# VM7000A
# Paperless Recorder

# Operation Manual

**Ohkura**

# To use this equipment safely

Thank you for purchasing our VM7000A Paperless Recorder.

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・Please installs it, operates it and prepares it, after this manual is often read, and it understands enough.
  There is danger where the accident and the trouble occur when handling is mistaken.
・This specification of Recorder is subject to change without prior notice for product improvement.
・It is prohibited to remodeling this Paperless Recorder without our permission.
  It doesn't assume the responsibility about the accident caused by having remodeled it without our permission.
・Please keep this manual if you actually use the Recorder.
・After reading this manual, keep it carefully by the instrument.
・Please consider this manual to be sure to extend to the final user.

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Manufacturer ： Ohkura Electric Co.,Ltd.

Format ： It records in the main body plaque.

Manufacture date ： It records in the main body plaque.

Manufacture country ： Japan


Note ： Windows are registered trademarks of Microsoft Corporation.

The symbols below are used on this instrument for the cautioning information.

| Symbols used on the instrument | |
| --- | --- |
| ⚠ | This shows "Caution for handling". This symbol is used on the parts need to reference the instruction manual for saving human body and the instrument. |
| ⏚ | This shows "Protective grounding". Be sure to provide protective grounding prior to operate this instrument. |
| ⚡ | This shows "Risk of electric shock". This symbol is used on the parts, which has a risk of electric shock. |

**Be sure to observe the following warnings/cautions and those provided in the text in order to secure safety in handling the instrument.**

## ⚠WARNING

| General | In order to prevent electric shock; be to disconnect this instrument from the main power source when wiring it. |
| --- | --- |
| Protective Grounding | (1) In order to prevent an electric shock; be sure to provide protective grounding prior to turning on this instrument. (2) Do not cut a protective grounding conductor or disconnect protective grounding. |
| Power Source | Make sure that the supply voltage for this instrument conforms to the voltage of the supply source. |
| Working Environment | Do not operate this instrument in the environment where it is exposed to a combustible / explosive / corrosive gas or water / steam. |
| Input and Output Wiring | Provide input and output wring after turning off the power. |

# ⚠CAUTION

| | |
|---|---|
| **Input and Output Wiring** | Do not use empty terminals for other purposes such as relaying, etc. |
| **Reverse-insertion attention** | Please confirm the direction to the insertion of SD card.<br>When forcibly inserting it in a wrong direction, SD card and the terminal on the main body side might be destroyed.<br>Please mote that the damage of the equipment by the reverse-insertion becomes off the subject of amends. |
| **Inside of Instrument** | Do not replace the main unit or printed circuit boards. When this is neglected, we cannot guarantee functioning of the instrument. Contact our dealer where you purchased the instrument, or our sales representative. |

# [Note]

| | |
|---|---|
| **Instruction Manual** | (1) Deliver this instruction manual to an end user.<br>(2) Prior to handling this instrument, be sure to read this manual.<br>(3) If you have any questions on this manual or find any errors or omissions in this manual, contact our sales representative.<br>(4) After reading this manual, keep it carefully by the instrument.<br>(5) When the manual is lost or stained, contact our sales representative.<br>(6) It is prohibited to copy or reproduce this manual without our permission. |
| **Installation** | (1) When installing this instrument, put on a protective gear such as safety shoes, helmet, etc. for your safety.<br>(2) Do not put your foot on the installed instrument or get on it, because it is dangerous. |
| **Maintenance** | Only our serviceman or persons authorized by OHKURA are allowed to remove and take the inner module, the main unit and printed circuit boards apart. |
| **Cleaning** | (1) Use dry cloth to clean the surface of this instrument.<br>(2) Do not use any organic solvent.<br>(3) Cleaning the instrument after turning off the power. |
| **Revisions** | This instruction manual is subject to change without prior notice. |
| **Free Dial** | （The Inquiry about the industrial instrument）<br>About the handling of the product and maintenance: 0120-17-0096 |

# ＜CONTENTS＞

# 1．INTRODUCTION

## 1.1 Paperless Recorder

① This recorder displays measured data in real time on the liquid crystal display. It is a paperless type that is also capable of saving the measured data to a SD memory card (hereinafter referred to as SD card). It can operate easily with the liquid crystal with the touch panel.

② It can set up to 12 channels for the input types such as thermocouple, resistance bulb, and DC voltage (or current).

③ It allows the measured data saved to the SD card to be displayed on the display unit.
Use of the support software attached to the recorder allows the saved data to be displayed on a personal computer.

## 1.2　Accessory check

Upon receiving the recorder unit, check the appearance for damage, and if the correct quantity of the accessories are supplied. Please contact the shop that purchases it or our salesman when there is a part not suitable by any chance.
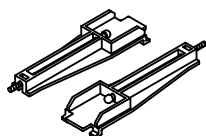
| ① Panel-mounting bracket | ② CD-ROM（Operation manual, Support software） | ③ Panel packing | ④ O-ring for waterproof |
|---|---|---|---|
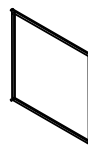
## 1.3 When temporarily keeping it

Please keep this recorder in the following environment. Please keep it in the following environment when it is built in the device.

> ⚠ **CAUTION**
>
> Externals, the function, and the longevity etc. of the product might be ruined when keeping it in poor surroundings.
>
> Environment when keeping it
>
> ・Place where dust are little.
> ・Place that doesn't include flammable gas, firedamp, causticity gas ($SO_2$、$H_2S$).
> ・Place without vibration and impact.
> ・Place where and where steam is a little. Place where moisture is a little.
> ・Place where direct sunshine doesn't strike. Place that doesn't become high temperature.
> ・Place that becomes low temperature too much.

## 1.4 Confirmation of form and specification

The plaque to which the form name has been described is on the case. Please confirm this equipment is a specification the same as the order referring to the table below.

```
    1   2   3   4   5   6   7   8   9  10  11
  ┌─┬─┬─┬─┬─┬─┬─┬─┬─┬──┬──┐
  │V│M│7│0│ │ │A│ │ │  │ O│
  └─┴─┴─┴─┴─┴─┴─┴─┴─┴──┴──┘
```

| Digit | Specifications | Code |
|---|---|---|
| | 〈Number of input points〉 | |
| 5-6 | 03 point | 03 |
| | 06 point | 06 |
| | 09 point | 09 |
| | 12 point | 12 |

【Option】

| Digit | Specifications | Code |
|---|---|---|
| 8 | 〈 Communication 〉 | |
| | Without | 0 |
| | RS-485 | 1 |
| 9 | 〈 I/O 〉 | |
| | Without | 0 |
| | DI/DO | 1 |
| | Relay output | 2 |
| 10 | 〈 Examination result book 〉 | |
| | Without | 0 |
| | With （Japanese） | 1 |
| | With （English） | 2 |

# 1.5 Handling SD card

Correspondence SD card is as follows.
・Panasonic's　1～32GB
・SanDisk's　　1～32GB
There is no SD card in this equipment. Please buy it in the computer shop etc.

⚠ **CAUTION**

・SD card on the market is sold having formatted it usually, therefore, it is not necessary to format it again. Please go with this recorder when formatting it. When formatting it by the format feature of the personal computer standard, it is likely not to operate correctly.
・Please confirm it is a correct direction and the firm insertion when it installs it. The recorder cannot recognize the SD card when forcibly inserting it in a wrong direction. Moreover, it causes the breakdown of the SD card and the main body of the recorder. Please note that the damage of the equipment when it reversely inserts it becomes off the subject of the guarantee.
・Please do not turn off power in recording of the SD card, and do not detach the SD card. Data might damage, and delete it.
・The data preserved on the card recommends the backup to be booked once a month.
・When the SD card breaks, important recorded data is lost. Please book the backup.
・MiniSD and the microSD card cannot be used. The use of miniSD and the microSD card adaptor has the possibility that the card doesn't come off., therefore, please do not use it.

① Standard of record

The standard of the record when the SD card of 2GB is used is as follows. Please note that the capacity that can be recorded by the situation of the occurrence of warning and the message is different.

　　　[Condition]
　　　　　－ Number of inputs　:　6 point
　　　　　－ Recorded data form　: Binary
　　　　　－ Record type　 : Maximum/minimum value record
　　　　　－ There is no event of the alarm, message etc.

| Capacity of SD card | 2GB | | | | |
|---|---|---|---|---|---|
| File preservation cycle | 1 hour | | | 1 day | |
| Data logging cycle | 1 sec | 2sec | 5sec | 10sec | 1min |
| Capacity that can be recorded | 1.0 year | 1.4 year | 1.8 year | 14.0 year | 33.7 year |

※ The record exceeding the product-life cycle is not guaranteed.

② Timing of data writing

First of all, recorded data is preserved in an internal memory, and it is automatically written on the SD card in the timing of the record stop. Moreover, the file is generated to an internal memory at the file record cycle, and when this file exceeds 50, it is automatically written on the SD card.

# 2. NAMES AND FUNCTIONS OF PARTS

## 2.1 Names and functions of parts
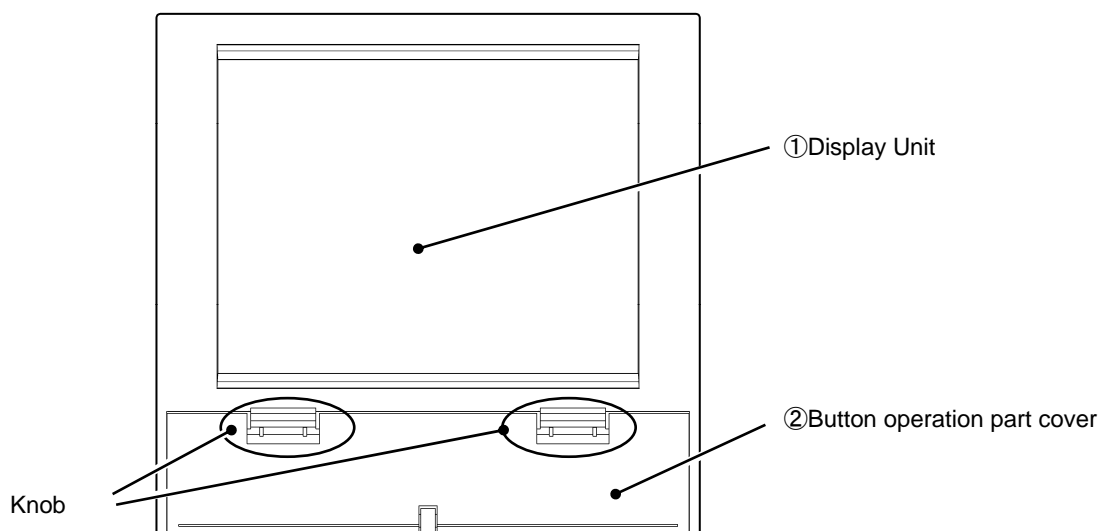


① Display area

　　The LCD is provided with touch panel. Display the measurement data and other various Parameter set screens. Touch the surface to set data.

② Button operation part cover

　　This panel protects the button operation part. It pulls it forward while pushing two knobs below to appear function keyboard.

　　Note: Please do the both hands to the opening and shutting of cover. It causes damage.
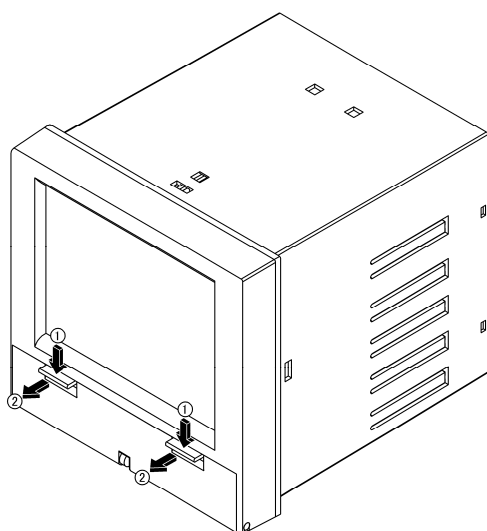


【When opening cover of button operation part】　　　　【When closing cover of button operation part】
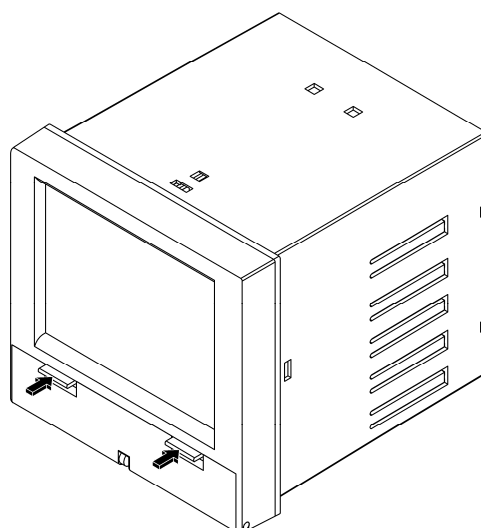
③Status display lamp

⑤MENU button
⑥FUNC button

REC   MENU   FUNC   PUSH TO EJECT

④REC button

⑦SD card slot
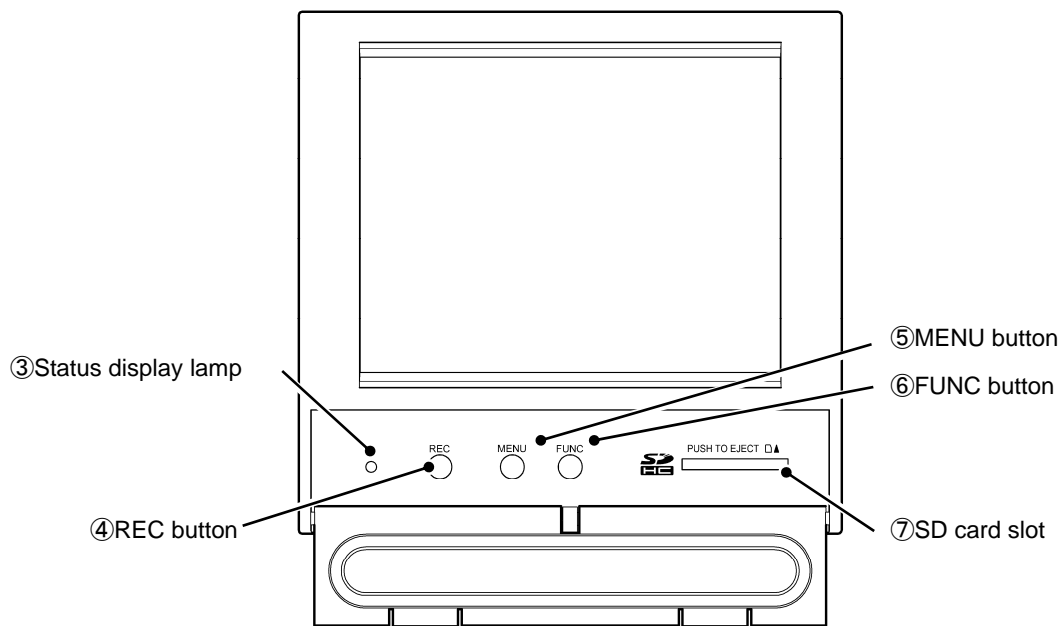
③ Status display lamp

　Allow the power ON/OFF, LCD (display) ON/OFF and record status to be displayed.

