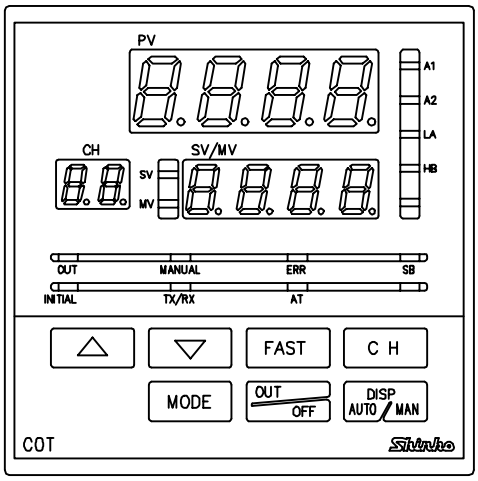
Console unit
COT-200
Instruction manual



Shinko

Preface

Thank you for the purchase of console unit **COT-200.**
This manual contains instructions for the mounting, functions, operations, and notes for the operation of the **COT-200.**
For your confirmation of the model and specifications of the unit, please read this manual carefully before starting operation.

To prevent accidents arising from the use of this console unit, please ensure the operator using it receives this manual.

Notes

- Specifications of the **COT-200** and the contents of this instruction manual are subject to change without notice.
- Care has been taken to assure that the contents of this instruction manual are correct, but if there are any doubts, mistakes or questions, please inform our sales department.
- Any unauthorized transfer or copying of this document, in part or in whole, is prohibited.
- Shinko Technos is not responsible for any damages or secondary damages incurred as a result of using this product, including any indirect damages.

SAFETY PRECAUTIONS

(Be sure to read these precautions before using our products)

The safety precautions are classified into categories: “Warning” and “Caution”.
Depending on circumstances, procedures indicated by ⚠ Caution may be linked to serious results so be sure to follow the directions for usage.

⚠ Warning

Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.

⚠ Caution

Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.

SAFETY PRECAUTIONS

(Be sure to read these precautions before using our products)

1. Installation precautions

⚠ Warning

Turn the power supplied to the instrument OFF before wiring or checking.
Working or touching the terminal with the power switched ON may result in an Electric Shock which could cause severe injury or death.

⚠ Caution

Mount the console unit in a place with:

- **A minimum of dust, and an absense of corrosive gasses**
- **No flammable, expolsive gasses**
- **No mechanical vibrations or shocks**
- **No exposure to direct sunlight, an ambient temperature of 0 to 50℃ (32 to 122℉)**
- **An ambient non-condensing humidity of 85%RH or less**
- **The units away from large capacity electromagnetic switches or cables**
- **No water, oil or chemicals or where the vapors of these substances can come into direct contact with the unit.**

Tighten the terminal screw with the specified torque.
If excessive force is applied to the screw when tightening, the screw or case may be damaged.

Note

Do not install this instrument near the flammable material though the case of this instrument is made of flame resisting resin.
Avoid setting this instrument directly on the flammable material.

SAFETY PRECAUTIONS

(Be sure to read these precautions before using our products)

2. Wiring precautions

⚠ Warning

Turn the power supplied to the instrunment OFF before wiring or checking.
Working or touching the terminal with the power switched ON may result in an Electric Shock which could cause severe injury or death.
The instrument must be grounded before the power supply to the instrument is turned on.

⚠ Caution

- **Do not put wire chips into the instrument, because they could cause fire, malfunction or trouble.**
- **For the COT-200 ground terminal, use a wire whose thickness is 2mm^2 or greater However, avoid grounding in conjunction with the power line.**
- **Use the solderless terminal with an insulation sleeve that fits M3 screw when wiring COT-200.**
- **Tighten the terminal screw with the specified torque. If excessive force is applied to the screw when tightening, the screw or case may be damaged.**
- **It is advised to provide the protective device against such environmental conditions as may cause damage to the device or contribute to the deterioration of its parts.**

3. Running and maintenance precautions

⚠ Warning

- **Do not touch live terminals. This may cause electric shock or problems in operation.**
- **Turn the power supplied to the instrunment OFF when retightening the terminal and cleaning**
- **Working or touching the terminal with the power switched ON may result in an Electric Shock which could cause severe injury or death.**

Revisions

The manual number is noted at the lower right of the back cover.

Print date	Manual number	Revision
Mar. 2001	COT21E1	First edition

1. Overview

1.1 Overview of the COT-200

When adding console unit (COT-200) to the C series devices, C series can be monitored in the same way a temperature controller with display (FC, GC series, etc) is used.

1.2 Unit and structure when applied to the C series.

(1) Console unit : COT-200

The console unit to monitor C series devices

(2) 2-channel temperature control unit : CCT-235-2 □ / □

Independent temperature control unit with 2 channels of which input and output type are the same

(3) Heating/Cooling temperature control unit : CCT-235-□/□, D□

Temperature control unit which enables both Heating and Cooling temperature control by 1CH input.

(4) Power source host link unit : CPT-20A

Supplies power to the CCT-235, the CLT-200 and the CLT-20S; is a link unit to communicate with the upper unit.

(5) CC-Link link unit : CLT-200

A link unit to connect to the CC-link master unit

(6) PC link unit : CLT-20S

A link unit to connect to a PC (Personal computer)

(7) Base unit : CBT-210 (-205)

A base unit to mount the CPT-20A, the CCT-235, the CLT-200 and the CLT-20S
(1 unit of CPT-20A per 1 base unit is required)

• When adding CPT-20A, CCT-235, CLT-200 or CLT-20S to CBT-210 (-205)

CBT-210	CPT-20A	CCT-235	CLT-200	CLT-20S
1 unit	1 unit	Max.8 unit	1 unit	
		Max.9 unit		1 unit
		Max.10 unit		

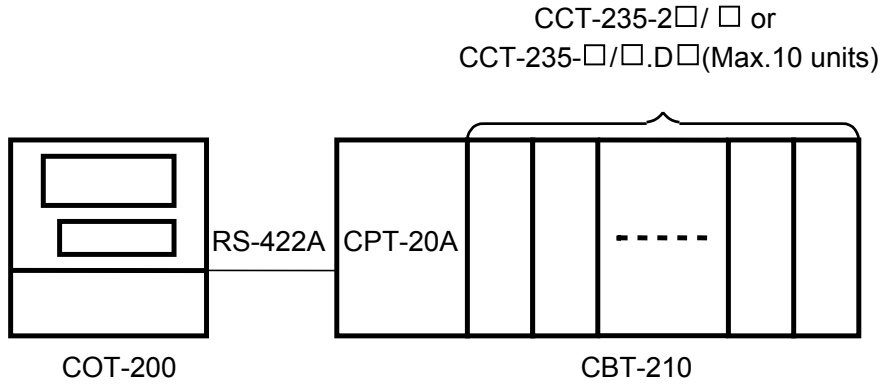
CBT-205	CPT-20A	CCT-235	CLT-200	CLT-20S
1 unit	1 unit	Max.4 unit	1 unit	
		Max.4 unit		1 unit
		Max.5 unit		

