Thank you for purchasing the SR series Hybrid Recorder. This manual contains information for ensuring the correct use of the SR series Hybrid Recorder. It also provides necessary information for installation, maintenance, and troubleshooting. This manual should be read by those who design and maintain equipment that uses the SR series Hybrid Recorder. Be sure to keep this manual nearby for handy reference.
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1. Introduction

Thank you for purchasing SR series (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 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 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

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.

Perchlorate Material

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

Warning
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.

   \[
   \text{Model code} \rightarrow \text{SR- } \square \square \square \square \square \square \square \square \\
   \text{Serial number} \rightarrow \text{Y5} \square \square \square \square \square \square \text{CHINO} \\
   \text{MADE IN JAPAN}
   \]

3. Accessories check
   Check the following accessories attached to the product.

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction manual</td>
<td>1</td>
<td>CD-R</td>
</tr>
<tr>
<td>Instruction manual [Install/Wiring]</td>
<td>1</td>
<td>Booklet</td>
</tr>
<tr>
<td>Bracket</td>
<td>2 (1 set)</td>
<td>For panel mounting, 22025-029001</td>
</tr>
<tr>
<td>Terminal screw</td>
<td>5</td>
<td>M3.5, for input terminal (spares for missing)</td>
</tr>
<tr>
<td>Chart paper</td>
<td>1</td>
<td>81406088-001</td>
</tr>
<tr>
<td>Cartridge pen (Analog pen)</td>
<td>1 each</td>
<td>Red (1st pen), Green (2nd pen)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blue (3rd pen), Brown (4th pen)</td>
</tr>
<tr>
<td>Plotter pen (Digital pen)</td>
<td>1</td>
<td>Purple</td>
</tr>
</tbody>
</table>

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

Request

1. Do not drop the product while taking 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.

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

* 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).

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.

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

<table>
<thead>
<tr>
<th>Symbol mark</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>! Warning</td>
<td>Cautions are explained to avoid causes for death or serious injuries of users.</td>
</tr>
<tr>
<td>! Caution</td>
<td>Cautions are explained to avoid causes for slight injuries of users or damages of the unit or peripheral devices.</td>
</tr>
</tbody>
</table>

2-3. Label

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

<table>
<thead>
<tr>
<th>Label</th>
<th>&quot;Name&quot; and place</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>! Alert symbol mark</td>
<td>Various terminals (back side)</td>
<td>Place to be handled with cautions to avoid &quot;electric shock&quot;, &quot;injuries&quot;, etc.</td>
</tr>
<tr>
<td>! Protective conductor terminal</td>
<td>Right side of power terminal (back side)</td>
<td>Terminal to be grounded to avoid electric shock</td>
</tr>
<tr>
<td>100 to 240V AC* 50/60Hz, 37VA</td>
<td>&quot;Power source specification&quot; Power conductor terminals</td>
<td>Specification of power (voltage range, frequency, and power consumption) used for the unit</td>
</tr>
</tbody>
</table>

*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. Do not use this unit in important in facilities related to, human life, atomic energy, aviation and space.

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.
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 marking.
4. Mounting and Wiring

4-1. External Dimensions

Dimensions below are with the mounting brackets.

![Diagram of external dimensions](image)

4-2. Mounting

<table>
<thead>
<tr>
<th>Caution</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Use the recorder mounting on an indoor installed instrumentation panel.</td>
</tr>
<tr>
<td>(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.</td>
</tr>
<tr>
<td>(3) For mounting the recorder on the panel, be careful of injury by dropping it.</td>
</tr>
</tbody>
</table>

1. Panel cutout and mounting method

- Minimum interval on multiple units mounting

![Diagram of panel cutout and mounting method](image)
(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**
- Overvoltage category ......II (EN standard)
- Pollution degree ..............2 (EN standard)

**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 ±10%
- Power frequency ········· General specification: 50/60Hz ±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].
### Warning

- Alert symbol mark (⚠️) and location
  - Mark is attached to the location to which if human body touches, an electric shock may be generated.

