON</td> <td>ON</td> <td>OFF</td> <td></td> </tr> <tr> <td>No.05</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td></td> </tr> </tbody> </table> <p>* After message No. is selected, when the trigger signals (1 second or more) are given, the selected message is printed. Chart recording must be ON. Message printing with key is available.</p>	Message	Between COM and EX□ terminals				For trigger 1 sec.or more	EX1	EX2	EX3	EX4 *	No.01	OFF	OFF	OFF			No.02	ON	OFF	OFF		No.03	OFF	ON	OFF		No.04	ON	ON	OFF		No.05	OFF	OFF	ON	
Message	Between COM and EX□ terminals				For trigger 1 sec.or more																																
	EX1	EX2	EX3	EX4 *																																	
No.01	OFF	OFF	OFF																																		
No.02	ON	OFF	OFF																																		
No.03	OFF	ON	OFF																																		
No.04	ON	ON	OFF																																		
No.05	OFF	OFF	ON																																		

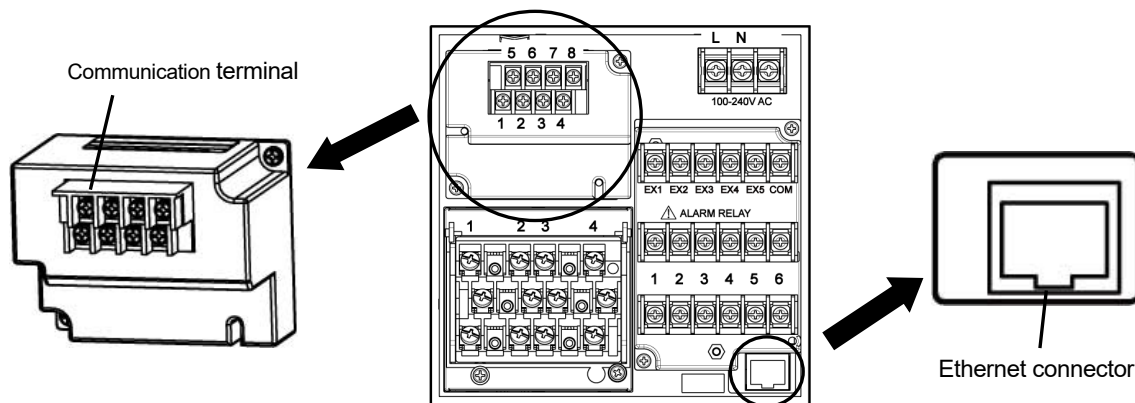
4) Operation which can be allocated to arbitrary terminal No.

ON: Short-circuit OFF: Open

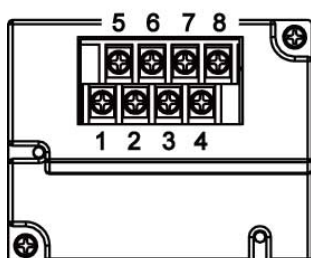
Operation name	Terminal contact signal
(4) Digital data printing	<p>Turn ON the terminal No. specified to "Digital data printing." Chart recording must be ON. Digital data printing with key is enabled. Even during execution, the acceptance can be repeated only once.</p>
(5) List printing (List No.1, 2, and 3)	<p>Turn ON the terminal No. specified to "List 1, List 2, or List 3 printing." Chart recording must be ON. List printing with key is available. (See general 8-12. List Printing Settings)</p>
(6) Integration reset	<p>When "Collective reset with remote contacts (EX)" is selected with "Calculation programming", turning ON the terminal No. specified to "Integration reset" resets the integration value. (See general 8-4. Calculation Settings.)</p>
(7) Message printing (No.01 to No.20)	<p>Message setting other than the setting here is required. (See general 8-13. Message Printing 1 Settings.) Turn ON the terminal No. specified to "Message printing (No. 01 to 20)." Chart recording must be ON. Message printing with key is available.</p>
(8) Time correction	<p>When the current time (second) is within 0 to 30 seconds, the time is corrected to zero second by dropping the seconds. When it is within 31 to 59 seconds, the time is put forward one minute by rounding up and corrected to zero second.</p>

7. Communication I/F terminal wiring (partly option)

SR100 can be connected for communications with RS232C, RS422A, RS485, and Ethernet.



1) Communication terminal type



		1	2	3	4	5	6	7	8
COM1	RS232C *				SG	SD		RD	
	RS422A *				SG	SDA	SDB	RDA	RDB
	RS485 *				SG	SA	SB	Short with SA	Short with SB
COM2	RS485	SA	SB	SG					

* RS232C and RS422A/485 of COM1 are to be specified on purchase.

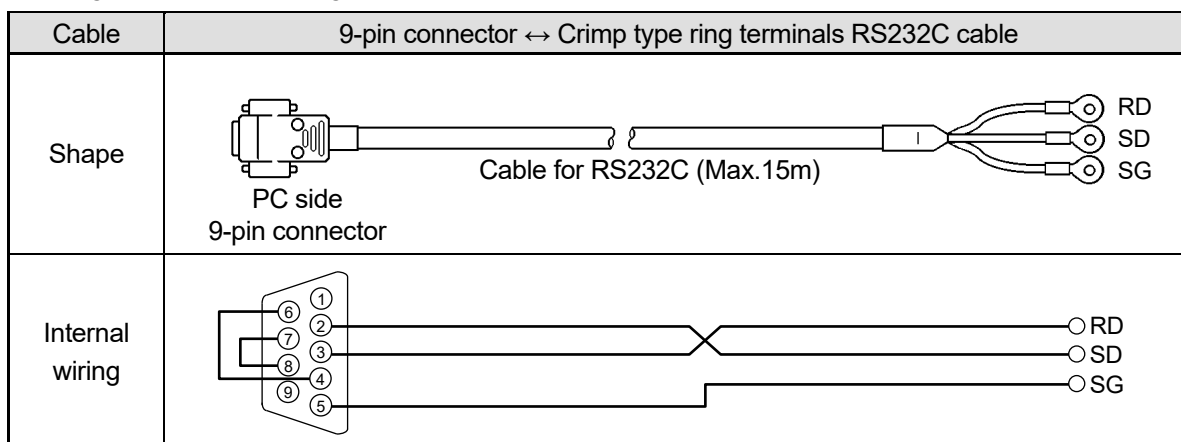
2) Communications cables

Please prepare communication cables before wiring in advance.

Since exclusive cables are available from us, place an order.

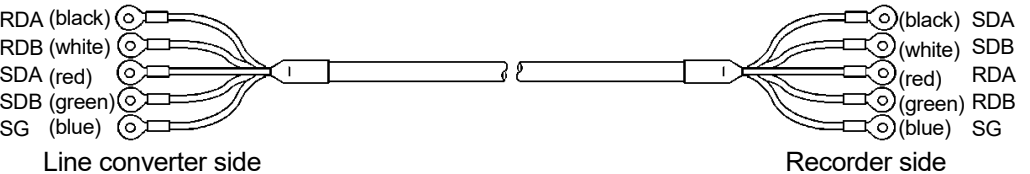
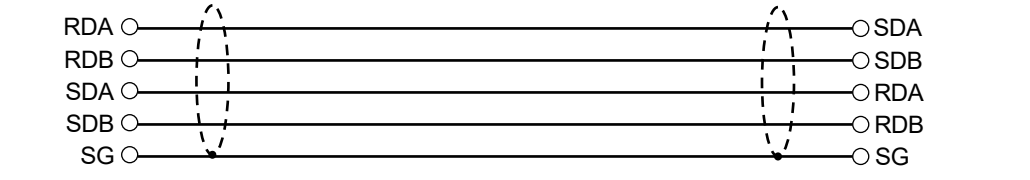
(1) RS232C