(8) Communication cable : CPM

A communication cable to connect the CPT-20A to the COT-200

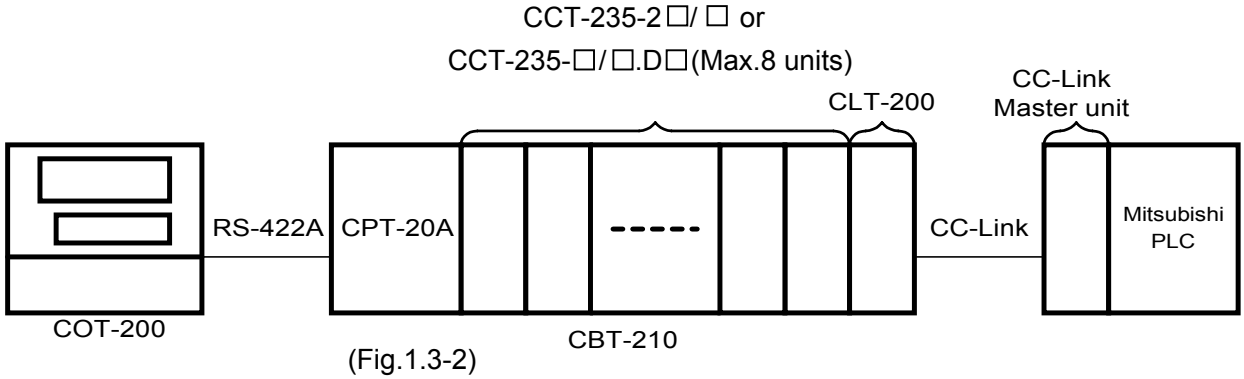
1.3 System configuration

• When using CCT-235



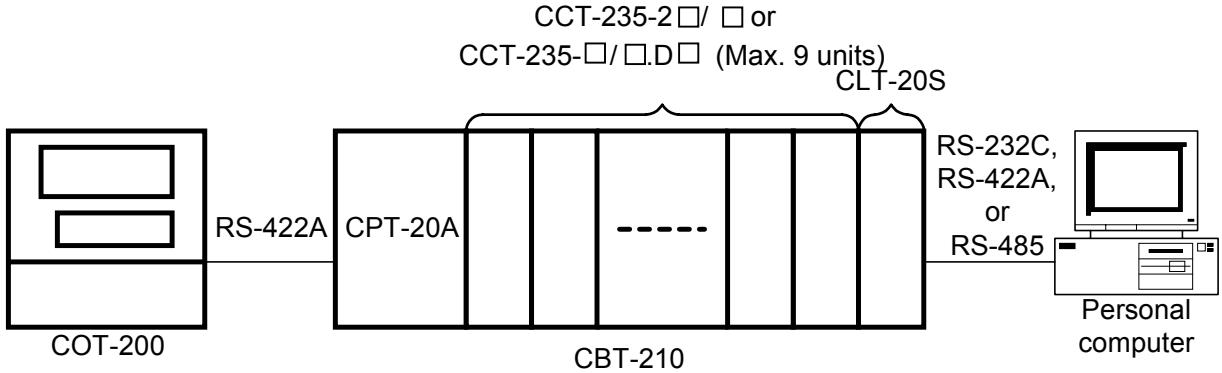
(Fig.1.3-1)

• When using CCT-235 and CLT-200



(Fig.1.3-2)

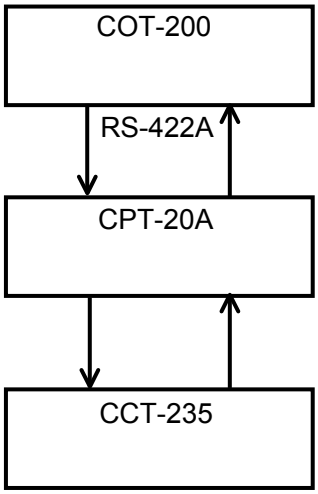
• When using CCT-235 and CLT-20S



(Fig.1.3-3)

1.4 Parameter exchange

Parameter exchange is as shown below.



The COT sends the command data to the CPT.
and receives the response data from the CPT

The CPT receives the sent data from the COT
and sends the data to the CCT.
The CPT receives the response data from the CCT
and sends the data to the COT.

The CCT receives the sent data from the CPT.
It performs the control, and sends the response data of the CCT to the CPT.

2. Model name

2.1 Model name

COT-200 : Console unit

2.2 How to indicate the model name

Warning

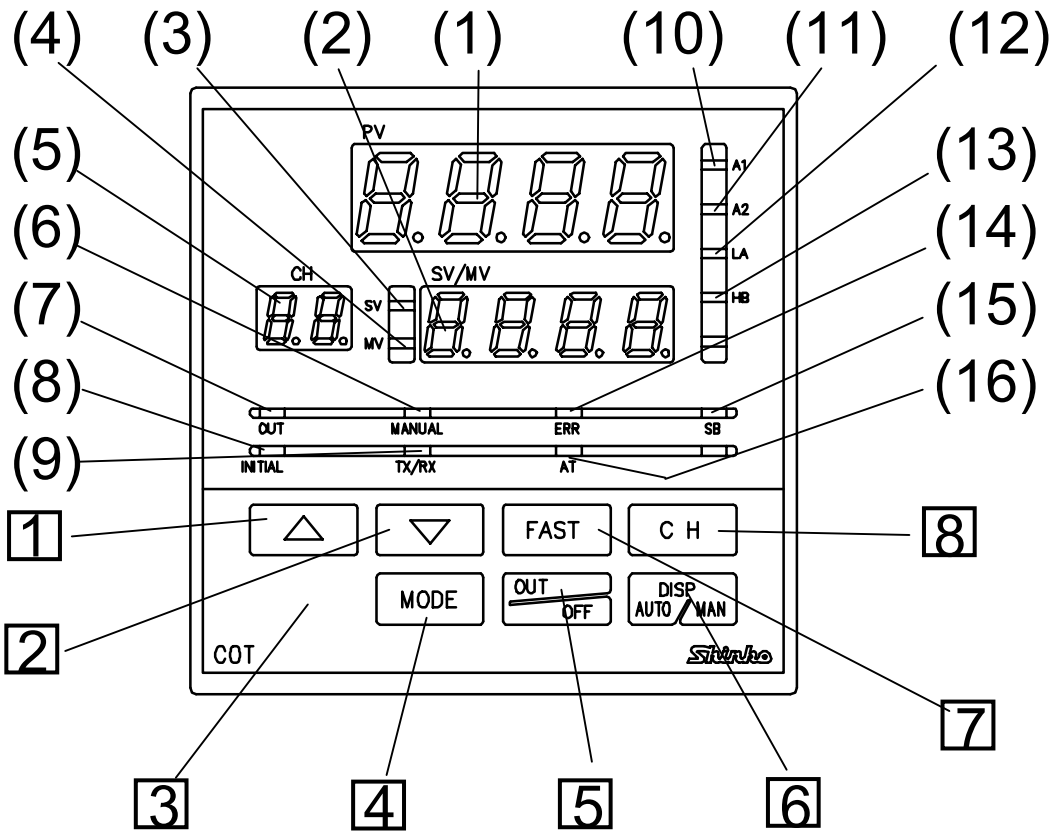
Turn the power supplied to the instrunment OFF before wiring or checking.
Working or touching the terminal with the power switched ON may result in an Electric Shock which could cause severe injury or death.

