High Resolution
Temperature Controller

REX-F9000

Instruction Manual

RKC INSTRUMENT INC.

IM9000F01-E2

Thank you for purchasing the **RKC** product.
Before operating this instrument, please carefully read this manual and fully understand its contents. And always keep it around you to make it available easily anytime.

SYMBOL

WARNING : If there are possible dangers such as electric shock, fire (burns), etc. which may result in operator's loss of life or injury, precautions to avoid such dangers are described.

CAUTION : In case instrument damages may be caused if operating procedures are not strictly followed, precautions to avoid such damages are described.

 : This mark is used when great care is needed especially for safety.

 : This mark is used when careful operation or handling is especially needed.

 : This mark is used when a supplemental description of operation or handling is needed.

 : This mark is used when detailed or related information needs to be referred to.

⚠ WARNING

- If failure or error of this instrument could result in a critical accident of the system, install an external protection circuit to prevent such an accident.
- Do not turn on the power supply until all of the wiring is completed. Otherwise electric shock, fire or malfunction may result.
- Use this instrument within the scope of its specifications. Otherwise fire or malfunction may result.
- Do not use this instrument in the places subject to flammable or explosive gas.
- Do not touch high-voltage blocks such as power supply terminals, etc. Otherwise electric shock may result.
- Never disassemble, repair or modify the instrument. This may cause electric shock, fire or malfunction.

CAUTION

- This is a Class A instrument. In a domestic environment this instrument may cause radio interference, in which case the user is required to take adequate measures.
- This instrument is protected from electric shock by reinforced insulation.
  So please arrange reinforced insulation to the wire for input signal against the wires for instrument power supply, source of power and loads as far as possible.
- This instrument is manufactured on the assumption that it is used in the condition of being mounted on the instrumentation panel. Therefore, take the necessary measures on the equipment side mounted with this instrument so that the operator or other personnel are not accessible to high-voltage blocks in this instrument such as power supply terminals, etc.
- Always observe precautions described in this manual. Otherwise serious injury or accident may result.
- Conduct all of the wiring in accordance with the local codes and regulations.
- Install a protection device such as a fuse, etc. in the power supply, input or output line, if necessary.
- Do not allow metal fragments or lead wire scraps to fall inside this instrument. This may cause electric shock, fire or malfunction.
- Firmly tighten each terminal screw at the specified torque. Otherwise electric shock or fire may result.
- Do not place any obstacle around this instrument in order not to impede radiation of heat. And do not close ventilation holes.
- Do not connect wires to unused terminals.
- Before cleaning the instrument, always turn off the power supply.
- Remove stains from this instrument using a soft, dry cloth. Do not use a volatile solvent such as thinner in order to avoid deformation or discoloration.
- Do not rub nor strike the display unit of this instrument with a hard object.

NOTICE

- This manual is prepared especially for readers who already have a fundamental knowledge of electricity, control, computer and communication.
- This manual is subject to change without prior notice.
- Examples of figures, diagrams and numeric values used in this manual are for a better understanding of the text, but not for assuring the resultant operation.
- This manual may not be reproduced or copied in whole or in part without **RKC**'s prior consent.
- **RKC** assumes no responsibility for any of the following damage which the user or third party may suffer.
  - Damage incurred as a result of using this product.
  - Damage caused by product failure which cannot be predicted by **RKC**.
  - Other indirect damage.
- In order to use this instrument continuously and safely, periodic maintenance is required. Some of components and parts used in this instrument have a limited service life, or deteriorate over time.
- This manual is carefully prepared. However, if any mistake or omission is found, please contact **RKC**.

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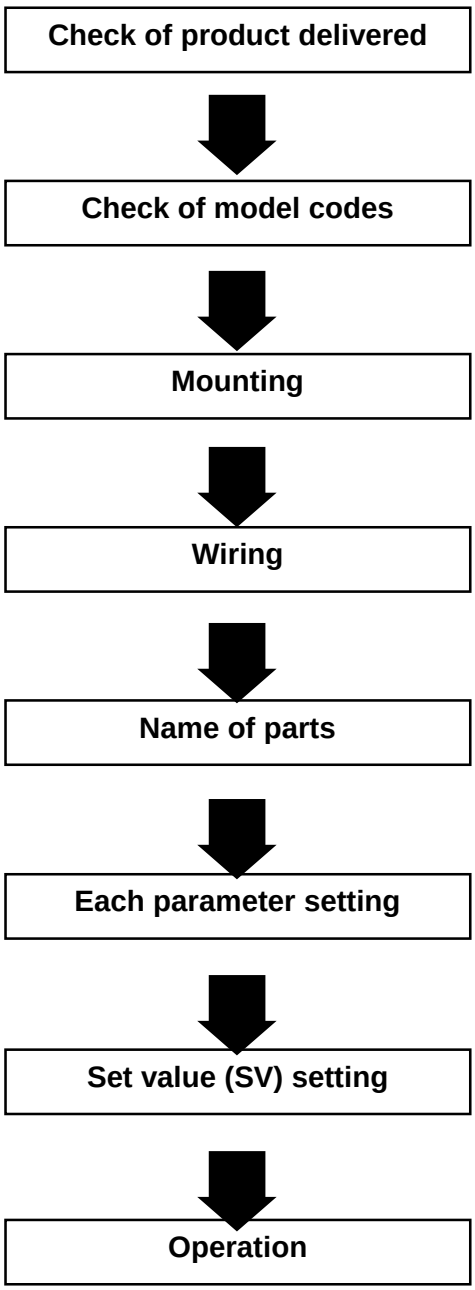
1. PREPARATION

1.1 Handling procedure

Conduct necessary work according to the following procedures :



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See "**1.3 Check of model code**" on page 2.
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1.2 Check of product delivered

Check than the following items are delivered without damage.

- Mainframe : 1 unit
- Mounting bracket : 2 pieces
- Instruction manual (IM9000F01-E2): 1 copy
- Communication Instruction Manual (IM9000F02-E□) : 1 copy
- Power feed transformer (PFT-01 or PFT-02) [Option] : 1 piece (Separate packing)

1.3 Check of model code

Check the model code from the following list to determine if the product delivered is as desired.

■ Model code

F9000 - □□□ - □ ∗ □□/□
①②③ ④ ⑤⑥ ⑦

① Number of channel
1 : 1-channel type
2 : 2-channel type

② Control output [CH1]
V : Voltage pulse
8 : Current 4 to 20 mA DC

③ Control output [CH2]
N : For the 1-channel type, there is no CH2 control output.
V : Voltage pulse
8 : Current 4 to 20 mA DC

④ Power supply voltage
3 : 24 V AC/DC
4 : 100 to 240 V AC

⑤ Analog output [CH1] *1
N : No analog output
4 : Voltage 0 to 5 V DC
6 : Voltage 1 to 5 V DC
7 : Current 0 to 20 mA DC
8 : Current 4 to 20 mA DC

⑥ Analog output [CH2] *1
N : No analog output
4 : Voltage 0 to 5 V DC
6 : Voltage 1 to 5 V DC
7 : Current 0 to 20 mA DC
8 : Current 4 to 20 mA DC

⑦ Power feed transformer *1
1 : PFT-01 (100 to 120 V AC)
2 : PFT-02 (200 to 240 V AC)
N : No power feed transformer provided

***1** : Option

2. MOUNTING

⚠ WARNING

In order to prevent electric shock or instrument failure, do not turn on the power before mounting or removing the instrument.

2.1 Cautions for mounting

(1) This instrument is intended to be used under the following environmental conditions. (IEC1010)

- OVERVOLTAGE CATEGORY Ⅱ
- POLLUTION DEGREE 2

(2) Avoid the following when selecting the mounting location.

- Ambient temperature of less than 0 °C or more than 50 °C.
- Ambient humidity of less than 45% or more than 85 % RH.
- Rapid changes in ambient temperature which may cause condensation.
- Corrosive or inflammable gases.
- Direct vibration or shock to the mainframe.
- Water, oil, chemicals, vapor or steam splashes.
- Excessive dust, salt or iron particles.
- Excessive induction noise, static electricity, magnetic fields or noise.
- Direct air flow from an air conditioner.
- Should be used indoors where the system is not exposed to direct sunlight.
- Heat to be accumulated radiation heat.

2.2 Dimensions

Engineering unit : mm

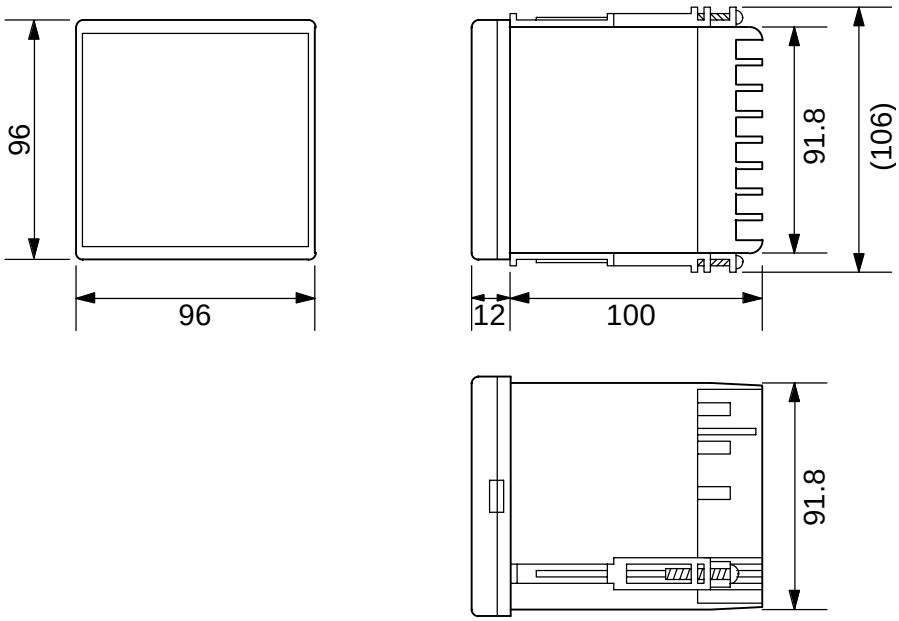
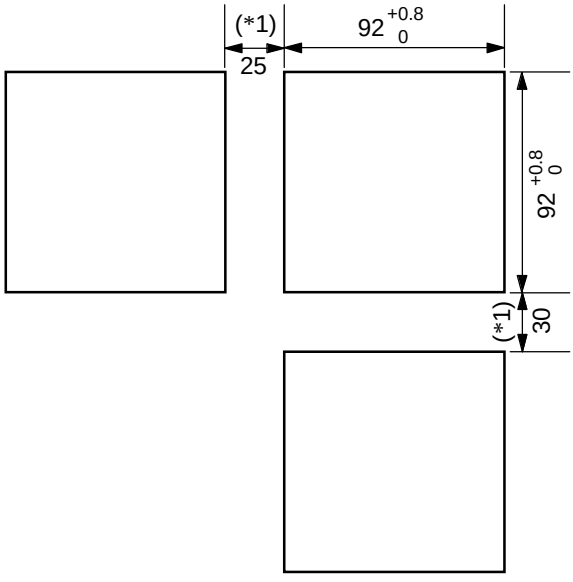
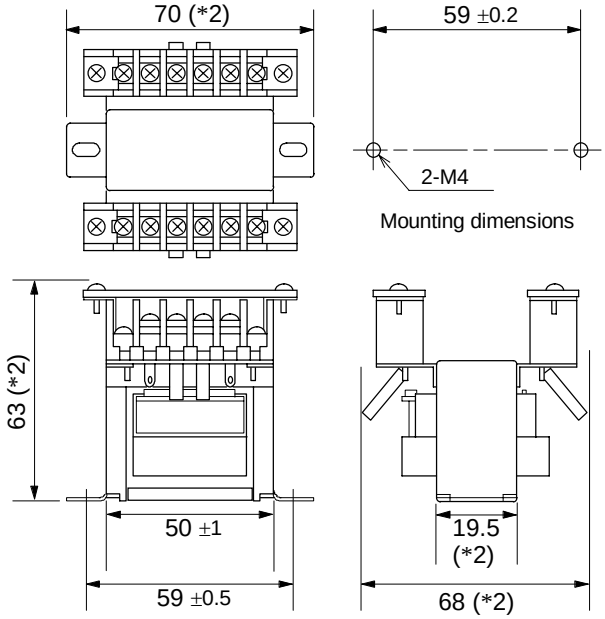


Fig. 2.1 Dimensions



(*1) : Minimum

Fig. 2.2 Panel cutout



(*2) : Maximum

Fig. 2.3 Dimensions
(Power feed transformer)

2.3 Mounting procedures

(1) Mount the panel cutout corresponding to the number of units on the panel by referring to panel cutout dimensions.
(2) Insert the instrument into the panel from the panel cutout.
(3) Insert the projections at the bottom of the bracket into the slots at the top of the controller (Fig. 2.4 ①).
(4) Then tighten the mounting bracket setscrew from the rear with a Phillips screwdriver. Do not over tighten the bracket setscrew. (Fig. 2.4 ②)
[Recommended tighten torque : 0.3 N·m or less (3 kgf·cm or less)]
(5) Set the other mounting bracket in the same way as in (3) and (4).

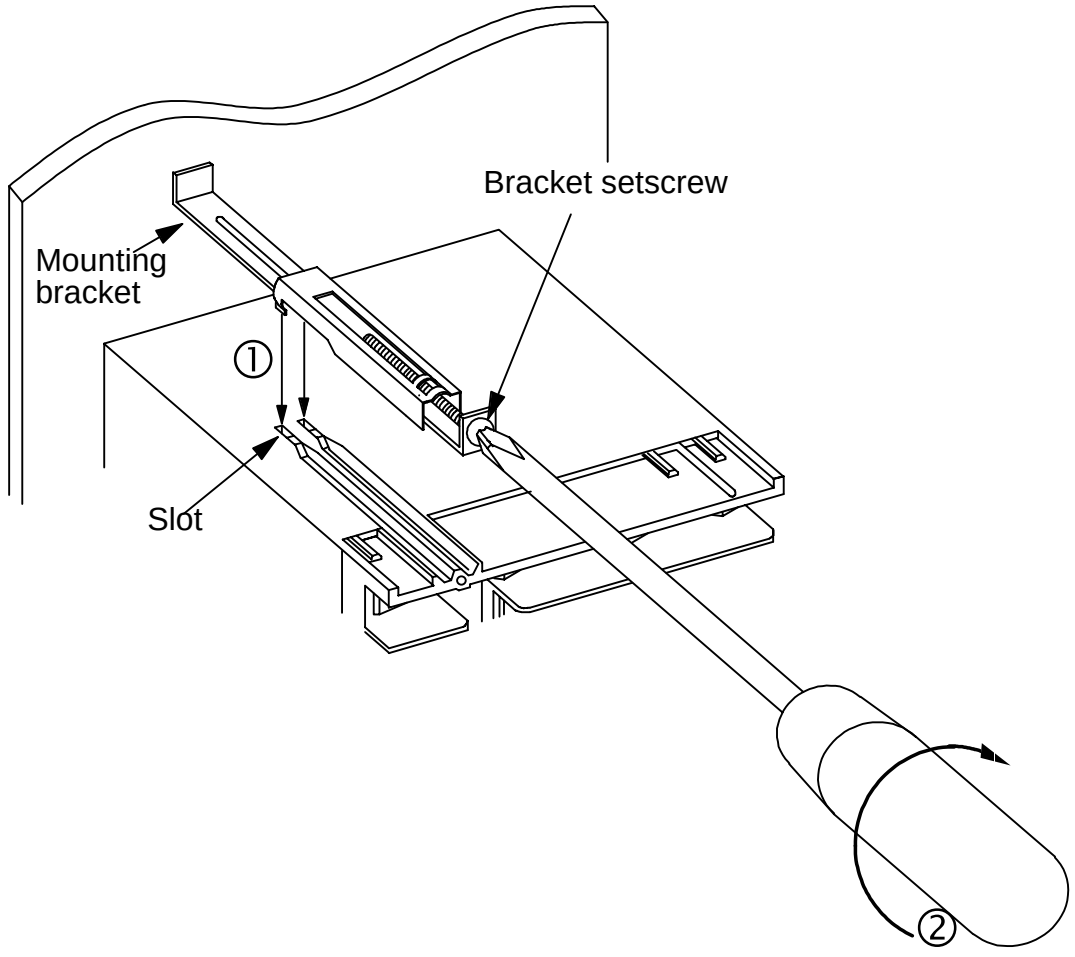


Fig. 2.4 Mounting

3. WIRING

⚠ WARNING

- In order to prevent electric shock or instrument failure, do not turn on the power supply until all of the wiring is completed.
- In failure or error of this instrument could result in a critical accident of the system, install an external protection circuit to prevent such an accident.
- In order to prevent instrument damage or failure, protect power line and input/output lines from high currents by using fuses with appropriate ratings.

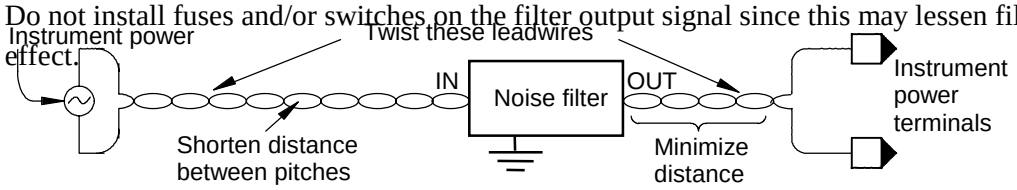
3.1 Cautions for wiring

(1) For RTD input connection, use lead wires with small lead wire resistance and also with the small
resistance difference between each of 3 or 4 lead wires.

(2) Conduct input signal wiring away from instrument power, electric equipment power and load lines to avoid noise induction.

(3) Conduct instrument power wiring so as not to be influenced by noise from the electric equipment power. If the instrument may be affected by external noise, a noise filter should be used.

- Shorten the distance between twisted power supply wire pitches. The shorter the distance between the pitches, the more effective for noise reduction.
- Install the noise filter on the panel which is always grounded and minimize the wiring distance between the noise filter output side and the instrument power terminals.
- Do not install fuses and/or switches on the filter output signal since this may lessen filter effect.



(4) For wiring, use wires conforming to the domestic standard of each country.

(5) For power supply wires, use twisted wires with low voltage drop.

(6) About 5 to 6 sec are required as the preparation time for contact output after power on. Use a delay relay when the output line, is used for an external interlock circuit.

(7) This instrument has no power supply switch nor fuses. Therefore, install the fuse close to the instrument and the switch, if required.