<table>
<thead>
<tr>
<th>Terminal name</th>
<th>Location of attached mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power terminal</td>
<td>Lower left of power terminal</td>
</tr>
<tr>
<td>Measurement input terminal</td>
<td>Upper left of terminal cover</td>
</tr>
<tr>
<td>Mechanical relay ‘c’ contact alarm terminal</td>
<td>Upper left of terminal cover</td>
</tr>
<tr>
<td>Mechanical relay ‘a’ contact alarm terminal</td>
<td>Lower left of N.O terminal</td>
</tr>
</tbody>
</table>

### 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.

### 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.

<table>
<thead>
<tr>
<th>! Warning</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Switch and overcurrent protective device</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>(2) Connect after the power source is turned OFF</td>
</tr>
<tr>
<td>When performing power and input/output wiring, make sure to turn OFF the feed power source to prevent an electric shock.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Main source</th>
<th>Countermeasures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electromagnetic switch or others</td>
<td>Insert noise filters between power source and input/output terminals. CR filters are used in many cases.</td>
</tr>
<tr>
<td>Power line with distortion of wave</td>
<td></td>
</tr>
<tr>
<td>Inverter</td>
<td></td>
</tr>
<tr>
<td>Thyristor regulator</td>
<td></td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Terminal Type and Termination Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal board</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Power/Protective conductor</td>
</tr>
<tr>
<td>Communications terminal</td>
</tr>
<tr>
<td>Terminals other than the above</td>
</tr>
</tbody>
</table>

* Use O type as possible.

* Be sure to use O type for the alarm output terminals.
* For other terminals, use also O type as possible.

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

**Warning**

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

1) Power/protective conductor terminals

- 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.

2) Power terminal wiring
Using 600V vinyl insulated cables 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

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)

- Warning

! Warning!
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 display of power terminal.

- Note

Note: Power terminal

- Caution

! Caution!
Mark at power terminals
After wiring the power terminals have power supply voltage applied. Make sure to install power terminal covers after wiring to prevent an electric shock.

- Warning

! Warning!
Pay attention to power supply voltage and noise.
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.
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 wiring
   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 wiring
   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 wiring
   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]

<table>
<thead>
<tr>
<th>Allowable input voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input type</td>
</tr>
<tr>
<td>Voltage, thermocouple input</td>
</tr>
<tr>
<td>Resistance thermometer input</td>
</tr>
<tr>
<td>*±60VDC for channels specified with ±10V range or more</td>
</tr>
</tbody>
</table>

![Warning]

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. 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.

<table>
<thead>
<tr>
<th>Alarm relay output 6 points ('a' contact)</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Diagram of 6-point alarm relay]</td>
</tr>
<tr>
<td>N.O terminal (M3.5)</td>
</tr>
<tr>
<td>Alarm relay output (6 points)</td>
</tr>
<tr>
<td>COM terminal (M3.5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alarm relay output 4 points ('c' contact)</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Diagram of 4-point alarm relay]</td>
</tr>
<tr>
<td>N.O terminal (M3.5)</td>
</tr>
<tr>
<td>Alarm relay terminal (4 points)</td>
</tr>
<tr>
<td>COM terminal (M3.5)</td>
</tr>
<tr>
<td>N.C terminal (M3.5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alarm relay output 2 points ('a' contact)</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Diagram of 2-point alarm relay]</td>
</tr>
<tr>
<td>N.O terminal (M3.5)</td>
</tr>
<tr>
<td>COM terminal (M3.5)</td>
</tr>
<tr>
<td>ALARM RELAY</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>N.O terminal (M3.5)</td>
</tr>
<tr>
<td>COM terminal (M3.5)</td>
</tr>
</tbody>
</table>
2) Wiring

Turn OFF the feed power source and the power source for buffer relay before wiring to prevent an electric shock.

(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)

<table>
<thead>
<tr>
<th>Mechanical relay ‘a’ contact output example</th>
<th>Mechanical relay ‘c’ contact output example</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Mechanical relay ‘a’ contact output example" /></td>
<td><img src="image" alt="Mechanical relay ‘c’ contact output example" /></td>
</tr>
</tbody>
</table>

- Contact protective element
  (Attachment to ‘a’ side is desirable.)