Model name labels are put on the case and inner assembly.
[Example]

COT-200	(1)	Model name: COT-200
TC	(2)	Option : Terminal cover
No. XXXXXX	(3)	Instrument number (indicated only on the inner assembly.)

3. Name and functions of the sections

3.1 Displays and indicators



(1) PV display : Process variable is indicated with red LED.

(2) SV/MV display : Setting value (SV), Manipulated variable (MV) or Heater current value is indicated with green LED.

(3) SV indicator : While SV is displayed on the SV display, green LED lights.

(4) MV indicator : While MV is displayed on the SV display, red LED lights.

(5) CH display : Channel number is indicated with yellow LED.

(6) Manual indicator : Red LED lights in manual indication.

(7) Control output indicator : When the control output of channel indicated on the CH display is on, green indicator lights.
For DC current output type, green LED blinks corresponding to the MV.

(8) Initial process indicator : When the power is turned on or initial processing is performed during running, yellow LED lights.

(9) Serial communication indicator : While serial communication is performing, yellow LED blinks.

(10) Alarm 1 (A1) output indicator : When alarm 1 (A1) output of the channel indicated on the CH display is on, red LED lights.

(11) Alarm 2 (A2) output indicator : When alarm 2 (A2) output of the channel indicated on the CH display is on, red LED lights.

(12) Loop break alarm 1 and 2 output action indicator : When Loop break alarm 1 and 2 output of the channel indicated on the CH display is on, red LED lights.

(13) Heater burnout alarm output action indicator : When Heater burnout alarm output of the channel indicated on the channel is on, red LED lights.

(14) Communication error indicator : When communication error occurs continuously, red LED blinks.

(15) Sensor burnout indicator : When the sensor of the channel indicated on the CH display is burnt out, red LED lights.

(16) Auto-tuning action indicator : During auto-tuning of the channel indicated on the channel number display, yellow LED lights.

3.2 Keys

Main functions are described below. However, the keys have other functions depending on the mode. Refer to Section 7.1 Operation flow chart. (P.18)

1 ▲ **(Increase key)**
This increases numerical value on SV display in the setting mode.

2 ▼ **(Decrease key)**
This decreases numerical values on SV display in the setting mode.

3 **(Auxiliary key)**
By using with other keys, special operations can be performed.

4 MODE **(MODE key)**
This selects the setting mode.

5 OUT/OFF **(OUT/OFF key)**
This changes ON / OFF of the control output.

6 DISP AUTO/MAN **(Display Auto / Manual key)**
This changes all the monitored channels and designated channel.

7 FAST **(FAST key)**
This makes the numeric value change faster by pressing the FAST key and ▲ key or ▼ key.

8 CH **(Channel key)**
This selects the channel number to be set in the setting mode.

• Before operating keys:

By pressing OUT/OFF key in any mode, control output OFF function works on the channel indicated. Once the function is working, it cannot be cancelled even if the power to the instrument is turned on and off again.

To cancel the function, press the OUT/OFF key when the channel on which control output OFF function is working is displayed.

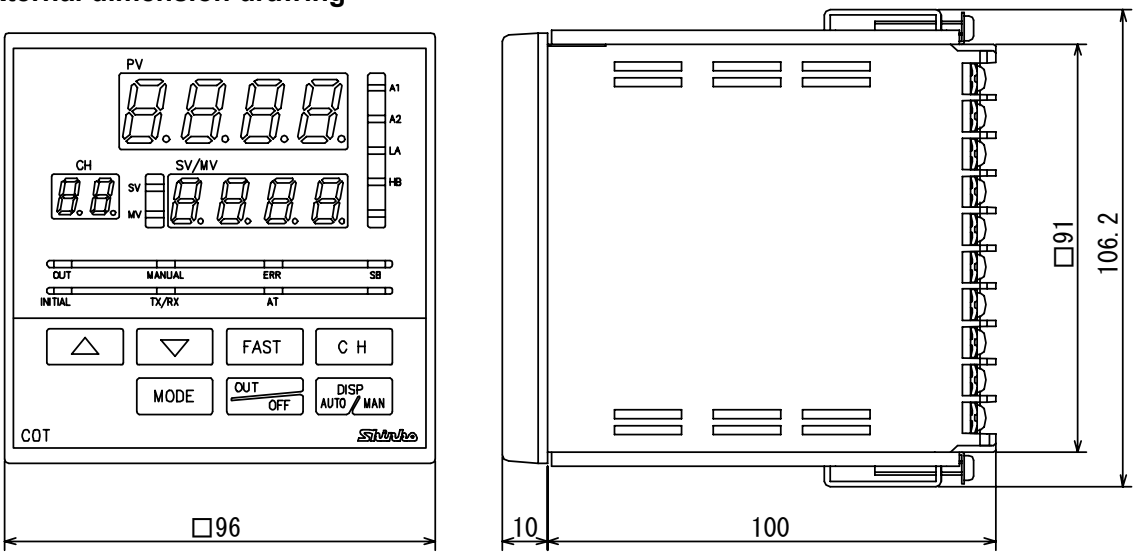
4.Mounting to the control panel

4.1 Site selection

Mount the console unit in a place with:

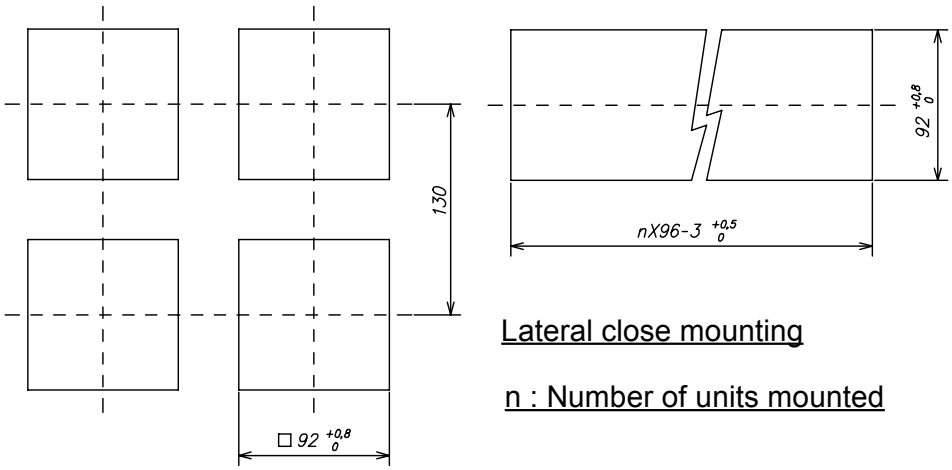
(1) A minimum of dust, and an absence of corrosive gasses
(2) No flammable and explosive gasses
(3) Few mechanical vibrations or shocks.
(4) No exposure to direct sunlight, an ambient temperature of 0 to 50℃ (32 to 122℉)
(5) An ambient non-condensing humidity of 85%RH or less
(6) The units away from large capacity electromagnetic switches or cables through which a large current is flowing
(7) No water, oil or chemicals or where the vapors of these substance can come into direct contact with the unit.