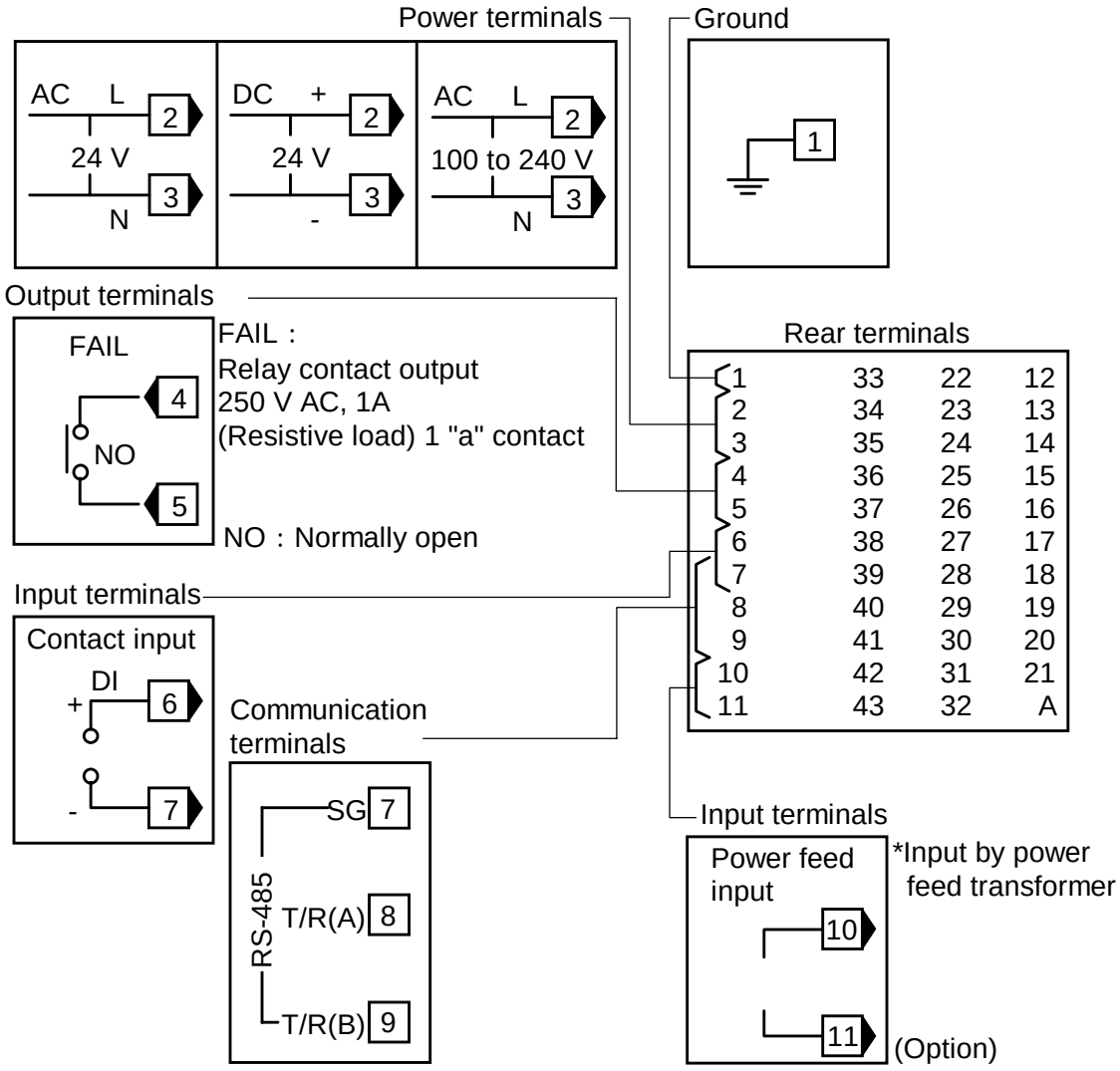
- Fuse type : Time-lag fuse
- Recommended fuse rating : Rated voltage : 250 V Rated current : 1 A

(8) Do not excessively tighten the terminal screws. In addition, use the solderless terminal appropriate to the screw size.

- Screw size : M3 × 8
- Recommended tighten torque : 0.4 N·m [4 kgf·cm]

3.2 Terminal configuration

Conduct wiring by referring to following diagrams.



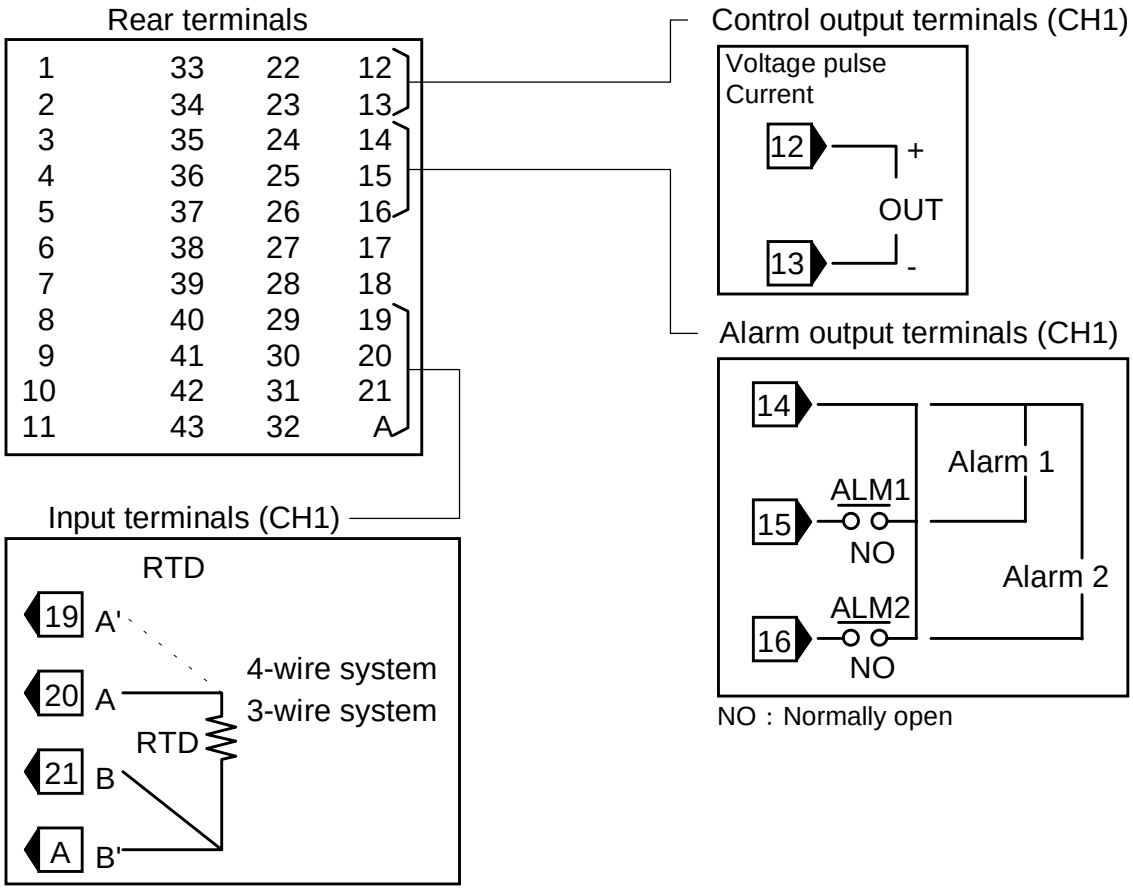
■ Power supply voltage :
85 to 264 V AC (50/60 Hz)
[Including power supply voltage variation]
(Rating : 100 to 240 V AC)

21.6 to 26.4 V AC (50/60 Hz)
[Including power supply voltage variation]
(Rating : 24 V AC)

21.6 to 26.4 V DC
[Including power supply voltage variation]
(Rating : 24 V DC)

■ Power consumption :
13 VA max. (at 100 V AC)
19 VA max. (at 240 V AC)
11 VA max. (at 24 V AC)
8.16W [340 mA] max. (at 24 V DC)

■ Contact input :
Number of input point : 1 point
Input type : Dry contact input
Resistance value judged that the contact opens. :
500 kΩ or more
Resistance value judged that the contact closed. :
10 Ω or less



■ Control output (CH1) :

Voltage pulse output : Output voltage : 0/12 V DC
Allowable load resistance : 600 Ω or more

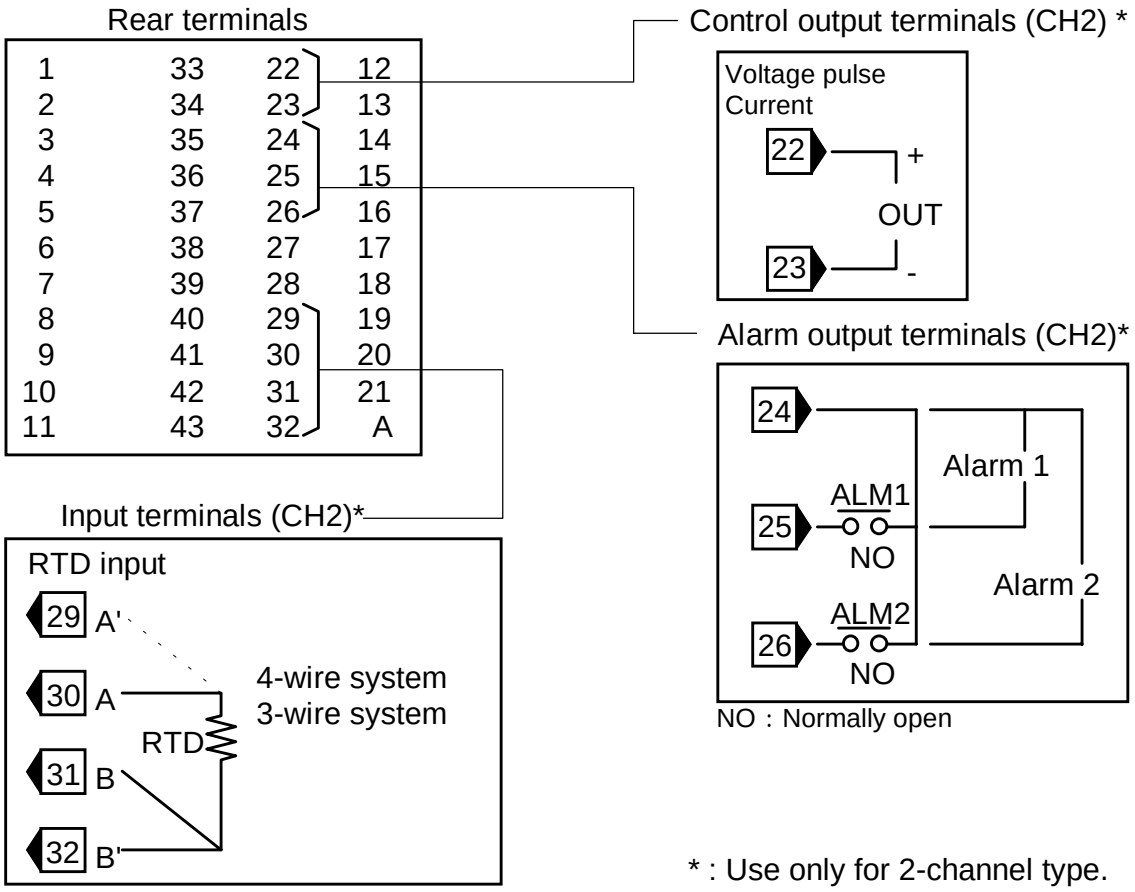
Current output : Output current : 4 to 20 mA DC
Resolution : 13 bit or more
Allowable load resistance : 600 Ω or less

■ Alarm output (CH1) :

Number of output points : 2 points [Relay contact output 250 V AC, 1A (Resistive load) 1a contact]
Electrical life : 50,000 times or more (Rated load)

■ Input (CH1) :

Input : RTD input : Pt100 Ω (JIS/IEC), JPt100 Ω
*Corresponding to the 3- and 4-wire systems.
Influence of input lead : 0.04 °C or less
(Per wire : 10 Ω or less)



■ Control output (CH2) :

Voltage pulse output : Output voltage : 0/12 V DC
Allowable load resistance : 600 Ω or more

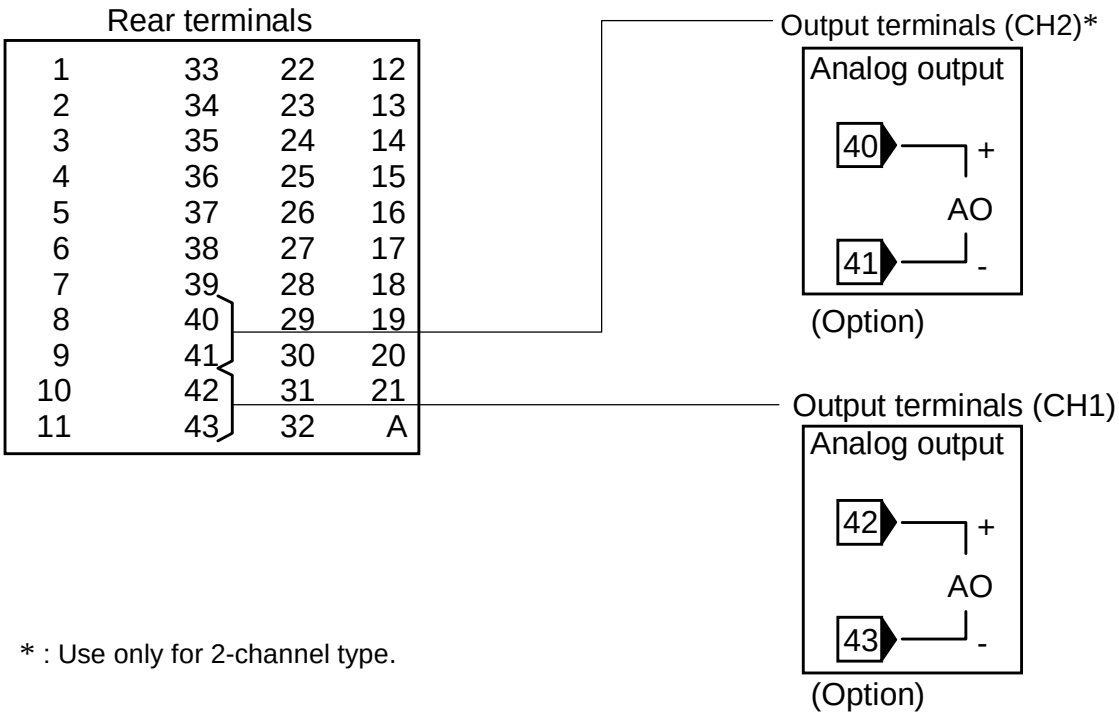
Current output : Output current : 4 to 20 mA DC
Resolution : 13 bit or more
Allowable load resistance : 600 Ω or less

■ Alarm output (CH2) :

Number of output points : 2 points [Relay contact output 250 V AC, 1A (Resistive load) 1a contact]
Electrical life : 50,000 times or more (Rated load)

■ Input (CH2) :

Input : RTD input : Pt100 Ω (JIS/IEC), JPt100 Ω
*Corresponding to the 3- and 4-wire systems.
Influence of input lead : 0.04 °C or less
(Per wire : 10 Ω or less)



* : Use only for 2-channel type.

■ Analog output (Option) :

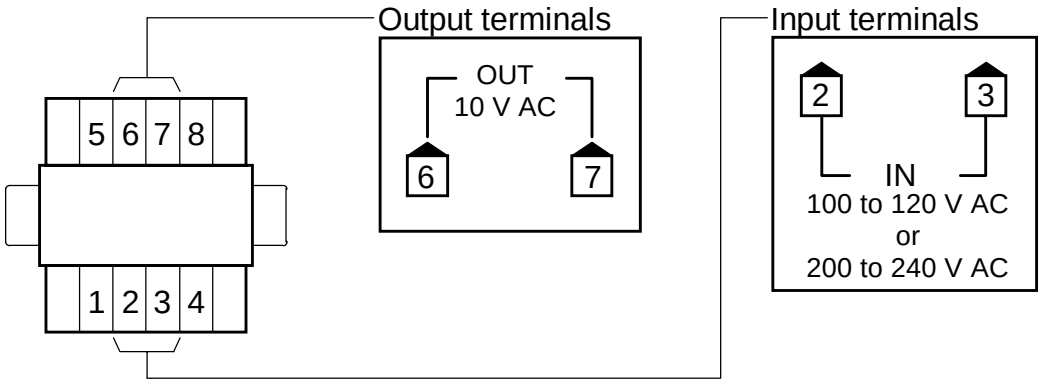
Number of output points : 1 point (1-channel type)
2 points (2-channel type)

Output types : Voltage output : 0 to 5 V DC, 1 to 5 V DC
Current input : 0 to 20 mA DC, 4 to 20 mA DC

Allowable load resistance : Voltage output : 1 k Ω or more
Current input : 600 Ω or less

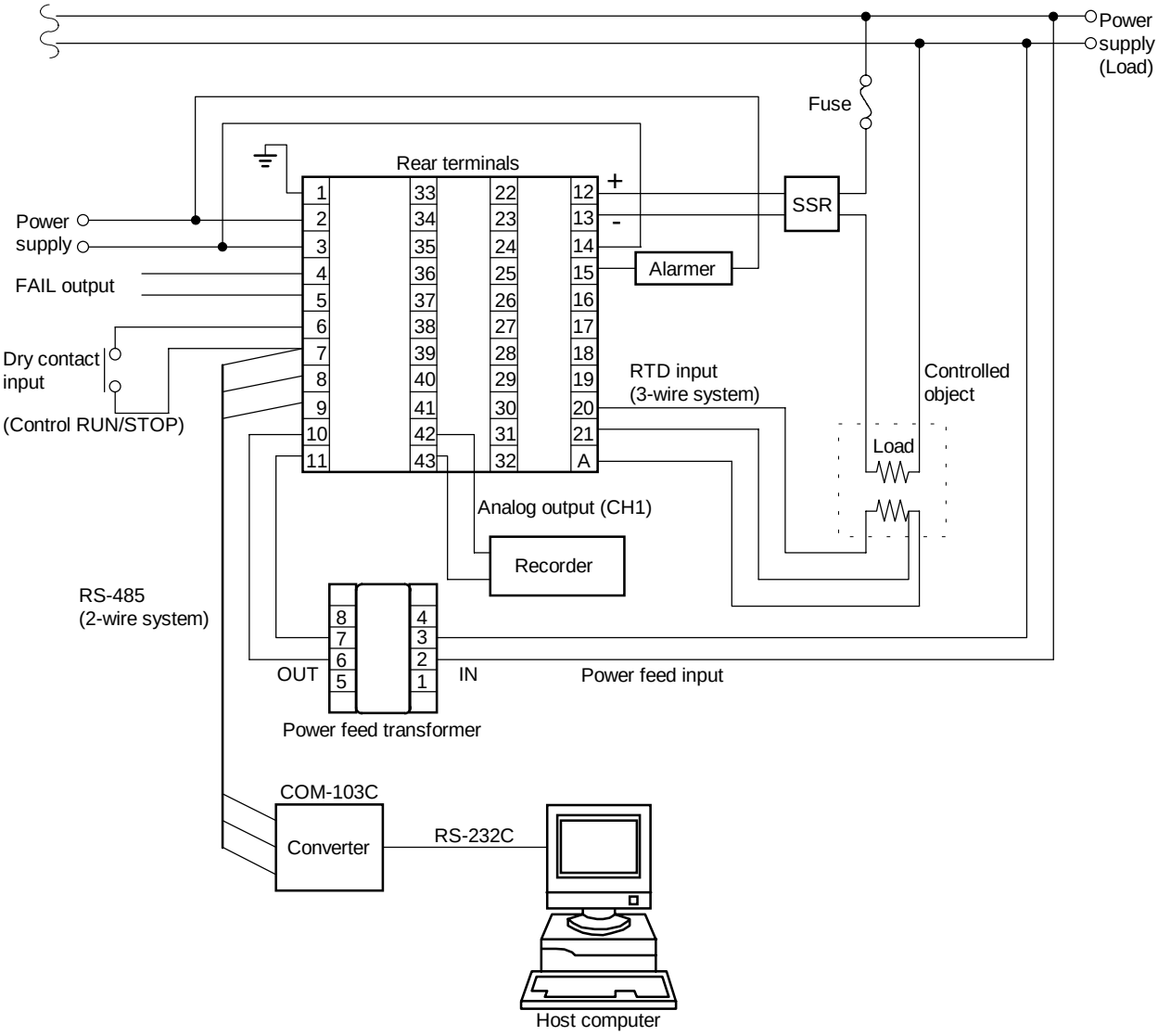
Output impedance : Voltage output : 0.1 Ω or less
Current input : 5 MΩ or more

Terminal configuration (Power feed transformer)

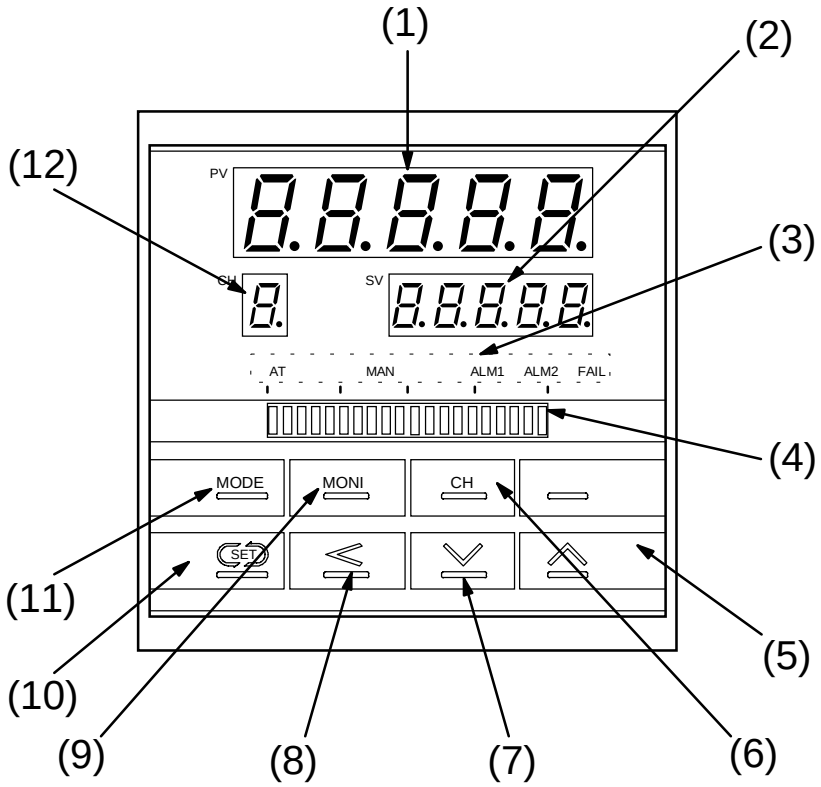


3.3 Wiring example

■ 1-channel type



4. NAME OF PARTS



(1) Measured value (PV) display unit [Green]

- Displays measured value (PV).
- Displays various each parameter symbol set value depending on the instrument.