Connection between PC and the unit or a line converter

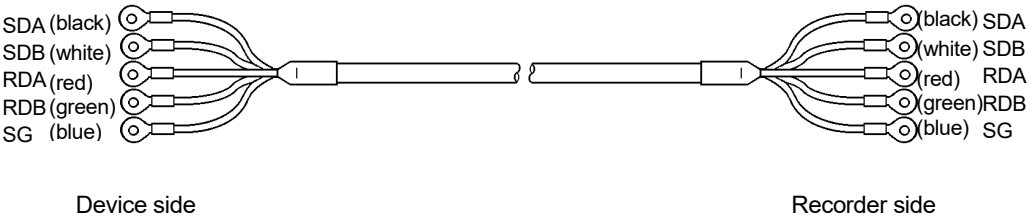
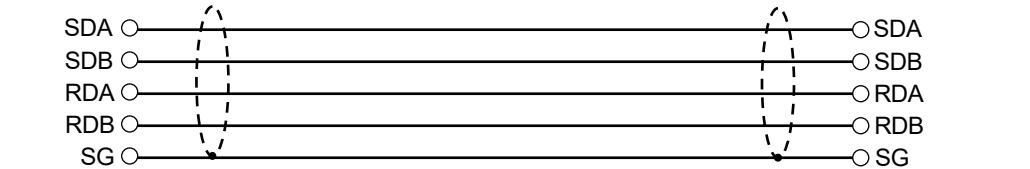


(2) RS422A

Connection between a line converter and the unit

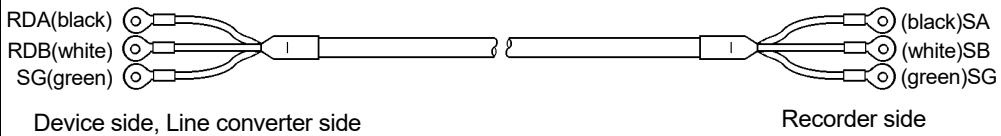
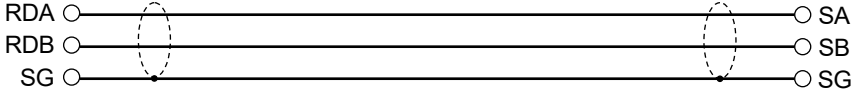
Cable	Crimp type ring terminals ↔ Crimp type ring terminals RS422A cable (for a line converter)
Shape	 <p>4-core cable of twisted 2-core cables of twisted VCTF lines. Each side has a SG (signal ground) line. Since the line converter has no SG terminal, cut and use the cable.</p>
Internal wiring	

Connection between the unit and other devices

Cable	Crimp type ring terminals ↔ Crimp type ring terminals RS422A cable (for parallel)
Shape	 <p>4-core cable of twisted 2-core cables of twisted VCTF lines. Each side has a SG (signal ground) line.</p>
Internal wiring	

(3) RS485

Connection between the unit and other devices and between a line converter and the unit

Cable	Crimp type ring terminals ↔ Crimp type ring terminals RS485 cable
Shape	 <p>2-core cable of twisted CVVS lines. Each side has a SG (signal ground) line. Since the line converter has no SG terminal, cut and use the cable.</p>
Internal wiring	

(4) Ethernet

- Connection between PC and devices

For direct (one-to-one) connection, use crossover twist-pair cables with shield (available locally as STP cable).

- Connection between HUB and devices (multiple devices can be connected)

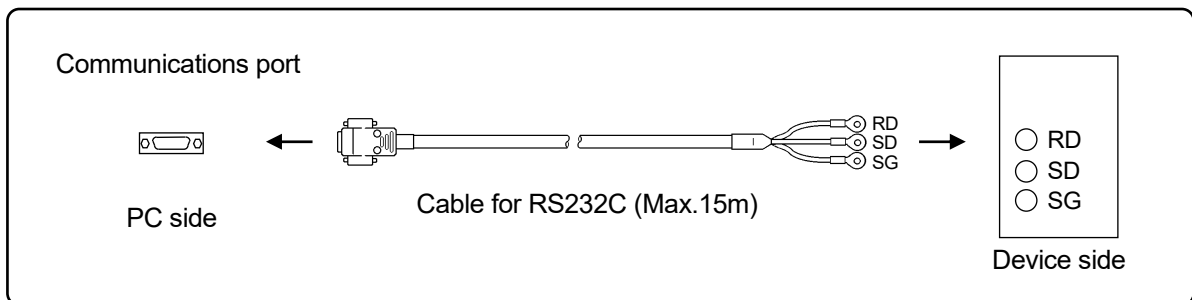
For (one-to-N) connection between PC and devices via HUB, use straight twist-pair cables with shield (available locally as STP cable).

3) Communications line wiring

(1) RS232C wiring

PC and devices are connected one-to-one with RS232C.

Example of terminal connection



(2) RS422A wiring

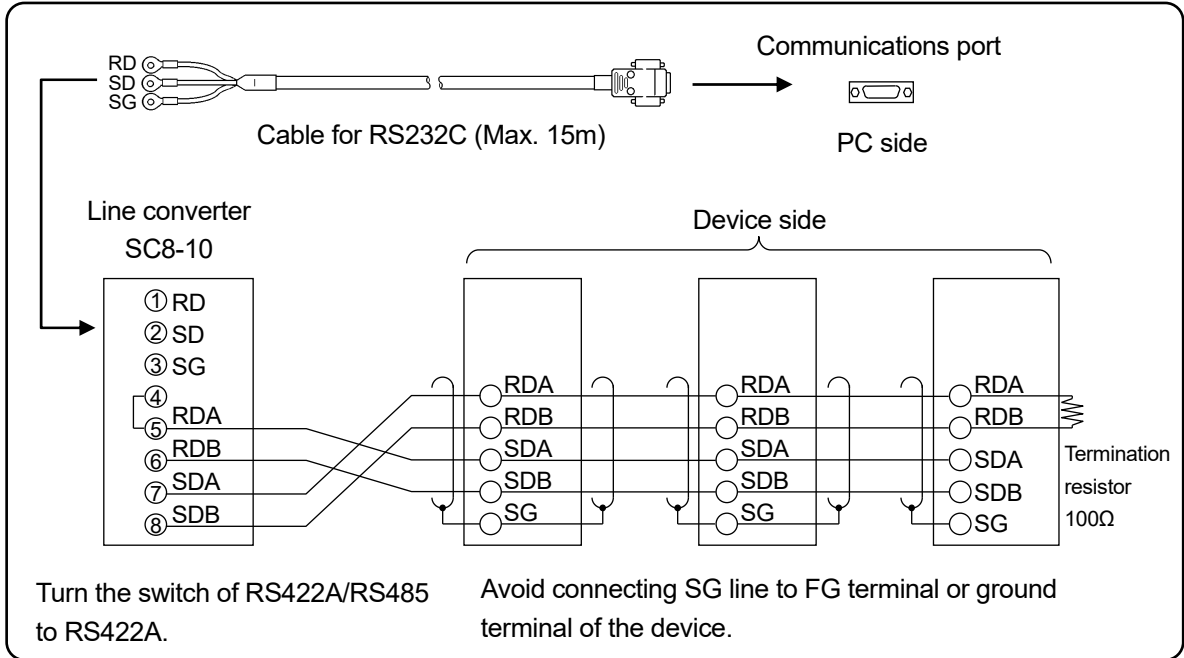
PC and multiple devices are connected with RS422A. A line converter is required.