4.2 External dimension drawing



(Fig.4.2-1)

4.3 Panel cutout



Lateral close mounting

n : Number of units mounted

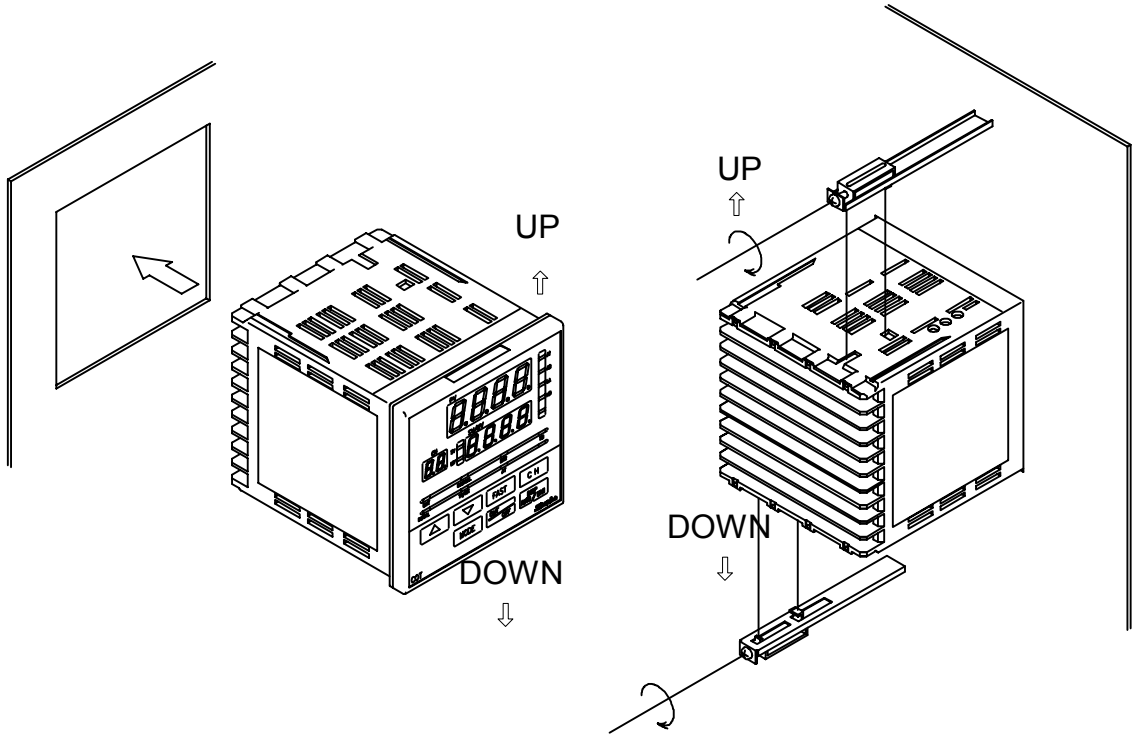
(Fig.4.3-1)

4.4 Mounting

Mountable panel thickness : 1 to 15mm
Insert the instrument from the front panel.
Catch the mounting bracket to the holes at the top and bottom of the case, and screw to fix.

⚠ Warning

Tighten the terminal screw with the specified torque.
If excessive force is given to the screw when tightening, the screw or case may be damaged.
The torque is approximately 0.12N•m.



(Fig.4.4-1)

5. Wiring connection

⚠ Warning

Turn the power supplied to the instrunment OFF before wiring or checking.
Working or touching the terminal with the power switched ON may result in an Electric Shock which could cause severe injury or death.
The instrument must be grounded before the power supply to the instrument is turned on.

⚠ Caution

Do not put wire chips into the instrument, because they could cause fire, malfunction or trouble.

For the COT-200 ground terminal, use a wire whose thickness is 2mm^2 or greater. However, avoid grounding in conjunction with the power line.

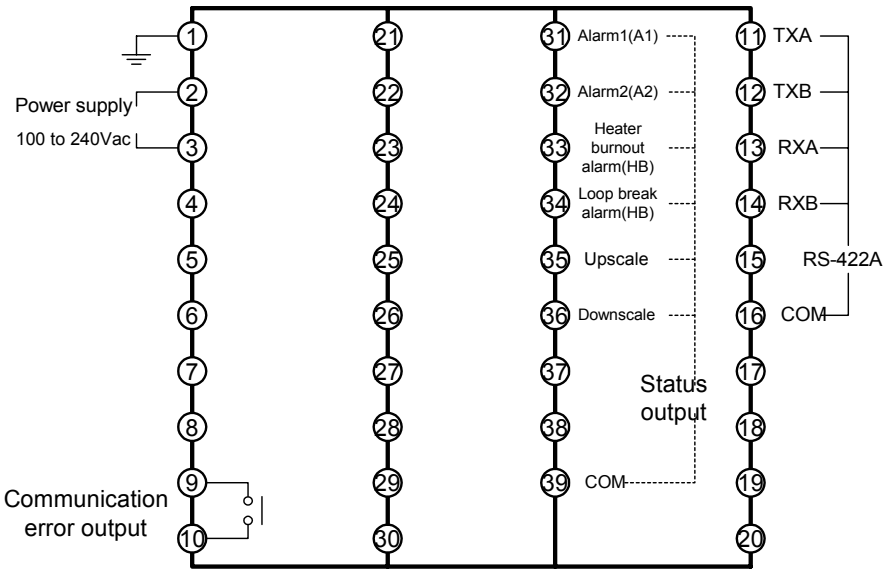
Use the solderless terminal with an insulation sleeve that fits to an M3 screw when wiring

COT-200.

Tighten the terminal screw with the specified torque.
If excessive force is applied to the screw when tightening, the screw or case may be damaged.

It is advised to provide the protective device against such environmental conditions as may cause damage to the device or contribute to the deterioration of its parts.