　Lamp ON (highlighted)　　　　　　: Power ON, recording suspended

　Lamp blinks（1 sec ON/1 sec OFF）: Power ON, recording in progress

　Lamp blinks（high speed）　　　　: Power ON, SD card writing

　Lamp OFF　　　　　　　　　　　: Power OFF

④ REC button

　Used to start or stop recording.

⑤ MENU button

　Display the menu screen.

　Used to the continuance of record when check screen of stops recording.

⑥ FUNC button

　The content of operation is allocated, and the operation can be done. It can select the "Change display", "Capture" and "Message".

　Select "OFF", when you use as a start/a stop of Sub record.

⑦ SD card slot

　Used for inserting the SD card.

　To remove the SD card from the slot, press SD card to insert.

| ⚠ CAUTION | **Please confirm the direction to the insertion of SD card. When forcibly inserting it in a wrong direction, SD card and the main body are destroyed.** |
|---|---|

| ⚠ CAUTION | **When you pull out the SD card while recording, it becomes impossible to record data normally and causes past preservation data to destroy. Please pull out the SD card after stopping recording.** |
|---|---|

## 2.2 Set of O-ring for waterproof

When the factory is shipped, O-ring for the waterproof is not installed. When the waterproof and dustproof uses it by the necessary environment, please install it according to the figure below.

O-ring for waterproof
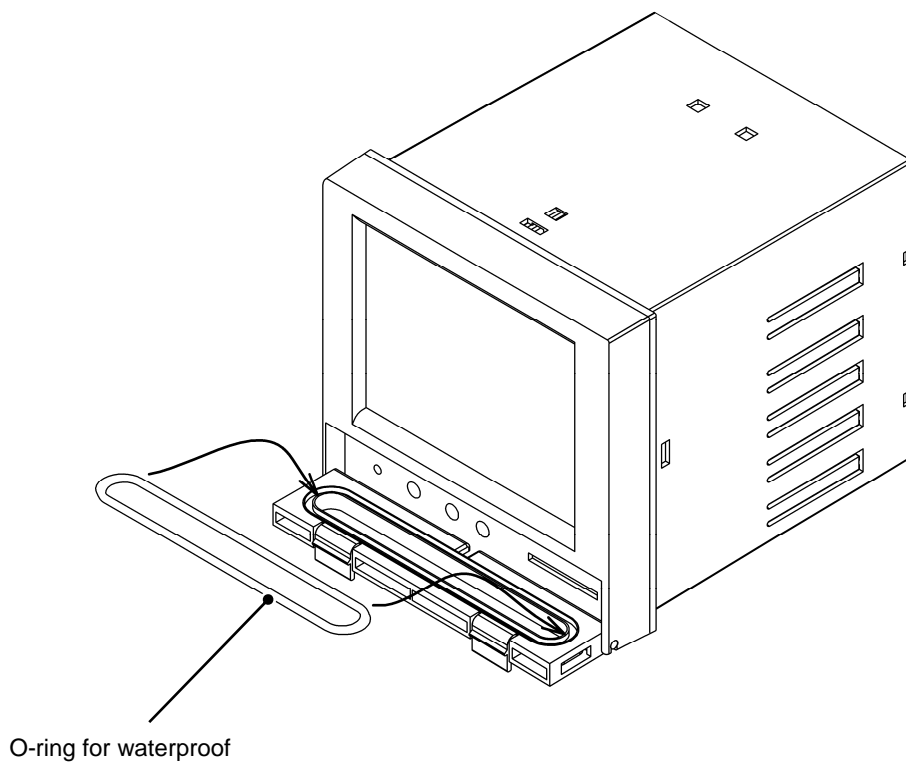
⚠ **CAUTION** **It is not abnormal though the opening and shutting operation of the cover becomes very hard if O-ring for the waterproof is installed.**

# 3. INSTALLATION

## 3.1 Installation place

Install place

This equipment is a structure that is installed in the panel and used.

Please choose and install the following places.

- Place without vibration and impact.
- Place where dust and causticity gas are few.
- Place where ambient temperature doesn't exceed 0 ∼ 50℃, and place where temperature change is a little.
- Place where high radiant heat is not received directly.
- Place where drop of water doesn't hang within the range of humidity 20 ∼ 80%RH, and place where dewfall is not done.
- Place where circulation of air is good.
- Place where space to be able to facilitate wiring, maintenance and check, can be taken.
- Place where electromagnetic radiation is not generated.
- Place where doesn't include flammable gas, firedamp, causticity gas ($SO_2$, $H_2S$).
- Place where machinery vibration is a little.
- The inclination at the installation must not incline at the right and the left, and it become the horizontal.
  （Inclining forward 0°，Backward tilting 0 ∼ 30°）


∠α＝60∼90°
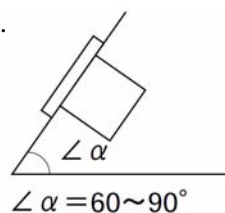
Install Panel

- The installation panel is recommended to use the steel board whose thickness is 1.2 mm or more.
- The thickness of the installation panel is 7 mm or less.

## 3.2 Installation on panel

Please put and install appended panel packing between the recorder and the panel.

Refer item 9.16 for externals size.

# 4. WIRING

## 4.1 Terminal stand array and LAN connector

The terminal stand is one row in the uppermost part, and 4 rows or less are in the lower side for the analog input and option.

The part of "Terminal No.41 ～ 49" becomes a connector for the type that the DI/DO of option is mounted.
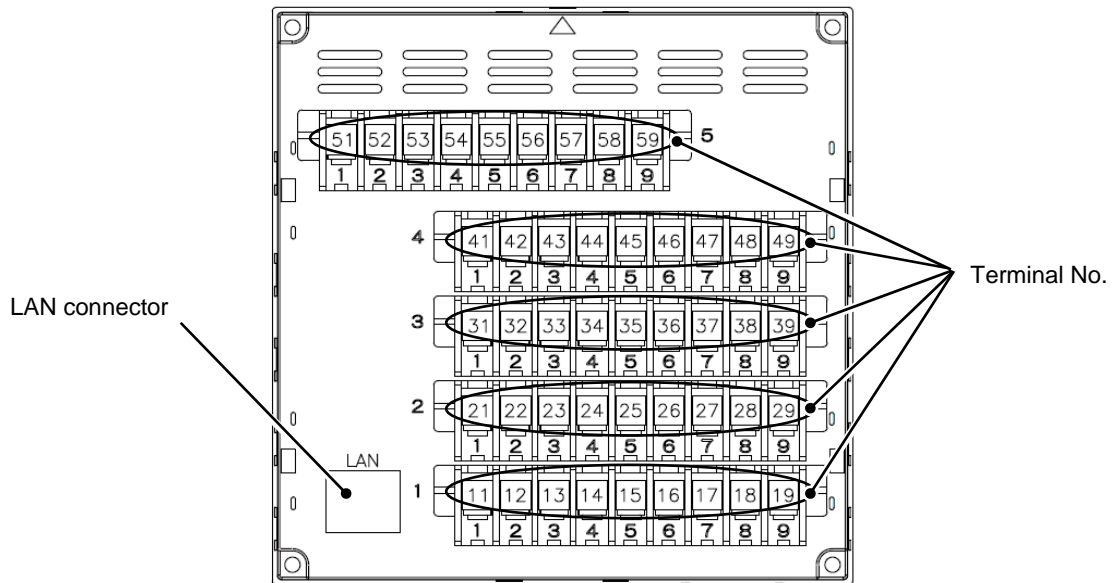
**Fig. 4-1    Terminal stand array（The back of recorder）**

| Terminal No. | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 |
|---|---|---|---|---|---|---|---|---|---|
| Name | POW | | | NC | COM ALM | | NC | RS-485 | |
| Sign | L | N | G | | A | C | | + | − |
| Terminal No. | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 |
| CH. | 10 | | | 11 | | | 12 | | |
| Input | +/A | −/B | V/B | +/A | −/B | V/B | +/A | −/B | V/B |
| Terminal No. | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| CH. | 7 | | | 8 | | | 9 | | |
| Input | +/A | −/B | V/B | +/A | −/B | V/B | +/A | −/B | V/B |
| Terminal No. | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| CH. | 4 | | | 5 | | | 6 | | |
| Input | +/A | −/B | V/B | +/A | −/B | V/B | +/A | −/B | V/B |
| Terminal No. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| CH. | 1 | | | 2 | | | 3 | | |
| Input | +/A | −/B | V/B | +/A | −/B | V/B | +/A | −/B | V/B |

## 4.2 Wiring for power supply

### ⚠ Warning

① Please energize to this equipment after doing the protection earth without fail for the electric shock prevention.

② Please do not cut the protective earth, and please do not remove connecting wires of the protective earth.

③ Please confirm the power-supply voltage of this equipment is corresponding to the voltage of the power supply.

④ Please energize to this equipment after applying the protection cover of the transparency.

### ⚠ CAUTION

① Please use the one that corresponds to 600V vinyl insulation electric wire (JIS C3307) or it for the electric wire for the power supply.

② Please install round shape pressure connection terminal (for M3.5) to which the insulation sleeve adheres on the electric wire terminal.

③ Please connect it with the protective earth terminal by the third kind or more (Earth resistance under 100Ω, Minimum thickness of ground line 1.6 mm).

④ When you share the protective earth conductor with other equipment, the influence of the noise from the ground line might be received. Sharing with other equipment is recommended to be avoided.

⑤ Please install the circuit breaker and the switch, etc. for safety, and specify that these are the cutting switches of the Recorder in the power supply wiring.

⑥ The voltage rating must use the main source of electrical power in the variation range in ±10%.

⑦ A transitional current might flow to the main source of electrical power when the power supply is turned on.

［Power supply terminal］

Power supply terminal is "Terminal No. 51 ～ 53".

| 51 | 52 | 53 |
|----|----|----|
| L | N | G |

［Wiring procedure］

① The protection cover of the transparency of the terminal stand is removed. It pulls forward while pushing the hook of two places of one side of cover part internally at the same time and it removes.

② The cable is connected with the power supply terminal. The protective grounding is connected with terminal No.53(G). Non-earth side of the power supply is connected with terminal No.51(L), and the earth side of the power supply is connected with terminal No.52(N).

③ The protection cover of the transparency is installed.

④ It is confirmed that the protection earth is correctly done.

# 4.3 Wiring for analog input

## ⚠ CAUTION

① Notes of input wire
- ・Please do not mix the noise about the input wiring. Moreover, the use of an effective shield line or twist line is recommended to the noise in the input wiring.
- ・At the thermo-couple input, please connect thermoelectricity vs. wire directly or use the protective conductor. The use of the input line with the shield is recommended.
- ・At the resistance temperature sensor input, the difference of the line resistance in three lines is assumed below the following. The use of the input line with the shield is recommended. Pt100, JPt100: Under 50mΩ.
- ・When there is a possibility of receiving the influence by the inductive noise, especially, when wiring near the high frequency power supply, the use of the twist line with the shield is recommended.
- ・Please install round shape pressure connection terminal (for M3.5) to which the insulation sleeve attaches on the electric wire terminal.

② Notes in wiring
- ・Please separate from the power supply circuit (power supply or DO circuit of 25V or more) and use this equipment and wiring between measurement points.
- ・Please short-circuited of the input terminal not used. (mV, V, Thermo-couple, is short-circuited +～－. Resistance temperature sensor is short-circuited A, B, B)
- ・Please ground the shield of the shield line.

[Analog input terminal]

Analog input terminal is "No.11 ～ 49". The number of terminals is different depending on the number of input channels.

| Terminal No. | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 |
|---|---|---|---|---|---|---|---|---|---|
| CH. | 10 | | | 11 | | | 12 | | |
| Input | +/A | −/B | V/B | +/A | −/B | V/B | +/A | −/B | V/B |
| Terminal No. | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| CH. | 7 | | | 8 | | | 9 | | |
| Input | +/A | −/B | V/B | +/A | −/B | V/B | +/A | −/B | V/B |
| Terminal No. | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| CH. | 4 | | | 5 | | | 6 | | |
| Input | +/A | −/B | V/B | +/A | −/B | V/B | +/A | −/B | V/B |
| Terminal No. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| CH. | 1 | | | 2 | | | 3 | | |
| Input | +/A | −/B | V/B | +/A | −/B | V/B | +/A | −/B | V/B |

[Details of terminal array of each input of CH.1～12]



&lt;TC・mV&gt;    &lt;V&gt;    &lt;mA&gt;    &lt;RTD&gt;

（250Ω shunt resistance connection）
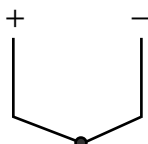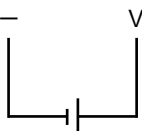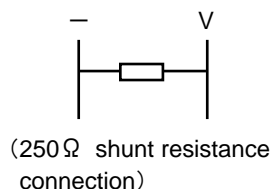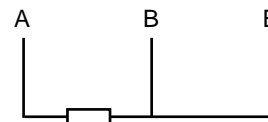
# 4.4 Wiring for COM ALM

COM ALM can be used as an alarm output of measurements etc.