■ mark on alarm output terminals

Maximum of 240VAC can be connected to the alarm output terminals of this unit. Basic insulation (dielectric strength 1390V) 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.

- Double insulation
- Reinforced insulation

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.

■ 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.

![Safety measures](image)

- Basic insulation between output channels

Caution

- Basic insulation between output channels

* N.C terminal is opened on alarm occurrence in opposite way to N.O terminal.
3) Precautions on wiring

The following are precautions on wiring.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical relay output specification contact capacity (Common to ‘a’ contact and ‘c’ contact)</td>
<td>Power supply</td>
</tr>
<tr>
<td>100VAC</td>
<td>2A</td>
</tr>
<tr>
<td>240VAC</td>
<td>2A</td>
</tr>
<tr>
<td>30VDC</td>
<td>2A</td>
</tr>
</tbody>
</table>

Contact protective element Z installation

- 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

- Coil rating: Contact capacity or less of output terminals
- Contact rating: Double of load current or more

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.

Selection of contact protective element

If there is no surge absorption element built-in buffer relay, install this element. The element of C/R (capacitor + resistor) is general.

- <C/R standard> C: 0.01μF (Rating about 1kv)
  - R: 100 to 150Ω (Rating about 1W)

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

Only with remote contacts terminals (option).

1) Remote contacts terminals

![Remote contacts terminals diagram]

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 diagram]
For contacts connected to the remote contacts terminals, use switches or relays driven with voltage level 30VAC or 60VDC or less or manual contacts which support light load.

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.)
### 3) Operation for which terminal No. is decided automatically

<table>
<thead>
<tr>
<th>Operation name</th>
<th>Terminal contact signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 chart speed selection</td>
<td>3 chart speed setting other than the setting here is required. (See general 8-7. Chart Speed Settings.)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recording ON/OFF and 3 chart speed selection</td>
</tr>
<tr>
<td>Recording ON</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>OFF</td>
</tr>
<tr>
<td>CS2</td>
<td>ON</td>
</tr>
<tr>
<td>CS3</td>
<td>OFF</td>
</tr>
<tr>
<td>Recording OFF</td>
<td></td>
</tr>
</tbody>
</table>

Chart recording must be ON.

### 2) Message printing (No.01 and 02)

<table>
<thead>
<tr>
<th>Message No.</th>
<th>COM and EX(\Box) terminals</th>
<th>For trigger</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.01</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>No.02</td>
<td>OFF</td>
<td></td>
</tr>
</tbody>
</table>

Message setting other than the setting here is required. (See general 8-13. Message Printing 1 Settings.)

At the point when the trigger signals (1 second or more) are given, the selected message is printed.

Message printing with key is available.

### 3) Message printing (No. 01 to 05)

<table>
<thead>
<tr>
<th>Message No.</th>
<th>COM and EX(\Box) terminals</th>
<th>For trigger</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.03</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>No.04</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>No.05</td>
<td>OFF</td>
<td></td>
</tr>
</tbody>
</table>

Message setting other than the setting here is required. (See general 8-13. Message Printing 1 Settings.)

* 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.

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

<table>
<thead>
<tr>
<th>Operation name</th>
<th>Terminal contact signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>4) Digital data printing</td>
<td>Turn ON the terminal No. specified to &quot;Digital data printing.&quot; Chart recording must be ON. Digital data printing with key is enabled. Even during execution, the acceptance can be repeated only once.</td>
</tr>
<tr>
<td>5) List printing</td>
<td>Turn ON the terminal No. specified to &quot;List 1, List 2, or List 3 printing.&quot; Chart recording must be ON. List printing with key is available. (See general 8-12. List Printing Settings)</td>
</tr>
<tr>
<td>6) Integration reset</td>
<td>When &quot;Collective reset with remote contacts (EX)&quot; is selected with &quot;Calculation programming&quot;, turning ON the terminal No. specified to &quot;Integration reset&quot; resets the integration value. (See general 8-4. Calculation Settings.)</td>
</tr>
<tr>
<td>7) Message printing (No.01 to No.20)</td>
<td>Message setting other than the setting here is required. (See general 8-13. Message Printing 1 Settings.) Turn ON the terminal No. specified to &quot;Message printing (No. 01 to 20).&quot; Chart recording must be ON. Message printing with key is available.</td>
</tr>
<tr>
<td>8) Time correction</td>
<td>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.</td>
</tr>
</tbody>
</table>
7. Communication I/F terminal wiring (partly option)
SR100 can be connected for communications with RS232C, RS422A, RS485, and Ethernet.