(2) Set value (SV) display unit [Orange]

- For the 2-channel type, measured value (PV) is displayed.
- Displays set value (SV) and various set values.

(3) Indication lamps

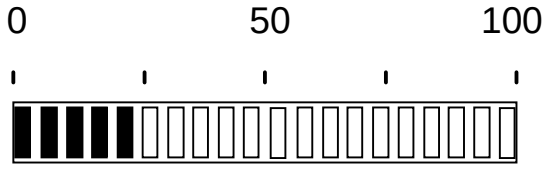
- AT (Autotuning lamp) [Green] : Flashes during autotuning execution.
- MAN (Manual lamp) [Green] : Lights in the manual mode.
- ALM1, ALM2 (Alarm lamps) [Red] : ALM1 : Lights when alarm 1 output is turned on.
  ALM2 : Lights when alarm 2 output is turned on.
- FAIL (Failure lamp) [Red] : Lights in the fail status.

(4) Bar-graph display unit :

- Manipulated output value (MV) display :

  When manipulated output value (MV) becomes 0 % or less, the dot at the left end of the bar-graph only flashes and when it exceeds 100 %, that at the right end flashes.

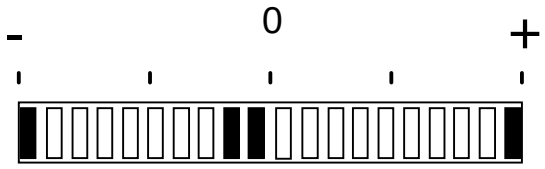
  [Example of display]



- Deviation display :

  The dots at both ends of bar-graph light to indicate deviation display.

  [Example of display]



(5) ∧ (Up key)

- Used to increase numerals.
- Mode selection is made.

(6) CH (Channel key)

The selection of CH1 and CH2 is made.

(7) ∨ (Down key)

- Used to decrease numerals.
- Mode selection is mode.

(8) < (Shift key)

Used when the cursor (brightly lit) is moved to the digit whose numeric value needs to be changed for

set value change.

(9) MONI (Monitoring key)

Used to call up the CH1PV/CH2PV, PV/SV or MV display.

(10) SET (Set key)

- Used for parameter registration/calling up.
- Used to call up "SV setting mode", "Operator set mode" or "Setup mode".

(11) MODE (Mode key)

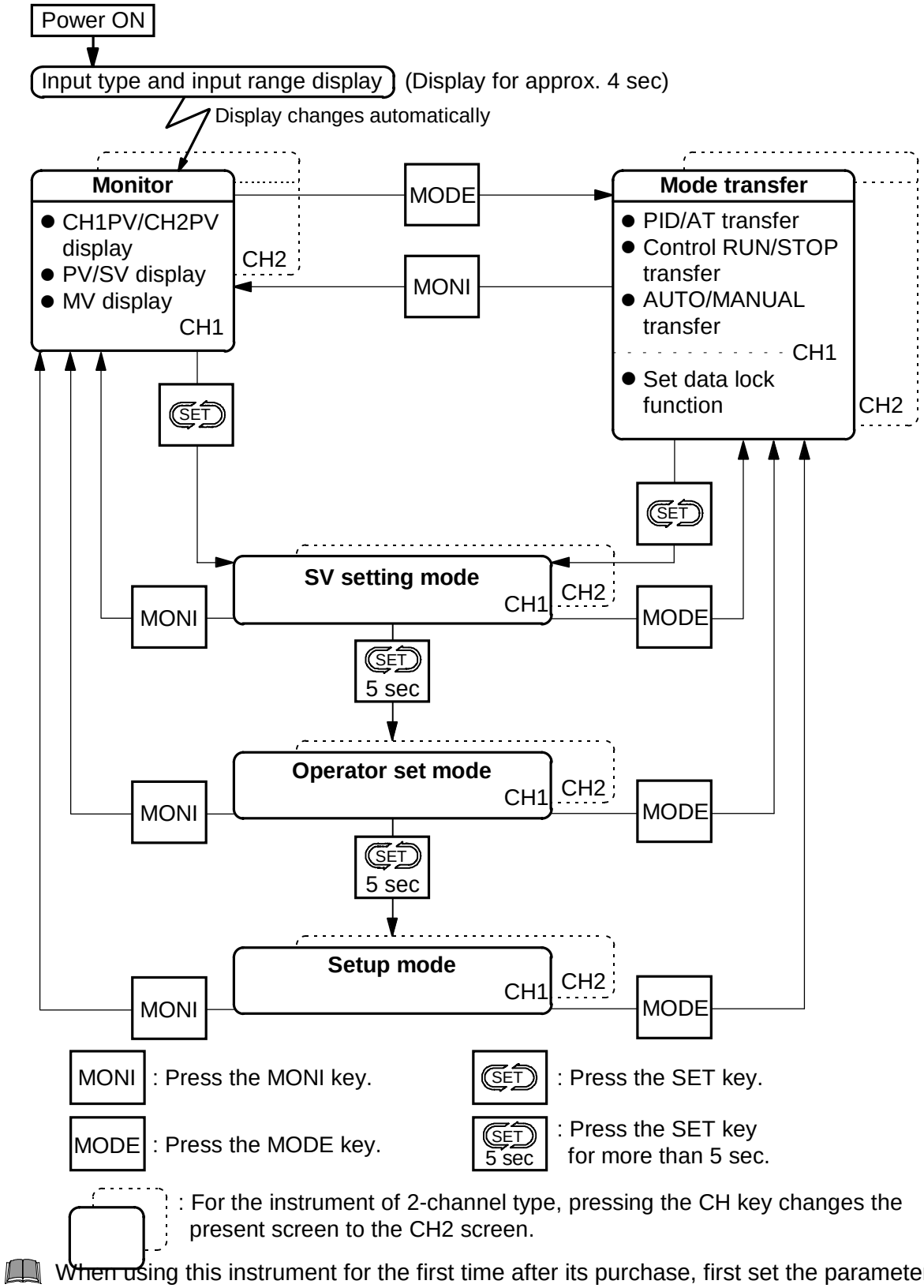
- Used to call up "Mode transfer".
- Used to select "PID/Autotuning transfer", "Control RUN/STOP", "AUTO/MANUAL" or "Set data lock".

(12) Channel (CH) display unit

- Displays the channel No. being used.
- For the 2-channel type and CH1PV/CH2PV display, nothing is displayed.

5. SETTING

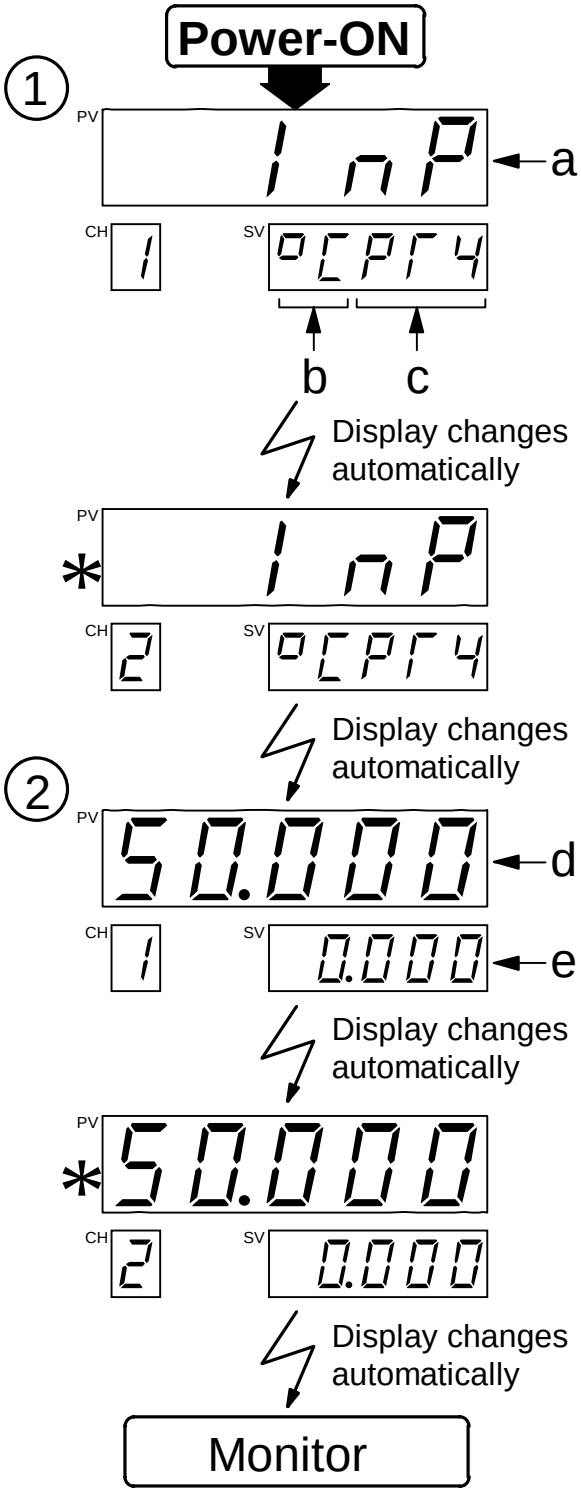
5.1 Calling-up procedure of monitor and each mode



When using this instrument for the first time after its purchase, first set the parameters in "5.6 Set up mode" (P.30).

■ Input type/input range display

This instrument immediately confirms input type and range following power-ON.



∗ : Display only for 2-channel type.

① Input type display

a : Input display parameter symbol (Inp)
b : Engineering unit (°C)
c : Input type :

- Pr3 : Pt100 Ω (3-wire system)
- JP3 : JPt100 Ω (3-wire system)
- Pr4 : Pt100 Ω (4-wire system)
- JP4 : JPt100 Ω (4-wire system)

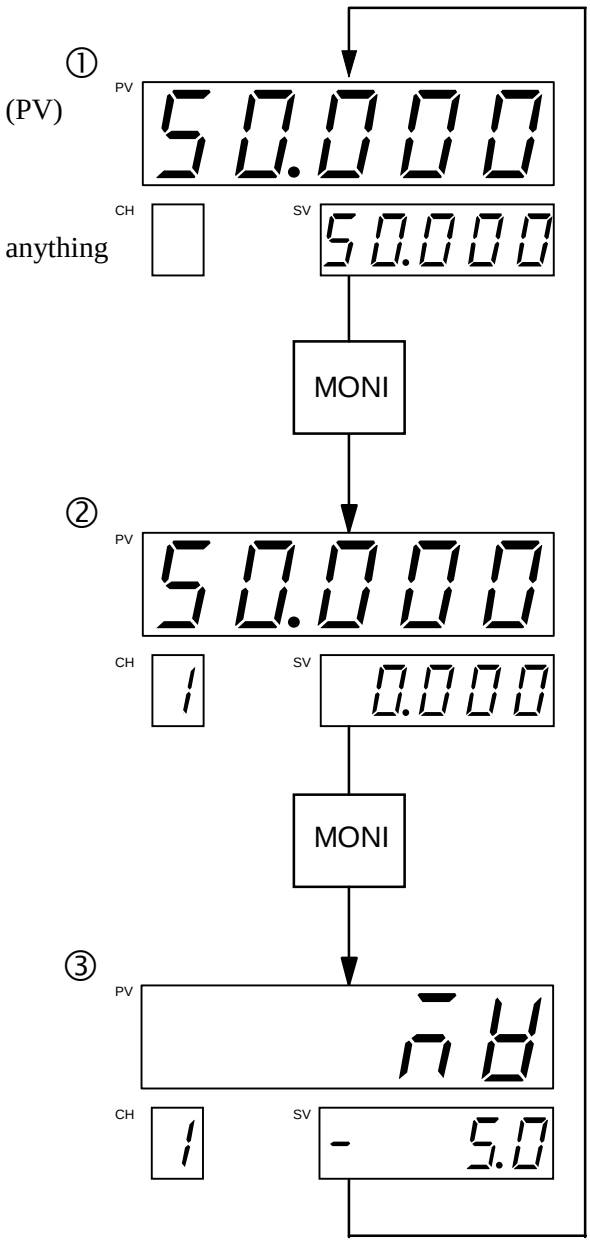
② Input range display

d : Setting limiter [high limit] (Input range high)
e : Setting limiter [low limit] (Input range low)

5.2 Monitor

The monitor unit monitors the measured value (PV) and set value (SV), and also monitors and changes the manipulated output value (MV).
The display in the monitor unit is selected by pressing the MONI key.

(1) Display sequence



① CH1PV/CH2PV display
The PV display unit shows measured value in CH1, while the SV display unit shows measured value (PV) in CH2.
The channel display unit does not show during CH1PV/CH2PV display.

② PV/SV display
Display measured value (PV) on the PV display unit and set value (SV) on the SV display unit. In addition, the manipulated output value (MV) can be manually (MANUAL) set in manual mode. The manipulated output value (MV) is displayed on the SV display unit.

③ MV display
The PV display unit shows the parameter symbol (MV), and the SV display unit shows the manipulated output value (MV).

📖 Usually the control is set to this monitor excepting that the set value (SV) and/or the parameter set value are changed.

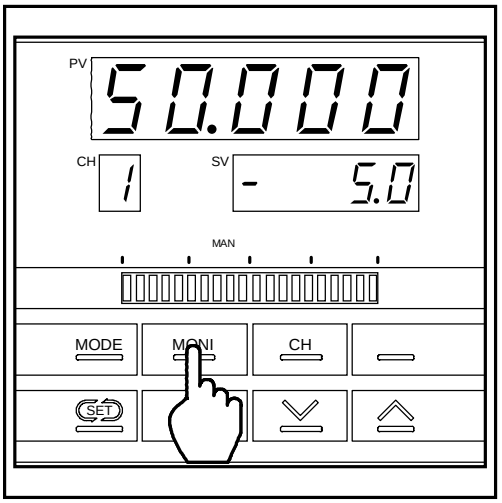
📖 For the 1-channel type, pressing the MONI key in MV display mode changes to the PV/SV display.

(2) Procedure for setting the manipulated output value (MV) in MAN mode

Manipulated output value (MV) in the manual (MAN) mode can be manually set in the PV/SV display.

The manipulated output value (MV) is changed after "MANUAL" is selected by "AUTO/MANUAL transfer" for mode transfer. (See P.19)

[Example]

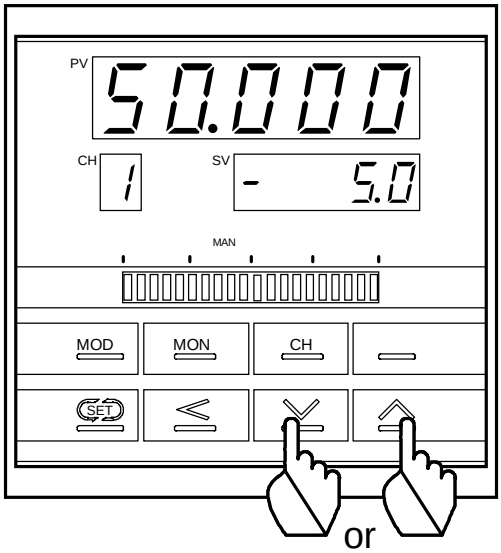


PV/SV display

① Set the instrument to PV/SV display

If the instrument is set to another mode, press the MONI key to set the instrument to the PV/SV display. At this time, the MAN lamp lights.

*For the details of PV/SV display selection, see "5.1 Procedure for setting each mode and monitor".



② Manipulated set value (MV) change

Pressing the UP key increases the manipulated output value on the SV display unit, and pressing the DOWN key decreases the value.

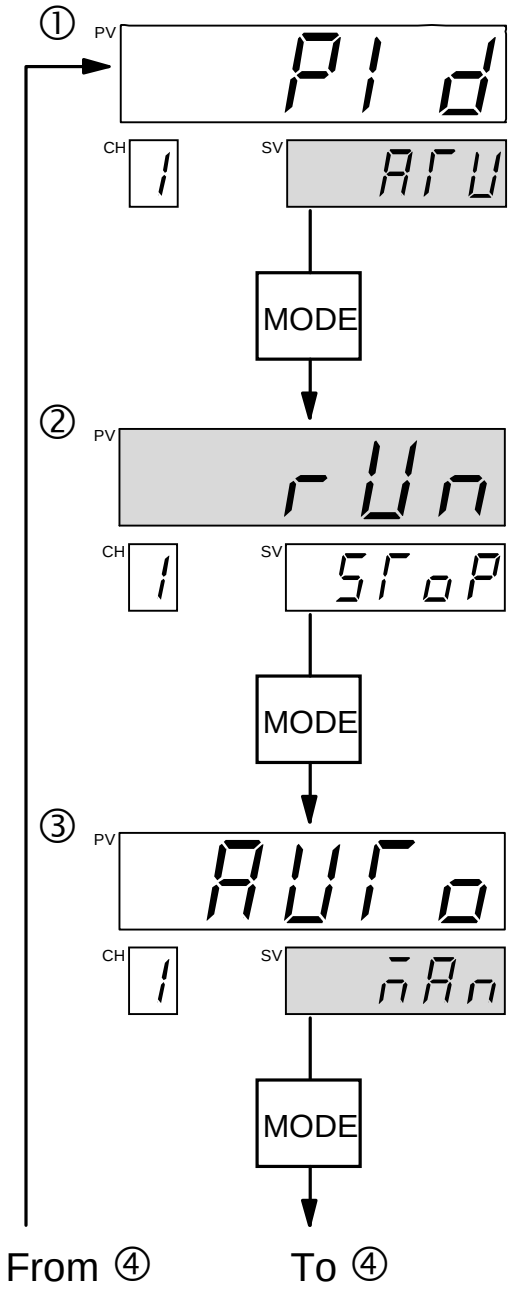
Setting range : -5.0 to + 105.0 %

*Keeping pressing the DOWN or UP key makes numeric value change faster.

5.3 Mode transfer

"Mode transfer" is used to change PID/AT, control RUN/STOP or AUTO/MANUAL or to set the set data lock. Display in the mode transfer is changed by the MODE key.

(1) Display sequence



① PID/AT transfer

PID control or autotuning (AT) is selected by pressing the UP/DOWN keys.
(The figure at left shows the PID control.)

*If the autotuning (AT) is executed, the AT lamp
flashes.

② Control RUN/STOP transfer

Selected when control is either executed (RUN) or stopped (STOP).
(The figure at left shows the STOP.)

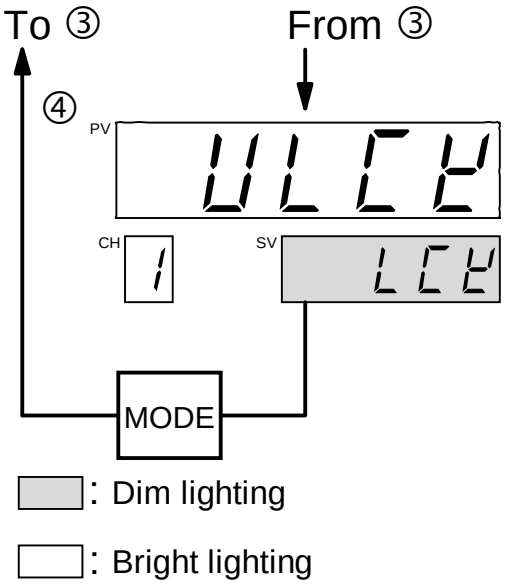
③ AUTO/MANUAL transfer

Selected when control is performed in either the automatic or manual mode.
(The figure at left shows the AUTO.)