［Schematic diagram］
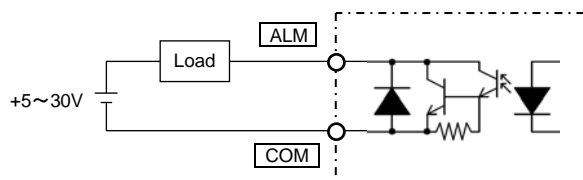


Open collector output （1 point）
Point of contact ratings : 30V DC 20mA/1 point

# 4.5  Wiring for LAN cable

［Communication specification］

| Specification | 10BASE-T |
|---|---|
| Transmission speed | 10Mbps |
| Transmission scheme | Baseband |
| The maximum network length or The maximum node interval | 500m (Cascade 4 steps) |
| The maximum segment length | 100m (Between the node and HUB) |
| Connecting cable | UTP (Twisted pair who doesn't have shield) 22-26AWG |
| Protocol | TCP/IP |

## ⚠ CAUTION

・ To avoid the influence of the inductive noise, LAN cable, please separate from the power supply line and strong electricity line as much as possible.

［Connection with personal computer］
Please connect it through HUB.
Please use the cross cable when connecting it directly with the personal computer.

# 4.6 Wiring for DI/DO (Option)

DI/DO becomes a connector joint.



DI/DO connector
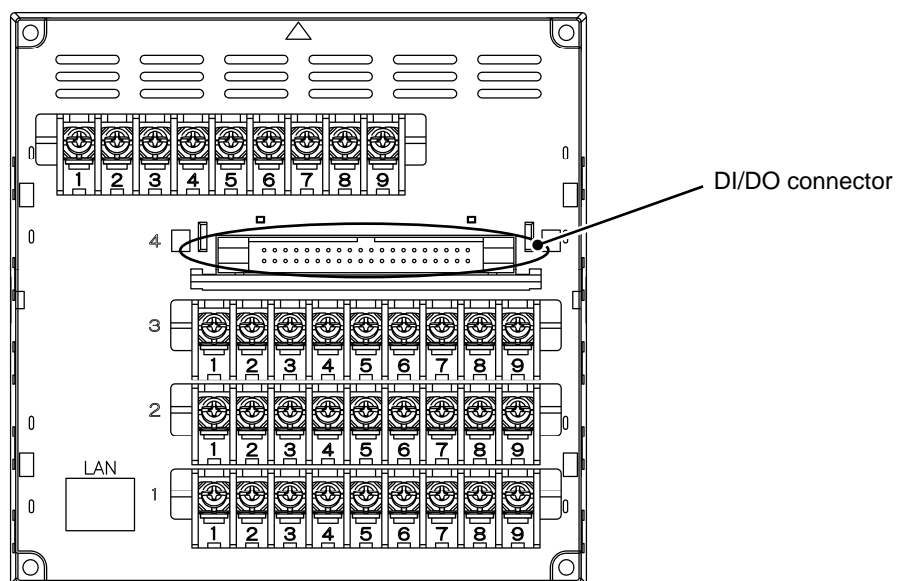
[Pin array]
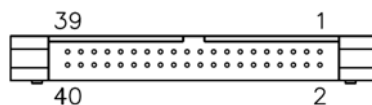


| Pin No. | Signal name | Pin No. | Signal name |
|---------|-------------|---------|-------------|
| 1 | DI1 | 21 | DO1 |
| 2 | DI2 | 22 | DO2 |
| 3 | DI3 | 23 | DO3 |
| 4 | DI4 | 24 | DO4 |
| 5 | DI5 | 25 | DO5 |
| 6 | DI6 | 26 | DO6 |
| 7 | DI7 | 27 | DO7 |
| 8 | DI8 | 28 | DO8 |
| 9 | DI9 | 29 | DO9 |
| 10 | NC | 30 | DO10 |
| 11 | NC | 31 | DO11 |
| 12 | NC | 32 | DO12 |
| 13 | DI_COM | 33 | DO_COM |
| 14 | DI_COM | 34 | DO_COM |
| 15 | DI_COM | 35 | DO_COM |
| 16 | DI_COM | 36 | DO_COM |
| 17 | DI_COM | 37 | DO_COM |
| 18 | DI_COM | 38 | DO_COM |
| 19 | DI_COM | 39 | DO_COM |
| 20 | DI_COM | 40 | DO_COM |

[DI schematic diagram]
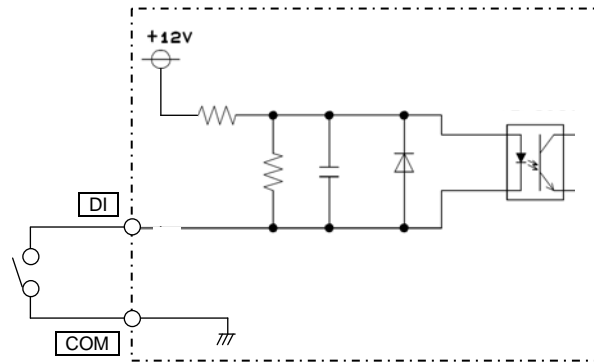


Wireless pressure point of contact input（9 point），common
Ratings：Photo coupler drive 12V DC about 3mA/1 point

［DO schematic diagram］
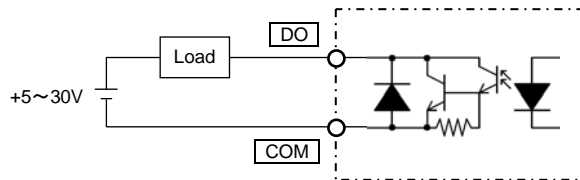


Open collector output（12 point），common
Point of contact ratings：30V DC　20mA/1 point

## 4.7 Wiring for relay output (Option)

| Terminal No. | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 |
|---|---|---|---|---|---|---|---|---|---|
| | RL1 | RL2 | RL3 | RL4 | RL5 | RL6 | COM | COM | COM |

RL：Relay output(6 points)
Contact capacity：3A/250V AC, 3A/30V DC　（3A/1 common, Total 9A or less）

# 5．OPERATION

## 5.1 Before operating

Please confirm the installation of SD card (Refer to item 1.5), wiring (Refer to item 4) before it operates. Afterwards, please confirm the various parameter settings (Refer to item 7).

## 5.2 Start and stop of record

The record begins when REC button is pushed.

When the record is stopped, the REC button is pushed again, and it Stop touches on the confirmation screen.

# 6. DISPLAY FUNCTION

## 6.1 Basic composition of data display screen



①Group screen name ③Change trend ④Graph type ②Clock display ⑤Change display
⑥Scale display
⑦Data display area
⑩Event flag display area
⑧Measured value display area
⑭Sub record display
⑨Event display area ⑮Internal memory ⑪SD card loading / writing status display ⑫Memory remainder capacity display ⑬Main record display
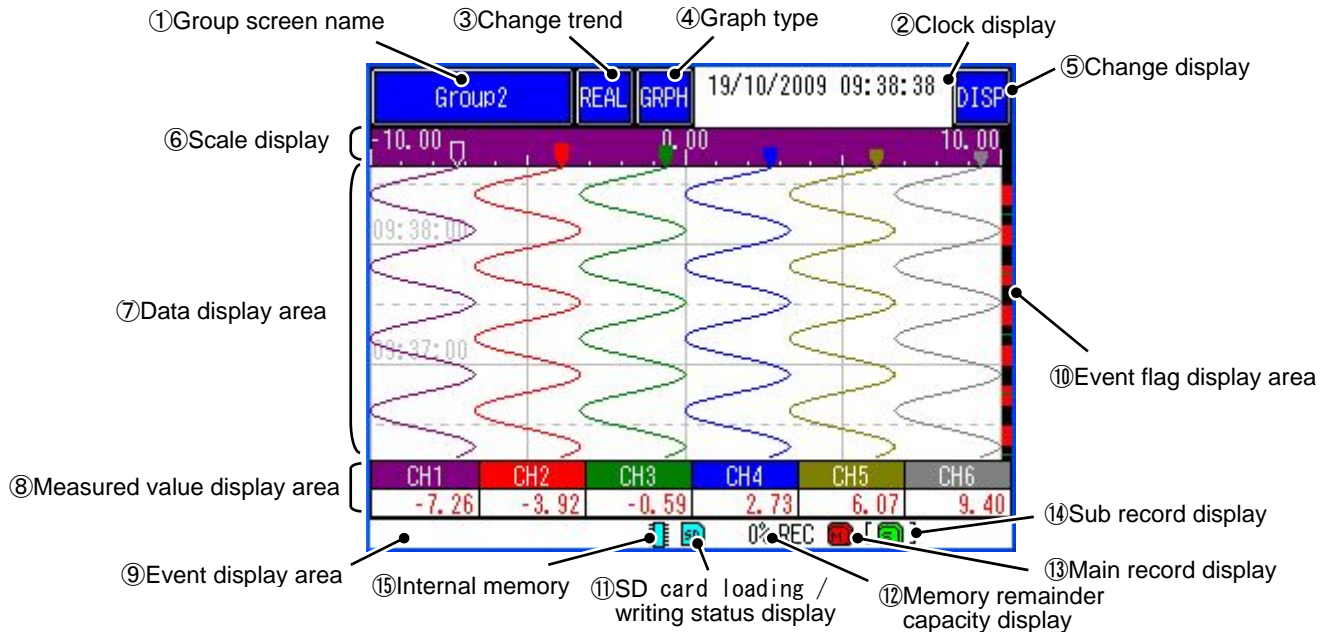
① Group screen name

Display the screen name ("Display Name") that was set arbitrarily. The group screen can be changed by touching.

② Clock display

Upper stage：Displays currently date and time.

Lower stage：Displays date and time in cursor area, when Historical trend display.

③ Change trend

The type of trend display can be changed by touching.

The name corresponding to the trend screen displayed now is displayed.

REAL：Real time trend display

HIST：Historical trend display

④ Graph type

The type of graph display can be changed by touching.

("Horizontal trend display" ⇒ "Vertical trend display" ⇒ "Bar graph display" ⇒ "Digital display" ⇒ "Event log" ⇒ "Horizontal trend display"…)

⑤ Change display

The displaying method of screen can be changed by touching.

("Display all ON" ⇒ "⑥Scale display OFF" ⇒ "⑥Scale display ON", "⑧Measured value display area OFF" ⇒ "⑥Scale plate OFF", "⑧Measured value display area OFF" ⇒ "Display all ON" …)

⑥ Scale display

Display scale on the "⑦Data display area". The scale width and display color corresponding to the channel is changed, when each channel point of "⑧Measured value display area" is touched.

⑦ Data display area

Allow the Real time trend display, Historical trend display, Bar graph display, Digital display and Event history / communication history display to be displayed. (Refer item 6.2 to 6.6)

Display measured data at the position of the cursor when Historical trend display.

⑧ Measured value display area

Display the currently measured value. When abnormally occurred, it becomes the following display.

Alarm occurred : red display

Burnout : B.OUT

Input circuit fault : Fault

When you display Real time trend or Historical trend, the trend corresponding to the channel is displayed by touching channel in the heavy line for 3 second, and displays the currently setting unit on the channel display area.

The display color of "⑥Scale display" and the scale width are changed to corresponding what.

When keeps touching channel part for 2 second, the figure below is displayed, and the content of the channel set can be confirmed.



Check settings : The setting status can be verified. And, a set item that becomes an object is selected touching, and Change set key can be moved directly to the selected set screen by touching.

Change set key can only be displayed when the "Mode" is "Advanced". Refer item 7.1 for Advanced mode.
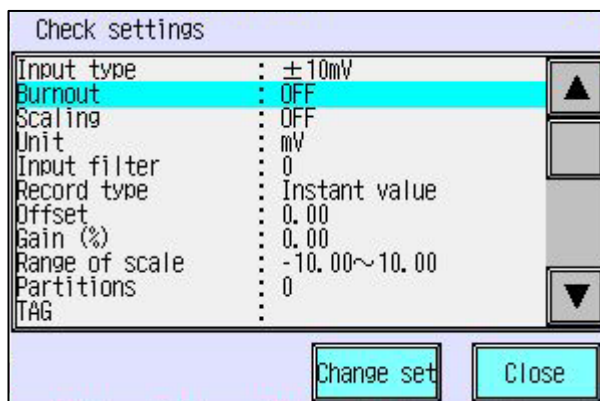


Scale : The scale can temporarily be changed.

⑨ Event display area

Event information such as beginning to record is displayed.

⑩ Event flag display area

The time when warning has been generated belt is red; the time when the event of the message etc. has been generated belt is displayed in green.

⑪ SD card loading / writing status display

It indicates the loading state of the SD card.

　　Gray display : shows the state where the SD card is not loaded in the slot.

　　　　　　　　When the SD card becomes removable even if the SD card is installed, it becomes a gray display.

　　Aqua display : shows the state where the SD card is loaded in the slot.

　　Red display : shows the state where the SD card is written.

⑫ Memory remainder capacity display

When the SD card is installed, the remainder capacity for which the SD card can be used is displayed by percent.

When the SD card is non-installed, the remainder capacity for which an internal memory can be used is displayed by percent.

⑬ Main record display

It indicates the state of the main record.

　　Green display : shows the state where the main record is not started.

　　Red display : shows the state where the main record is started.

⑭ Sub record display

It indicates the state of the sub record.

　　Green display : shows the state where the sub record is not started.

　　Red display : shows the state where the sub record is started.

⑮ Internal memory

It indicates the state of the internal memory.