RS422A cable is 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



(3) RS485 wiring

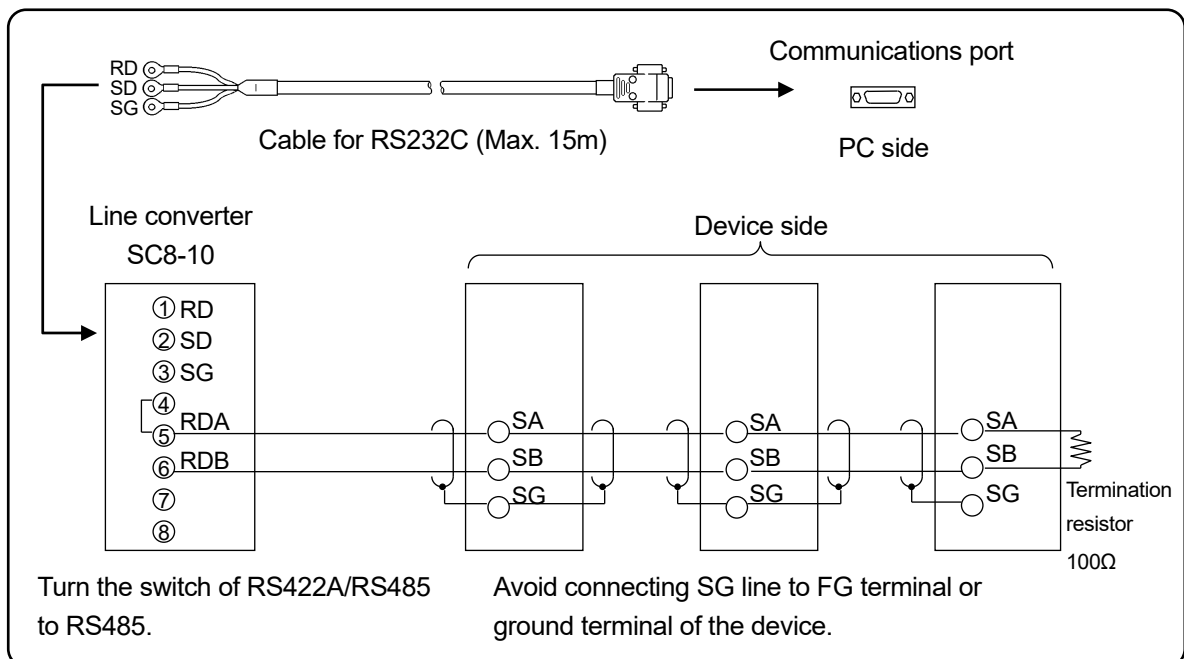
PC and multiple devices are connected with RS485. A line converter is required.

RS485 cable is 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.

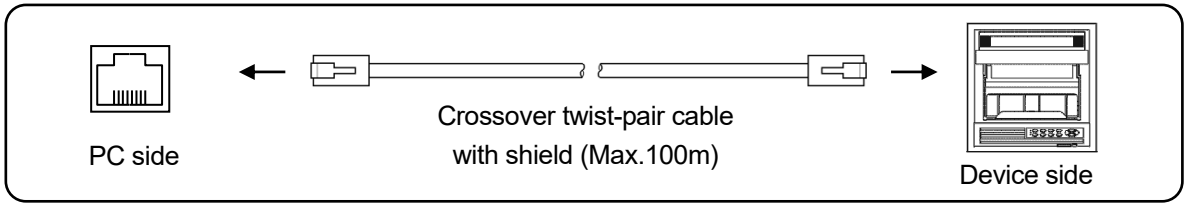
(General metal film resistors will be fine. They are available from us, place an order.)

Example of terminal connection

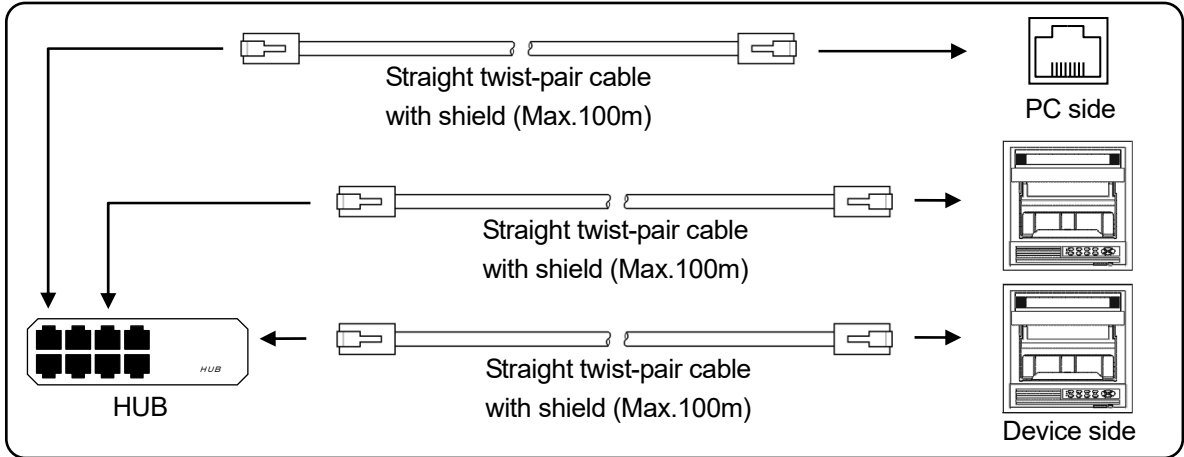


(4) Ethernet wiring

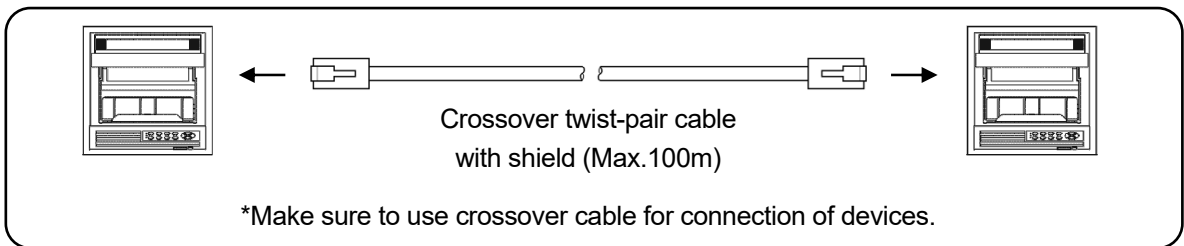
- Example of connection between PC and Ethernet devices (one-to-one connection)



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

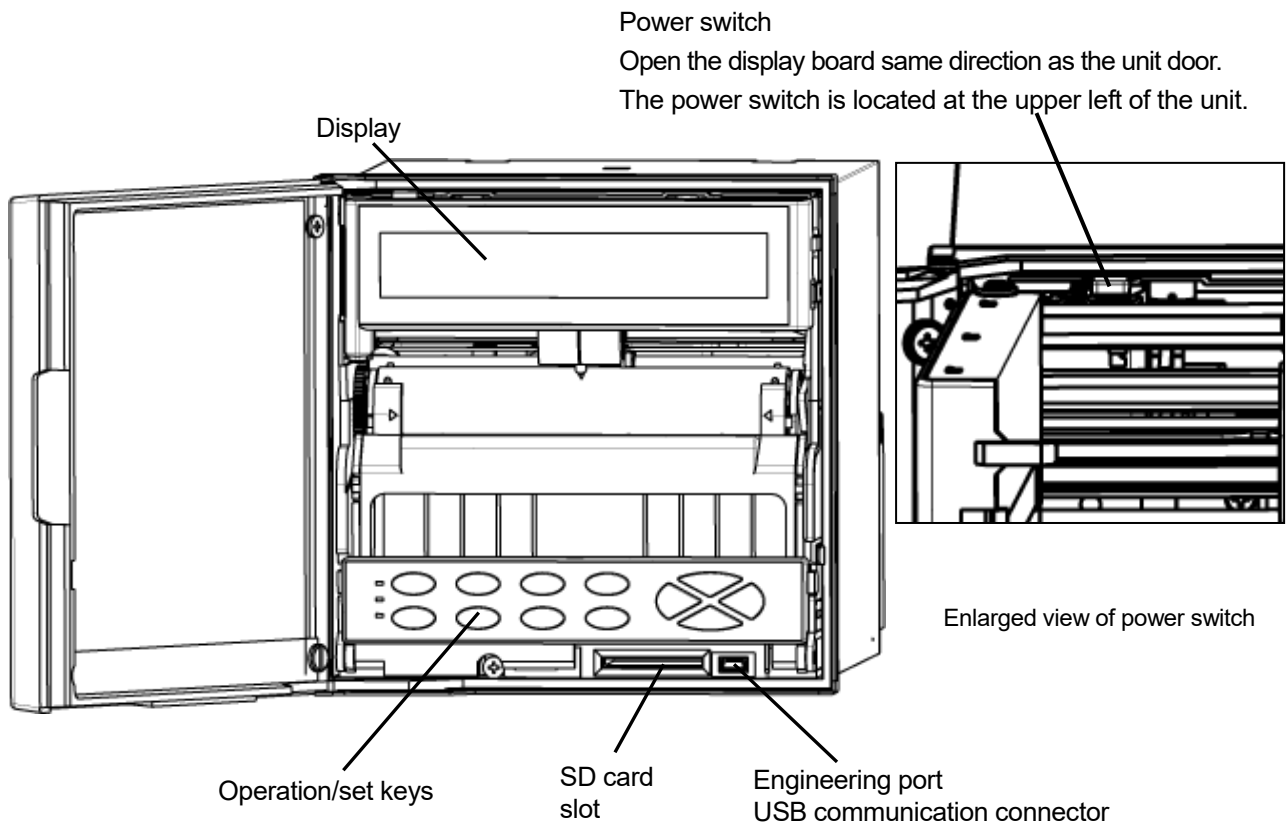


- Example of connection of devices (one-to-one connection)