5.1 Terminal arrangement

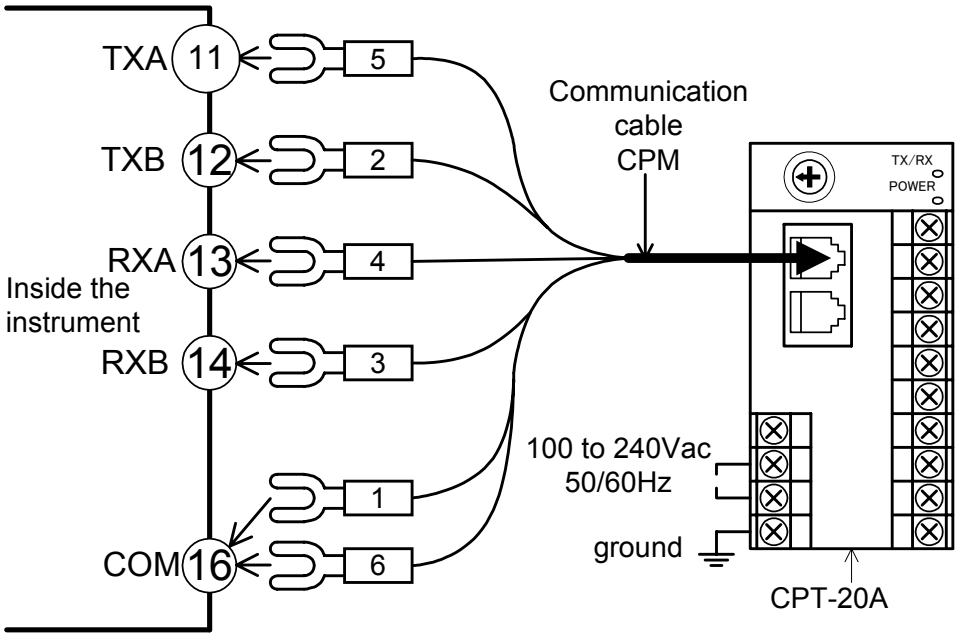


(Fig.5.1-1)

- **The terminal board of this instrument is designed to be wired from the left side. Be sure to insert the lead wire from the left side to the terminal and tighten it using the terminal screw.**
- **A dotted line means this is an option, and if option is not designated, there are no corresponding terminals. See (P.38) in detail for options.**

5.2 Wiring connection example

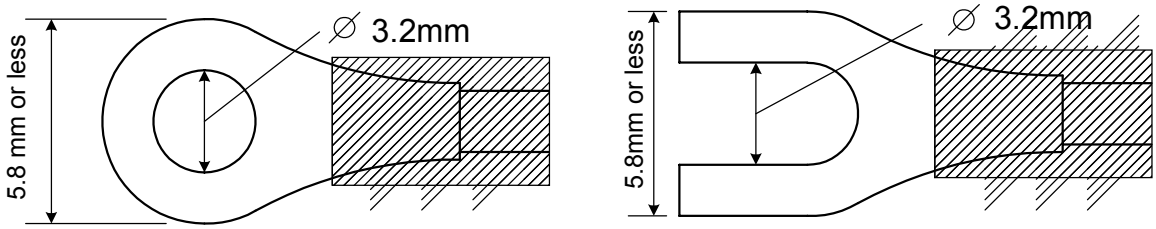
• Communication terminal



(Fig.5.2-1)

• Recommended terminals

Use a solderless terminal with an insulation sleeve that fits an M3 screw as shown below.



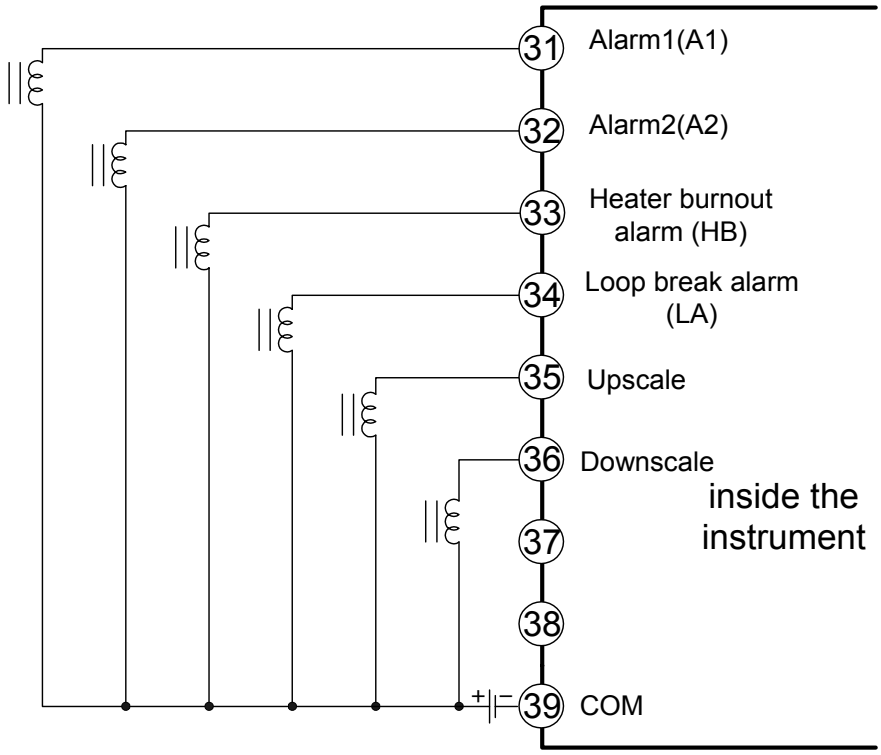
(Fig.5.2-2)

Solderless terminal	Manufacturer	Model name	Tightening torque
Y type	Nichifu Terminal Industries CO.,LTD	1.25-Y3	0.6N•m MAX 1.0N•m
	Japan Solderless Terminal MFG CO.,LTD	VD1.25-B3A	
Round type	Nichifu Terminal Industries CO.,LTD	1.25-3	
	Japan Solderless Terminal MFG CO.,LTD	V1.25-3	

• Status output terminal (Option : SO)

Open collector output : 6 circuits

Capacity : 24Vdc Max. 50mA



(Fig.5.2-3)

6. Setup

After the power is supplied to this instrument, set it up as follows.

*** The data transfer rate of this instrument is fixed to 19,200bps.**
Set the data transfer rate of CPT-20A to 19,200bps.

6.1 Number of connected units setting

Set the number of connected CCT-235 units.
Unless the number of connected units is set, only 1 unit is monitored even if the plural units of the CCT-235 are connected.

• How to set the number of units:

In the PV/SV display mode, press the ▲, ▼, MODE key for 3 seconds or greater.
"Unit" is indicated on the PV display and "current setting value" is indicated on the SV/MV diplay and switches to the number of units setting mode.
At this time set the number of the CCT-235s by pressing the ▲ or ▼ key.
The number indicated on the SV/MV display shows the number of CCT-235s connected.
Press the MODE key after the setting is complete.
The display returns to the PV/SV display mode.

6.2 Reading all setting values:

When the power is supplied to the COT-200 and the C series at the same time, the COT-200 automatically reads the setting data of the C series and it makes the setting data as the same one of the C series.