　　Aqua display : shows the state where the internal memory is not access.

　　Red display : shows the state where the internal memory is access.

# 6.2 Real time trend display of measured data

[**Explanation**]

The measured data can be display in graph. The vertical or horizontal trend directions can be selected by touching to GRPH key.

The refreshment cycles of graph synchronizes record cycles.



**Horizontal trend**

Time scale display

Display division

Trend display

Measured value display of each channel (Instantaneous value)

Measured value display in TAG No. or the unit is also available.

**Vertical trend**

Time (H : M : S) (24-hour display)

Display division

Trend display

Measured value display of each channel (Instantaneous value)

Time scale display
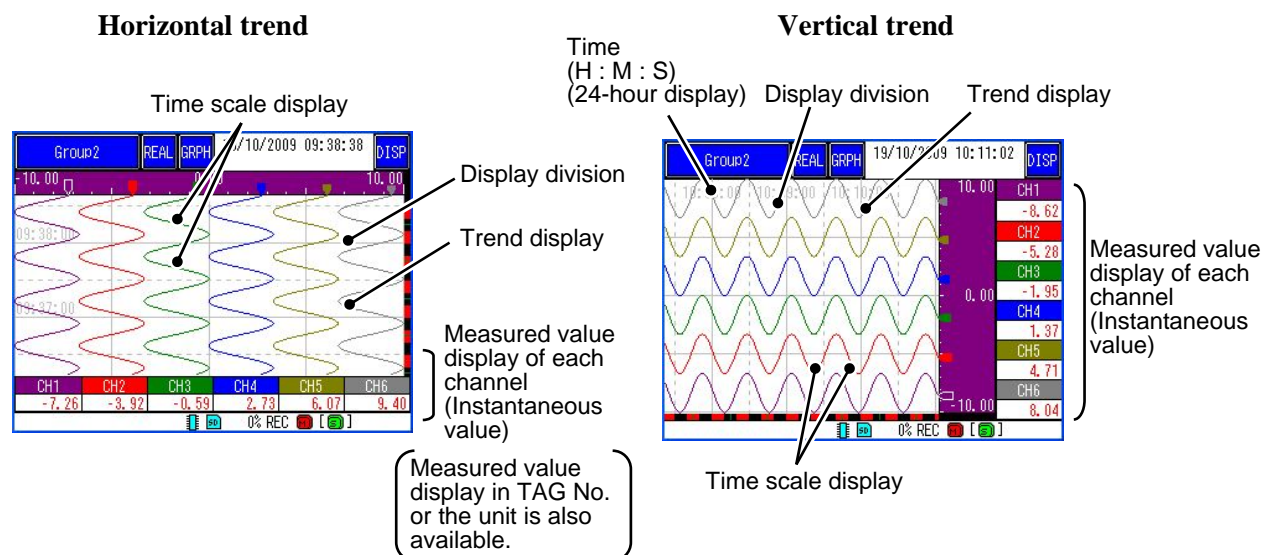
# 6.3 Display of measured data in bar graphs

[**Explanation**]

The measured data can be display in bar graph.

[**Operation**]

The measured data can be changed bar graph by touching the GRPH key several times.



Scale display

Bar graph

Measured value display of each channel (Instantaneous value)
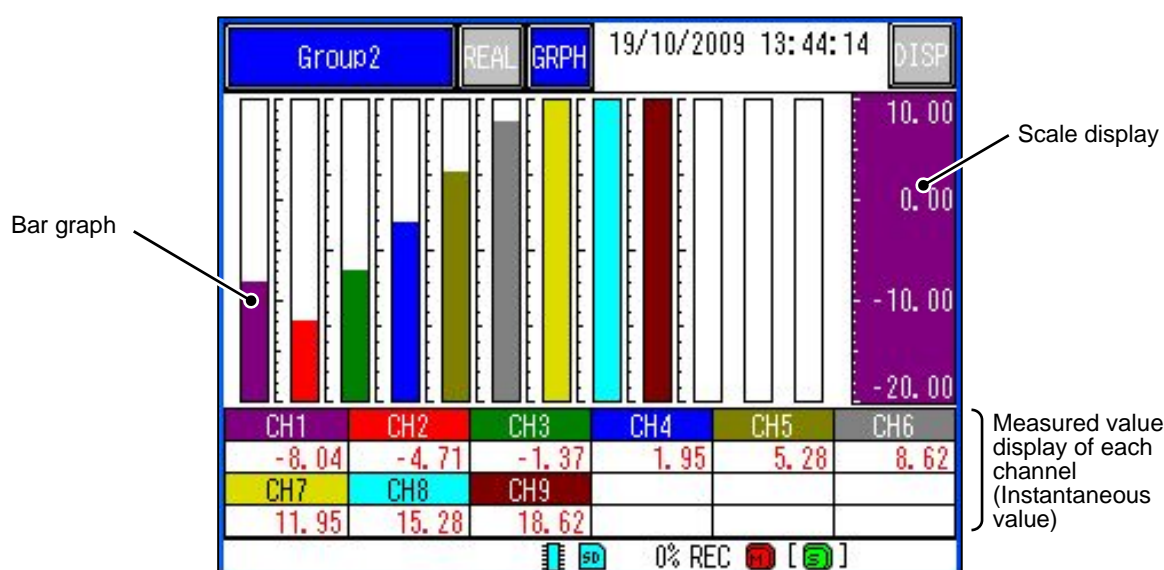
# 6.4 Digital display of measured data

[**Explanation**]

 The measured data can be display in digital graph.

[**Operation**]

 The measured data can be changed digital graph by touching the GRPH key several times.

Channel No.



① Unit
②Display of measured value
③Alarm No.
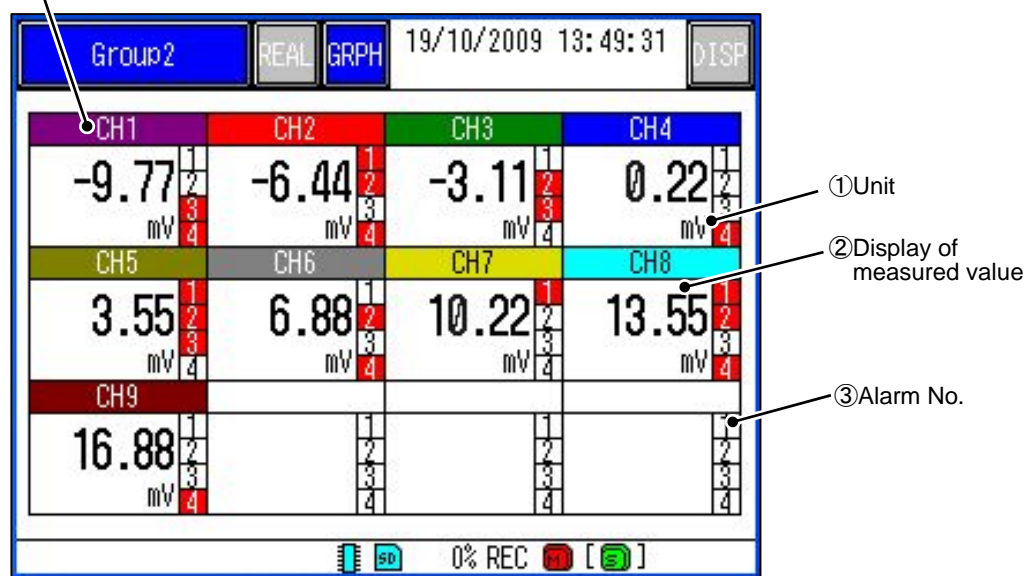
① Unit of each channel is displayed.
② Measured values of each channel are displayed in digital value.
③ When an alarm occurs, Alarm No. at the channel is displayed in red.

# 6.5 Historical trend display

［**Explanation**］

The past data of currently recoding data or the data saved in the past can be read and displayed.

［**Operation**］

Press the REAL key on the Real time trend display, and the following display appears.

①Cursor date

②Cursor

⑦Measured value display of each channel (Instantaneous value)

③Arrow key

④Expansion key       ⑤Display movement key    ⑥File select key
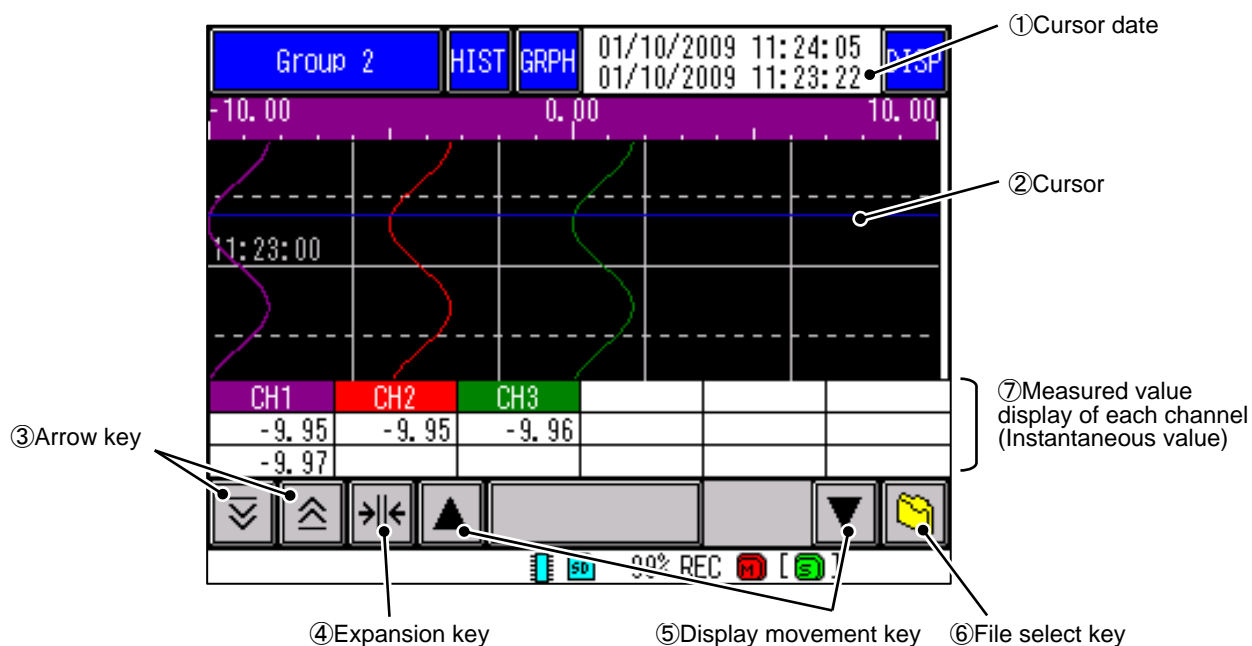
① Cursor date

   The date that the "②cursor" indicates is displayed. (Upper stage is currently date)

   "①Cursor date" when it touches, and the date is specified, "②Cursor" is moved to an arbitrary position.

② Cursor

   This date of line for measured value is displayed on the "⑦Measured value display of each channel".

③ Arrow key

   The position of cursor can be moved. The cursor position moves in the graph part even if touching.

④ Expansion key

   Select the minimum and the maximum values, and expands graph display area on the range.

   The standard size can be returned by touching again.

⑤ Display movement key

   The graph display area can be moved.

⑥ File select key

The data saved in the past can be read and displayed.



Folder group                    File group
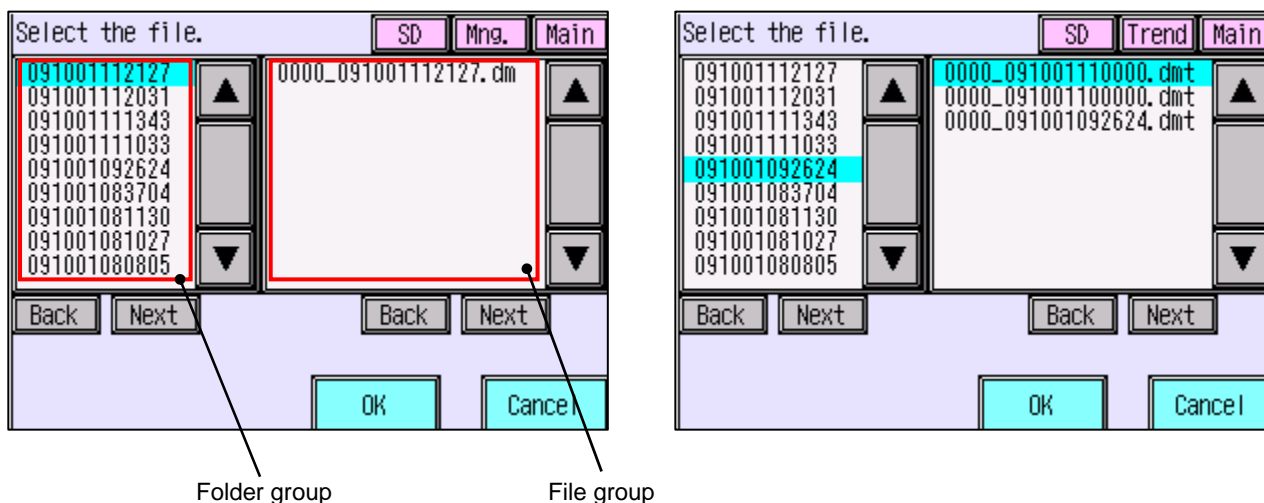
When you select an arbitrary folder from among the "Folder group", the file data included in the folder is displayed in the file group. When select an arbitrary file, and touching the OK key, on the historical trend screen, the data preserved in the past is read and displayed.

The SD key when touching, the SD card can be switched to an internal memory.

The Mng. key when touching, the display of administrative file (.dm) and trend file (.dmt) can be switched.

The Main key when touching, the Main record file can be switched to the display of the Sub record file.

⑦ Measured value display of each channel

"①Cursor date" for measured value is displayed.

When you make the item of the record type "Max /Min", the display becomes 2 steps.

Upper step：The Maximum value

Lower step：The Minimum value

The following items are displayed on the historical trend display based not on the setting of the past recording but on the currently selected values.