5. Part Names

5-1. Front Section of Internal Unit



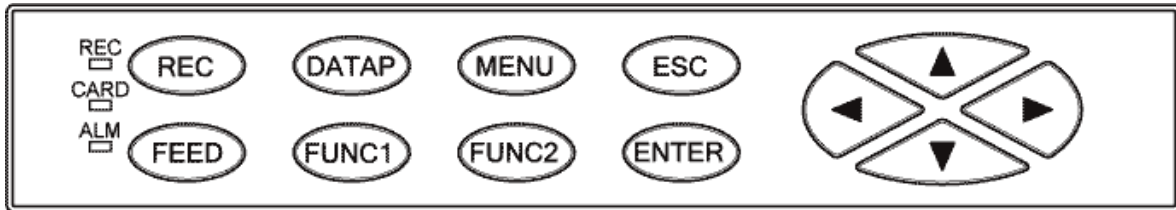
Note 1 How to handle the door

The front of the door is made of glass. Avoid giving any shock to the glass or giving any strong force to the frame for preventing any injury due to breakage.


Note 2 Operation/set key



Avoid closing the door in the state of operation/set keys opened. If the door is closed in the state of the operation/set keys opened, the mechanism of the operation/set keys allows the operation/set keys to be lifted to the direction for closing to prevent damage; however, behavior for protection is not guaranteed. If the door is closed forcedly or fast, it may be damaged.

5-2. Operation/Set Keys



Status LED

- REC
Lights in green while recording is ON. Recording is turned ON/OFF by the  key.
Flashes when chart ends.
- CARD
Lights in green when SD card is recognized by the unit, or flashes in a recognition process.
- ALM
Flashes in red when alarm occurs.

Key names		Functions
REC	Record key	Turns ON/OFF recording. Used with the  key.
FEED	Feed key	Feeds chart at a speed of 600mm/min while this key is pressed.
DATAP	Data print	Prints the data at the time of pressing this key. Used with the  key.
FUNC1	Function 1 key	Switches and sets functions (function is shown on the display).
FUNC2	Function 2 key	Switches and sets functions (function is shown on the display).
MENU	Menu key	Displays various setting items.
ESC	Escape key	Returns to the previously displayed screen.
▲/▼ ◀/▶	Up/Down Left/Right	Moves the cursor up/down and left/right. Used also to select setting items or values. Used also to advance the channel number.
ENTER	Enter key	Used to register various settings.

6. Operation

6-1. Preparation for Operation

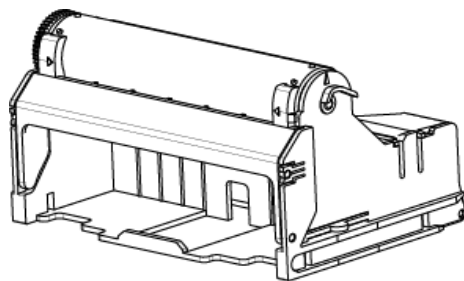
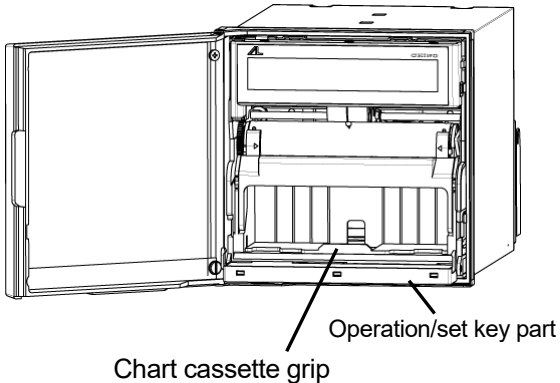
Note

Handling of chart cassette

Be careful of injury by dropping the chart cassette after pulling it from inner unit. Take care not to catch your fingers in the unit when putting the chart cassette back.

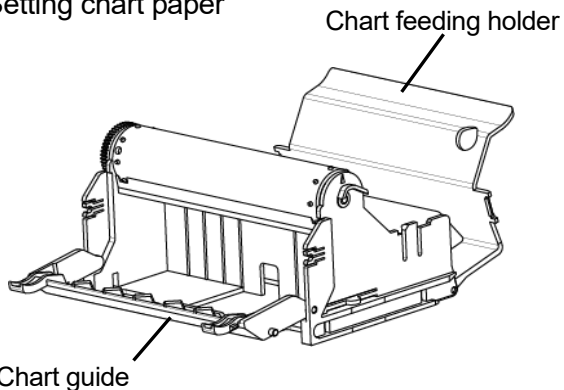
1. How to set chart paper

1. Pulling out the chart cassette

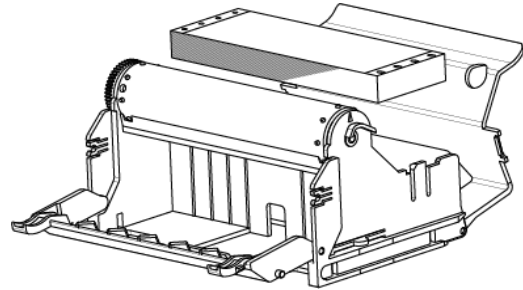


- (1) Open the unit door.
- (2) Hold the chart cassette grip and pull it toward you.
- (3) Each pen rises up when pulled out the chart cassette.

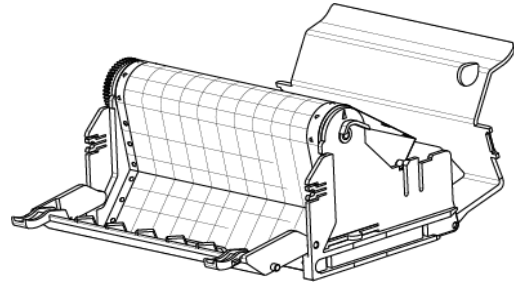
2. Setting chart paper



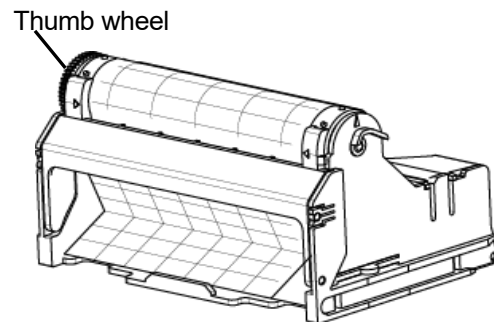
- (1) Open the chart guide and chart feeding holder.
- (2) Loosen the both ends of chart to prevent double feed.



- (3) Set chart in the chart housing at the back of the chart cassette. The "square" hole and "rectangle" hole should be at the left and right side of the chart respectively. Make sure to set chart in the correct direction.



- (4) Draw out chart approximately 20cm and set holes on the both ends to the sprockets of the chart drum. Put two or three folds of chart in the chart tray at the front of the chart cassette and then close the chart guide and chart feeding holder opened in the step (1).

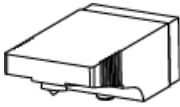
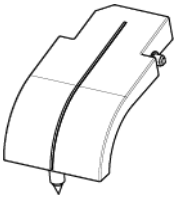
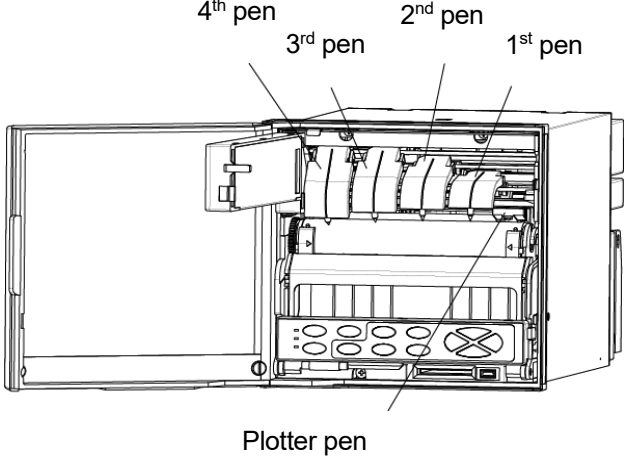


- (5) Turn the thumb wheel downward and make sure that the holes on the both ends of chart are not released from the sprockets, and feeding is smoothly done.