*For the details of manual operation, see "(2) Procedure for setting manipulated output value (MV) in MAN mode" (P.18).

: Dim lighting

: Bright lighting



④ Set data lock function

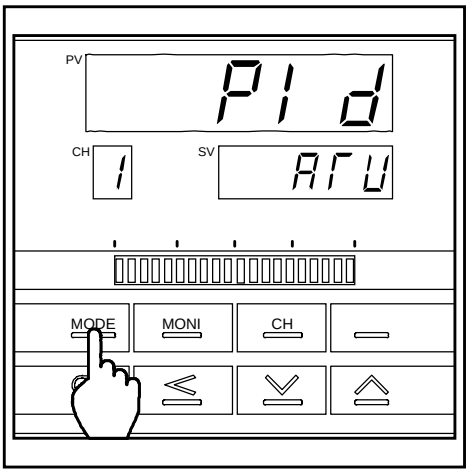
Selected when either the set data lock function is invalidated (unlock) or validated (lock).
(The figure at left shows the unlock.)

*For details on set data lock, See "**5.6 Setup mode**" (P.29).

- If mode transfer is disabled by locking the set data (PG40) in setup mode, no mode transfer is made by the front key. However, even if mode transfer is disabled, control RUN/STOP can be made by the contact input.
- For the 1-channel type, if the key is not operated for more than 1 minute, the present display automatically returns to the PV/SV display.
- For the 2-channel type, if the key is not operated for more than 1 minute, the present display automatically returns to the CH1PV/CH2PV display.

(2) Transfer to mode

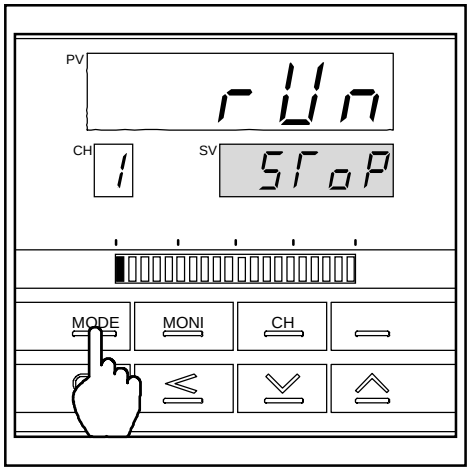
[Example] When operation is changed from execution (RUN) to STOP.



PID/AT transfer

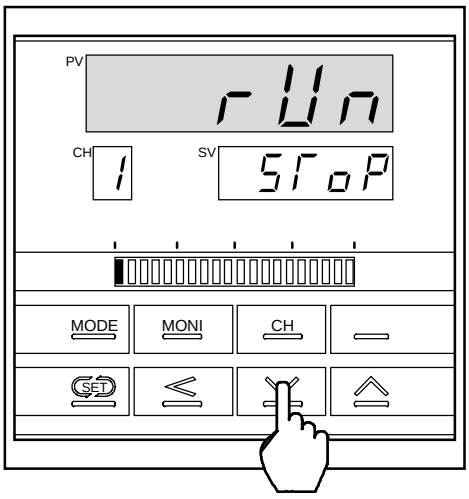
① Press the MODE key to set the instrument to the
"Mode transfer".
First, "PID/AT transfer" is displayed.

* For the details of "Mode transfer" selection, see "5.1 Procedure for selecting each mode and monitor".

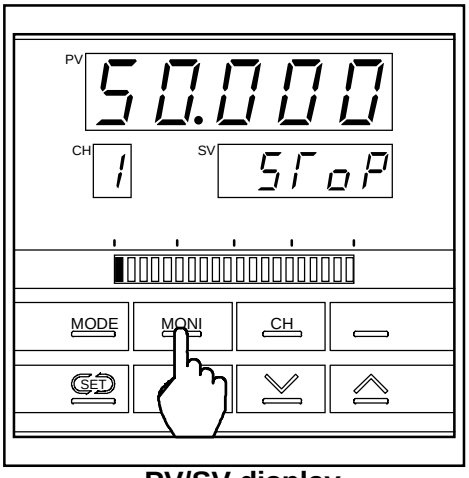


Control RUN/STOP transfer

② Press the MODE key to display "Control RUN/ STOP transfer".
The display selected is brightly lit.



③ Press the DOWN key to change the instrument from RUN to STOP. For mode transfer, mode transfer becomes valid at this time.



PV/SV display

④ After the above transfer is finished, press any key of MONI and MODE to set the instrument to the desired status.
(The figure at left shows the PV/SV display.)

* The transfer of other modes is also the same. Select the desired mode, then change to that mode.

(3) Control RUN/STOP transfer by contact input

The control RUN/STOP can be transferred according to the open/close status of the rear terminal Nos. 6 and 7.The control RUN/STOP transfer status by contact input is shown in the following.

The contact state during Control RUN/STOP transfer

	Front key selection	Status of rear terminal	Actual control mode
Control RUN/STOP	RUN	Closed	RUN
		Open	STOP
	STOP	Closed	
		Open	

- If control is stopped (STOP) by the front key, it is not started (RUN) even in the contact is closed.
- In this instrument, the control RUN/STOP is transferred approx. 1 sec after the rear terminal (Nos. 6, 7) open/close status is changed.

5.4 SV setting mode

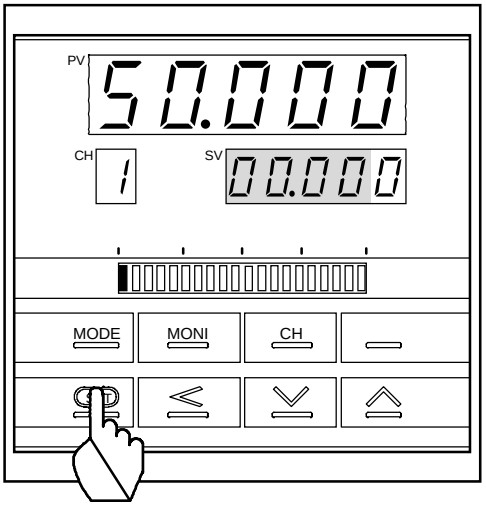
The SV setting mode is used to set the temperature set value (SV) which is the target value for control.

■ Setting change procedure

Setting caution

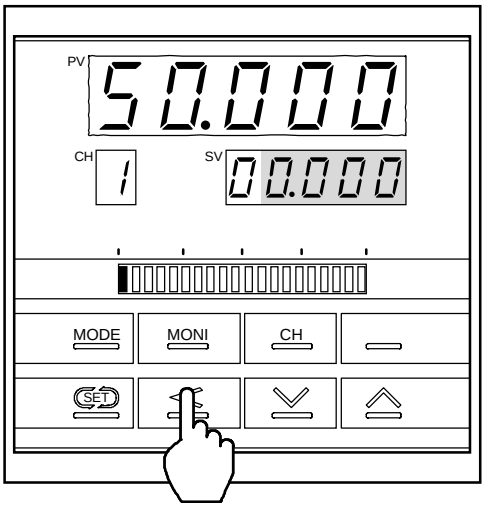
If the set data is locked, no SV setting mode is displayed.

[Example] When the set value (SV) is change to 20.000 °C

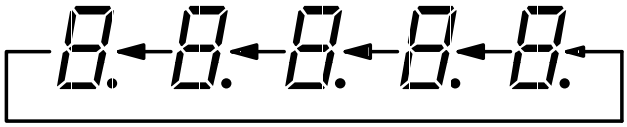


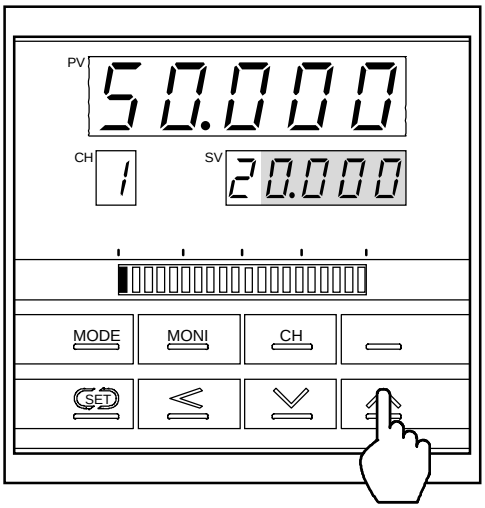
SV setting mode

① Press the SET key to set the instrument to the "SV setting mode".
Display measured value (PV) on the PV display unit and set value (SV) on the SV display unit.

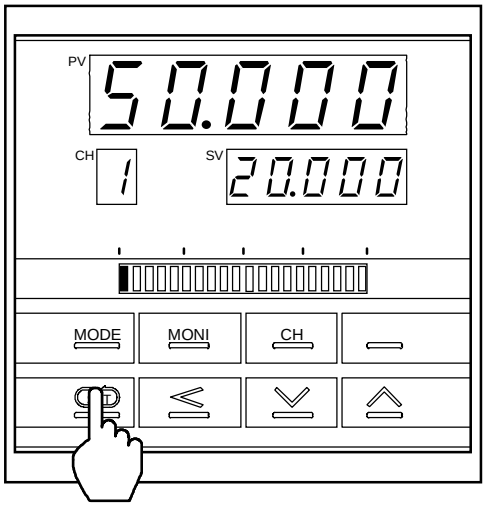


② Press the SHIFT key to move the brightly lit digit up to the most significant digit. Every time
are SHIFT key is pressed, each brightly lit digit movers as follows.





③ Press the UP key to set "2".
Pressing the UP key increments numeric value, and pressing the DOWN key decrements the value.



Monitor (PV/SV display)

④ Pressing the SET key registers the value thus set. (The present screen is changed to the PV/SV display.)

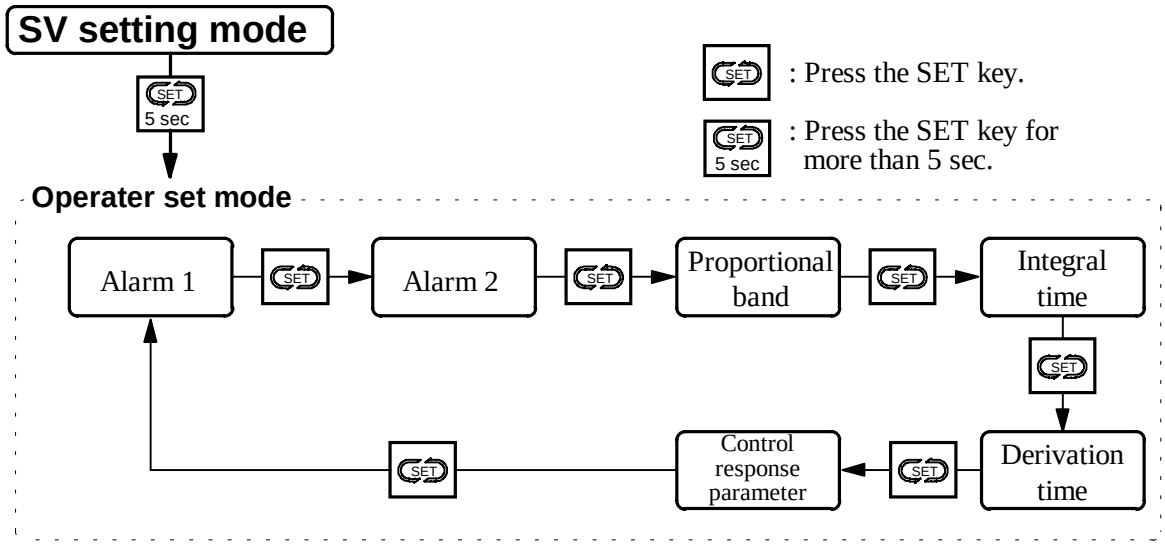
For the 1-channel type, if the key is not operated for more than 1 minute, the present display automatically returns to the PV/SV display.

For the 2-channel type, if the key is not operated for more than 1 minute, the present display automatically returns to the CH1PV/CH2PV display.

5.5 Operator set mode

The operator set mode is used to set various parameters for alarm set values and control. The display within operator set mode is changed by pressing the SET key.

(1) Display sequence



(2) Description of each parameter

Parameter list **#1 : Factory set value**

Symbol	Name	Setting range	Description	#1
AL 1	Alarm 1 setting *1	Process alarm : 0.000 to 50.000 °C Deviation alarm : -19.999 to +19.999 °C	Set the alarm 1 set value.	5.000
AL1				
AL2	Alarm 2 setting *2		Set the alarm 2 set value.	
P	Proportional band	0.001 to 50.000 °C *0.000 can't be set.	The proportional band for PI or PID control is set.	30.000
I	Integral time	0.1 to 3600.0 sec *0.0 can't be set.	Eliminates offset occurring in proportional control.	240.0
d	Derivative time	0.0 : Derivative action OFF 0.1 to 3600.0 sec	Prevents ripples by predicting output change, thereby improving control stability.	60.0

Continued on the next page.

Parameter list **#1 : Factory set value**

Symbol	Name	Setting range	Description	#1
rPT	Control response parameter	0 : Slow 1 : Medium 2 : Fast	Response required due to set-point change in PID action is performed.	0

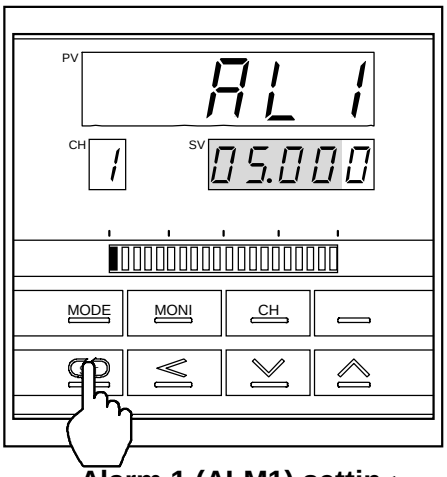
*1 : If there is no alarm 1, "-----" is displayed.
*2 : If there is no alarm 2, "-----" is displayed.

(3) Procedure for setting each parameter

Setting cautions

- For this instrument, the numeric value is not registered if it is only change by the UP/DOWN keys.
- If the set data is lock, all of the digits on the SV display unit are brightly lit and the set value cannot be changed.

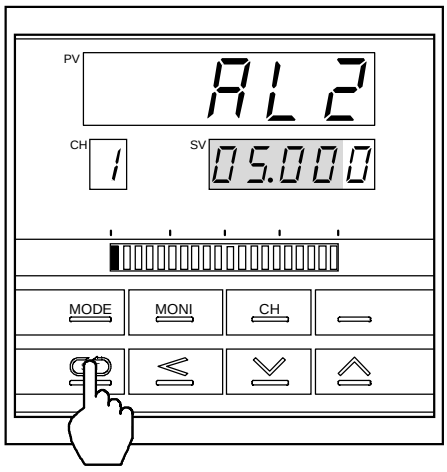
[Example] When the alarm 2 (AL2) is changed to 50.000 °C



Alarm 1 (ALM1) setting

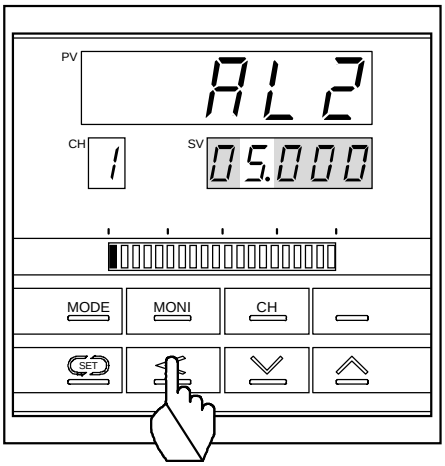
① Press the SET key for more than 5 sec to set the instrument to operator set mode.
Operator set mode is selected, "Alarm 1 (AL1) setting" is displayed first.

* For the details of operator set mode selection, see "5.1 Procedure for selecting each mode and monitor".

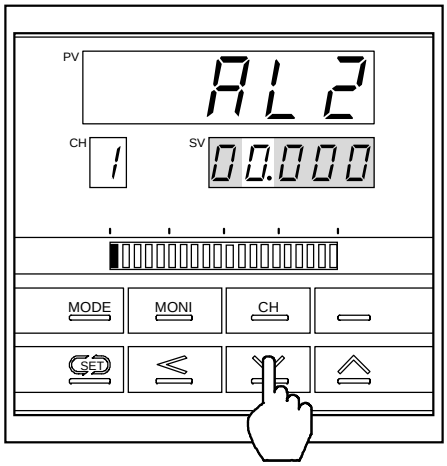


Alarm 2 (AL2) setting

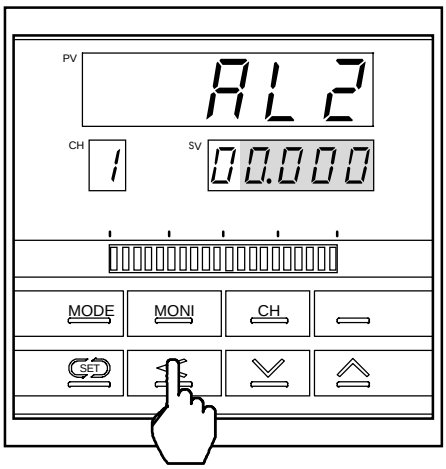
② Press the SET key to set the instrument to the alarm 2 setting.



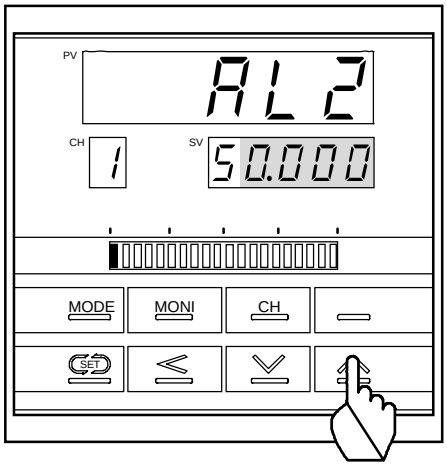
③ Press the SHIFT key to brightly light the units digit.



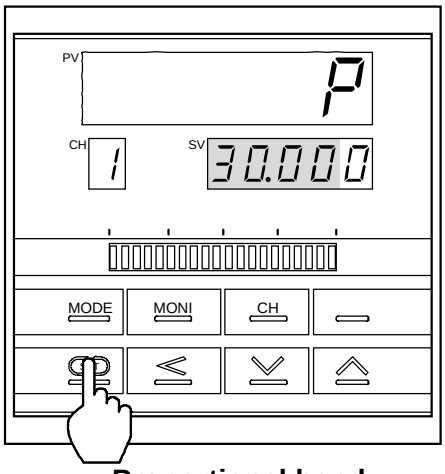
④ Press the DOWN key to enter "0" in the units digit.



⑤ Press the SHIFT key to move the brightly lit digit up to the most significant digit.



⑥ Press the UP key to enter "5" in the significant digit.



Proportional band

⑦ After the displayed value is changed, press the SET key.
[The present display changes to the proportional band display.]