● Trend direction

● Number of screen partition

● Trend scale display

● Color bar display selection

# 6.6 Event history / communication history display

[**Explanation**]

When a specific event is generated in the data recording now, it is possible to make a mark. The history of LAN communication is preserved.

[**Operation**]

The event history display can be displayed by touching the GRPH key several times. And, the screen can be changed communication history display by touching the DISP key several times. Clear key when touching, the vita information can be cleared. The Update key when touching, it is updated to the latest vita information.
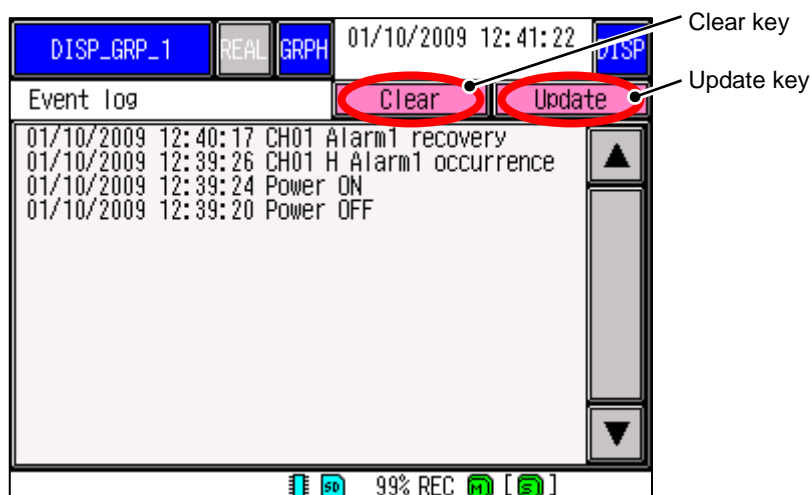


It is possible to switch to the communication history display with the DISP key.
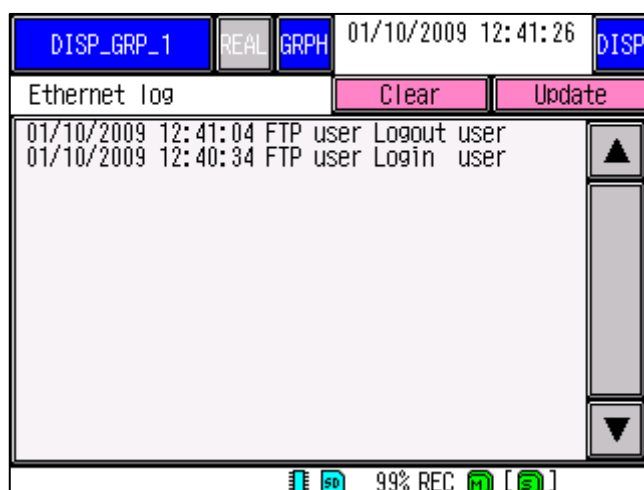
# 7. SETTING AND CHECKING PARAMETERS

## 7.1 Operational mode

［**Explanation**］

This Paperless Recorder can do a more detailed setting by setting the "Operation mode" to "Advanced mode" on the parameter setting screen and the system setting screen.

［**Operation**］

Touch the MENU button ⇒ System ⇒ Device/Other ⇒ Mode
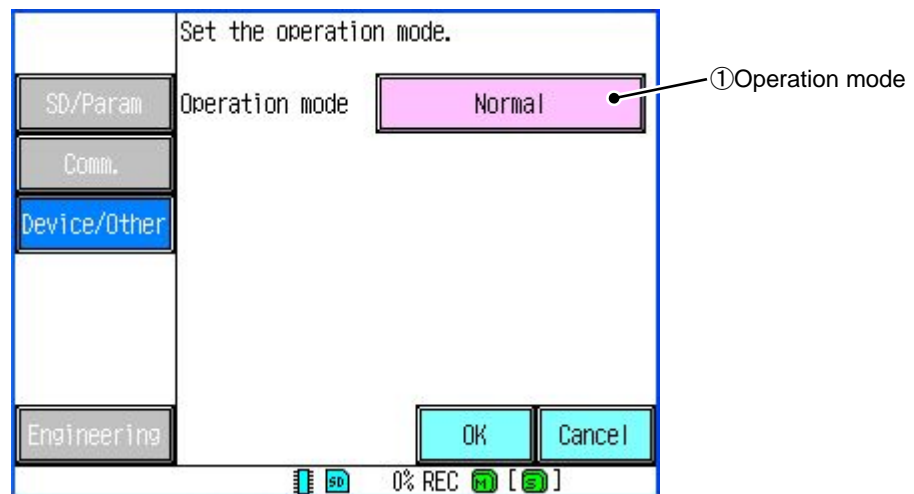


① Operation mode

The operation mode can be changed by touching "①Operation mode".

("Normal" ⇒ "Advanced" ⇒ "Normal"…)

The set item displayed on "Parameter" and "System" increases in an "Advanced" compared with "Normal".

Initialization is "Normal".

# 7.2 Setting and checking

① Main menu

The menu display can be displayed by pressing MENU button. The parameter setting display can be displayed by select "Parameter" touching.

Back key when touching, it returns to the trend screen.



Main menu     Parameter setting                           Back key

Sub menu
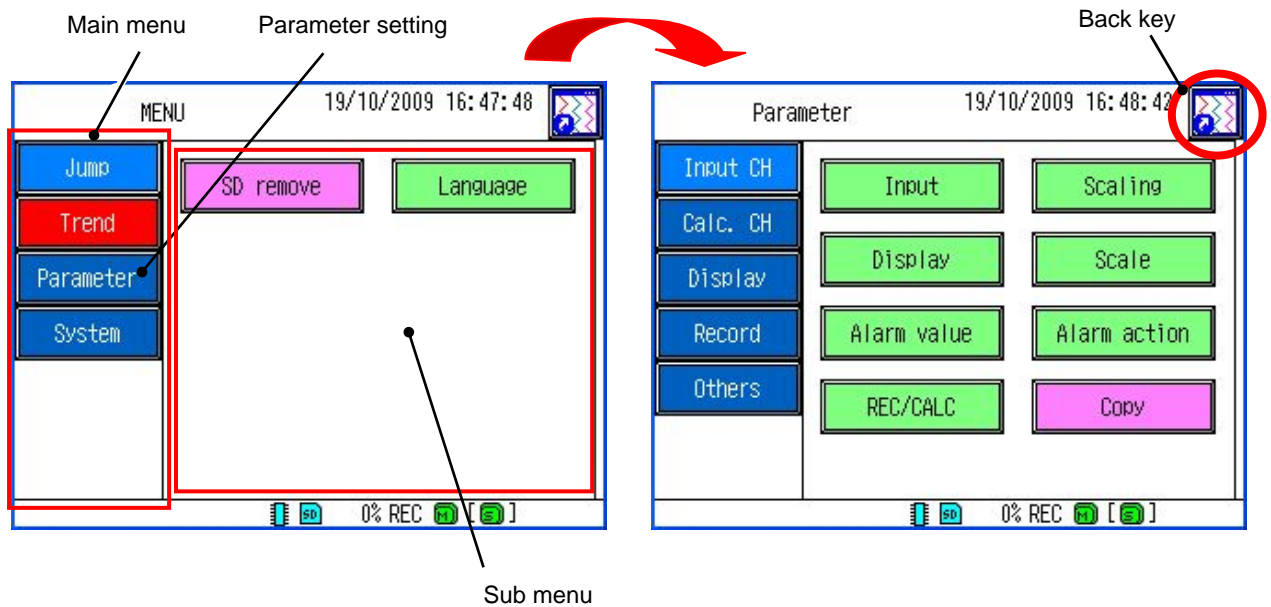
# 7.3 Outline of parameter setting procedure

Data display screen → MENU → Menu screen

Operate explanation
● Everything is moved, selected and canceled by the touch of the screen.
● MENU button
 The menu display can be moved.
● Back key
 The trend display can be returned from currently setting display.
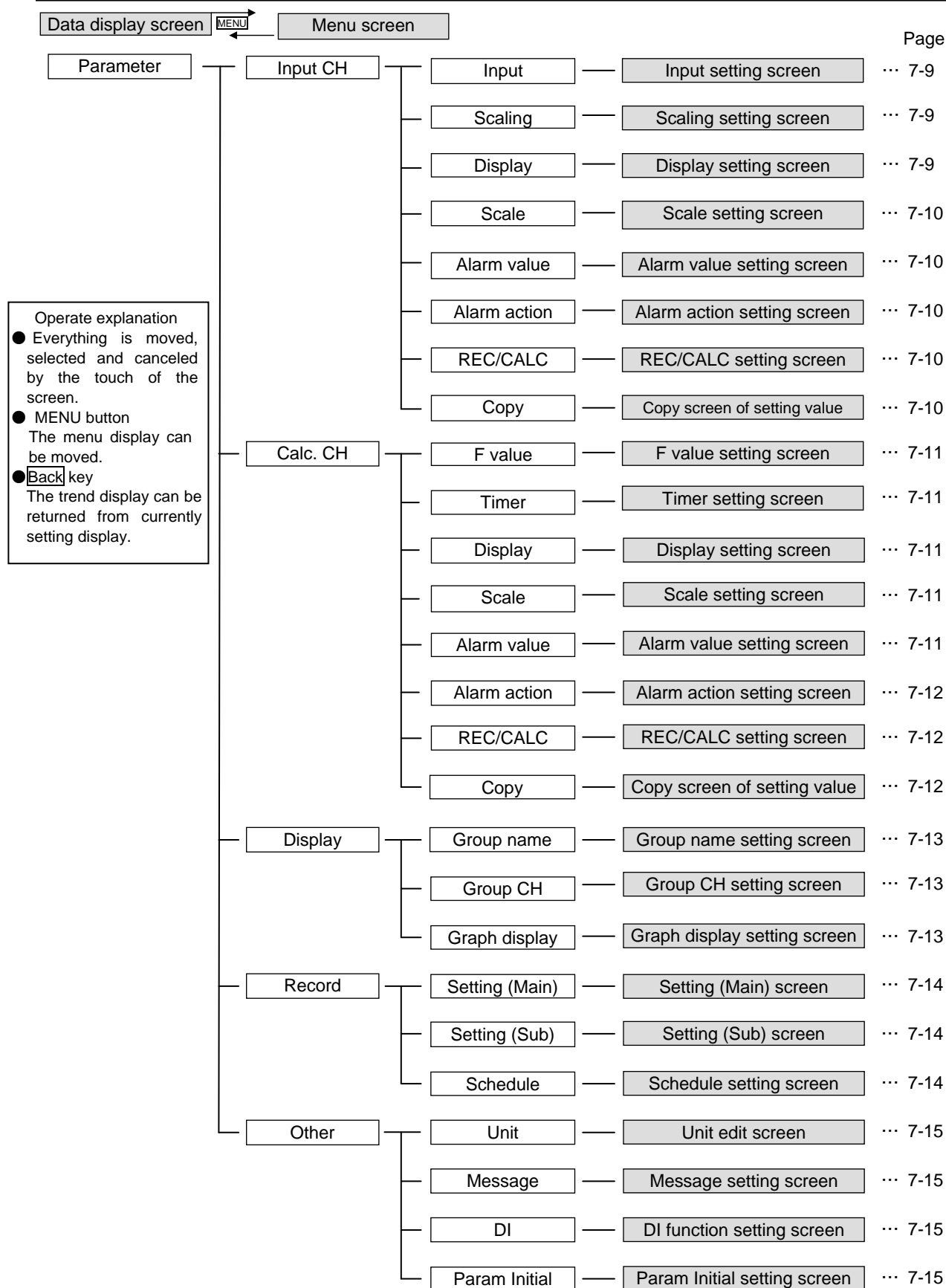
# 7.4 Basic operation of setting screens

[**Explanation**]

The basic operation of the setting screens is classified in the following methods. To move a set item, the corresponding item is touched.

① Item into which set content whenever touching changes

| Record type | OFF |
|---|---|
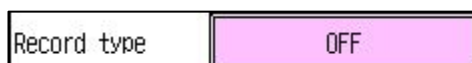
In this case, OFF when touching, it changes with Instant value ⇒ Average ⇒ Max/Min ⇒ OFF.

Please display the content to be set by touch the key.

② When selecting contents to set by the menu.

| Channel | ◀ | CH01 | ▶ |
|---|---|---|---|

In this case, the channel select display can be changed by selects CH01 touching. It touches the channel to be selected.

| Input CH | CH01 | CH02 | CH03 | CH04 |
|---|---|---|---|---|
| Calc. CH | CH05 | CH06 | CH07 | CH08 |
|  | CH09 |  |  |  |

When ◀, ▶ touching, channel No. can be changed directly without changing into the channel selection screen.

When you can select two or more items, selected items become the luminous colors.

| Input CH | CH01 | CH02 | CH03 | CH04 |
|---|---|---|---|---|
| Calc. CH | CH05 | CH06 | CH07 | CH08 |
|  | CH09 |  |  |  |

③ When selecting contents to set from list.

The item displayed in the list is selected touching.

The scroll bar is displayed when there is a selection item that exceeds the size of the screen.

The display can be changed by touching arrow key (▲, ▼) or sliding scroll bar.

When the item is selected, OK is decided touching.