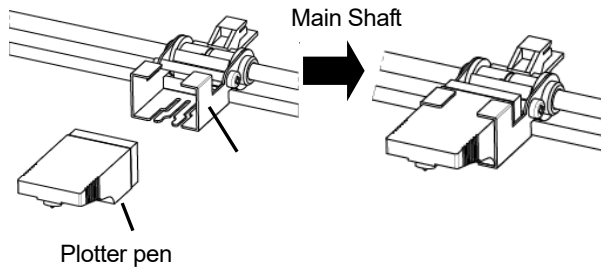
3. Returning the chart cassette to the inside of the unit

- (1) Align the guide of the chart cassette with the guide rail located at the both sides of the internal chassis and then insert the cassette until it is locked.
- (2) Operate the **FEED** key to check if the chart is fed properly and smoothly. If not, reset the chart again.

2. How to set plotter pen and cartridge pen

<p>1. Recording pen types</p> <p>(1) There are two types of recording pens, the plotter pens for digital printing and cartridge pen for trace printing.</p> <p>(2) There are four kinds of cartridge pens for the 1st pen to the 4th pen. These are of same shape but differ in ink colors.</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Plotter pen</p>  </div> <div style="text-align: center;"> <p>Cartridge pen</p>  </div> </div>															
<p>2. Preparation</p> <p>(1) Confirm that the recorder is turned on and press REC → ENTER key (recording is off state).</p> <p>(2) Cartridge pen and plotter pen stop at standby position and rise up.</p> <p>(3) Prepare each pen. After opening aluminum package, remove the pen cap.</p> <p>(4) Open the door and display panel to the same direction.</p> <p>(5) Replace the pens while the chart cassette is in the housing.</p>																
<p>3. Pen replacement mode [Rep.Pen]</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>REC 2011/12/14 09:07:36 25mm/H</p> <p>1 12.3°C</p> <p>SD: ENT CH SET MENU MENU (FUNC1) AUTO/CONST (FUNC2) ALARM</p> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; border-radius: 50%; padding: 5px; margin-right: 10px;">ESC</div> <div style="margin-right: 10px;">↑</div> <div style="margin-right: 10px;">↓</div> <div style="border: 1px solid black; border-radius: 50%; padding: 5px;">MENU</div> </div> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>COM 1</td> <td>E-mail</td> <td>Opn. Rec</td> <td>Date</td> <td>*</td> </tr> <tr> <td>COM 2</td> <td>*</td> <td>FailOut</td> <td>System</td> <td>*</td> </tr> <tr> <td>*</td> <td>*</td> <td>*</td> <td>SysInfo</td> <td>Rep. Pen</td> </tr> </table> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>MENU Replace a Pen.</p> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; border-radius: 50%; padding: 5px; margin-right: 10px;">ESC</div> <div style="margin-right: 10px;">↑</div> <div style="margin-right: 10px;">↓</div> <div style="border: 1px solid black; border-radius: 50%; padding: 5px;">ENTER</div> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>Replace a Pen</p> <p>Rep. Pen (FUNC1) Start</p> </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; border-radius: 50%; padding: 5px; margin-right: 10px;">ESC</div> <div style="margin-right: 10px;">↑</div> <div style="margin-right: 10px;">↓</div> <div style="border: 1px solid black; border-radius: 50%; padding: 5px;">FUNC1</div> </div> <div style="border: 1px solid black; padding: 5px;"> <p>Replace a Pen (Pen1)</p> <p>Rep. Pen (END) Next (ESC) End</p> </div>	COM 1	E-mail	Opn. Rec	Date	*	COM 2	*	FailOut	System	*	*	*	*	SysInfo	Rep. Pen	<p>(1) Set to the pen replacement mode. Pressing MENU key displays menu screen (programming items).</p> <p>(2) Select [Rep.Pen].</p> <p>(3) Press FUNC1 key and start pen replacement.</p> <p>(4) All the cartridge pens move to the center. Each press of ENTER key moves each pen to the far left, replace the pen in order.</p>
COM 1	E-mail	Opn. Rec	Date	*												
COM 2	*	FailOut	System	*												
*	*	*	SysInfo	Rep. Pen												

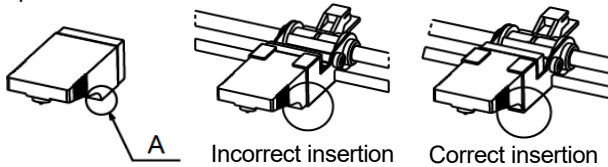
4. Setting plotter pen



- (1) Insert the plotter pen into the penholder until it stops.
(Note) Incomplete insertion may result in recording troubles.
(2) For removing of the plotter pen, pull it from the penholder.

Ref 1 Setting plotter pen

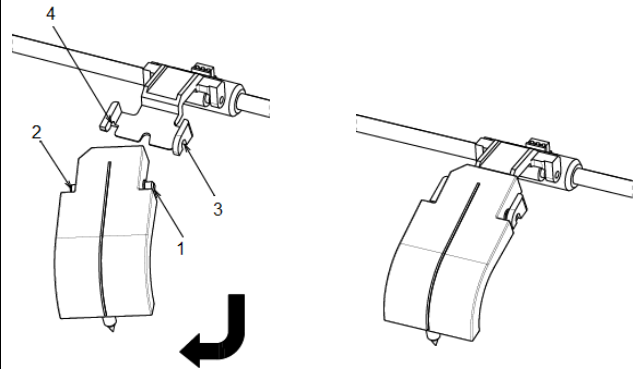
Insert the plotter pen until it makes clicking sound. When the insertion is done correctly, "A" part fits into the penholder.



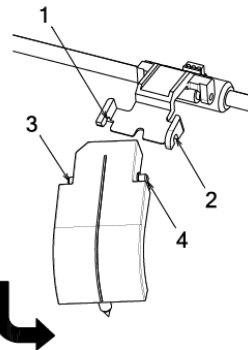
Note 1 Attachment/removal of cartridge pen

When loading or replacing the cartridge pen, make sure to turn the power off, be in the state of REC OFF or perform under the pen replacement mode. Otherwise the dotting mechanism operates during cartridge pen replacement and unexpected force is applied to the mechanical parts then the instrument may be damaged. Do not move the recording structure right/left by force.

5. Setting cartridge pen



- (1) From an angle shown in the figure, push lug 1 of the cartridge pen into cavity 3 of the penholder. Next, rotate the cartridge pen to the direction of the arrow then push lug 2 into cavity 4.

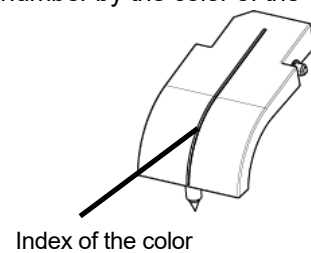


- (2) For removing, rotate the cartridge pen to the direction of the arrow as shown in the figure above and remove lug 3 of the cartridge pen from cavity 1 of the penholder then remove lug 4 of the cartridge pen from cavity 2 of the penholder.

Ref 2 Colors of the cartridge pen

Determine the pen number by the color of the cartridge pen.

- Red: 1st pen
Green: 2nd pen
Blue: 3rd pen
Brown: 4th pen



Note 2 Maintenance of pens

1. Pen tip

The pen tip is made of felt material. If an excessive force is added to it, the top of the pen tip will be crushed and making clear printing or tracing becomes impossible.

2. Pen cap

Each pen is provided with a pen cap for preventing drying and protecting the pen tip. Remove and retain the pen caps before setting the pen. For stopping the recording more than a day, remove the pen then put the cap on and store it.