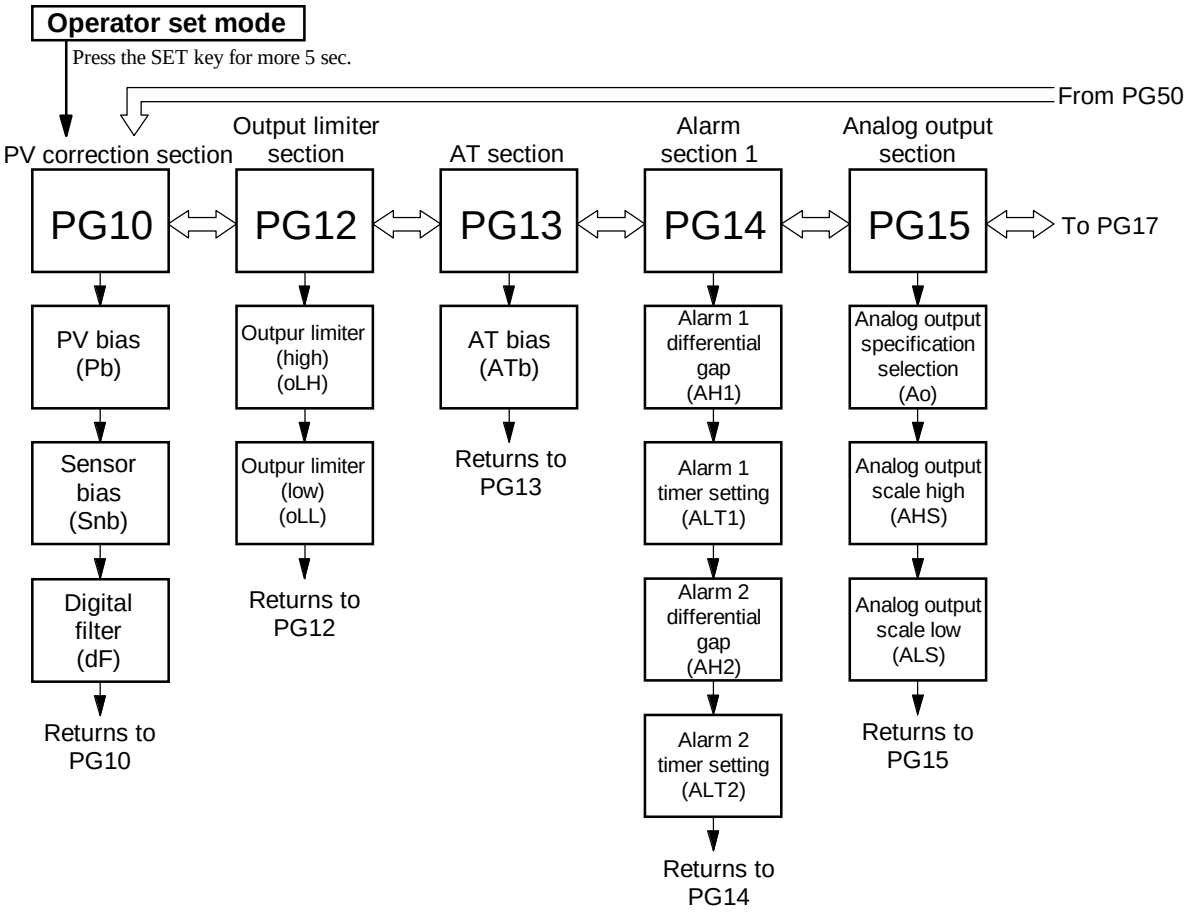
📖 For the 1-channel type, if the key is not operated for more than 1 minute, the present display automatically returns to the PV/SV display.

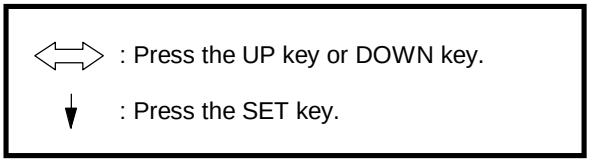
📖 For the 2-channel type, if the key is not operated for more than 1 minute, the present display automatically returns to the CH1PV/CH2PV display.

5.6 Setup mode

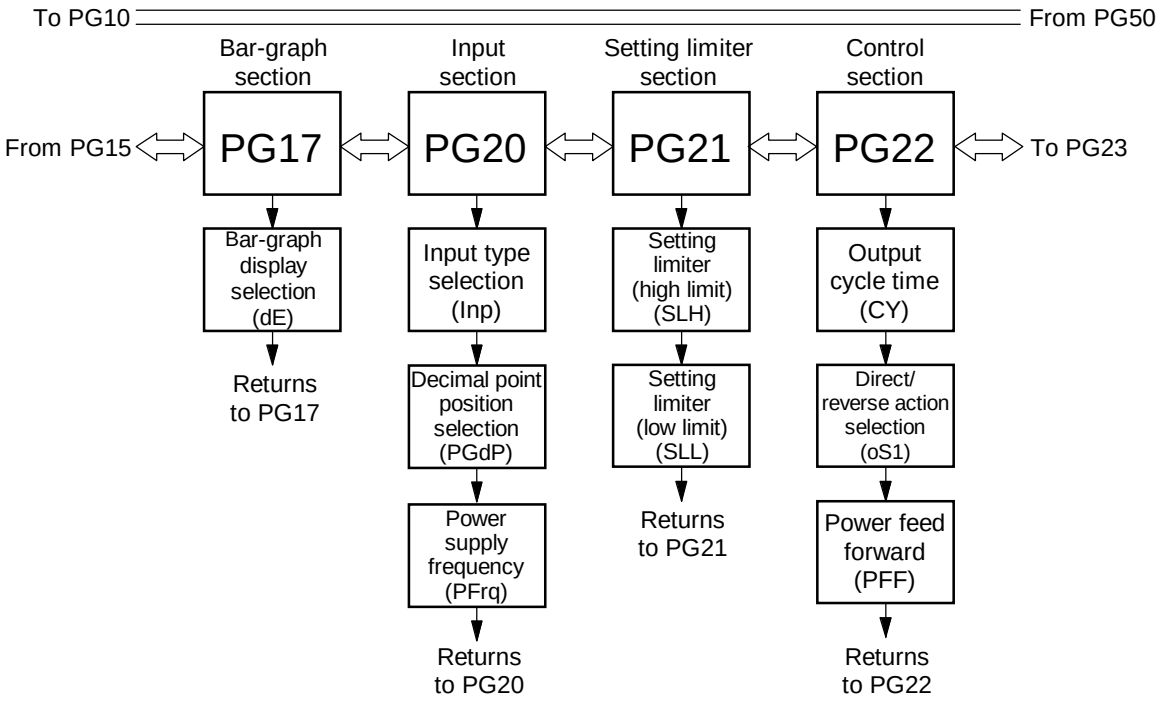
The setup mode is used to set some specific specifications (input type, input range, alarm type, etc.) and characteristics (setting limiter, alarm differential gap, etc.) of this instrument.

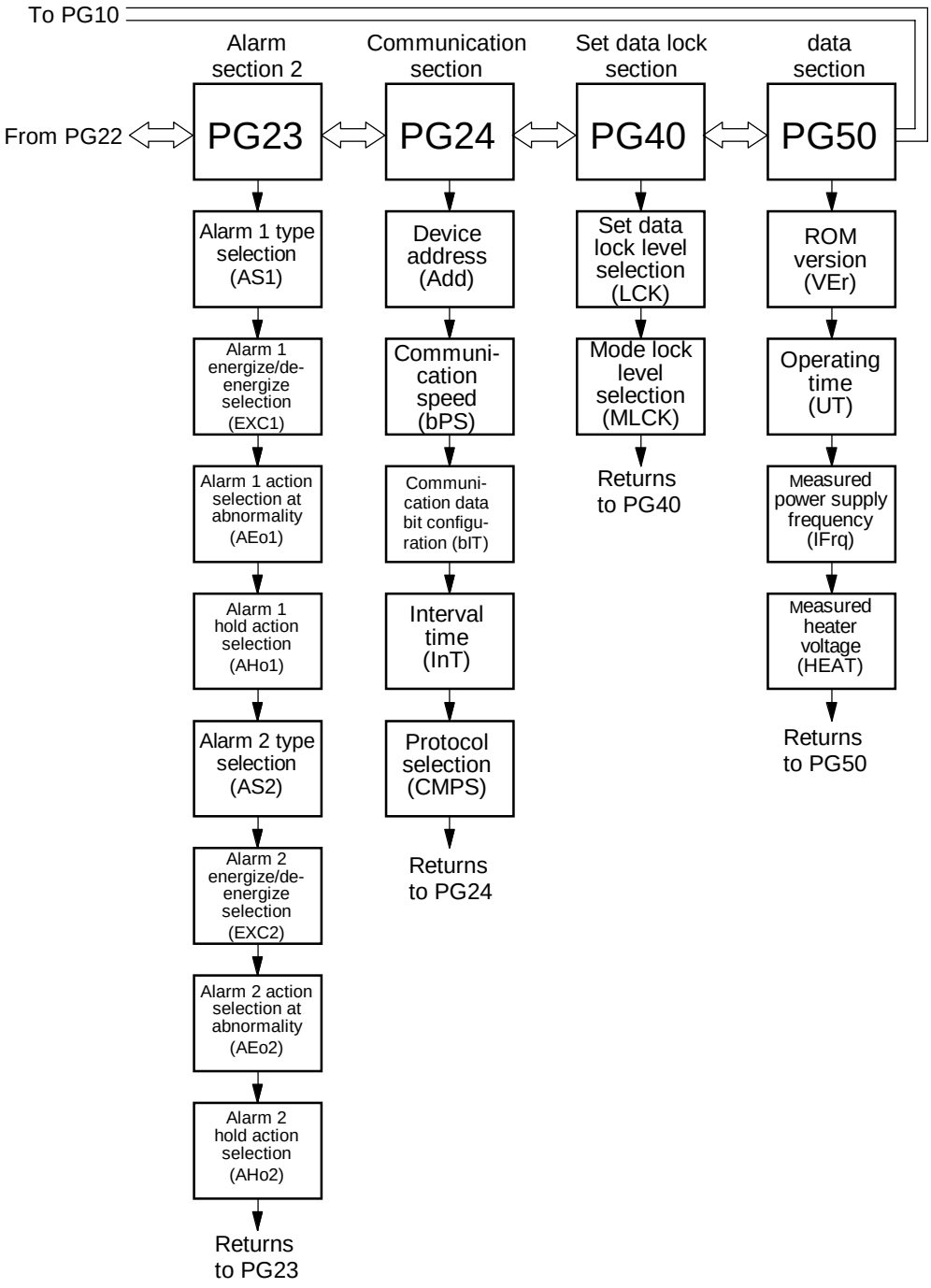
(1) Display sequence





PG : Means Parameter Group


To PG10
From PG50
Bar-graph section
Input section
Setting limiter section
Control section
From PG15
PG17
PG20
PG21
PG22
To PG23
Bar-graph display selection (dE)
Returns to PG17
Input type selection (Inp)
Decimal point position selection (PGdP)
Power supply frequency (PFrq)
Returns to PG20
Setting limiter (high limit) (SLH)
Setting limiter (low limit) (SLL)
Returns to PG21
Output cycle time (CY)
Direct/ reverse action selection (oS1)
Power feed forward (PFF)
Returns to PG22


To PG10
From PG22
Alarm section 2
Communication section
Set data lock section
data section
PG23
PG24
PG40
PG50
Alarm 1 type selection (AS1)
Alarm 1 energize/de-energize selection (EXC1)
Alarm 1 action selection at abnormality (AEo1)
Alarm 1 hold action selection (AHo1)
Alarm 2 type selection (AS2)
Alarm 2 energize/de-energize selection (EXC2)
Alarm 2 action selection at abnormality (AEo2)
Alarm 2 hold action selection (AHo2)
Returns to PG23
Device address (Add)
Communi-cation speed (bPS)
Communi-cation data bit configu-ration (bIT)
Interval time (InT)
Protocol selection (CMPS)
Returns to PG24
Set data lock level selection (LCK)
Mode lock level selection (MLCK)
Returns to PG40
ROM version (VEr)
Operating time (UT)
Measured power supply frequency (IFrq)
Measured heater voltage (HEAT)
Returns to PG50

(2) Description of each parameter

PV correction section [PG10]

#1 : Factory set value

Symbol	Name	Setting range	Description	#1
PG10	Parameter group 10	————————	The first characters of parameter group PG10.	——
Pb	PV bias	-19.999 to +19.999 °C	Sensor correction is made by adding bias value to measured value (PV).	0.000
Snb	Sensor bias	-1.9999 to +1.9999 Ω	Enter the value obtained by subtracting sensor calibration data from the sensor true value. *1	0.0000
dF	Digital filter	0.0 : OFF 0.1 to 100.0 sec	Noise in measured value (PV) input is reduced by the employment of first-order lag filter.	0.0

*1 : For details, see "9. 5 Sensor bias function."

Output limiter section [PG12]

#1 : Factory set value

Symbol	Name	Setting range	Description	#1
PG12	Parameter group 12	————————	The first characters of parameter group PG12.	——
oLH	Output limiter (high)	Output limiter (low limit) to 105.0 %	High limit of manipulated output value (MV).	100.0
oLL	Output limiter (low)	-5.0 % to output limiter (high limit)	Low limit of manipulated output value (MV).	0.0

AT section [PG13]

#1 : Factory set value

Symbol	Name	Setting range	Description	#1
PG13	Parameter group 13	————————	The first characters of parameter group PG13.	——
ATb	AT bias	-19.999 to +19.999 °C	Adds bias to set value (SV) when autotuning (AT) is performed.	0.000

Alarm section 1 [PG14]

#1 : Factory set value

Symbol	Name	Setting range	Description	#1
PG14	Parameter group 14	————————	The first characters of parameter group PG14.	——
AH1	Alarm1 differential gap *1	0.000 to 5.000 °C	Sets alarm 1 differential gap.	2.000
ALT1	Alarm 1 timer setting *1	0 to 600 sec	Sets time until alarm is turned ON after measured value (PV) enters alarm 1 area.	0
AH2	Alarm 2 differential gap *2	0.000 to 5.000 °C	Sets alarm 2 differential gap.	2.000
ALT2	Alarm 2 timer setting *2	0 to 600 sec	Sets time until alarm is turned ON after measured value (PV) enters alarm 2 area.	0

*1 : If there is no alarm 1, "-----" is displayed.

*2 : If there is no alarm 2, "-----" is displayed.

Analog output section [PG15]

#1 : Factory set value

Symbol	Name	Setting range	Description	#1
PG15	Parameter group 15	————————	The first characters of parameter group PG15.	——
Ao	Analog output specification selection *1	0 : Measured value (PV) 1 : Deviation (DEV) *2 2 : Set value (SV) 4 : Manipulated output value (MV)	Sets analog output type.	0
AHS	Analog output scale high *1	*3	Sets high limit of analog output range.	50.000
ALS	Analog output scale low *1		Sets low limit of analog output range.	0.000

*1 : If there is no analog output, "-----" is displayed.

*2 : Do not set "3."

*3 : The analog output scale (AHS/ALS) differs depending on the analog output specification (Ao).

Analog output specification	Analog output scale range
0 : When measured value (PV) is selected.	0.000 to 50.000 °C
1 : When deviation (DEV) is selected.	-19.999 to +19.999 °C
2 : When set value (SV) is selected.	0.000 to 50.000 °C
3 : When manipulated output (MV) is selected.	-5.0 to +105.0 %

Bar-graph section [PG17]

#1 : Factory set value

Symbol	Name	Setting range	Description	#1
PG17	Parameter group 17	————————	The first characters of parameter group PG17.	——
dE	Bar-graph display selection	0 : Manipulated output (MV) *1 1 : Deviation (DEV) [0.01 °C/dot] 2 : Deviation (DEV) [0.1 °C/dot]	Selects the details of bar-graph display.	0

*1 : For manipulated output value (MV) display : 5 % bar-graph dot

Input section [PG20]

#1 : Factory set value

Symbol	Name	Setting range	Description	#1
PG20	Parameter group 20	———————	The first characters of parameter group PG20.	——
Inp	Input type selection	0 : Pt100 Ω (3-wire system) 1 : Pt100 Ω (4-wire system) 2 : JPt100 Ω (3-wire system) 3 : JPt100 Ω (4-wire system)	Can change measured value (PV) input type.	0
PGdP	Decimal point position selection	0 : No digit below decimal-point 1 : 1 digit below decimal-point 2 : 2 digits below decimal-point 3 : 3 digits below decimal-point	Set the position of the decimal point for the measured value to be displayed.	3
PFrq	Power supply frequency	0 : 50 Hz 1 : 60 Hz 2 : Auto setting	The power supply frequency to reject normal mode noise contained in the input is set.	0

📖 The setting of parameter group 20 (PG20) can be changed only in the control stop state.

Setting limiter section [PG21]

#1 : Factory set value

Symbol	Name	Setting range	Description	#1
PG21	Parameter group 21	———————	The first characters of parameter group PG21.	——
SLH	Setting limiter (high limit)	Setting limiter (low limit) to 50.000 °C	Sets high limit of setting range (input range).	50.000
SLL	Setting limiter (low limit)	0.000 °C to Setting limiter (high limit)	Sets low limit of setting range (input range).	0.000

📖 The setting of parameter group 21 (PG21) can be changed only in the control stop state.

Control section [PG22]

#1 : Factory set value

Symbol	Name	Setting range	Description	#1
PG22	Parameter group 22	————————	The first characters of parameter group PG22.	——
CY	Output cycle time	0.1 to 100.0 sec	Sets control output cycle.	0.1
oS1	Direct/reverse action selection	0 : Direct action 1 : Reverse action	Selects direct or reverse control action.	1
PFF	Power feed forward	0 : OFF 1 : ON	Selects power feed forward function ON/OFF.	1

📖 The setting of parameter group 22 (PG22) can be changed only in the control stop state.

Alarm section 2 [PG23]

#1 : Factory set value

Symbol	Name	Setting range	Description	#1
PG23	Parameter group 23	————————	The first characters of parameter group PG23.	——
AS1	Alarm 1 type selection	*1	Selects alarm 1 action.	0
EXC1	Alarm 1 energize/ de-energize selection	0 : Energize alarm 1 : De-energize alarm	Selects whether alarm 1 is set to energized alarm or de-energized alarm.	0
AEo1	Alarm 1 action selection at abnormality	0 : Normal action 1 : Forced alarm output ON *2	The alarm 1 action when an input error caused by sensor break, etc. occurs is selected.	0
AHo1	Alarm 1 hold action selection	*3	Selects the presence or absence of alarm 1 hold action.	0
AS2	Alarm 2 type selection	*1	Selects alarm 2 action.	0
EXC2	Alarm 2 energize/ de-energize selection	0 : Energize alarm 1 : De-energize alarm	Selects whether alarm 2 is set to energized alarm or de-energized alarm.	0
AEo2	Alarm 2 action selection at abnormality	0 : Normal action 1 : Forced alarm output ON *2	The alarm 2 action when an input error caused by sensor break, etc. occurs is selected.	0
AHo2	Alarm 2 hold action selection	*3	Selects the presence or absence of alarm 2 hold action.	0

📖 The setting of parameter group 23 (PG23) can be changed only in the control stop state.

Continued on the next page.

*1 : Alarm types

Set value	Type
0	No alarm **
1	Set value high alarm
2	Set value low alarm
3	Process high alarm
4	Process low alarm
5	Deviation high alarm
6	Deviation low alarm
7	Deviation high/low alarm (Absolute value setting)
8	Band alarm (Absolute value setting)

** : Even if the instrument is set to "No alarm," the setting of "Energized/De-energized," or "Action at error occurrence" is effective.

*2 : "0 : Normal action" : If an error occurs, the alarm action is taken as selected by alarm 1 or alarm 2 type election.

"1 : Forced alarm output ON" : If an error occurs, the alarm output is forcibly turned on regard1ess of the alarm action selected by alarm 1 or alarm 2 type selection.

*3 : Hold action types

Set value	Type
0	No hold action
1	Hold action is taken when the power is turned on.
2	Hold action is taken when the power is turned on or the setting is changed.

Communication section [PG24]

#1 : Factory set value

Symbol	Name	Setting range	Description	#1
PG24	Parameter group 24	———————	The first characters of parameter group PG24.	——
Add	Device address	00 to 99	Sets device address of this instrument.	0
bPS	Communi-cation speed	0 : 1200 bps 3 : 9600 bps 1 : 2400 bps 4 : 19200 bps 2 : 4800 bps	Selects communication speed.	3
bIT	Communi-cation data bit configu-ration	*1	Selects data bit configuration during communication.	0
InT	Interval time	0 to 250 ms	Sets interval time to match timing during data send and receive.	250
CMPS	Protocol selection	0 : RKC standard communication 1 : Ladder communication	Selects communication protocol.	0

*1 : Communication data bit configuration

Set value	Parity bit	Data bit	Stop bit
0	None	8	1
1	None	8	2
2	Even	8	1
3	Even	8	2
4	Odd	8	1
5	Odd	8	2
6	None	7	1
7	None	7	2
8	Even	7	1
9	Even	7	2
10	Odd	7	1
11	Odd	7	2

📖 The setting of parameter group 24 (PG24) can be changed only in the control stop state.