Scroll bar
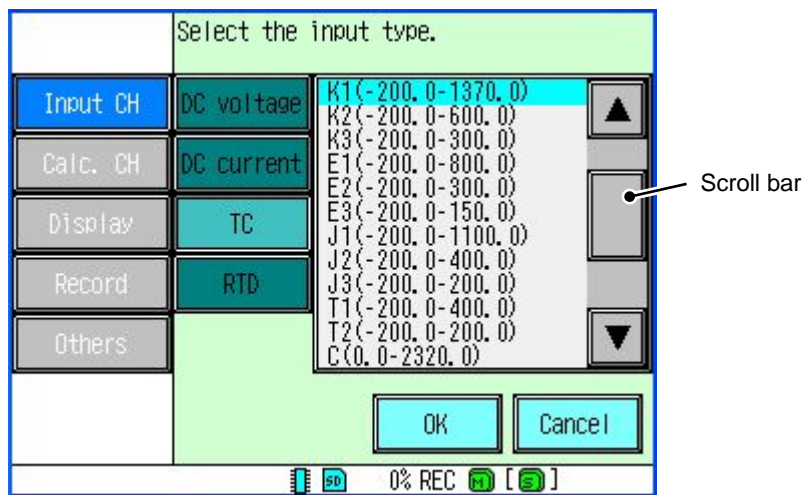
④ When setting contents by entering characters or numerical value.
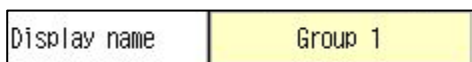


In this case, touch the Group 1 to display the character entry display.

Touch the keys to enter a character one by one, and touch the OK key after entry.

The some characters corresponding to the one key. The character can be changed by touching the same key several times.

Example : In this case, ABC key when touching, it changes with "A" ⇒ "B" ⇒ "C" ⇒ "A" …

[Reference]

Description of Character Entry screen



①Character Entry box
②Alphabet key
③Numerical value key
④Symbol key
⑤Del key　⑥BS key　⑦Space key　⑧Arrow key
⑨Character input key
⑩Clear key
⑪List key
⑫OK key
⑬Cancel key
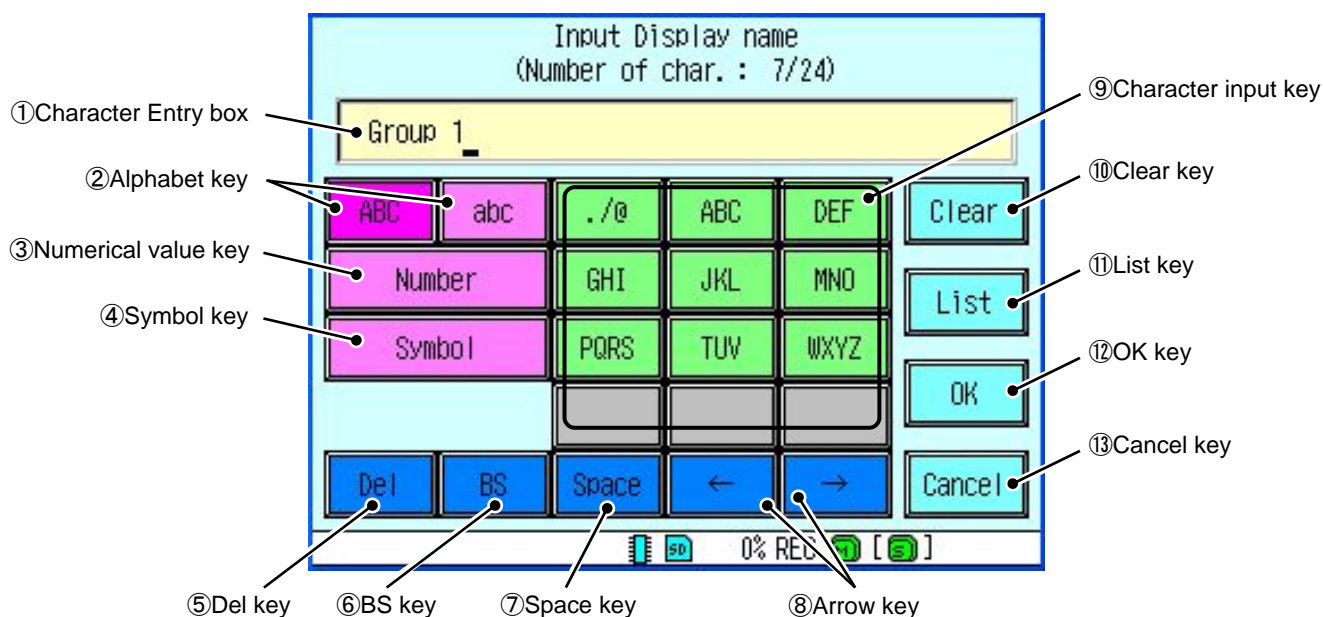
① Character Entry box

The input character is displayed.

② Alphabet key

The capital letters and small letters can be changed.

③ Numerical value key

The numerical value input can be changed.

④ Symbol key

The symbol input can be changed.

⑤ Del key

The character or numerical value of the currently cursor position can be deleted.

⑥ BS key

The character or numerical value of the currently cursor position ahead a character can be deleted,
and the cursor is moved to the left.

⑦ Space key

The space character can be inputted.

⑧ Arrow key

The arrow key can be moved.

⑨ Character input key

It is a key to input the character.

In case where the character string is filled with blank, delete the blank and then enter characters.
You can't enter characters without deleting blank.

The "voice sound symbol" and "semivoiced sound symbol" uses one character's worth of an area.
They should advance one character with the "⑧Arrow key ( ▷ )", when you continuously input
the character allocated in the same button.

⑩ Clear key

It has input character or numerical value can be all deleted.

⑪ List key

The input character can be selected from character string list.

⑫ OK key

The input contents can be entered.

⑬ Cancel key

The input contents can be canceled.

# 7.5 Setting the input spec

[**Explanation**]

For select of the input types for each channel (thermocouple, resistance bulb and DC voltage input),
and the presence of Burn Out function can be set.

Note: When the recorder is in recording, the "Input type" cannot be changed.

[**Operation**]

Select the Input CH ⇒ Input on the Parameter.

The content of the display is different according to the input kind of setting.

| | | |
|---|---|---|
| | Set the input of channel. | ①Channel No. |
| Input CH | Channel ◀ CH01 ▶ | |
| Calc. CH | Input type B | ②Input type |
| Display | Burnout ON | ③Burn Out |
| ⑥No selected range Record | RJC Assignment CH | ④RJC |
| Others | RJC Channel CH01 | ⑤RJC channel |
| | OK Cancel | ⑥OK, Cancel key |
| | 🔋 SD 0% REC 🔳 [🔳] | |
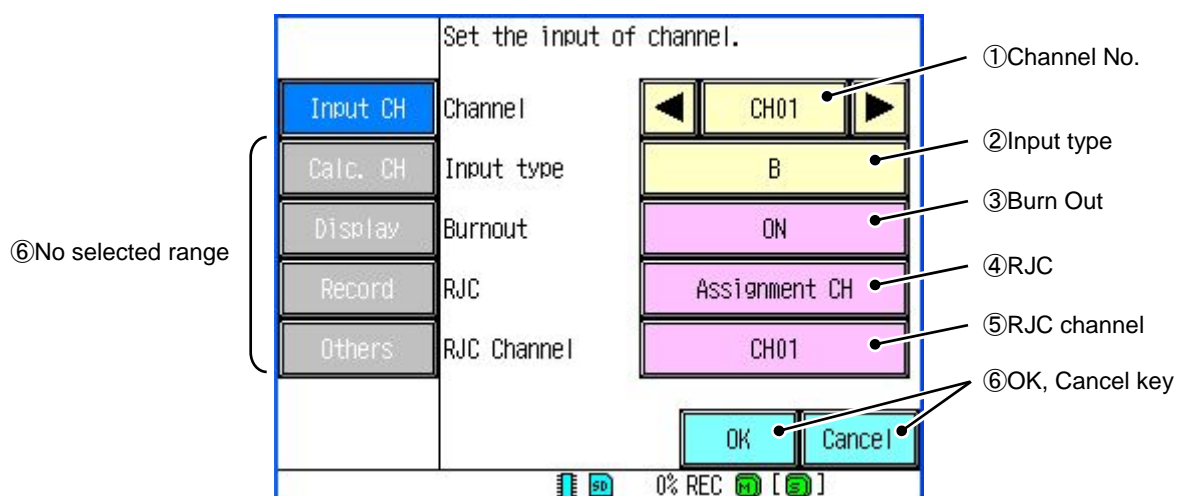
① Channel No.

The set channel is selected.

② Input type

The input type select display can be displayed by selects "②Input type" touching.

The list of input type can be displayed by touching input group. Selects the input signal touching,
and sets OK key touching. (The selected item is displayed in aqua)

The display can be changed by touching arrow key (▲, ▼) or sliding scroll bar.

Touch the Chancel key when not changing.

| | | |
|---|---|---|
| Input group | Select the input type. | |
| Input CH | DC voltage | K1(-200.0-1370.0) |
| Calc. CH | DC current | K2(-200.0-600.0)<br>K3(-200.0-300.0)<br>E1(-200.0-800.0)<br>E2(-200.0-300.0) |
| Display | TC | E3(-200.0-150.0)<br>J1(-200.0-1100.0)<br>J2(-200.0-400.0) |
| Record | RTD | J3(-200.0-200.0)<br>T1(-200.0-400.0) |
| Others | | T2(-200.0-200.0)<br>C(0.0-2320.0) |
| | OK Cancel | |
| | 🔋 SD 0% REC 🔳 [🔳] | |
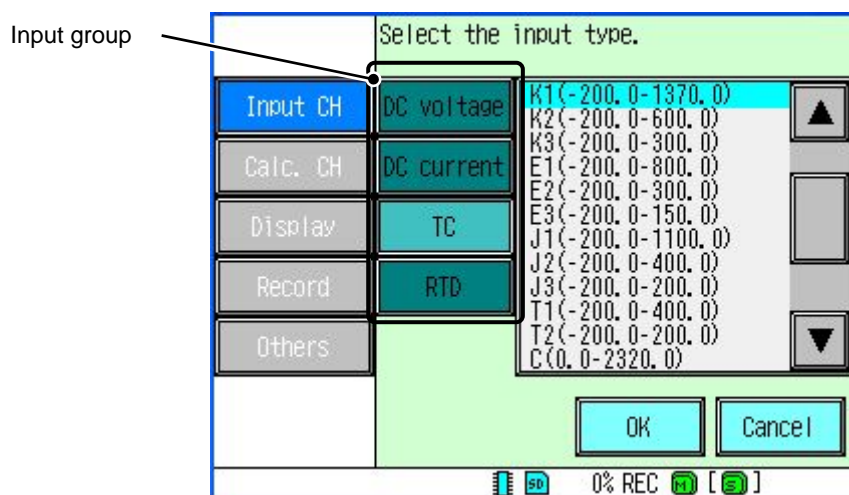
③ Burn Out

Setting the Burn Out function.（The record swings over to the 0% side or the 100% side）

Burn Out function can only be set when the input type is "TC" and "mV".

④ RJC

The method of making amends for the temperature of the terminal of the thermo-couple cooking stove is selected.

Internal：It makes amends with a built-in temperature sensor.

Assignment CH：It makes amends for measurements of the specified channel as a temperature of the terminal.

OFF：It doesn't make amends for the temperature of the terminal.

⑤ RJC channel

RJC channel can only be set when the "④RJC" is "Assignment CH". The measurement channel of a standard point of contact is specified.

⑥ OK, Cancel key

The each setting for changing contents is saved by the OK key. And, the "Parameter" can be returned not change by the Cancel key.

⑦ No selected range

The gray color is displayed that cannot be selected now. In this case, can be selected by presses OK key (or Cancel key) returning to "Parameter".

# 7.6 Input CH

〔**Explanation**〕
Various settings concerning the input channel are done.

〔**Reference**〕
When the operational mode is only an advanced mode, the item that "〇" is attached to "Advanced" is displayed. Refer item 7.1 for "Mode".
There are setting and item not displayed according to the number of input channels and set of the other content.
An item not revocable is displayed in the gray.

〔Input〕

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Channel | Select the channel number. | |
| Input type | Set the input type. | |
| Burnout | Select the Burn Out function when the input kind is "mV" and "TC" | |
| RJC | Select the RJC function. ※1 | 〇 |
| RJC Channel | Select the RJC channel.    ※2 | 〇 |

※1 RJC can only be displayed when the input type is "TC".

※2 RJC Channel can only be displayed when the "RJC" is "Assignment channel".

〔Scaling〕

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Channel | Select the channel number. | |
| Scaling | Set the scaling and square rooter. ※1 | |
| Range | Input the value of range. ※2 | |
| Ind. Value | Input the Ind. value. ※2 | |
| Ind. value DP | Set the Ind. value DP.  ※2 | |
| Unit | Set the unit.  ※2<br>It is possible to select it from unit prepared beforehand or the unit that sets the user. | |

※1 Scaling can only be displayed when the input type is "DC voltage" or "DC current".

※2 These items can only be displayed when the "Scaling" is "ON" or "Square root ON".

〔Display〕

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Channel | Select the channel number. | |
| TAG | Input the TAG.<br>Tag can display it instead of the channel. Display the channel operation screen for item 6.1-⑧. | |
| Description | Set the comment for input channel. | |
| Display color | Select the display color. The colors that can be selected are 16 colors. | |

［Scale］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Channel | Select the channel number.  When "0" is input, it displays it according to the scale display automatically. | |
| Range of scale | Input the range of scale. | |
| Partitions | Input the value of partitions. | ○ |

［Alarm value］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Channel | Select the channel number. | |
| Act. | Select the action type. | |
| OUT | Select the DO number. | |
| Value | Input the alarm value. ※ | |

※ Value cannot be set when the "Act." is "Fault"

※ When you select warning kind of "Fault", warning is generated at "H over", "L over", "Burnout", "Invalid value", and "abnormal input" etc.

［Alarm action］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Channel | Select the channel number. | ○ |
| Hysteresis (%) | Input the value of Hysteresis. | ○ |
| Alarm delay(sec) | Input the value of Alarm delay. | ○ |

［REC/CALC］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Channel | Select the channel number. | |
| Input filter | Input the value of Input filter. | |
| Record type | Select the Record type.  ※ | |
| Offset | Input the value of Offset. | |
| Gain (%) | Input the value of Gain. | |

※ When the record type is "off", neither the record nor the historical trend display to the SD card are done.