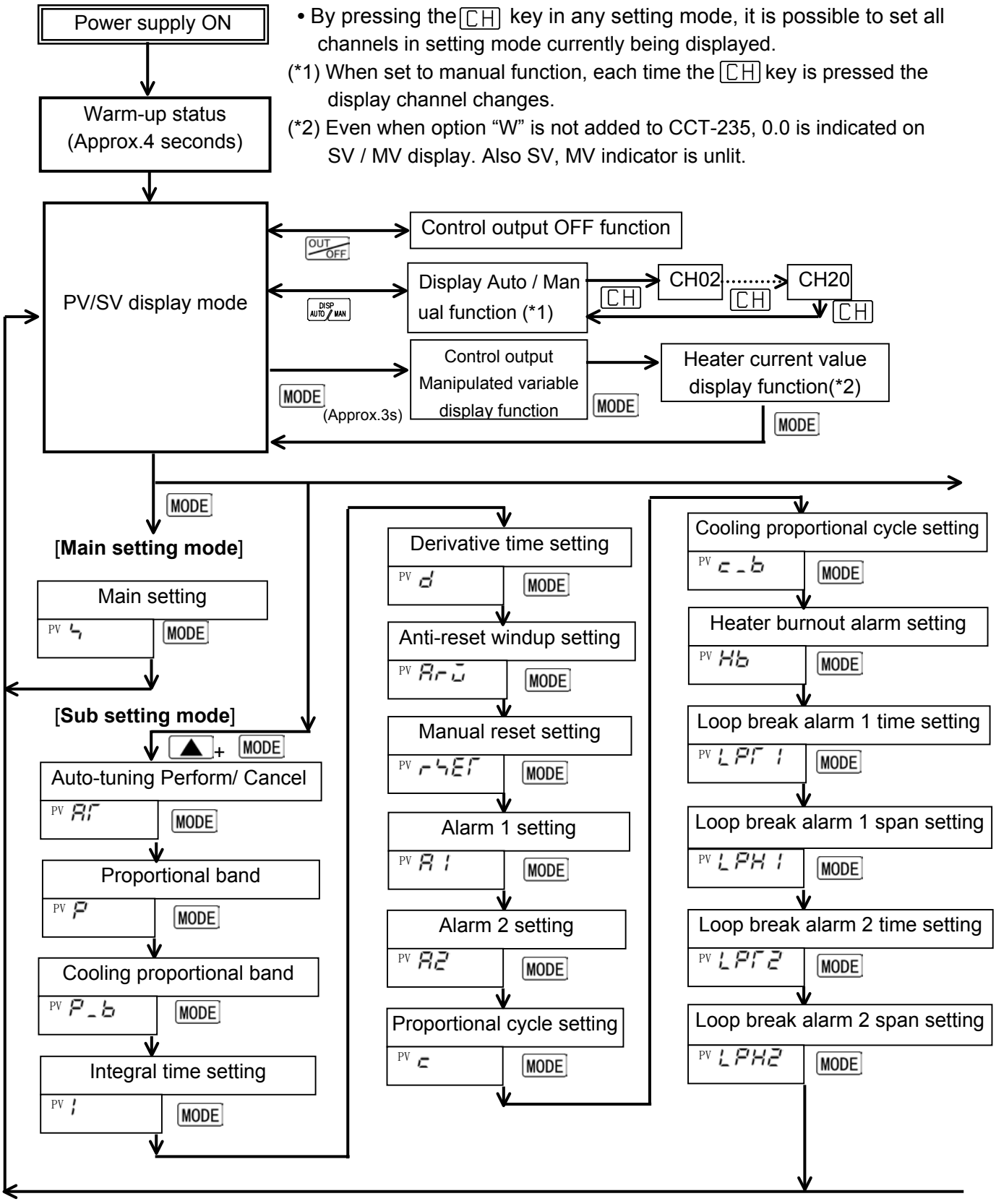
> ⚠ **Caution**
>
> **If the power supply to the COT-200 is turned off and on again while the power supply to the C series is turned on, the COT-200 cannot read the setting data of the C series automatically. In this case, read all the setting data of the C series from the COT-200 manually.**

• How to read all the setting values:

Keep pressing the ▽, MODE, FAST, and CH keys for 3 seconds or greater in PV/SV display mode.
PV display indicates "rEAd" and then reverts to the PV/SV display mode again.

7. Operation

7.1 Operation flow chart

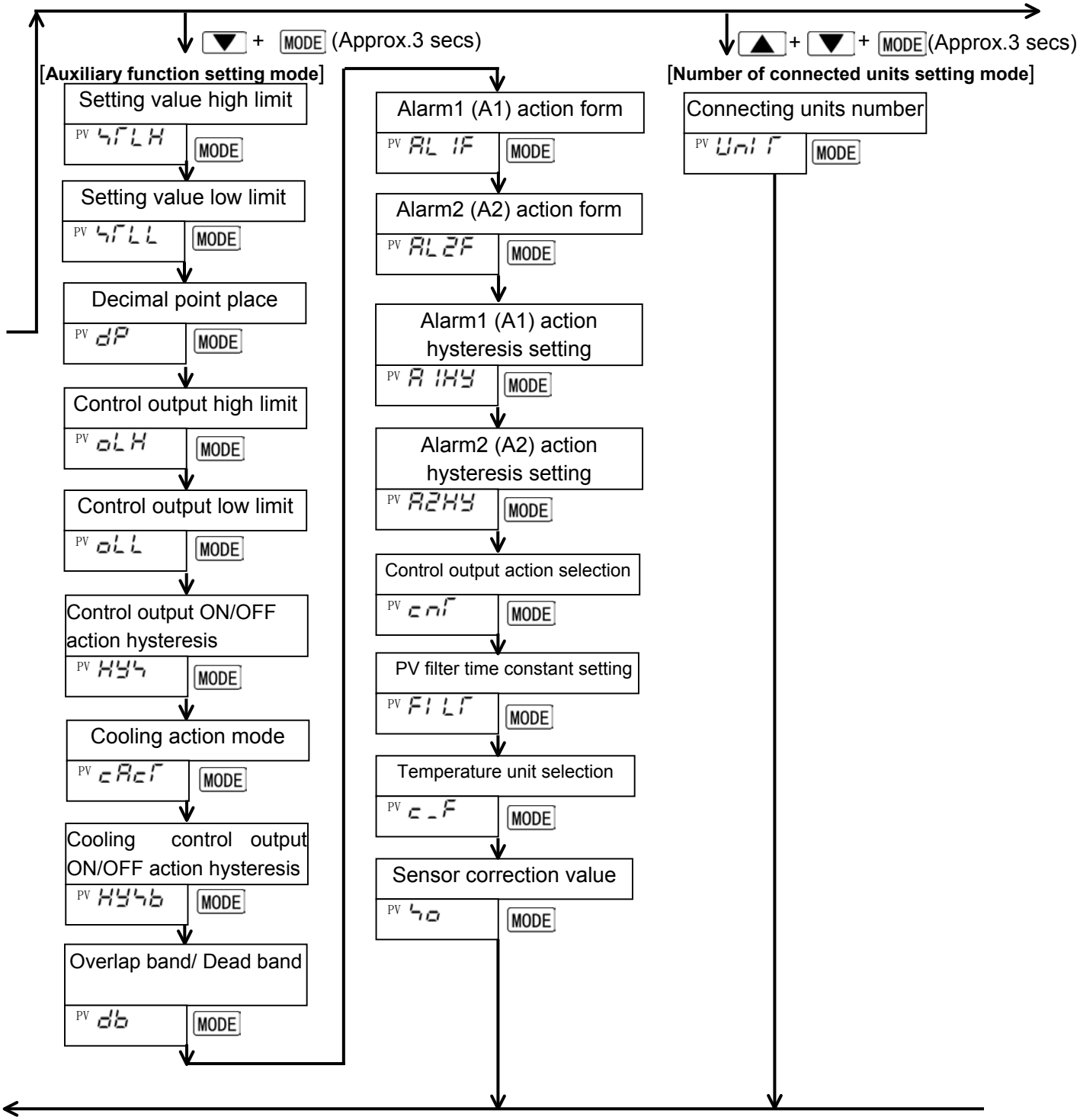


- By pressing the CH key in any setting mode, it is possible to set all channels in setting mode currently being displayed.