Set data lock section [PG40]

#1 : Factory set value

Symbol	Name	Setting range	Description	#1
PG40	Parameter group 40	————————	The first characters of parameter group PG40.	——
LCK	Set data lock level selection	*1	Set level which enables set data lock.	0
MLCK	Mode lock level selection	*2	Set level which enables mode lock.	0

*1 : Set data lock level

Set value	Set data lock level
0	Set value (SV) and parameter cannot be set.
1	Only set value (SV) can be set.
2	Only parameter group (PG) cannot be set.

If order to make the set data lock effective, select "Unlock" by using the set data lock function on the mode transfer.

*2 : Mode lock level

Set value	PID/AT	AUTO/MANUAL	Control RUN/STOP
0	X	X	X
1	X	-	X
2	-	X	X
3	-	-	X
4	X	X	-
5	X	-	-
6	-	X	-
7	-	-	-

- : Unsettable (Mode lock)

X : Settable (Mode unlock)

Data section [PG50]

#1 : Factory set value

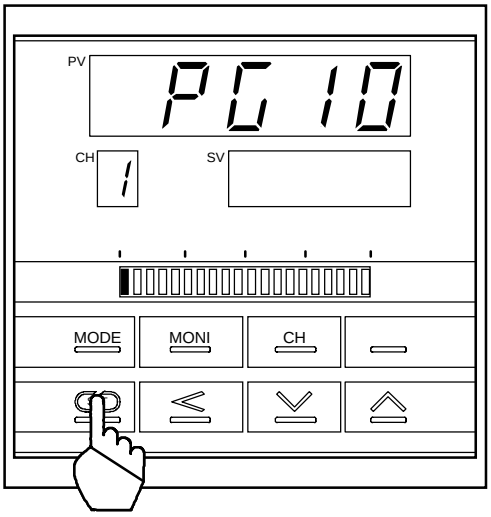
Symbol	Name	Setting range	Description	#1
PG50	Parameter group 50	————————	The first characters of parameter group PG50.	——
VEr	ROM version	E□□□□□	The SV display unit shows the ROM No. in 5 digit.	——
UT	Operating time	0 to 99999 time	Display the totalized operation time of this instrument.	——
IFrq	Measured power supply frequency *1	0.00 to 100.00 Hz	Displays the power supply frequency measured by the power feed input.	——
HEAT	Measured heater voltage *1	0.0 to 160.0 %	Heater voltage measured by using power feed input is displayed in % to the rated value.	——

*1 : Displays "00000" if the power feed transformer is not connected.

(3) Procedure for setting each parameter

- For this instrument, the numeric value is not registered if it is only change by the SET key.
- If the set data is lock, all of the digits on the SV display unit are brightly lit and the set value cannot be changed.
- The setting of PG20, PG21, PG22, PG23, or PG24 can be changed only when control stops.

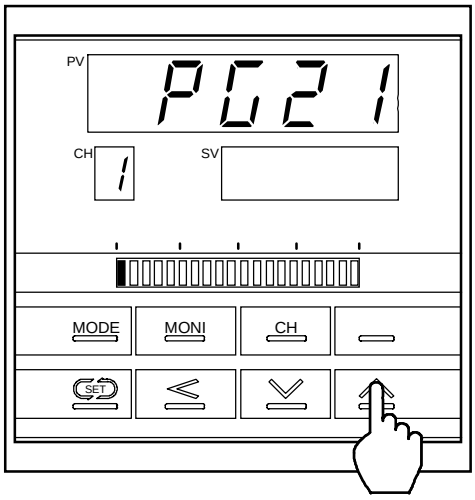
[Example] When the setting limiter (high limit) is changed to 30.000 °C



Parameter group 10 (PG10)

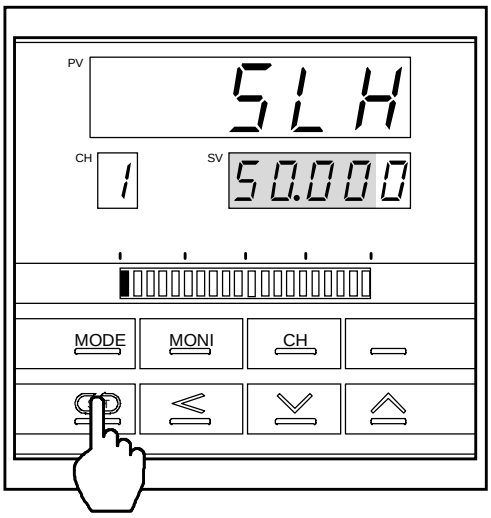
① Press the SET key for more than 5 sec in operator set mode to set the instrument to setup mode. Setup mode is selected, "Parameter group 10 (PG10)" is displayed first.

* For the details of setup mode selection, see "5.1 Procedure for selecting each mode and monitor".



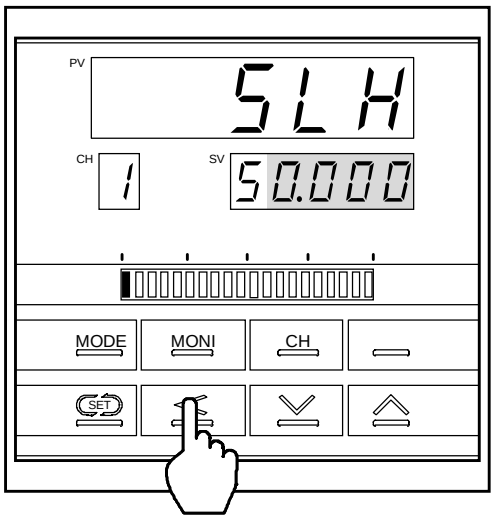
Parameter group 21 (PG21)

② Press the UP key to set the instrument to the PG21 (Setting limiter section).

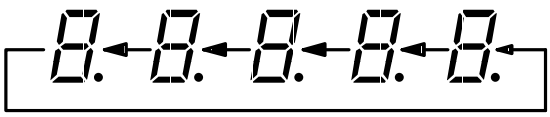


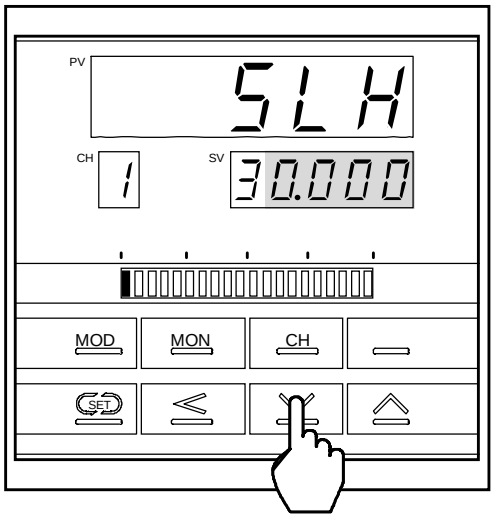
Setting limiter (high limit)

③ Press the SET key to set the instrument to the "Setting limiter (high limit)".

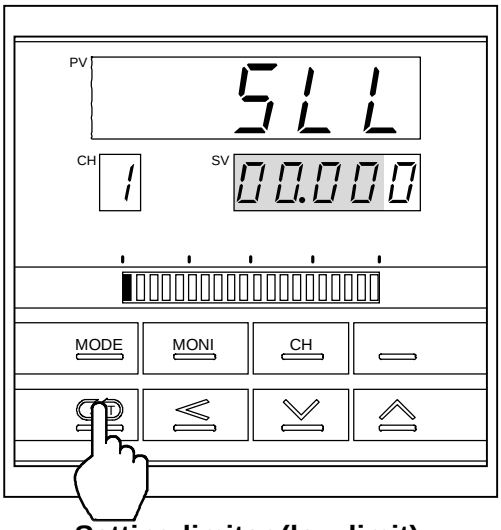


④ Press the SHIFT key to move the brightly lit digit up to the most significant digit.
Every time the SHIFT key is pressed, each brightly lit digit moves as follows.





⑤ Press the DOWN key to enter "3" in the most significant digit.



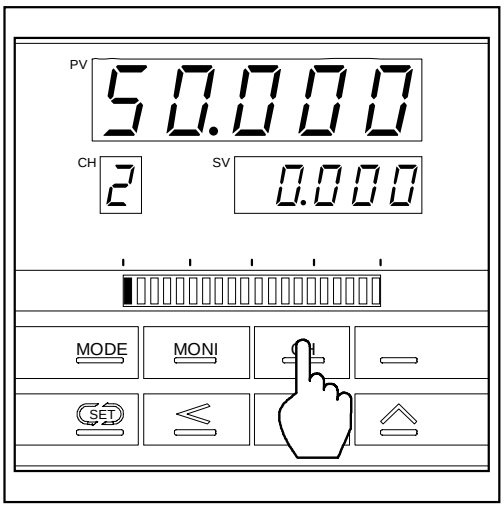
Setting limiter (low limit)

⑥ Press the SET key to change to the next parameter. Thus, the set value is registered.

- The same setting procedure applies when other parameters are also set.
- For the instrument of 2-channel type, press the CH key to select CH2, then make the setting. The setting procedure is the same as the CH1 parameter setting.
- For the 1-channel type, if the key is not operated for more than 1 minute, the present display automatically returns to the PV/SV display.
- For the 2-channel type, if the key is not operated for more than 1 minute, the present display automatically returns to the CH1PV/CH2PV display.

5.7 Procedure for selecting CH2 (For 2-channel type)

In order to set the CH2 monitor, set value (SV) or each parameter, press the CH key to change CH1
to CH2. The setting procedure is the same as the CH1 setting.



PV/SV display (CH2)

6. OPERATIONS

CAUTIONS

- Connect the input signal wiring, and then turn ON the power. If the input signal wiring opens, the instrument judges the input is disconnected.
  •Action at input break : Up-scale
  •Action at input short circuit : Downscale
- No influence is exerted upon the instrument for power failure of 20 ms or less. For power failure of 20 ms more than, the instrument performs the same operation as that at the time of power-ON after power recovery.

(1) Procedure for operation

① Before turning on the power, check that all of the mounting and wiring are correctly made.

② Turn on the power of this instrument .
If the power is turned on for the first time, as the instrument is set to the control RUN state, set the instrument to the control STOP state by "Control RUN/STOP transfer" (see P.19).
For details on "Control RUN/STOP", See "(3) Control RUN/STOP transfer by contact input"
(P.22).

③ Check that the set value (SV) and each parameter are correctly set.

④ Control starts if control STOP is changed to control RUN.

(2) Operation under operation execution (RUN)

- For needing a change in the details of display in the monitoring status, see "**5.2 Monitor**" (P.17).
- When needing a change in the set value (SV), see "**5.4 SV setting mode**" (P.23).
- When needing a change in the alarm set value and PID, see "**5.5 Operator set mode**" (P.25).
- For needing a change in the each parameter, see "**5.6 Setup mode**" (P.29).
  However, as parameters which cannot be changed during control RUN are included in parameters in setup mode, set the instrument to the control STOP state once to change the parameter.
- When needing activation of the autotuning (AT) function, see "**(4) Requirements for autotuning (AT)**" (P.46).

(3) Cautions at operation stop (STOP)

In the monitoring status, the measured value (PV) display unit shows measured value (PV). Also the set value (SV) display unit, " (SToP)".

(4) Requirements for autotuning (AT)

Autotuning (AT) is the function of automatically measuring, computing and setting the optimum PID constants. The requirements for autotuning (AT) start and suspension are described in the following. Autotuning (AT) is started/stopped by "PID/AT transfer" in the mode transfer (See P.19).

■ Requirements for autotuning (AT) start

Start autotuning (AT) when all the following conditions are satisfied :

① In the mode transfer
- PID/AT transfer → PID
- Control RUN/STOP transfer → RUN
- AUTO/MANUAL transfer → AUTO mode

② Input value should not be abnormal.

③ The output limiter (high) value should be 0.1 % or more and the output limiter (low) value, 99.9 % or less.

■ Requirements for autotuning (AT) suspension

- When set value (SV) is changed
- When output limiter (high) or output limiter (low) value is changed
- When PV bias and/or digital filter are changed
- When AT bias is changed
- When the instrument is transferred to the manual mode by "AUTO/MANUAL transfer"
- When control is stopped by "Control RUN/STOP transfer"
- When the instrument is transferred to PID control by "PID/AT transfer"
- When input value becomes abnormal.
- When power failure occurs
- When the instrument is in the FAIL status

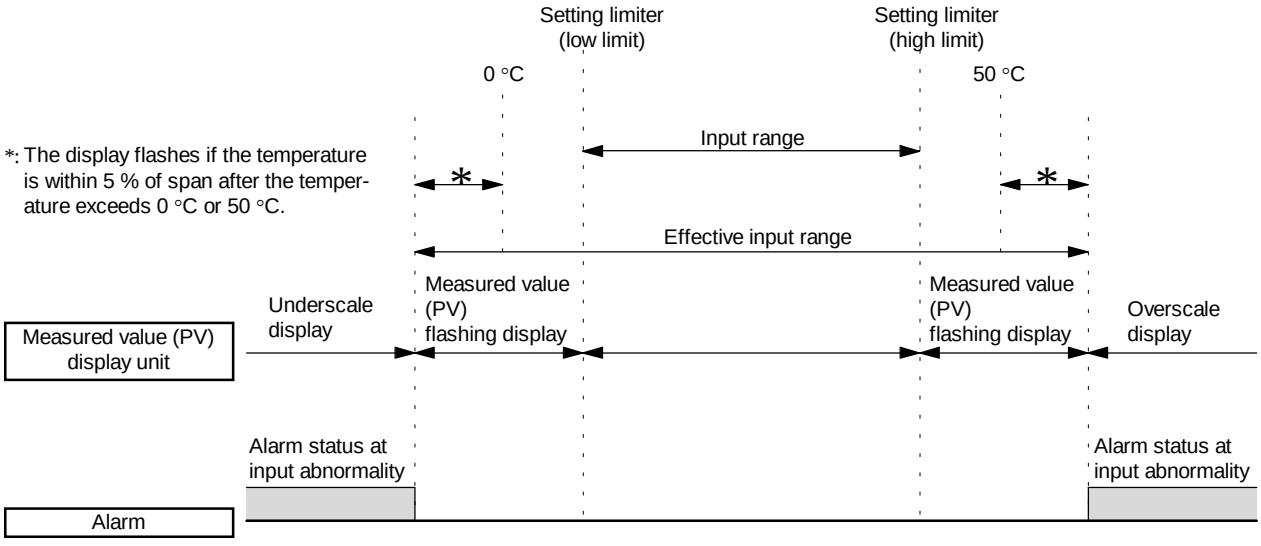
📖 When autotuning (AT) suspension requirements are established, the instrument immediately suspends autotuning (AT) function to transfer the above function to PID control. PID constants at that time are left as they were before autotuning (AT) start.

7. DISPLAY AT ABNORMALITY

■ For input abnormality

Display	Details	Action (output)	Measures
Measured value (PV) Flashing	Input abnormality Measured value (PV) exceeds the setting limiter (high limit) or setting limiter (low limit).	The controller takes alarm action which is selecting of parameter group 23 (PG23).	**WARNING** In order to prevent electric shock, prior to replacing the sensor, always turn OFF the power. Check input type, range, sensor and sensor connection.
OOOOO Flashing	Overscale Measured value (PV) is beyond the effective input range.		
UUUUU Flashing	Underscale Measured value (PV) is below the effective input range.		

Each status at input abnormality is shown in the following :



The setting limiter (high limit or low limit) is set by parameter setting group 21 [PG21] (see P.35) in setup mode.

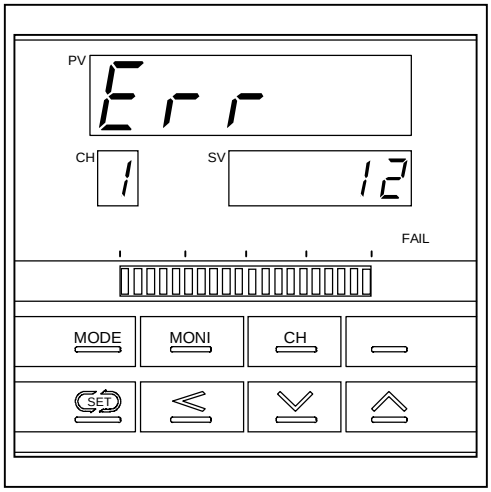
■ By self-diagnostic function

In an error is detected by the self-diagnostic function, the PV display unit flashes "Err", and the SV display unit shows the error code. Error is displayed on the "PV/SV" display. In addition, the FAIL lamp light if an error occurs.
If two or more errors occurs simultaneously, the total summation of these error codes is displayed.

Error code	Details	FAIL	Control output	Alarm output	Analog output	Measures
-	MCU abnormality	OPEN *1	OFF	OFF	OFF	Turn off the power once. If an error occurs after the power is turned on again, contact your nearest RKC sales office or agent from which you bought the instrument.
-	MCU power supply voltage abnormality					
-	Software abnormality					
16	Input circuit abnormality			*2	No affected	
8	EEPROM error			No affected		
4	Adjusted data destruction			*2		
2	Sensor break					
1	Other abnormality			No affected		

*1 : FAIL output : The relay contact is closed under normal operation.
*2 : The REX-F9000 takes any alarm action selected in the parameter group "23" (PG23).

Example : When EEPROM error and adjusted data destruction occurs simultaneously



The PV display unit shows "Err", and the SV display unit shows the number 12 obtained by adding 8 (EEPROM error) to 4 (adjusted data destruction).

8. REPLACING THE RUBBER PACKING

⚠ WARNING

- In order to prevent electric shock and instrument failure, always turn off the power supply before replacing the rubber packing.
- In order to prevent electric shock and instrument failure, always turn off the power supply before pulling out the internal chassis.
- In order to prevent injury or instrument failure, do not touch the internal printed circuit board.

If the waterproof and dustproof rubber packing deteriorates, contact your nearest RKC sales office or agent from which you bought the instrument.

Parts code	Remarks
KF900N-32	For the board
KD900-35	For the case

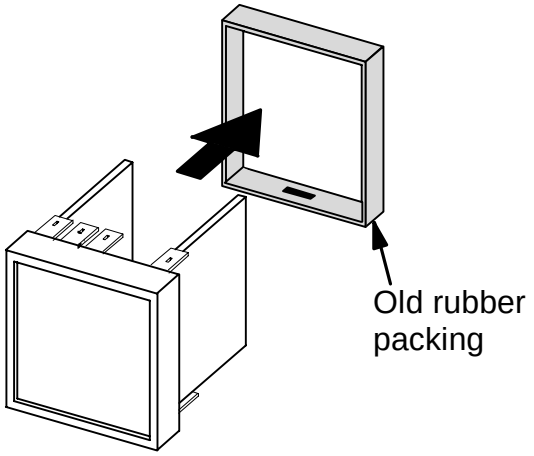
CAUTION

Prior to replacing the rubber packing, first confirm that no water remains, then turn on the power supply. If the water remains, shorting may result.

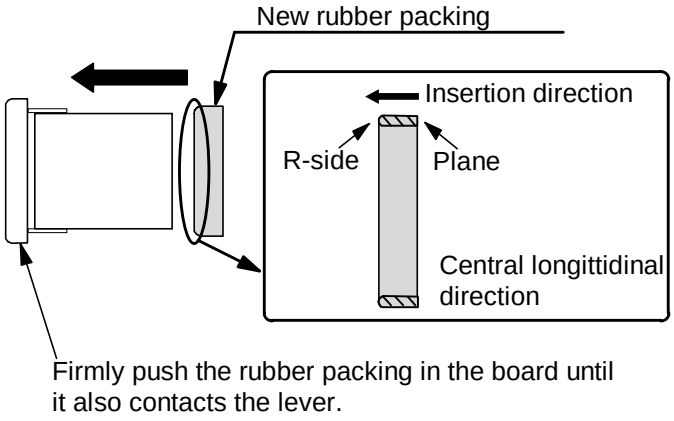
■ Replacement of rubber packing

(1) For the board

① Pull the internal assembly out of the case, then remove the old rubber packing.

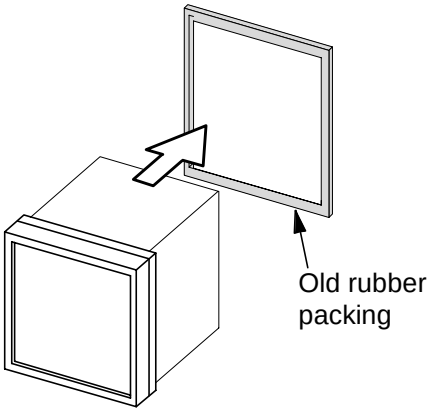


② Replace the old rubber packing with a new one, then put the internal chassis in the case.