1) Communication terminal type

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM1</td>
<td></td>
<td>SG</td>
<td>SD</td>
<td>RD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS232C</td>
<td></td>
<td>SG</td>
<td>SD</td>
<td>RD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS422A</td>
<td></td>
<td>SG</td>
<td>SDA</td>
<td>SDB</td>
<td>RDA</td>
<td>RDB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS485</td>
<td></td>
<td>SG</td>
<td>SA</td>
<td>SB</td>
<td>Short with SA</td>
<td></td>
<td>Short with SB</td>
<td></td>
</tr>
<tr>
<td>COM2</td>
<td></td>
<td>SA</td>
<td>SB</td>
<td>SG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 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

<table>
<thead>
<tr>
<th>Cable</th>
<th>9-pin connector ↔ Crimp type ring terminals RS232C cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PC side</td>
</tr>
<tr>
<td></td>
<td>9-pin connector</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cable for RS232C (Max. 15m)</td>
</tr>
<tr>
<td>Internal wiring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RD</td>
</tr>
<tr>
<td></td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>SG</td>
</tr>
</tbody>
</table>
## Connection between a line converter and the unit

<table>
<thead>
<tr>
<th>Cable</th>
<th>Crimp type ring terminals ↔ Crimp type ring terminals RS422A cable (for a line converter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape</td>
<td>![Diagram showing cable connection between line converter and unit]</td>
</tr>
<tr>
<td></td>
<td><strong>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.</strong></td>
</tr>
<tr>
<td>Internal wiring</td>
<td>![Internal wiring diagram]</td>
</tr>
</tbody>
</table>

## Connection between the unit and other devices

<table>
<thead>
<tr>
<th>Cable</th>
<th>Crimp type ring terminals ↔ Crimp type ring terminals RS422A cable (for parallel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape</td>
<td>![Diagram showing cable connection between unit and other devices]</td>
</tr>
<tr>
<td></td>
<td><strong>4-core cable of twisted 2-core cables of twisted VCTF lines. Each side has a SG (signal ground) line.</strong></td>
</tr>
<tr>
<td>Internal wiring</td>
<td>![Internal wiring diagram]</td>
</tr>
</tbody>
</table>
### (3) RS485

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

<table>
<thead>
<tr>
<th>Cable</th>
<th>Crimp type ring terminals ↔ Crimp type ring terminals</th>
<th>RS485 cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape</td>
<td>RDA (black)</td>
<td>(black)SA</td>
</tr>
<tr>
<td></td>
<td>RDB (white)</td>
<td>(white)SB</td>
</tr>
<tr>
<td></td>
<td>SG (green)</td>
<td>(green)SG</td>
</tr>
<tr>
<td></td>
<td>Device side, Line converter side</td>
<td>Recorder side</td>
</tr>
</tbody>
</table>

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.

### Internal wiring

<table>
<thead>
<tr>
<th></th>
<th>RDA</th>
<th>RDB</th>
<th>SG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>SA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SG</td>
</tr>
</tbody>
</table>

### (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**

![Communications port diagram](attachment://communications_port_diagram.png)

- **Communications port**
  - PC side
  - Cable for RS232C (Max. 15m)
  - Device side
(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)
5. Part Names

5-1. Front Section of Internal Unit

- 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.

- 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 forcibly or fast, it may be damaged.
## 5-2. Operation/Set Keys

![Key Diagram]

**Status LED**
- **REC**: Lights in green while recording is ON. Recording is turned ON/OFF by the REC 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.