(*1) When set to manual function, each time the CH key is pressed the display channel changes.

(*2) Even when option "W" is not added to CCT-235, 0.0 is indicated on SV / MV display. Also SV, MV indicator is unlit.

- ▲ + MODE : Press the MODE while the ▲ is being pressed.
- ▼ + MODE (Approx.3s) : Press the MODE for approximately 3 seconds while the ▼ is being pressed.
- ▲ + ▼ + ⬚ + MODE (Approx.3s) : Press the MODE while ▲, ▼, ⬚ are being pressed for approximately 3 seconds.
- ⬚ + MODE + FAST + CH (Approx.3s) : Press CH while ⬚, MODE, FAST are being pressed for approximately 3 seconds.

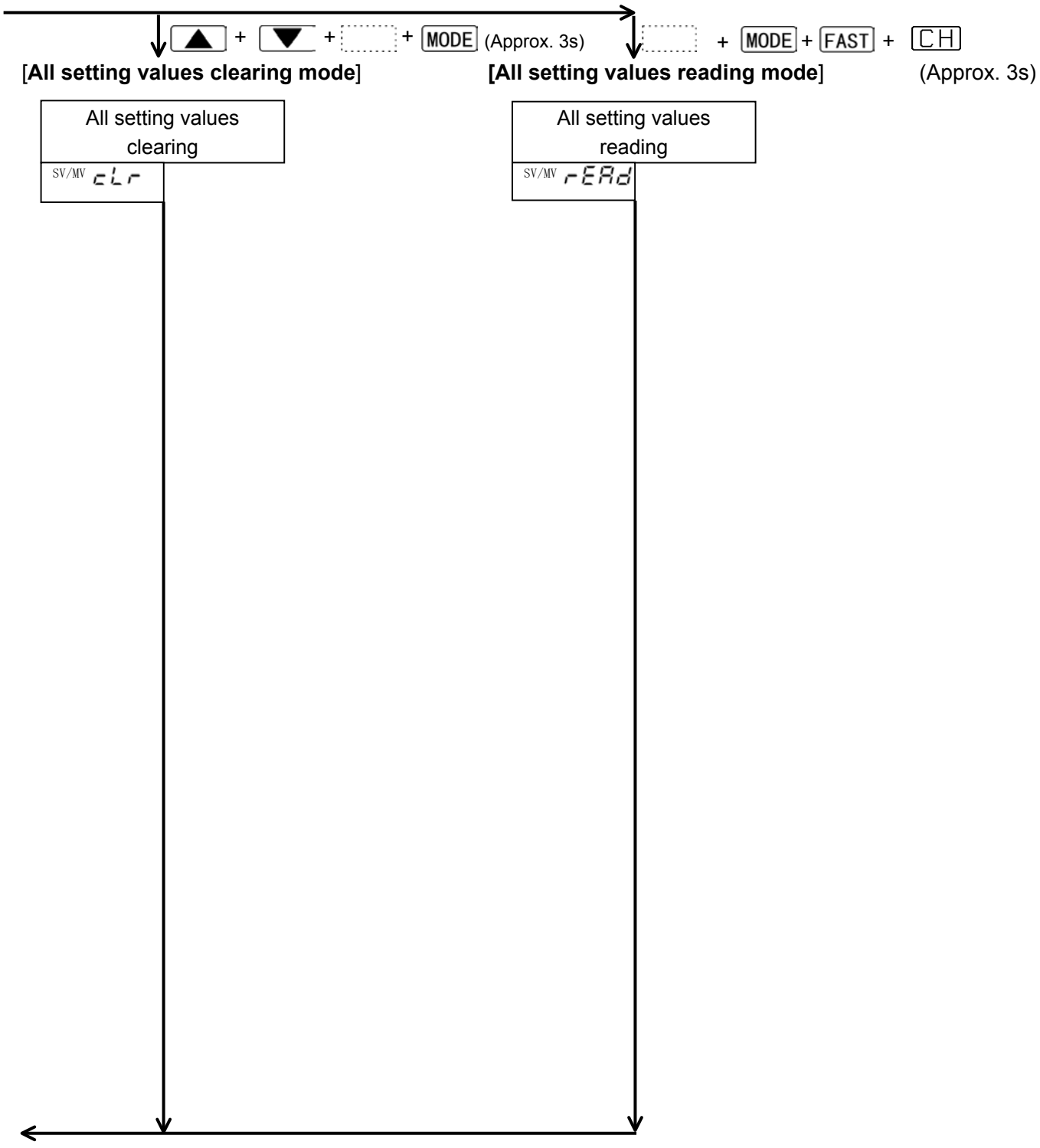


• By pressing the CH key in any setting mode, it is possible to set all the channels in the setting mode currently being displayed.

[Example: Main setting value setting mode]

In the CH1 main setting value setting mode, press CH key and the mode will turn to CH2 main setting value setting mode.

Pressing the CH key again, and the mode will turn to CH3 main setting value setting mode.



7.2 Operation

- After the power supply, the model name "cot (COT)" is indicated on the PV display for approximately 4 seconds.
  During this time, all LED indicators, as well as SV /MV and CH display are in their OFF status.
  After that, the PV on the PV display, the main setting value on the SV /MV display and the channel number being monitored on the CH display are indicated respectively, and the monitoring starts.

⚠ Caution

In the case of DC voltage and DC current input, scale change must be carried out.
When transmitting the value which is set at the COT-200 to the CCT-235, the COT-200 transmits the value converting it into the rated value of the CCT-235. The COT-200 converts the read value from the CCT-235 into the scaling setting range of the COT-200 and indicates it.
When setting the undividable value in connection with the scaling span of the COT-200 and the rated value of the CCT-235, it is probable that the read value from the CCT-235 will not correspond to the set value during the process above.
(The read value will be rounded down to the nearest whole number.)

The formula for scale change when tranmitting from the COT-200 to the CCT-235 is as follows:

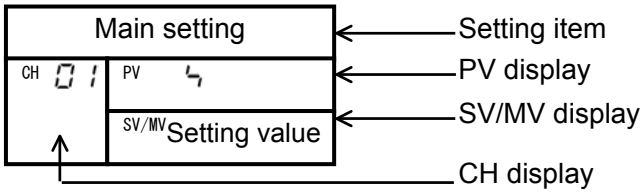
$$Xs = \frac{(SV-STLL)\times(CS-CZ)}{(STLH-STLL)}$$

The formula for showing the read value from the CCT-235 is as follows.