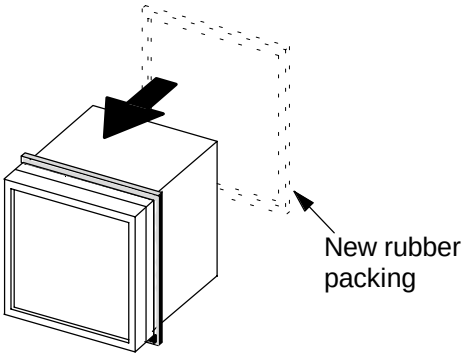


(2) For the case

① Remove the mounting bracket and disconnect all of the lead wires from the rear terminal board of this instrument, then remove the instrument from the control panel. Next, remove the deteriorated rubber packing from this instrument.



② Firmly push the new rubber packing into the instrument, then re-mount the instrument in the control panel.



9. FUNCTION DESCRIPTION

9.1 PV bias

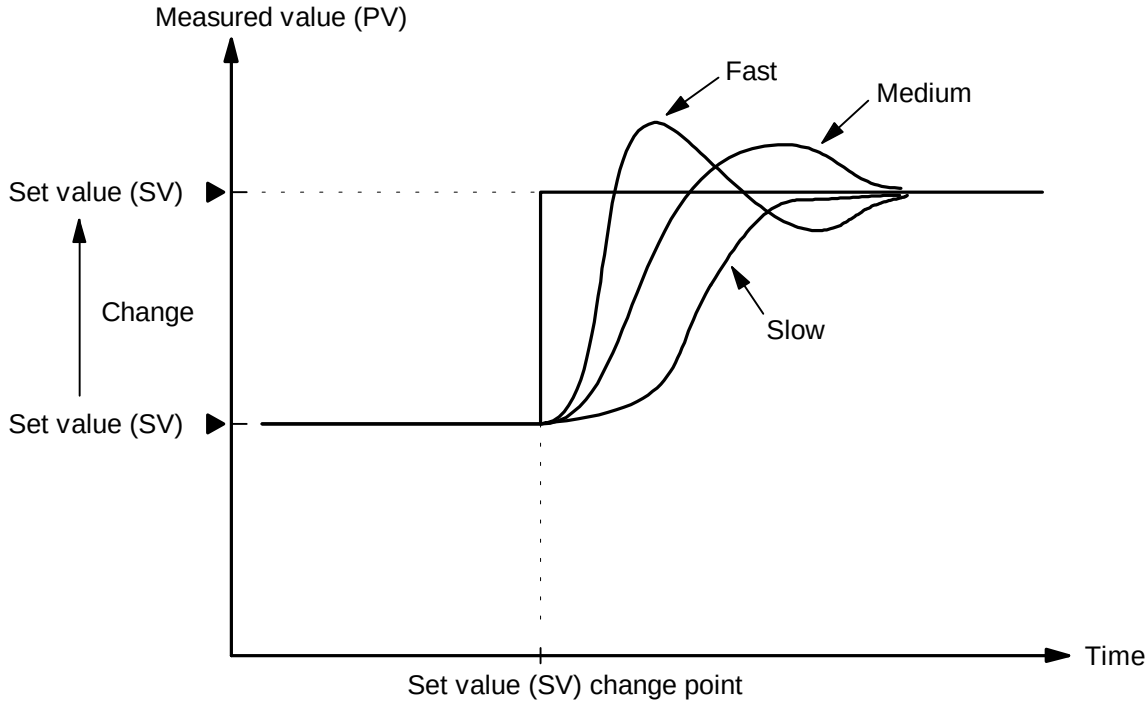
The value set in the PV bias is added to the actual input value to correct the input value. The PV bias is used to correct the individual variations in the sensors or when there is difference between the measured value (PV) of other instruments.

9.2 Digital filter

This is a 1st-order lay filter by software prepared in order to reduce fluctuations of measured value (PV) by noise. Thus, control eliminating input noise influence becomes possible by setting appropriately this filter time constant according to measured object characteristics and noise level. However, if the time constant is too small, the filter may yield no benefit, but and it the time constant is to large, control response will be adversely effected.

9.3 Control response parameter

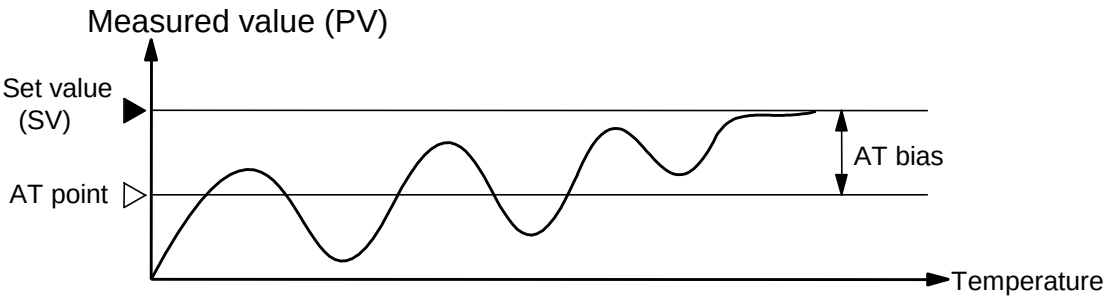
The control response parameter function is used to determine how to response to temperature set value (SV) changes in PID control. One control response parameter can be selected from among three steps (Slow, Medium, Fast). In order to achieve faster controlled object response to set value (SV) change, select Fast. However, slight overshoot is unavoidable when selecting Fast. Depending on the controlled object, specify Slow if overshoot should be avoided.



9.4 AT bias

The AT bias is set when the autotuning function in which the measured value (PV) does not exceed the set value (SV) is activated. Our autotuning method performs ON/OFF control centering around the set value (SV), then calculates and sets each of the PID constants by hunting the measured value (PV). However, overshooting caused by this hunting may not be preferable depending on the controlled object. In such a case, the desired AT bias is set. If it is set, another set value (SV) to activate the autotuning function [AT point] can be set.

[Example] When AT bias is set to the minus (-) side



9.5 Sensor bias function

The sensor bias function is used to correct the input value by using sensor calibration data provided from the sensor manufacture.
This correction is made so that sensor calibration data is subtracted from the sensor true value and the result thus obtained is input to this instrument.

Example : For RTD of Pt 100 Ω, 23 °C

Sensor calibration data : 23 °C =108.9721 Ω
Sensor true value at 23 °C : 108.9585 Ω
108.9585 (Sensor true value) - 108.9721 (Calibration data) = -0.0136 Ω
From the above,
Input correction value : -0.0136 Ω

9.6 Alarms (ALM)

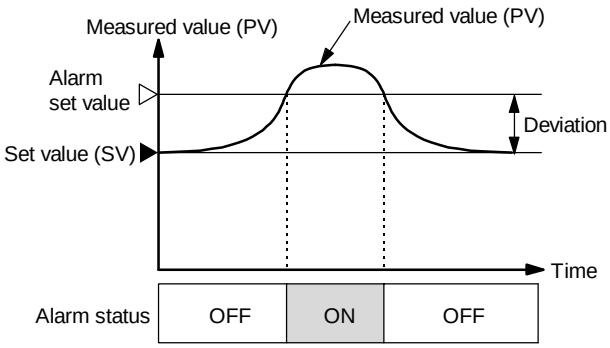
Alarm (ALM) function sets up the alarm status when the measured value (PV) or the deviation reaches the alarm set values. In the alarm status, the alarm output is output from the digital output terminals, and the alarms are used to drive the equipment danger signals or the safety equipment.

(1) Deviation alarm

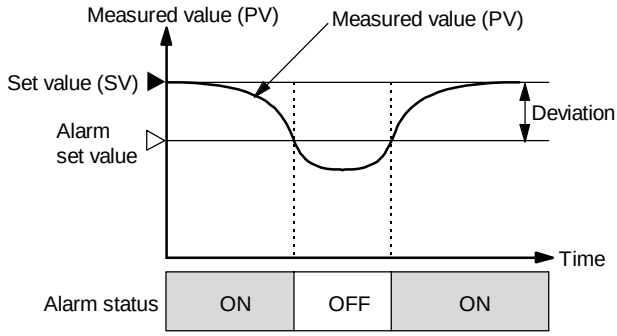
The alarm lamp lights if the deviation [Measured value (PV) - Set value (SV)] reaches the alarm set value. Therefore, the alarm set value moves with set value (SV) change.

- **Deviation high alarm**

  The alarm lamp lights if the deviation [Measured value (PV) - Set value (SV)] exceeds the alarm set value to produce the alarm status.



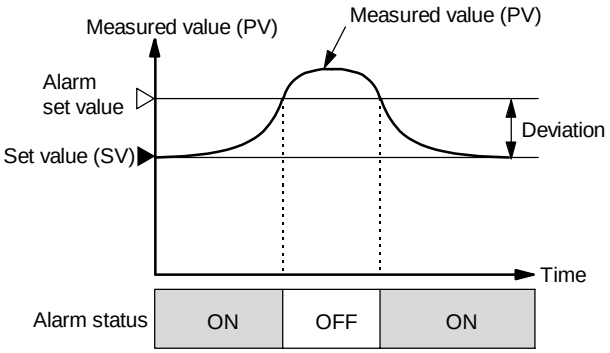
[When the deviation is on the positive side]



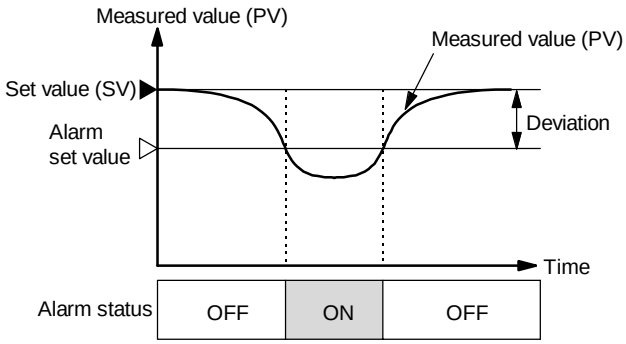
[When the deviation is on the negative side]

- **Deviation low alarm**

  The alarm lamp lights if the deviation [Measured value (PV) - Set value (SV)] falls below the alarm set value to produce the alarm statuse.



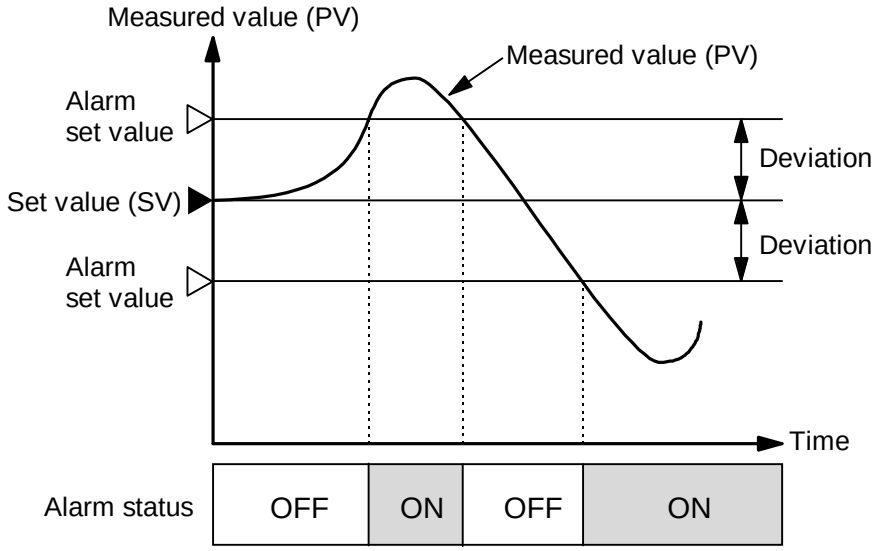
[When the deviation is on the positive side]



[When the deviation is on the negative side]

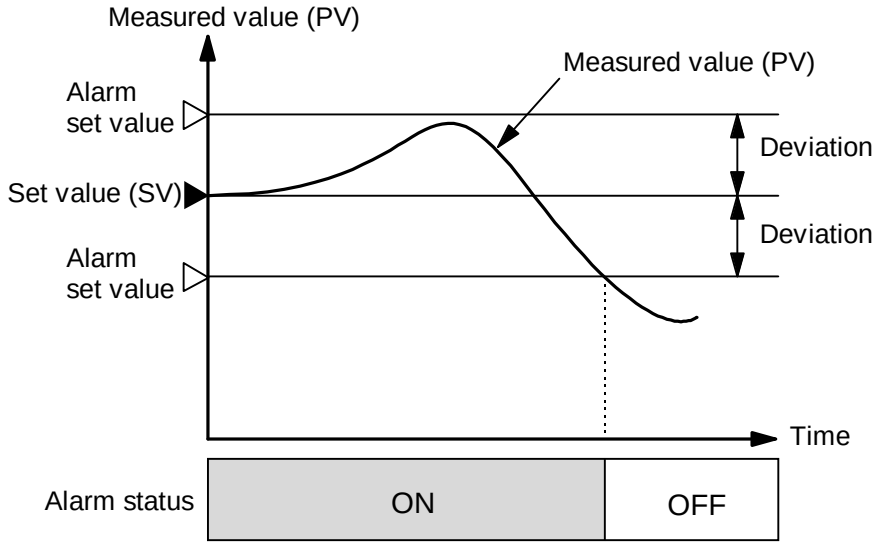
- **Deviation high/low alarm**

  The alarm lamp lights if the deviation absolute value [Measured value (PV) - Set value (SV)] is less than or greater than the alarm set value to produce the alarm status.



- **Band alarm**

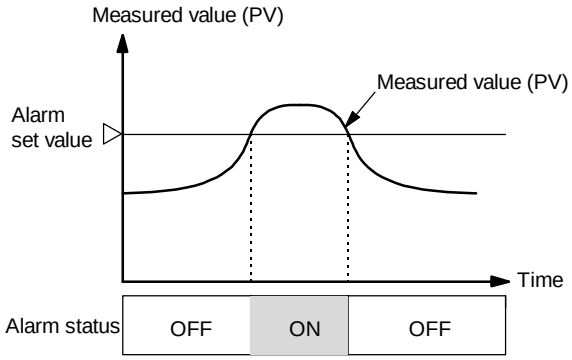
  The alarm lamp lights if the deviation absolute value [Measured value (PV) - Set value (SV)] is within the alarm set value to produce the alarm status.



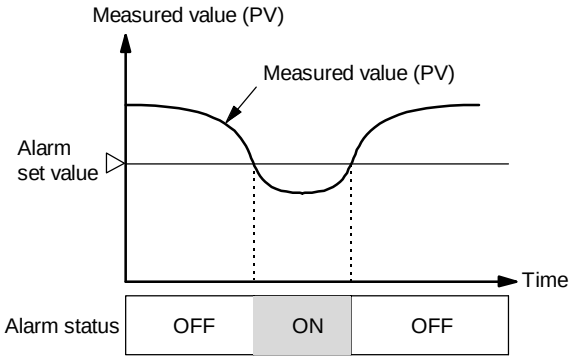
(2) Process alarm

This alarm function if measured value (PV) reaches the alarm set value.

●Process high alarm



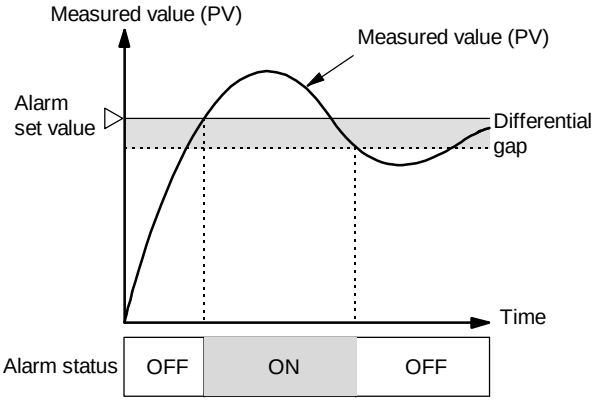
● Process low alarm



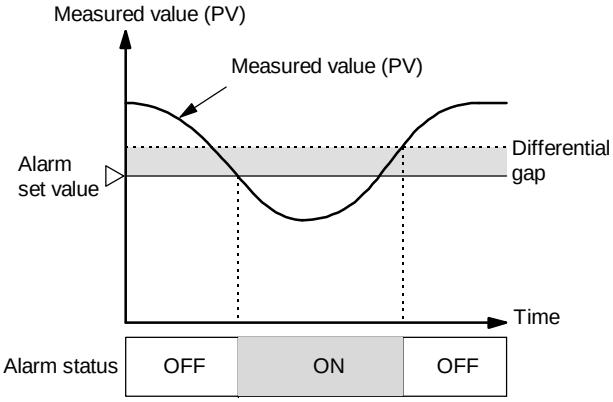
(3) Alarm differential gap

Alarm relay contact may repeat its turning ON and OFF due to input fluctuation if measured value (PV) is near the alarm set value. An alarm differential gap setting can prevent the relay contact from ON or OFF repetition.