3. How to set power frequency

Set the power frequency of the utilized region, setting so does not relate to operation of the unit directory, but this will result in the reduction of the power supply noise. Default setting is 50Hz, switch the power frequency in the region of 60Hz.

See general "8-26. System Settings" for power frequency settings.

6-2. Basic Operation

1. Power on

Turn the power switch to ON while the chart cassette is in the housing.

Data will be shown on the display after about 10 seconds.

After detecting the initial position, the printer prints the date and time and then feeds chart about 5mm.

Note 1 Display backup

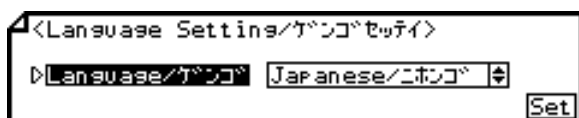
Backup of settings, clock and display mode are made.
However, channel number is not saved so the data with smallest channel number within set range will be displayed.

Note 2 While recording is OFF

The date/time printing is not performed at power-on.

2. Language setting

The language setting is displayed at initial startup or after memory clear.



Press the **ENTER** key to make it available for setting and then set the display language with the **▲/▼** keys.

Language can be selected from English and Japanese.

When setting is completed, move the cursor to **Set** and press the **ENTER** key to register the setting.

The language setting can also be set later.

(Refer to "8-28 Soft Dip Switch Settings" in the instruction manual for "General" provided separately.)

3. Switching of display

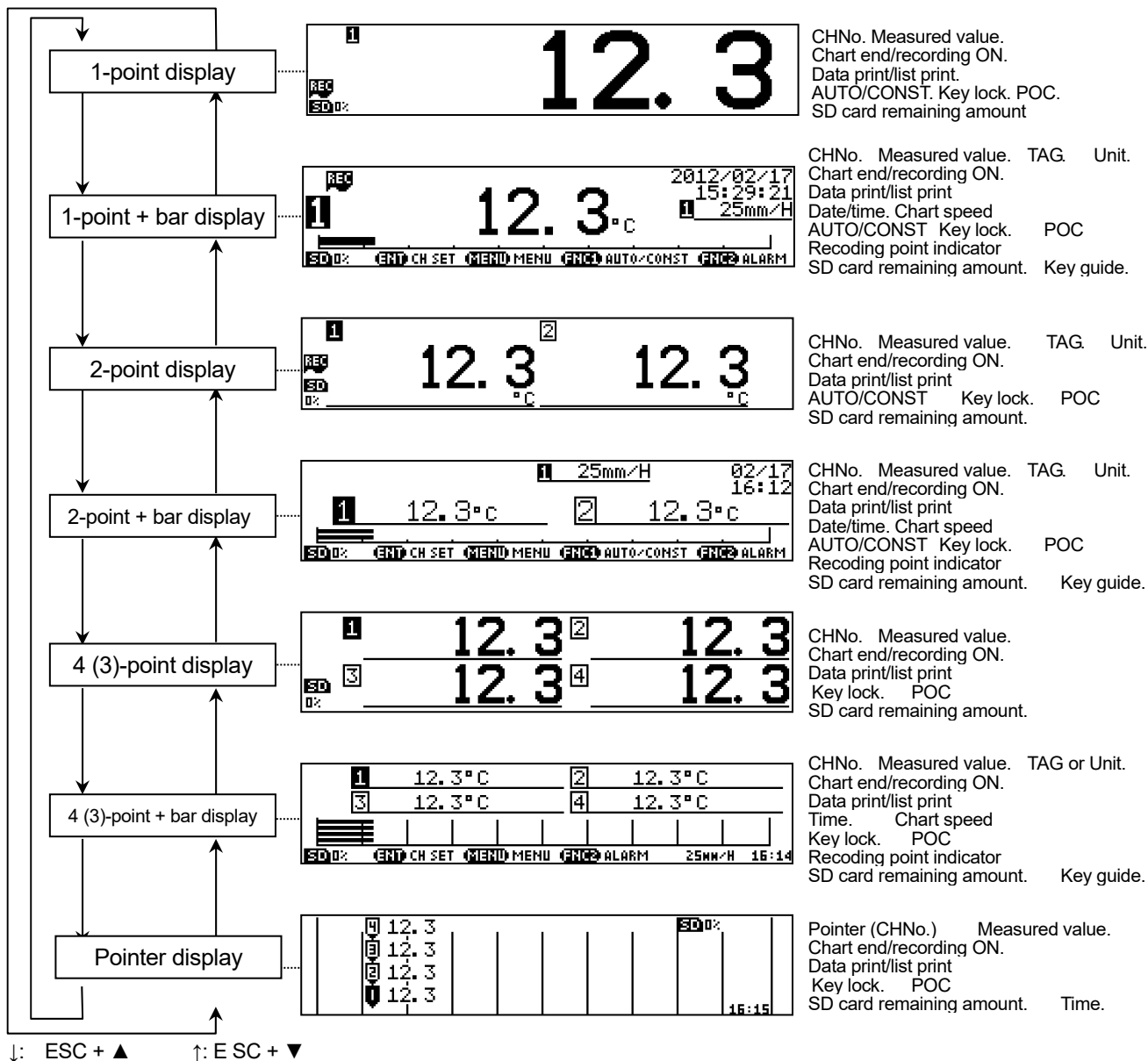
The unit can provide seven display modes depending on the number of inputs.



On 1-point display, 1-point + bar display, 2-point display and 2-point + bar display, either fixed or sequential display can be selected for each display mode (pressing the **FUNC1** key switches the display between AUTO: sequential and CONST: fixed).

With the sequential display, channel number advances every two seconds (factory default which can be changed).

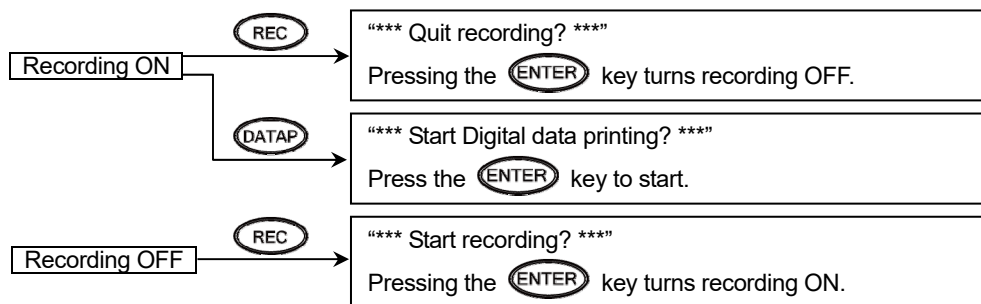
While holding down the **ESC** key, press the   key to change the display mode.

See general "8-23. Display Settings" to set default display mode at power-on.



↓: **ESC + ▲** ↑: **ESC + ▼**
 To switch from "1-point display" to "1-point + bar display", press the  key while holding down the **ESC** key.
 To switch from "1-point display" to "Pointer display", press the  key while holding down the **ESC** key.

4. Chart recording operation



* Any of the above settings can be cancelled by pressing the **ESC** key.
(The setting is cancelled also after about 10 seconds without key operation.)


1) Turning ON/OFF chart recording

Recording can be turned ON/OFF by pressing the **REC** key → **ENTER** key.

While recording is ON, the “REC” status LED lights up.

Recording is not performed while it is OFF, but reading inputs, updating data and calculating alarms are performed. Data printing, list printing and message printing are unavailable.

Note 1 Pressing the **REC** key → **ENTER** key becomes invalid in some cases

- (1) Key operation is unavailable when  is shown on the display indicating that keys are locked.
- (2) When using remote contacts (optional), key operation becomes unavailable when recording is turned OFF by a remote contact terminal.

Note 2 Ink bleeding on the chart

This recorder is pen type. Due to the setting condition of the recorder or movement from the actual input signal, pens may draw lines on the same place of the chart many times and so ink may bleed on the chart. If ink bleeds on the chart, change setting condition, such as setting chart speed faster, to prevent ink bleeding.

Reference 1 Up and down of pens

- (1) When the printing is turned off, each pen lifts up automatically. Even if the power is turned off in this condition, this pen position is maintained.
- (2) When the chart cassette is pulled out, each pen lifts up. If the printing has been turned off when pulling out the chart cassette, each pen has already been lifted up and it maintains its position.