［Copy］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Source CH | Select the copy source channel number. | |
| Destination CH | Select the copy destination channel number. (Plurals can be selected.) | |

# 7.7 Calc. CH

The operational expression and the more details setting of the operation channel can be set with the parameter loader software. Setting it with the main body of the recorder becomes only the part. Please refer to the parameter loader manual for details.

〔F value〕

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Reference temp. | Input the value of Reference temp. | ○ |
| Z value | Input the Z value. | ○ |
| Start temp. | Input the value of start temp. | ○ |
| Manual reset | Start the Manual reset. | ○ |

〔Timer〕

| Item | Setting contents | Advanced |
|------|------------------|----------|
| T1 timer(sec) | Input the value of T1 timer. | ○ |
| T2 timer(min) | Input the value of T2 timer. | ○ |

〔Display〕

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Channel | Select the channel number. | ○ |
| TAG | Input the TAG. Tag can display it instead of the channel. Display the channel operation screen for item 6.1-⑧. | ○ |
| Description | Set the comment for input channel. | ○ |
| Display color | Select the display color. The colors that can be selected are 16 colors. | ○ |

〔Scale〕

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Channel | Select the channel number. | ○ |
| Range of scale | Input the range of scale. | ○ |
| Partitions | Input the value of partitions. When "0" is input, it displays it according to the scale display automatically. | ○ |

〔Alarm value〕

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Channel | Select the channel number. | ○ |
| Act. | Select the action type. | ○ |
| OUT | Select the DO number. | ○ |
| Value | Input the alarm value. ※ | ○ |

※ Value cannot be set when the "Act." is "Fault"

※ When you select warning kind of "Fault", warning is generated at "H over", "L over", "Burnout", "Invalid value", and "abnormal input" etc.

［Alarm action］

| Item | Setting contents | Advanced |
|---|---|---|
| Channel | Select the channel number. | ○ |
| Hysteresis (%) | Input the value of Hysteresis. | ○ |
| Alarm Delay(sec) | Input the value of Alarm delay. | ○ |

［REC/CALC］

| Item | Setting contents | Advanced |
|---|---|---|
| Channel | Select the channel number. | ○ |
| Input filter | Input the value of Input filter. | ○ |
| Record type | Select the Record type. | ○ |
| Offset | Input the value of Offset. | ○ |
| Gain (%) | Input the value of Gain. | ○ |

［Copy］

| Item | Setting contents | Advanced |
|---|---|---|
| Source CH | Select the copy source channel number. | ○ |
| Destination CH | Select the copy destination channel number. (Plurals can be selected.) | ○ |

# 7.8 Display

In the "Display", it is possible to set it variously concerning the display of the measuring data.

［Group name］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Group | Select the group number. | |
| Display name | Set the display name. | |
| TAG disp set | Select the TAG display set. | |
| Display | Select the display "ON", "OFF". ※ | |

※ Display cannot be set when the "Group" is "Group1" and "Sub Group".

［Group CH］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Group | Select the group number. | |
| Chanel No. | The selected part is brightly, and an arbitrary channel can be set. Only the registered channel is recorded in the sub record. | |

［Graph display］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Group | Select the group number. | |
| Horizontal trend | The Horizontal trend display is "ON" and "OFF" is selected. | |
| Vertical trend | The Vertical trend display is "ON" and "OFF" is selected. | |
| Bar graph | The Bar graph display is "ON" and "OFF" is selected. | |
| Digital display | The Digital display is "ON" and "OFF" is selected. | |

# 7.9 Record

In the record setting, it is possible to set it variously concerning the record of the measuring data.

［Setting(Main)］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Record Cycle | Select the record cycle. | |
| File rec cycle | Select the file rec cycle. ※1 | |
| File overwrite | Select the file overwrite function, when SD card memory full. ※2 | |

※1 The range that can be selected by the item at the record cycle changes.

　　"100 ms" cannot be selected by the main record.

| Record cycle | File rec cycle |
|--------------|----------------|
| 1sec～5sec | 1hour |
| 10sec～1min | 1hour, 1day |
| 2min～3min | 1hour, 1day, 1week |
| 5 min～30 min | 1hour, 1day, 1week, 1month |
| 60 min | 1hour, 1day, 1week, 1month, 1year |

※2 Old data is deleted and operation is set when select the "ON".

　The record operation is stopped when the amount of the memory remainder is lost when select the "OFF".

［Setting(Sub)］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Sub rec cycle | Select the Sub record cycle. | ○ |
| Sub pre rec | Select the Sub pre record. | ○ |
| Sub rec timing | Select the Sub record timing. ※1 | ○ |
| DI No. | Select the DI number. ※2 | ○ |

※1 Func key can only be set when the "FUNC key" of "Device/Other" is "OFF".

※2 "DI No." can only be displayed when the "Sub rec timing" is "DI".

・About the file record cycle of sub record.

　As for the sub record, the file record cycle is automatically set by the record cycle. It is not possible to select it.

| Record cycle | File record cycle |
|--------------|-------------------|
| 100mm sec | 10min |
| 1～30sec | 1hour |
| 1～60min | 1day |

［Schedule］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Schedule | Select the schedule. | ○ |
| Start time | Input the value of start time. | ○ |
| End time | Input the value of end time. | ○ |
| Select week | Select the week. (Plurals can be selected.) | ○ |

# 7.10 Others

［Unit］

| Item | Setting contents | Advanced |
|---|---|---|
| Unit | The edit display of new unit can be moved by touching "Add". | |

［Message］

| Item | Setting contents | Advanced |
|---|---|---|
| Message No. | Select the Message number. | ○ |
| Message | Input the Message. | ○ |
| Timing | Select the timing of message is displayed. | ○ |
| Channel No. | Select the channel number. ※1 | ○ |
| Alarm No. | Select the alarm number. ※1 | ○ |
| DI No. | Select the DI number. ※2 | ○ |

※1 This item can only be displayed when the "Timing" is "Alarm occurred" or "Alarm cleared".

※2 "DI No." can only be displayed when the "Timing" is "DI ON" or "DI OFF".

［DI］

| Item | Setting contents | Advanced |
|---|---|---|
| DI No. | Select the DI Number. | ○ |
| Function | Select the DI function. | ○ |

［Param initial］

| Item | Setting contents | Advanced |
|---|---|---|
| Param initial | Initialize the parameter. | |

［Wizard］

| Item | Setting contents | Advanced |
|---|---|---|
| Wizard | An at least necessary set item can continuously be set to each channel. | ※ |

※ Wizard can only be displayed when the "Mode" is "Normal".

# 8.  SETTING AND CHECKING SYSTEMS

## 8.1  Outline of system setting procedure

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# 8.2 SD / Param

［SD remove］

Please execute it before taking out the SD card.

| Item | Setting contents | Advanced |
|------|------------------|----------|
| SD remove | The current measuring data is written to the SD card while recording and the SD card can be taken out. The record is continued. | |

［SD format］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| SD format | Start the format SD card. | |

［Param save］

The parameter setting and the system setting are preserved on the SD card.

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Param save | Select the saving file. | |

［Param load］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Param load | Select the loading file. | |

# 8.3 Comm.

［Ethernet1］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| IP Address | Input the IP Address. | |
| Subnet Mask | Input the Subnet Mask. | |
| Default GW | Input the Default GW. | |
| DNS address | Input the DNS address. | |
| MAC address | Display the MAC address. | |

［Ethernet2］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Keep alive | Select the keep alive function. | ○ |
| Keep alive cycle (min) | Input the value of keep alive cycle. | ○ |

［SNTP1］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Current date | Display the current date. | |
| SNTP Func | Select the SNTP function. When turning it "on", the time data is received from the SNTP server, and it proofreads at time. When you correct time by using the SNTP function while recording, it is not corrected when there is a difference for ±5 minutes or more from present time. When the error margin is within 5 minutes, time is moved and corrected little by little. | |
| SNTP address | Input the SNTP address. | |
| Cal cycle time | Input the value of cal cycle time. | |
| Cal start | Start the calibration. | |

［SNTP2］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Get the time, when power ON. | The function to acquire time when the power supply is turned on is "ON" and "OFF" is selected. When the SNTP function is only "ON", it is effective. When you turn on the power supply while "ON", it doesn't begin to record until the time data is acquired. | |
| Time zone(UTC) | Select the time zone. | |

［FTP］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| User name | Input the user name. | |
| Password | Set the password. (Cannot use space character in password.) | |
| Level | Select the level. | |

［Modbus］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Operation | Select the operation of Modbus. | ○ |
| Station No. | Input the value of station number. | |
| Modbus TCP Receive timeout | Input the time until timeout. | |

［RS-485］

| Item | Setting contents | Advanced |
|------|------------------|----------|
| Parity | Select the parity function. | ○ |

# 8.4 Device / Other

［LCD］

| Item | Setting contents | Advanced |
|---|---|---|
| Sleep time(min) | Input the value of sleep time. | |
| Act. brightness | Input the value of LCD active brightness. It lightens by the numerical value large. | |
| Sleep brightness | Input the value of LCD sleep brightness. It lightens by the numerical value large. | |

［Clock］

| Item | Setting contents | Advanced |
|---|---|---|
| Current date | Display the current date. | |
| Setting date | Input the value of setting date. | |

［FUNC key］

| Item | Setting contents | Advanced |
|---|---|---|
| Function | Set the function key. | |

［File format］

| Item | Setting contents | Advanced |
|---|---|---|
| File format | Select the file format. | |

［Jump menu］

| Item | Setting contents | Advanced |
|---|---|---|
| Add | The item added to the menu display is selected. | |

［Mode］

| Item | Setting contents | Advanced |
|---|---|---|
| Operation mode | Select the operation mode. | |

［Language］

| Item | Setting contents | Advanced |
|---|---|---|
| Language | Select the language. | |
| Date format | Select the date format. | |

［Version］

| Item | Setting contents | Advanced |
|---|---|---|
| Version | Display the Version. | |
| Serial No. | Display the Serial number. | |

# 8.5 Engineering

**[Explanation]**

This item is for the factory coordination. Please do not change the setting.

# 9. SPECIFICATION

## 9.1 Basic specification

• Number of inputs：Selection from 3,6,9,12 points.（Immediately after purchase）

• Input circuit：Inputting mutual insulation.

• Measuring period：100mm sec

• Input type：

Direct voltage, direct current (shunt resistance of necessity), TC and RTD

• Changing of input type：

Setting from set menu displayed with front side MENU button.

• Burnout function：

"TC" and "mV (scale OFF)"is equipped normally. ON/OFF of the function use can be set.

When the input is disconnected, the record is shaken off on 100% side.

• CMRR：Over 140dB

• NMRR：Over 60dB

• Allowable signal source resistance：

When the burnout is "ON", the influence like $0.18\mu V/\Omega$ is exerted on resistance.

Lead wire resistance of RTD is under $5\Omega$.

• Input filter function：

It is possible to set it to each channel.（The first delay filter）

The time constant can be set within the range of $0\sim99$ sec.

• Scaling function：

It is possible by direct voltage (current) input.

Range that can be scaled：±32000

Decimal point position：It is possible to set it arbitrarily.

Unit sign：It is possible to select it from unit that is preset inside or 20 units (each unit eight characters or less) that can be made.

• Square root function：

The input value of each channel is square (root) calculated.

• Calculation function：

Number of operation channels：36 points

Arithmetic, general, multiplication and F value calculation can be calculated with each calculation channel.

The content of the calculation can be set and be confirmed only with the Parameter Loader (Personal computer software appended by standard).

• F value calculation function：

F value of each channel (fatal value of the bacterium by the heating sterilization) is calculated from the measurement temperature.

The content of the calculation can be set and be confirmed only with the Parameter Loader (Personal computer software appended by standard).

# 9.2 Measurement range

| Range code | Type | Measurement range | Max Resolution | Accuracy rating | Remarks |
|---|---|---|---|---|---|
| 000 | mV | −10.00 ～ +10.00 | 10μV | | |
| 001 | mV | 0.00 ～ +20.00 | 10μV | | |
| 002 | mV | 0.00 ～ +50.00 | 10μV | | |
| 003 | V | −0.200 ～ +0.200 | 1mV | ± （0.1%+1digit） | |
| 004 | V | −1.000 ～ +1.000 | 1mV | | |
| 005 | V | −10.00 ～ +10.00 | 10mV | | |
| 006 | V | 0.000 ～ +5.000 | 1mV | | |
| 007 | mA | 4.00 ～ 20.00 | 0.01mA | | |
| 008 | B  *1 | 0.0 ～ 1820.0 | 0.1℃ | | *1    0～400℃ :  ±4% |
| 009 | R1  *2 | 0.0 ～ 1760.0 | 0.1℃ | | 　　　400～800℃ :  ± （0.15%+1digit） |
| 010 | R2  *2 | 0.0 ～ 1200.0 | 0.1℃ | | |
| 011 | S  *2 | 0.0 ～ 1760.0 | 0.1℃ | | *2   0～200℃ :  ± （0.15%+1digit） |
| 012 | K1 | −200.0 ～ 1370.0 | 0.1℃ | | |
| 013 | K2 | −200.0 ～ 600.0 | 0.1℃ | | |
| 014 | K3 | −200.0 ～ 300.0 | 0.1℃ | ± （0.1%+1digit） | |
| 015 | E1 | −200.0 ～ 800.0 | 0.1℃ | | |
| 016 | E2 | −200.0 ～ 300.0 | 0.1℃ | However,  −200.0 ～ 0.0 ℃ | |
| 017 | E3 | −200.0 ～ 150.0 | 0.1℃ | is ± （0.15%+1digit） | |
| 018 | J1 | −200.0 ～ 1100.0 | 0.1℃ | | |
| 019 | J2 | −200.0 ～ 400.0 | 0.1℃ | | |
| 020 | J3 | −200.0 ～ 200.0 | 0.1℃ | | |
| 021 | T1 | −200.0 ～ 400.0 | 0.1℃ | | |
| 022 | T2 | −200.0 ～ 200.0 | 0.1℃ | | |
| 023 | C | 0.0 ～ 2320.0 | 0.1℃ | | |
| 024 | Au−Fe  *3 | 1.0 ～ 300.0 | 0.1K | ± （0.2%+1digit） | *3    1～20K :  ± （0.5%+1digit） |
| 025 | N | 0.0 ～ 1300.0 | 0.1℃ | ± （0.1%+1digit） However,  −200.0 ～ 0.0 ℃ is ± （0.15%+1digit） | 　　　20～50K :  ± （0.3%+1digit） |
| 026 | PR40−20  *4 | 0.0 ～ 1880.0 | 0.1℃ | ± （0.2%+1digit） | *4    0～300℃ :  ± （1.5%+1digit） |
| 027 | PLⅡ | 0.0 ～ 1390.0 | 0.1℃ | ± （0.1%+1digit） | 　　　300～800℃ :  ± （0.8%+1digit） |
| 028 | U | −200.0 ～ 400.0 | 0.1℃ | However,  −200.0 ～ 0.0 ℃ | |
| 029 | L | −200.0 ～ 900.0 | 0.1℃ | is ± （0.15%+1digit） | |
| 030 | Pt100−1 | −200.0 ～ 650.0 | 0.1℃ | | |
| 031 | Pt100−2 | −200.0 ～ 200.0 | 0.1℃ | ± （0.1%+1digit） | |
| 032 | JPt100−1 | −200.0 ～ 630.0 | 0.1℃ | | |
| 033 | JPt100−2 | −200.0 ～ 200.0 | 0.1℃ | | |