<table>
<thead>
<tr>
<th>Key names</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>REC</td>
<td>Record key</td>
</tr>
<tr>
<td>FEED</td>
<td>Feed key</td>
</tr>
<tr>
<td>DATAP</td>
<td>Data print</td>
</tr>
<tr>
<td>FUNC1</td>
<td>Function 1 key</td>
</tr>
<tr>
<td>FUNC2</td>
<td>Function 2 key</td>
</tr>
<tr>
<td>MENU</td>
<td>Menu key</td>
</tr>
<tr>
<td>ESC</td>
<td>Escape key</td>
</tr>
<tr>
<td>▲/▼</td>
<td>Up/Down</td>
</tr>
<tr>
<td>◀▶</td>
<td>Left/Right</td>
</tr>
<tr>
<td>ENTER</td>
<td>Enter key</td>
</tr>
</tbody>
</table>
6. Operation

6-1. Preparation for Operation

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.

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.
2. How to set plotter pen and cartridge pen

1. Recording pen types
   (1) There are two types of recording pens, the plotter pens for digital printing and cartridge pen for trace printing.
   (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.

2. Preparation
   (1) Confirm that the recorder is turned on and press → key (recording is off state).
   (2) Cartridge pen and plotter pen stop at standby position and rise up.
   (3) Prepare each pen. After opening aluminum package, remove the pen cap.
   (4) Open the door and display panel to the same direction.
   (5) Replace the pens while the chart cassette is in the housing.

   (1) Set to the pen replacement mode. Pressing key displays menu screen (programming items).
   (2) Select [Rep.Pen].
   (3) Press key and start pen replacement.
   (4) All the cartridge pens move to the center. Each press of key moves each pen to the far left, replace the pen in order.
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. 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 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 key, press the key to change the display mode.
   See general "8-23. Display Settings" to set default display mode at power-on.

<table>
<thead>
<tr>
<th>Display Mode</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-point display</td>
<td><img src="example" alt="1-point display" /></td>
</tr>
<tr>
<td>1-point + bar display</td>
<td><img src="example" alt="1-point + bar display" /></td>
</tr>
<tr>
<td>2-point display</td>
<td><img src="example" alt="2-point display" /></td>
</tr>
<tr>
<td>2-point + bar display</td>
<td><img src="example" alt="2-point + bar display" /></td>
</tr>
<tr>
<td>4 (3)-point display</td>
<td><img src="example" alt="4 (3)-point display" /></td>
</tr>
<tr>
<td>4 (3)-point + bar display</td>
<td><img src="example" alt="4 (3)-point + bar display" /></td>
</tr>
<tr>
<td>Pointer display</td>
<td><img src="example" alt="Pointer display" /></td>
</tr>
</tbody>
</table>

To switch from "1-point display" to "1-point + bar display", press the key while holding down the key.
To switch from "1-point display" to "Pointer display", press the key while holding down the key.

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

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.
3. Chart recording operation

### Chart recording operation

<table>
<thead>
<tr>
<th>Recording ON</th>
<th><strong>Quit recording?</strong></th>
<th>Pressing the ENTER key turns recording OFF.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recording OFF</td>
<td><strong>Start Digital data printing?</strong></td>
<td>Pressing the ENTER key to start.</td>
</tr>
</tbody>
</table>

* 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.

#### 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.

<table>
<thead>
<tr>
<th>Operation</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chart feeding</td>
<td>Execute</td>
<td>Stop</td>
</tr>
<tr>
<td>Trace printing (Cartridge pen)</td>
<td>Execute</td>
<td>Up at where it is</td>
</tr>
<tr>
<td>Digital data printing (Plotter pen)</td>
<td>Execute</td>
<td>Up at standby position</td>
</tr>
<tr>
<td>Up and down of pens</td>
<td>Down</td>
<td>Up</td>
</tr>
</tbody>
</table>

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2) Data printing

Print numeric values of the latest measurement data as shown in the example below. Printing mode is different depending on the chart speed.

When the chart speed is 1 to 499mm/H, trace printing is continued without interruption. Printing is done by synchronized with chart feeding.