Reference 2 Printing Operation

The table below explains the printing operation when the printing is ON or OFF.

Operation	ON	OFF
Chart feeding	Execute	Stop
Trace printing (Cartridge pen)	Execute	Up at where it is
Digital data printing (Plotter pen)	Execute	Up at standby position
Up and down of pens	Down	Up

3) Chart feed

Chart can be fed using the **FEED** key.

While the **FEED** key is pressed, chart is fed at a speed of 600mm/min. When fast-feeding chart, recording is stopped.

Feed chart when a measurement target or measurement condition is changed.

Reference Feeding chart

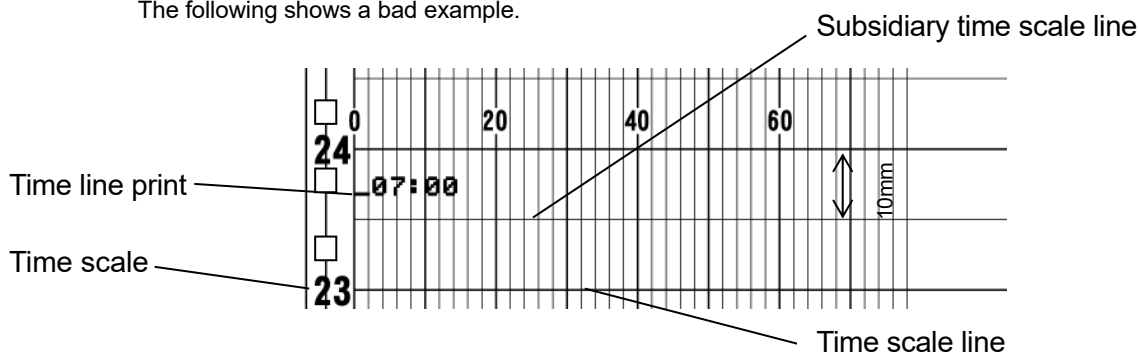
Chart can be fed manually using the drum. However, a few millimeters of chart may not be fed due to mechanical nature of the unit. Therefore, we recommend that chart be fed by the **FEED** key.

Also, for the same reason, use the **FEED** key to feed when new chart is set.

4) Aligning time line

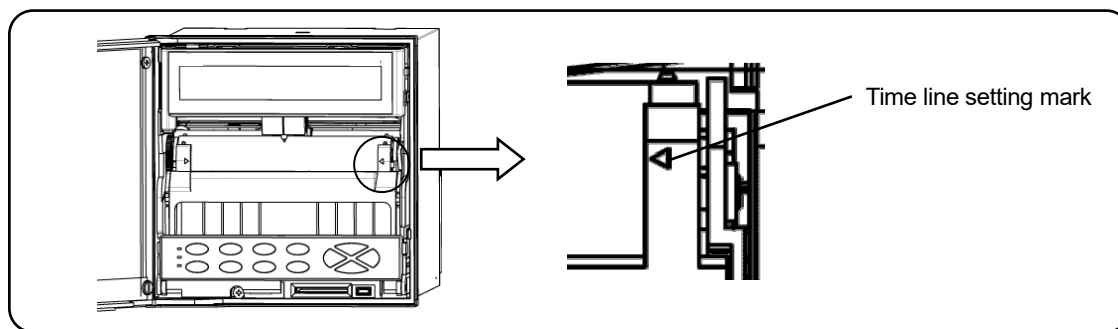
When operating the unit with a chart speed of multiples of 10 (mm/H), it is advisable to align the time line print with the time scale of chart for easier view of the result.

The following shows a bad example.

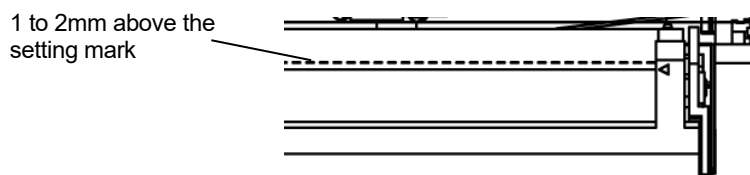


This is useful only when you use a chart with 10mm-pitch time scale.

- (1) There is a time line setting mark (<) on the right side of the chart guide located at the front of the chart cassette.



- (2) Align a time scale line with the setting mark (<) as viewed from the front by pressing the **FEED** key (do not align it manually).
- (3) It may be a good idea to set a time scale line 1 to 2mm above the setting mark (<) to perform a fine adjustment later.



- (4) Press the **REC** key and turn off the "REC" status LED.
- (5) Press the **REC** key at a desired time <xxh 00min> and turn on the "REC" status LED.
- (6) After a few hours, check to see if the time line print is aligned with a time scale line. If the time line print comes behind a time scale line, press the **FEED** key briefly and see how it works. If it comes ahead, remove the chart and set it back for a few hours and then try again.

7. Inspection and Maintenance

7-1. Routine Inspection

Check the remaining amount of chart and recording condition on a daily basis to keep the unit in good condition. When any abnormality is found, take an appropriate action according to the general "11. Troubleshooting".

Maintenance/inspection item	Operation
Plotter pen and cartridge pen replacement	When the trace printing (trend line) fade away or becomes less visible, replace the cartridge pen with new one. When the letters of digital printing fade away or become less visible, replace the plotter pen with new one. (See "6-1.2. How to set plotter pen and cartridge pen".)
Chart replacement	A chart paper can last about 20 days when fed at a speed of 20mm/H continuously. When the end of chart nears, an end mark (red line on the right edge of chart) appears. In this case, replace the chart with new one. (See "6-1.1. How to set chart paper".)
Cleaning	Wipe away dirt on the unit with a soft, dry cloth or a cloth dampened with warm water or neutral detergent.



Caution

Do not use chemical solvents including thinner and benzine to prevent the unit surface from melting. The chart guide is made of acrylic. It may produce a crack when a chemical solvent is used.



Caution

Do not lubricate the mechanical section such as the main shaft and gear.

7-2. Consumable Parts and Replacement Guideline

The unit includes some consumable parts. To use the unit for a long time in good condition, we recommend that these parts be replaced regularly.



Warning

Do not replace parts other than chart and pens by yourself. Not only does it fail to replace properly, but it also may pose dangerous situation. Make sure to contact Azbil's sales agent for replacement of consumable parts.

1. Consumable parts and recommended replacement cycle

(Usage under the condition of temperature: 20 to 25°C, humidity: 20 to 80%RH, operation time: 8hours/ a day)

	Consumable part	Replacement cycle	Operating condition, etc.
Mechanical parts	Pen servo (for cartridge pen)	4 to 6 years	Use under the normal condition as below: <ul style="list-style-type: none"> • No corrosive gas • Dust free, oil smoke free, dry place • Free from vibration and impact • No other factors affecting operation
	Pen servo (for plotter pen)	4 to 6 years	
	Belt	4 to 6 years	
	Chart drive mechanism	4 to 6 years	
	Motors	4 to 6 years	
Electronic parts	Power supply	5 years	At an ambient temperature of 25°C
	Relay (for alarm)	100,000 times	Resistive load
		30,000 times	Inductive load
	Lithium battery	10 years	8-hour operation per day (at an ambient temperature of 40°C or lower)
	Keys	500,000 times	Depends highly on the use and surrounding conditions.
Display (LCD)	4 to 6 years	At an ambient temperature of 25°C	