## 9.3 Display part

- Indicator :
  5.7 inch TFT color LCD （320×240 dot）
  The touch panel, back light is applied.
  The brilliance control is possible.
    The pixel that always lights partially or doesn't light the liquid crystal display might exist. And, it is not a breakdown though the irregularity of brightness might be caused. Please acknowledge it beforehand.
- Display color : 16 color
- Display language :
  Japanese/English is selected from a set screen. （Initialization is English）
- Backlight longevity :
  50,000 hour （When the LCD sleep function is used, it is possible to prolong the life span.）
- Display group :
  Number of groups   : Main record 6, Sub record 1
  Number of channel : The display setting of 12 channels or less is possible by each channel.
- Real time trend display :
  A present measuring data is displayed in the graph.
  Direction : Vertical or Horizontal
  Numeric display/non-display, Scale display/non-display is possible to select it.
  Display updates cycle 1 sec
- Historical trend display :
  A past measuring data is displayed in the graph.
  Direction : Vertical or Horizontal
  Numeric display/non-display, Scale display/non-display is possible to select it.
- Bar graph display :
  A present measuring data is displayed in the vertical direction bar graph.
  Display updates cycle 1 sec
- Digital display :
  A present measuring data is zooming displayed. Alarm occurred No. is displayed.
  Display updates cycle 1 sec
- Event history :
  Alarm history, Message data, Self-diagnosis information is displayed.
- Communication history :
  Communication history is displayed.
- Parameter display/setting :
  The set data screen is displayed with front side MENU button.
- TAG display :
  Number of characters that can be displayed : 8 characters or less

## 9.4 Operation Button

- Number of button :   3 （It is possible to operate it by opening the cover under the front side.）
- Function :
  REC     : Record start/Stop
  MENU   : Various set screens are displayed.
  FUNC   : The function to allocate beforehand is executed.

# 9.5 Record function

•External recording medium：
　SD memory card（It corresponds to the SD/SDHC standard）

•Internal memory：About 100MB

•Record capacity：
　ＳＤ standard：2GB or less
　SDHC 規格：32GB or less

•Record method：
　The record begins by turning on the REC button. It records by the new file name at the time of each record beginning.

•Main record：
　Each channel data of 6 main record groups set in the display group is recorded. The content of the record is trend data, event data, and message data.

•Sub record：
　Each channel data of 1 sub record groups set in the display group is recorded. The content of the record is trend data only.
　The record condition can be selected from "sync.", "Alarm", "DI".

•Data record cycle：
　The cycle when data is recorded can be selected from "1 sec ～ 60 min".（Only the sub record can select the data logging cycle of 100 milliseconds）

•File preservation cycle：
　First of all, recorded data is preserved in an internal memory. And, when the memory is filled or the record stops, it is written in the SD memory card.
　The preservation period of the data of one record file can be selected from "1 hour ～ 1year".

•Trend data：
　Either minimum value or the maximum value of the mean value, the instantaneous value or measurements is preserved from among the measuring data sampled at the measuring period.

•Other recorded data：
　Alarm information, Message record

•Preservation capacity：
　At the following condition, it is possible to record at the time of the table below.
　　［Condition］
　　　－Number of inputs：6 points
　　　－Record data format：Binary
　　　－Record type：Max/Min record
　　　－Event none of alarm and message, etc.

| SD card capacity | 2GB | | | | |
|---|---|---|---|---|---|
| File pre cycle | 1 hour | | | 1 day | |
| Data rec cycle | 1 sec | 2 sec | 5 sec | 10 sec | 1 min |
| Record capacity | 1.0 year | 1.4 year | 1.8 year | 14.0 year | 33.7 year |

　　　※The record exceeding the product-life cycle is not guaranteed.

•The memory remainder capacity display：
　The internal memory or the remainder capacity of SD memory card is percent displayed on the screen of this machine. When the recording area of the SD memory card disappears, is the record stopped or whether it deletes from old data and the record continuance is done can be set.

•SD memory card：
　Confirmed operation SD memory card：
　・Panasonic company　1～32GB
　・Sandisk company　　1～32GB
　Please buy it in the computer shop etc.
•Data format：
　It is possible to select it from either of method of the binary or binary＋CSV.（It is not possible
　to change while recording. Comma Separated Value is directory readable in Excel etc. Reading
　of the data recorded by the binary form is improper）
　CSV format：About 120 bytes by 1 sampling.（6 channel input, when Max/Min record）
　Binary format：About 30 bytes.（6 channel input, when Max/Min record）

# 9.6 Alarm function

•Number of setting：It is possible to set it up to four points or less by each channels.
•Alarm type：HI, LOW, Fault data
•Display：
　When warning is occurred, it displays in a digital display.
　It displays right frame of horizontal trend display, and under frame of the vertical trend graph
　in red.
•Hysteresis：
　It is possible to set it with 0 ～ 100% of the cooking stove.
•Alarm output：
　Common alarm output　：1 point（Open collector output）
　Point of contact ratings　：30V DC　20mA/1 point

# 9.7 Ethernet（10BASE-T）

■HTTP server
• Measurements display：
　Measurements of each channel and the alarm situation are displayed by a digital value.
■FTP server
• File download：
　The record file preserved on the SD memory card can be downloaded.
• File delete：
　The record file preserved on the SD memory card can be deleted.
• Access attestation：The right of access is attested to the FTP server.
■Modbus TCP
•Data reading：
　Reading measurements and the setting is possible in the Modbus TCP protocol.
•Data writing：
　The setting can be written in the Modbus TCP protocol.
■SNTP
• SNTP client function：
　Present time can be synchronized with at the time of the SNTP server.

# 9.8 Power supply part

- Rated supply voltage ： 100～240V AC
- Range of use voltage ： 85～264V AC
- Power supply frequency ： 50/60Hz（Sharing）
- Power consumption ：

| Power-supply voltage | Power consumption | |
|---|---|---|
| | Usually | LCD OFF ※ |
| 100V AC | Under 15VA | Under 12VA |
| 240V AC | Under 25VA | Under 22VA |

　※ When you "OFF" the backlight by the LCD sleep function.

# 9.9 Structure

- Installation method ： Panel burial installation（Vertical panel）
- Installation posture ： The rear side 0 ～ 30°, The right and left horizontal
- The installation panel thickness ： 2 ～ 7mm
- Material ： Polycarbonate, glass10%, UL94-V0
- Color ： Black
- Externals size ： 150（W）×144（H）×181.8（D）mm
- Mass ： About 1.0kg（Input 3 channel, option none）
- External terminal stand ： M3.5 screw terminal

# 9.10 Normal operating condition

- Power-supply voltage ： 85～264V AC
- Ambient temperature ： 0～50℃
- Surrounding humidity ： 20～80%RH
- Warm-up time ： 30 min or more after power supply is turned on.

# 9.11 Others

- Clock ：
  With calendar function (Christian era)
  Accuracy ±50ppm or less (About 2 min / month difference)
  However, it doesn't contain the error margin at power supply ON/OFF.
- Memory backup ：
  The parameter is preserved in an internal flash memory.
  The clock backup with the built-in lithium battery.（Battery life when no energizing, about 5 year）
- Insulation resistance ： Over 500V DC 20MΩ（Between each terminal－G terminals）
- Electric strength ：
  Between input terminals ⋯ 500V AC / 1 min
  Between power supply terminal－G terminals ⋯ 2000V AC / 1 min
  Between input terminal－G terminals ⋯ 500V AC / 1 min

## 9.12  Compatible specification

•CE：
  EMC instruction：EN61326-1 compatible
  Low Voltage Directive：EN61010-1 適合
• Dustproof and waterproof standard：
  JIS C0920　IP65（Front panel）conforming

## 9.13  Transportation and storage conditions

• Temperature：－10～60℃
• Humidity：5～90%RH
• Vibration：Under 10～60Hz 2.45m/s$^2$
• Impact：Under 249m/s$^2$（State of packing）

## 9.14  Optional function（Option）

■Communication
  RS-485 communication module can be mounted.　（The 8th form digit code "1"）
• Telecommunication facility　：
  Electric specification：EIA RS-485 conforming
  Protocol：Modbus RTU
  Communication method：2-wire system half duplex：Start-stop synchronization
  Data form：Data length：8 bit
  Stop bit：1 bit
  Parity：Even, Odd, OFF
  Transmission rate：9600 bps
  Max connected number：The master includes 32 stand
                                （Multi drop）
  Communication distance：Max 500m（Total extension）
■DI/DO　（The 9th form digit code "1"）
Only one card with "the DI input in 9 points" and "the DO output in 12 points" can be mounted.
However, when the number of inputs is 12 points or relay output card selection, it is not possible
to mount.
•Connected method：Connector（40 pin、DI/DO coexistence）
•Insulation resistance：500V DC　over 20MΩ（Between each terminal－G terminals）
•Electric strength：500V AC 10mA　1min（Between each terminal－G terminals）
•DI input：
  Wireless pressure point of contact input（9 points）, Common
  Ratings：Photo coupler drive 12V DC about 3mA/1 point
  The following control is possible according to the contact input.（ON/OFF pulse time over 0.5
  sec）
  ①Start/stop of main and sub record operation
  ②Message setting
  ③Multiplication value reset
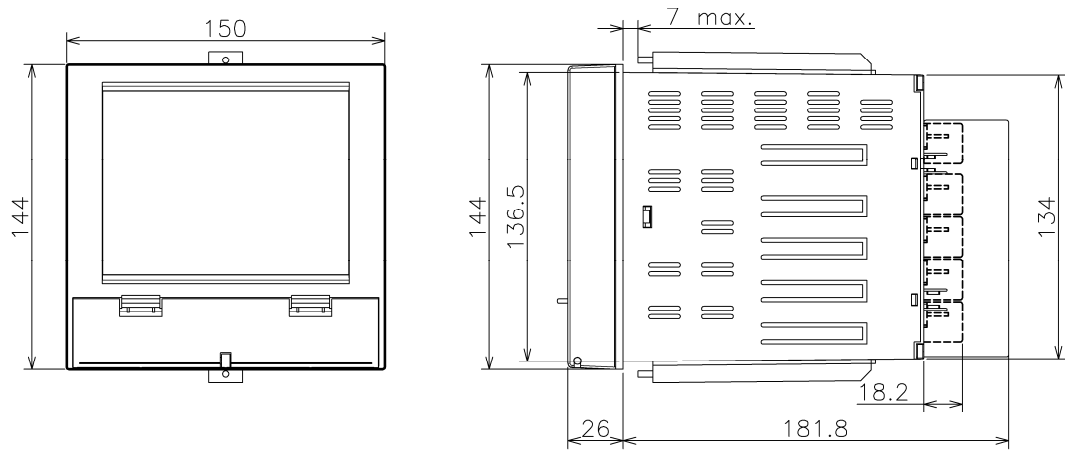  ④LCD back light ON/OFF control

•DO output ：
Open collector output（12 points）, Common
Point of contact ratings：30V DC　20mA/1 point
It is possible to specify it for an alarm output.
■Relay output 　（The 9th form digit code "2"）
Only one card with the output of the relay of 6 points can be mounted. However, when the number of inputs is 12 points or DI/DO card selection, it is not possible to mount. It is possible to specify it for an alarm output.
• Connected method：Terminal stand（M3.5 screw）
• Contact capacity：
3A/250V AC, 3A/30V DC
However 3A/1 common　Total under 9A
• Insulation resistance：500V DC　Over 20MΩ（Between relay terminal－G terminal）
• Electric strength：2000V AC　10mA　1 min（Between relay terminal－G terminal）

## 9.15　Support software

Two kinds of support software are appended by the standard.
• The corresponding model is PC/AT compatible.
• Operation by the home-made PC and the shop brand personal computer cannot be guaranteed.
• Disk device：
　CD-ROM drive corresponding to Windows XP/Vista
• Capacity of hard disk：
　The lowest remainder capacity：Over 500MB
• OS：Windows XP/Vista
• Printer：
　Printer and printer driver corresponding to Windows XP/Vista
■Parameter Loader software
• The main function：
　It is software to do the setting and the edit in various parameters of the main body on the personal computer. A set content is preserved on the SD memory card, and it is possible to read with the recorder.
■Data Viewer software
• The main function：
　It is software that reproduces the recorded data preserved on the SD memory card on the personal computer. It equips it with the historical trend display and the event display function. Data can be output to the CSV file.

# 9.16  Externals size



＜Panel cutting＞