When the chart speed is 500mm/H or more, trace printing is interrupted and data printing is started.

Press the [DATA] key → [ENTER] key to perform data printing.

Use the periodic data printing function to perform data printing periodically.

This cannot be performed while recording is OFF or keys are locked.

---

**Reference**

Operation during printing and print cancel

Operation: Operations including measurement continue without being interrupted.

Cancel: To stop data printing halfway through, press the [REC] key → [ENTER] key.

Then, pressing the [REC] key → [ENTER] key returns to the previous printing status.

---

**Example of data printing**

```
0 14:00

13:53 1: -25.15V 2: -10.05V
3: -20.15V 4: 40.30V
```

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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 <xx: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”.

<table>
<thead>
<tr>
<th>Maintenance/inspection item</th>
<th>Operation</th>
</tr>
</thead>
</table>
| 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.

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

<table>
<thead>
<tr>
<th>Consumable part</th>
<th>Replacement cycle</th>
<th>Operating condition, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pen servo (for cartridge pen)</td>
<td>4 to 6 years</td>
<td>Use under the normal condition as below: • Temp: 25°C, humidity: 80%RH or lower • No corrosive gas • Dust free, oil smoke free, dry place • Free from vibration and impact • No other factors affecting operation</td>
</tr>
<tr>
<td>Pen servo (for plotter pen)</td>
<td>4 to 6 years</td>
<td></td>
</tr>
<tr>
<td>Belt</td>
<td>4 to 6 years</td>
<td></td>
</tr>
<tr>
<td>Chart drive mechanism</td>
<td>4 to 6 years</td>
<td></td>
</tr>
<tr>
<td>Motors</td>
<td>4 to 6 years</td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>5 years</td>
<td>At an ambient temperature of 25°C</td>
</tr>
<tr>
<td>Relay (for alarm)</td>
<td>100,000 times</td>
<td>Resistive load</td>
</tr>
<tr>
<td></td>
<td>30,000 times</td>
<td>Inductive load</td>
</tr>
<tr>
<td>Lithium battery</td>
<td>10 years</td>
<td>8-hour operation per day (at an ambient temperature of 40°C or lower)</td>
</tr>
<tr>
<td>Keys</td>
<td>500,000 times</td>
<td>Depends highly on the use and surrounding conditions.</td>
</tr>
<tr>
<td>Display (LCD)</td>
<td>4 to 6 years</td>
<td>At an ambient temperature of 25°C</td>
</tr>
</tbody>
</table>
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.

![Internal Chassis Fixing Screws](image)

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

![Printed board](image)

![Battery](image)
(3) Using a tapered, insulated tool, remove the battery from the battery holder.

![Image]

**Caution**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>The unit components include a small amount of harmful chemical substance no more than the defined amount by RoHS.</td>
</tr>
<tr>
<td>(2)</td>
<td>The unit must be disposed of by a waste disposal company or in accordance with the local regulations.</td>
</tr>
<tr>
<td>(3)</td>
<td>The unit uses a lithium battery and the battery must be disposed of by a waste disposal company.</td>
</tr>
<tr>
<td>(4)</td>
<td>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.</td>
</tr>
</tbody>
</table>
## Revision History of CP-UM-5749E

<table>
<thead>
<tr>
<th>Printed</th>
<th>Edn.</th>
<th>Revised pages</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 2013</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sep. 2014</td>
<td>2</td>
<td>End</td>
<td>Change AAS-511A-014-03 to AAS-511A-014-04</td>
</tr>
<tr>
<td>June 2017</td>
<td>3</td>
<td>17, 20, End</td>
<td>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</td>
</tr>
</tbody>
</table>
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 a 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
   Azbil Corporation’s products other than those explicitly specified as applicable (e.g. azbil Limit Switch For Nuclear Energy) shall not be used in a nuclear energy controlled area (radiation controlled area).

   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.

   In addition, 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
     [For use outside nuclear energy controlled areas] [For use of Azbil Corporation’s Limit Switch For Nuclear Energy]
   * 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 inquiries 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. 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.

AAS-S11A-014-06