7-3. Battery removal method for the purpose of disposal

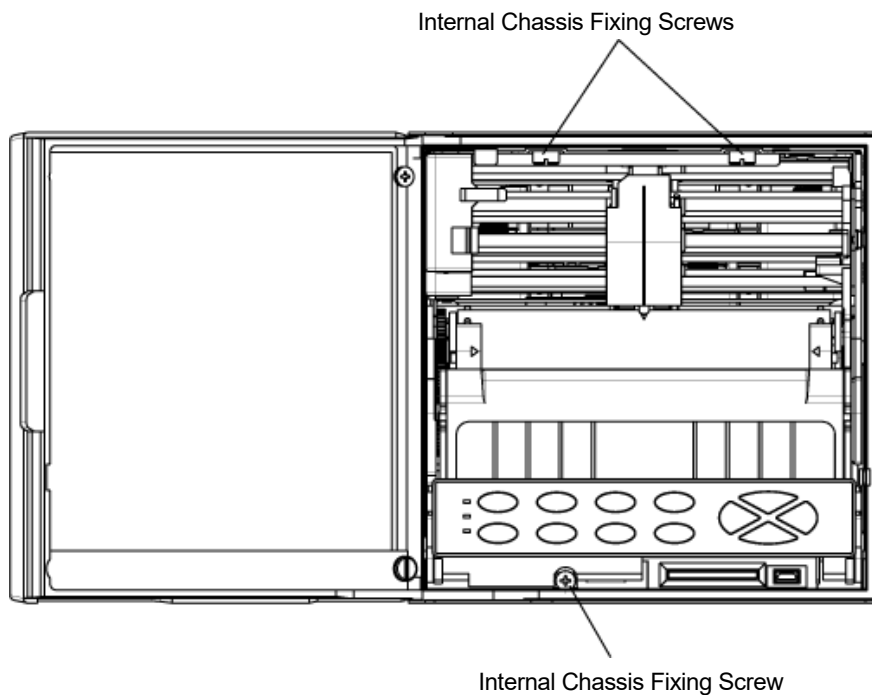


Caution

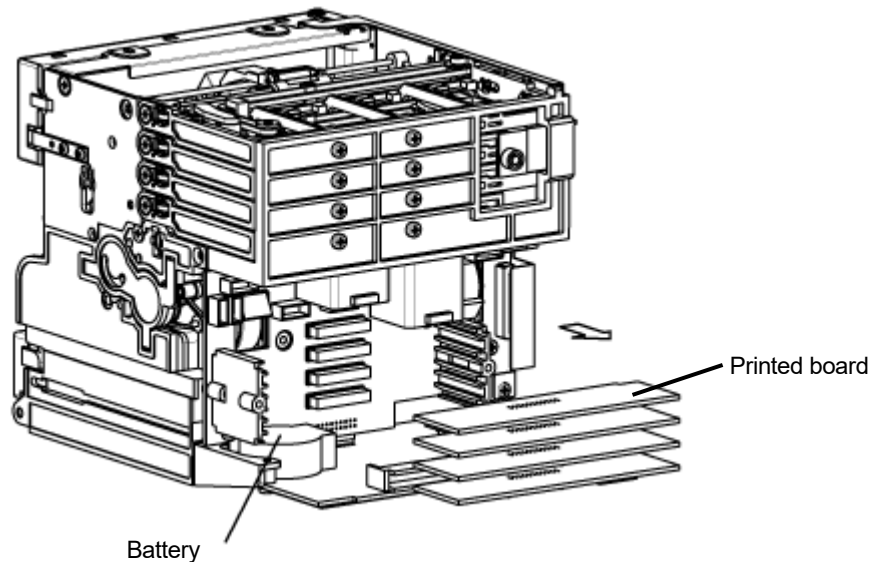
Do not replace the battery. Doing so might cause damage or malfunction.
Do not remove the battery except when disposing the recorder.

1. Removing the battery

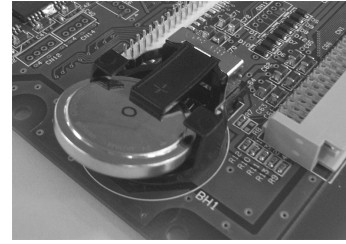
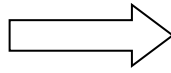
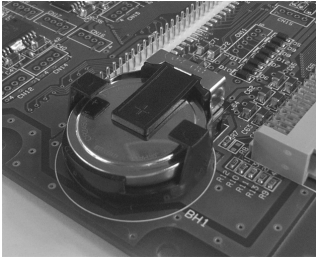
- 1) Removing the internal chassis
 - (1) Open the unit door and then open the display board in the same direction.
 - (2) Turn OFF the power switch.
 - (3) Remove three screws fixing the internal chassis and pull out the internal chassis.



- 2) Removing the battery
 - (1) Pull the printed board backward.
 - (2) Battery is located at the back of the internal chassis.



(3) Using a tapered, insulated tool, remove the battery from the battery holder.



Caution

- (1) The unit components include a small amount of harmful chemical substance no more than the defined amount by RoHS.
- (2) The unit must be disposed of by a waste disposal company or in accordance with the local regulations.
- (3) The unit uses a lithium battery and the battery must be disposed of by a waste disposal company.
- (4) The packing materials used for the unit, such as box, plastic bag, cushion and sticker, should be sorted for recycling in accordance with local regulations.

Revision History of CP-UM-5749E

Printed	Edn.	Revised pages	Description
Dec. 2013	1		
Sep. 2014	2	End	Change AAS-511A-014-03 to AAS-511A-014-04
June 2017	3	17 20 End End	2), (2) Change 13 pages → 4-3. Wiring, 2. Precautions on wiring 4), (8) Change the sentences Add "Revision History of CP-UM-5749E" Change AAS-511A-014-04 to AAS-511A-014-06
Sept. 2018	4	1	Change instruction manual labels → instruction manual, labels and markings
Aug. 2019	5	2 3 4 5 8 14 15 17 19 25 31 33 36 End	Add three digits to the serial number Add *When using recording paper other than the genuine chart, operation is not guaranteed. Change sentence of 2-3. inside the table Add 9. Do not look at light directly Add overvoltage in Industrial environment overvoltage 3. 2) Add (AWG20 to 16) Change wire diameter 2mm ² or more → Copper cable with AWG 20 to 16 (green/yellow) Add Maximum temporary overvoltage: ±60VDC inside the caution Add Do not use the instrument for measurements on mains circuits. inside the warning 2) Add Use the cable of AWG 20 to 16. Add and industrial environment should be overvoltage category I. inside the warning Change 1390VAC → 1500VAC inside the warning Add only the circuit of secondary side which is reinforced from primary side or treated double insulation is able to be connected. inside the warning Add Example of connection of devices (one-to-one connection) Add 6-2. Basic Operation 2. Language setting Add Note 2 Ink bleeding on the chart Change printing status → trace printing status inside the reference Add Caution Do not lubricate the mechanical section such as the main shaft and gear. 7-2. 1. Add (Usage under the condition of temperature: 20 to 25°C, humidity: 20 to 80%RH, operation time: 8hours/ a day) Change AAS-511A-014-06 to AAS-511A-014-10
Jun. 2022	6	Cover 1 2 5 6 11 Back cover	Change "SR100" to "Model SR100". Change sentence of "Thank you for purchasing...". Change "SR series" → "SR100". Delete "or damage" from (1) and (2) in "Product warranty scope". Removed "Windows XP, Windows Vista" from Trademark and added "Windows 8.1, Windows 10". Add date of manufacture "YYYYMMDD" to the Model code label. Change of bracket "2 (1 set)" to "1 set". Delete "22025-029001". Change sentence of 6. Installing the safety device. Change "CE marking" to "CE / UKCA marking" Add the Caution "Caution at removing and replacing" Change (09) → (11) Change URL. Delete (K).

Terms and Conditions

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

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

1. Warranty period and warranty scope

1.1 Warranty period

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

1.2 Warranty scope

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

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

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

2. Ascertainment of suitability

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

- (1) Regulations and standards or laws that your Equipment is to comply with.
- (2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
- (3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use

Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down. You are required to provide your Equipment with safety design such as fool-proof design,*1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance,*3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

*1. A design that is safe even if the user makes an error.

*2. A design that is safe even if the device fails.

*3. Avoidance of device failure by using highly reliable components, etc.

*4. The use of redundancy.

3. Precautions and restrictions on application

3.1 Restrictions on application

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

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

*5. Nuclear power quality: compliance with JEAG 4121 required

*6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes," etc.

*7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

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

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

3.2 Precautions on application

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

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

4. Precautions against long-term use

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

5. Recommendation for renewal

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

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

6. Other precautions

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

7. Changes to specifications

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

8. Discontinuance of the supply of products/parts

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

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

9. Scope of services

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

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

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



Specifications are subject to change without notice. (11)

[Selling agency]

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