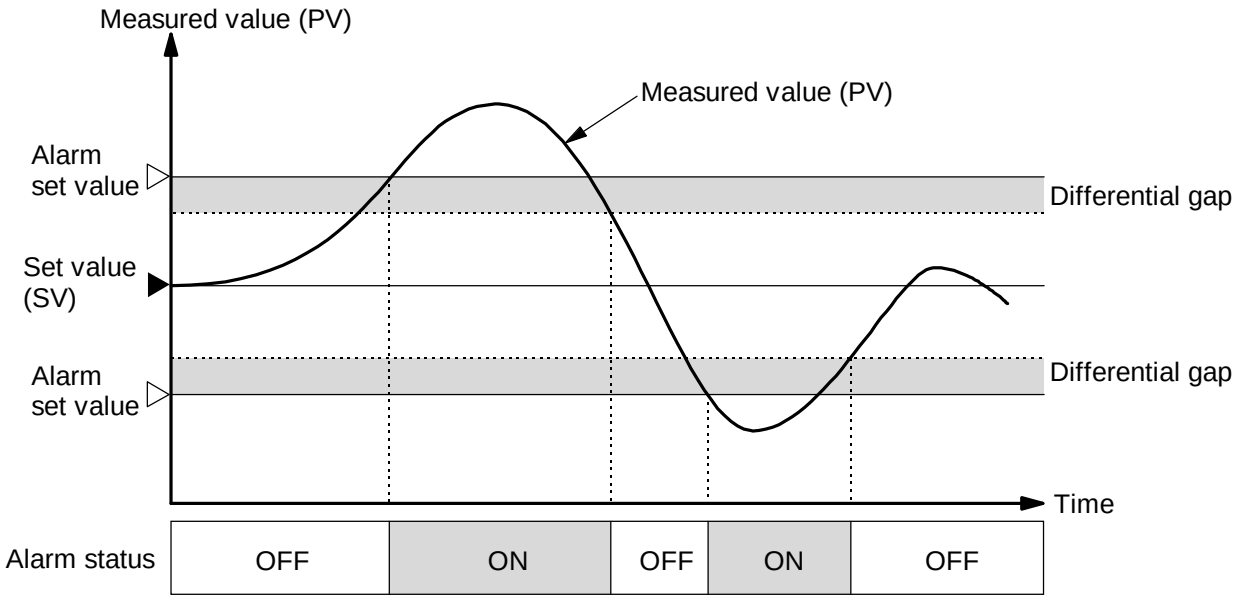
● High alarm (deviation/process)



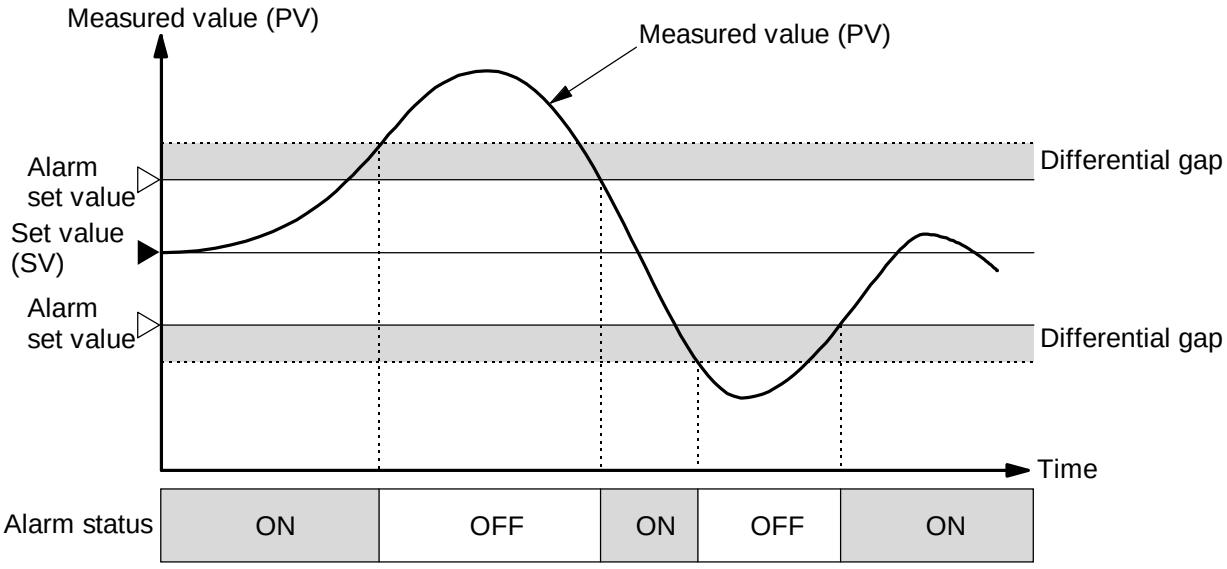
● Low alarm (deviation/process)



● **High/Low alarm (deviation/process)**



● **Band alarm**

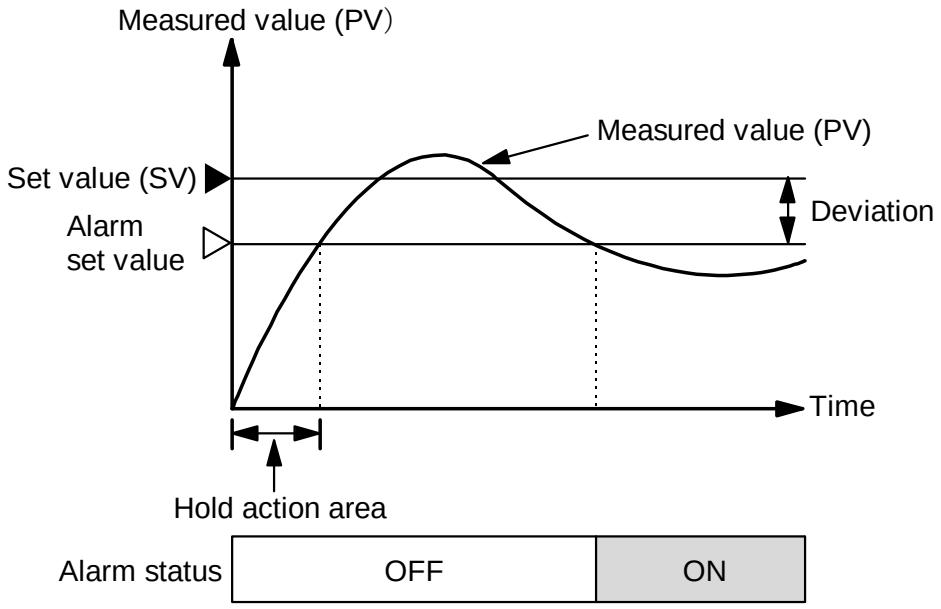


(4) Alarm hold action

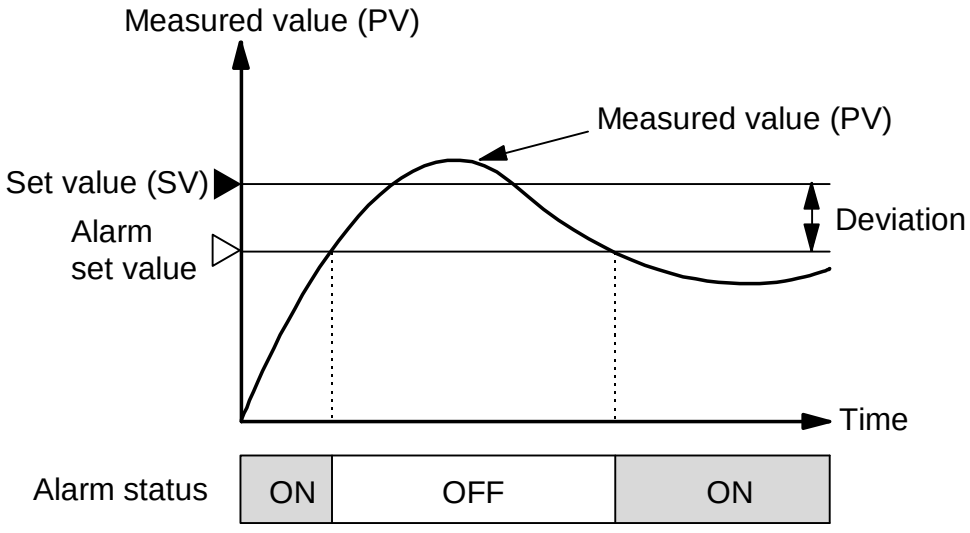
Hold action is an action which makes the alarm function invalid even if measured value (PV) is in the alarm status at the time of power-ON, transferring operation mode from STOP to execution (RUN) or changing the set value (SV). This state continues until the above measured value (PV) once exits from the alarm status.

[Example] The difference between alarms with "Hold action" and without "Hold action" are described by referring to the low limit deviation alarm as an example.

- **With alarm hold action**



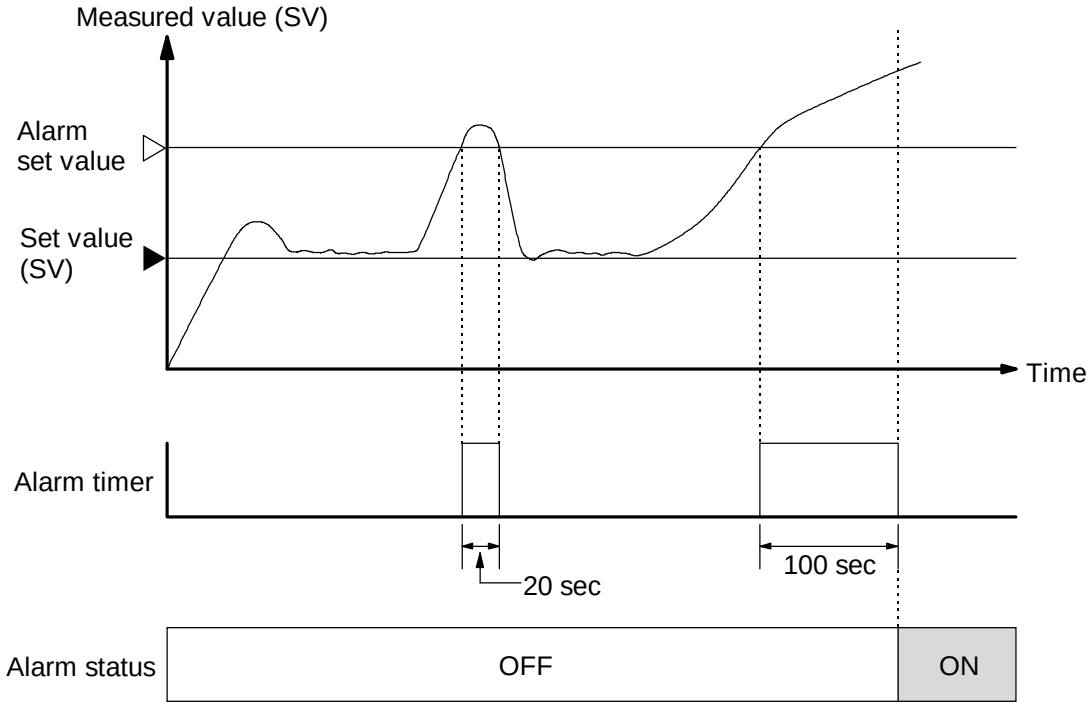
- **Without alarm hold action**



(5) Alarm timer

This is the function of setting the timer to the non-alarm status as far as it is within the alarm timer set time and to the alarm status if it exceeds the alarm timer set time after measured value (PV) or the deviation exceeds the alarm set value.

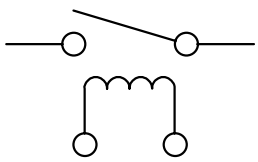
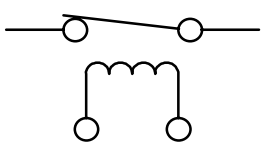
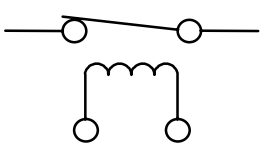
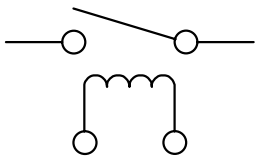
[Example] When alarm timer is set to 100 sec.



(6) Alarm energized/de-energized

Energized : Relay contact is closed under the alarm status.
De-energized : Relay contact opens under the alarm status.

Diagram for explaining operation (At power-ON)

	Non-alarm status	Alarm status
Energized		
De-energized		

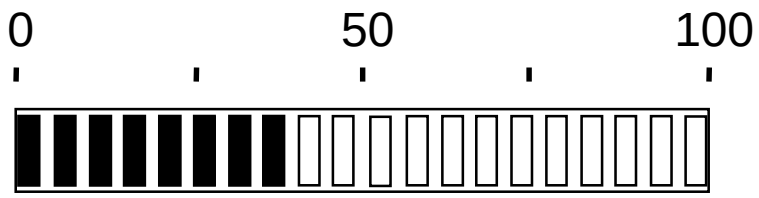
9.7 Bar-graph display

This is a function of displaying manipulated output value (MV), or deviation on 20-dot LEDs.

(1) Manipulated output value (MV) display

Manipulated output value (MV) is displayed in a span of from 0 to 100 %. One dot is 5 % fixed.

[Example] For 40 % manipulated output value (MV)

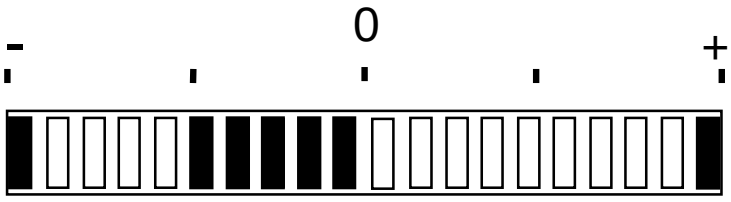


When manipulated output value (MV) becomes 0 % or less, the dot at the left end of the bar-graph only flashes and when it exceeds 100 %, all dots on the bar-graph light and only the dot at the right end flashes.

(2) Deviation display

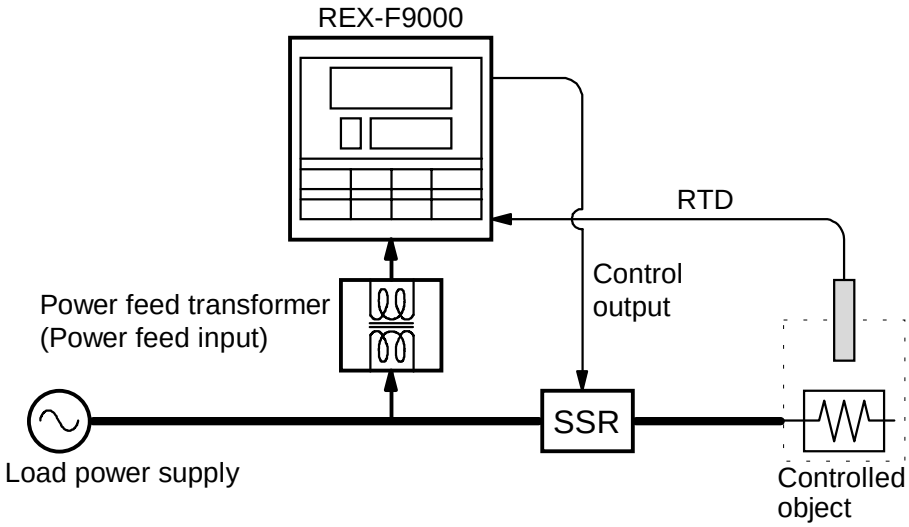
The deviation between measured value (PV) and set value (SV) displayed. The dots at both ends of bar-graph light to indicate deviation display. One dot is variable in a range of from 1 to 100 digit. Either 0.01 °C or 0.1 °C corresponding one dot can be selected.

[Example] For a range of -0.1 °C to +0.1 °C and a deviation of -0.05 °C



9.8 Power feed forward function

The power feed forward function is used to stabilize the control point by monitoring the load voltage by the power feed transformer. If the power feed input voltage becomes less than approx. -30 % of the rated value, control automatically stops.



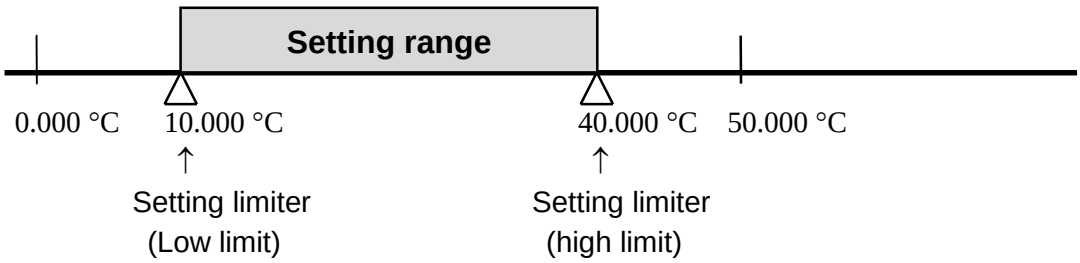
9.9 Power supply frequency setting

The power frequency is set to reject normal mode noise contained in the input. If the power frequency of this instrument is set to "Automatic setting (see P.35)", it is automatically measured and set by the power feed input. If the power feed input voltage becomes less than approx. -30 % of the rated value, control automatically stops.

9.10 Setting limiter

This is the function of limiting the set value (SV) setting range.

[Example] When the setting range is between 0.000 and 50.000 °C and the high and low setting limits are set to 40.000 °C and 10.000 °C, respectively.



10.SPECIFICATIONS

10.1 Input

(1) Input type : RTD input Pt100 Ω (JIS/IEC), JPt100 Ω (JIS)
*Corresponding to the 3- and 4-wire systems
(2) Number of input points : 1 point or 2 points
(3) Input range : 0.000 to 50.000 °C
(4) Action at input break : Up-scale
(5) Action at input short circuit : Downscale

10.2 Display function

(1) Measured value (PV) display unit : 5 digit, 7-segment LED (Green)
(2) Set value (SV) display unit : 5 digit, 7-segment LED (Orange)
(3) Channel (CH) display unit : 1 digit, 7-segment LED (Orange)
(4) Bar-graph display unit : 20 dot LED (Green)

10.3 Control action

(1) Control method : Brilliant PID control (With autotuning function)
(2) Output limiter : Both of the output limiters (high limit and low limit) can be set.
(3) Control output : Voltage pulse output : Output voltage : 0/12 V DC
Allowable load resistance : 600 Ω or more
Output cycle time : 0.1 to 100.0 sec
Current output : Output current : 4 to 20 mA DC
Resolution : 13 bits or more
Allowable load resistance : 600 Ω or less

10.4 Performance

(1) Setting accuracy : Temperature setting : ±0.05 °C
Other setting : Within ±0.1 % of setting range
(2) Input display accuracy : ±0.05°C
(3) Insulation resistance : Between measuring and grounding terminals: 20 MΩ or more at 500 V DC
Between power and grounding terminals: 20 MΩ or more at 500 V DC
(4) Withstand voltage : Between measuring and grounding terminals: 1 minute at 1000 V AC
Between power and grounding terminals: 1 minute at 1500 V AC
Between power and measuring terminals: 1 minute at 2300 V AC
(5) Power failure effect : No influence is exerted upon the instrument for power failure of less than 20 ms.
(6) Memory backup : Backed up by non-volatile RAM
Number of write times : Approx. 100, 000 times
Data storage period : Approx. 10 years

10.5 Alarm function

(1) Number of alarm point : 2 points, each
(2) Alarm type : Deviation high alarm
Deviation low alarm
Deviation high/low alarm
Band alarm
Process high alarm
Process low alarm
*Hold action can be added.
(3) Differential gap : 0.000 to 5.000 °C
(4) Alarm timer : 0 to 600 sec
(5) Output method : Energized output or De-energized output
(6) Output type : Relay contact output 250 V AC, 1A (Resistive load) 1a contact
Electrical life : 50,000 times or more

10.6 Contact input function

(1) Number of input point : 1 point
(2) Function : Control RUN/STOP transfer
(3) Input type : Dry contact input
At open : 500 kΩ or more
At close : 10 Ω or less

10.7 Communications

(1) Interface : Based on EIA standard RS-485
(2) Connection method : 2-wire system, half-duplex multidrop connection
(3) Communication distance : 1 km
* However, the maximum communication distance varies slightly with the surroundings such as cable etc.
(4) Synchronous method : Start/stop synchronous type
(5) Communication speed : 1200 bps, 2400 bps, 4800 bps, 9600 bps or 19200 bps
(6) Communication data configuration :
RKC standard communication : Start bit : 1
Data bit : 7 or 8
Parity bit : Unused or Used
(Odd number or even number)
Stop bit : 1 or 2
Ladder communication : Start bit : 1
Data bit : 8 (Fixed)
Parity bit : None
Stop bit : 1

(7) Protocol : RKC standard communication : ANSI X3.28 subcategory 2.5, A4
(Polling/selecting type)
Ladder communication : Non-protocol type
(8) Error control : RKC standard communication : Vertical parity check (With parity bit selected)
Horizontal parity check (BCC check)
(9) Maximum connection : RKC standard communication : 32 sets including a host computer.
Ladder communication : 32 sets including a PLC
(10) Communication code : RKC standard communication : ASCII 7-bit code
Ladder communication : BCD code and Control code
[STX, CR and LF]
(11) Terminal resister : 100 Ω or more (Externally connected)
(12) Xon/Xoff control : None

10.8 Self-diagnostic function

(1) Check item : MCU, MCU power supply voltage, Input circuit, Adjustment data, Software (watchdog timer), EEPROM, and Sensor break check, etc.
(2) Display at abnormality : Failure lamp lights
(3) FAIL output : If an error occurs, the relay contact is opened.
Relay contact output 250 V AC, 1A (Resistive load), 1a contact
*Electrical life : 50.000 times or more (Rated load)

10.9 Analog output function (Option)

(1) Number of output point : 1 point (1-channel type)
2 points (2-channel type)
(2) Output signal : Voltage output : 0 to 5 V DC, 1 to 5 V DC
Current output : 0 to 20 mA DC, 4 to 20 mA DC
*Specify when ordering
(3) Allowable load resistance : Voltage output : 1 kΩ or more
Current output : 600 Ω or less
(4) Output scaling : High and low limit can be set.
(5) Output type : Measured value (PV), Deviation (DEV), Set value (SV), Manipulated output (MV)

10.10 General specifications

(1) Power supply voltage : 85 to 264 V AC (50/60 Hz)
[Including power supply voltage variation] (Rating : 100 to 240 V AC)
21.6 to 26.4 V AC (50/60 Hz)
[Including power supply voltage variation] (Rating : 24 V AC)
21.6 to 26.4 V DC
[Including power supply voltage variation] (Rating : 24 V DC)

(2) Power consumption : 13 VA max. (at 100 V AC)
19 VA max. (at 240 V AC)
11 VA max. (at 24 V AC)
8.16W [340 mA] max. (at 24 V DC)

(3) Ambient temperature : 0 to 50 °C

(4) Ambient humidity : 45 to 85 % RH (No condensation)

(5) Operating environment : There should be neither corrosive gas nor much dust.

(6) Method of attachment : Panel attachment

(7) Weight : Approx. 530g

(8) Dimensions : 96 (W) × 96 (H) × 100 (D) mm

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