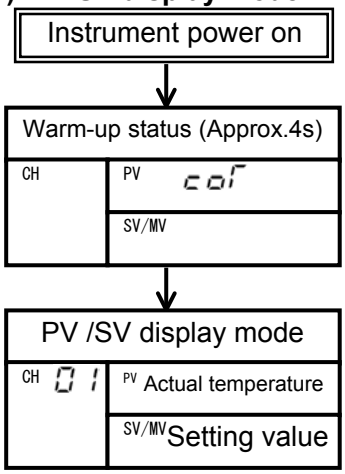
$$Xd = \frac{(RV-CZ)\times(STLH-STLL)}{(CS-CZ)} + STLL$$

Xs, Xd	: The value after scale change
SV	: The value set to the COT-200
RV	: The value read from the CCT-235
STLH	: The scaling high limit value of the COT-200
STLL	: The scaling low limit value of the COT-200
CS:	: The rated high limit value of the CCT-235 (10000)
CZ	: The rated low limit value of the CCT-235 (0)

• Key operations are described as follows.



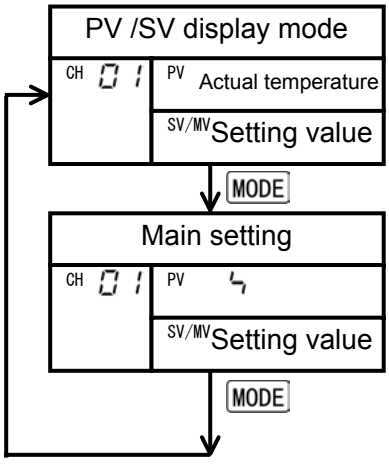
(1) PV /SV display mode



• CH1 is being monitored now.
• Setting item and value cannot be changed.

(2) Main setting mode

If the MODE key is pressed, the main setting mode is selected.
The setting value (numeric value) can be increased or decreased by pressing the ▲, ▼ or FAST keys.
The setting value is registered by pressing the MODE key and the display reverts to the PV/SV display.

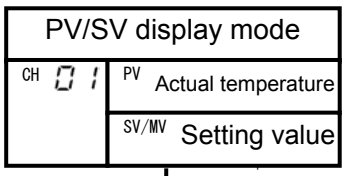


• Sets the main setting value of CH1.
• Setting range Thermocouple or RTD input:
Within the rated scale range
DC input:
Scaling low limit to Scaling high limit value

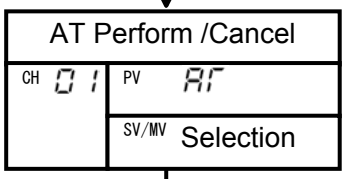
(3) Sub setting mode

If the MODE key is pressed while the ▲ key is being pressed, the sub-setting mode is selected. The setting value (numeric value) can be increased or decreased by pressing the ▲, ▼ or FAST keys.

By pressing the MODE key, the setting value is registered and setting item is changed.



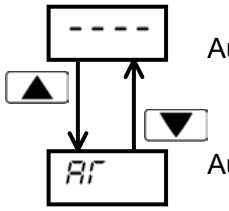
▲ + MODE



- Selects Auto-tuning performance or Cancellation of CH1.
- If the MODE key is pressed after selecting AT performance, AT starts.

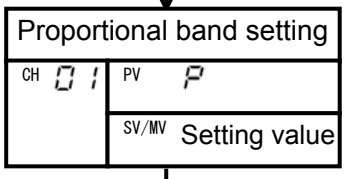
It is unable to set any setting item for the channels which are performing "Auto-tuning".

MODE



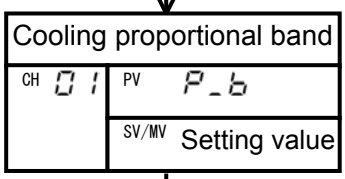
⚠ Caution

Do not perform Auto-tuning while controlling with ON /OFF or PD action mode, or the control action will be changed to the PID action mode after AT is complete.
If the AT is canceled in the process, P,I, D and ARW values return to the former value at which AT is performing.



- Sets the proportional band of CH1.
  For the explanation of the proportional band, refer to the Instruction manual of the C series.
- Setting range : 0.0 to 100.0% (ON /OFF action if set to 0.0)

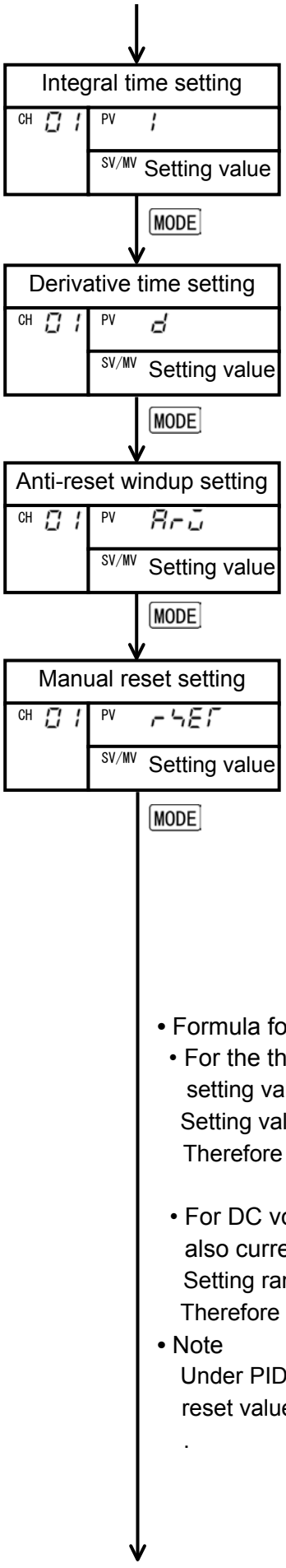
MODE



- Sets the cooling proportional band of CH1.
  For the explanation of the cooling proportional band, refer to the Instruction manual of the C series.
- Setting range : 0.0 to 10.0 times [The heating side proportional band setting]
  (ON /OFF action if set to 0.0)

Settable only when CCT-235 is heating /cooling control output.

MODE



• Sets the integral time of CH1.
For the explanation of the integral time, refer to the Instruction manual of the C series.
• Setting range : 0 to 3600 seconds (Off when set to 0)

• Sets the derivative time of CH1.
For the explanation of the derivative time, refer to the Instruction manual of the C series.
• Setting range : 0 to 3600 seconds (Off when set to 0)

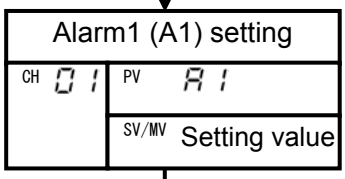
• Sets the anti-reset windup of CH1.
For the explanation of the anti-reset windup, refer to the Instruction manual of the C series.
• Setting range : 0 to 100%

• Sets the reset value of CH1 manually to correct the offset
(Offset: Deviation between SV and PV when the control is stabilized.)
• Setting range In the case of Thermocouple and RTD input:
±(Rated scale range x Proportional band setting value)℃(℉)
Unable to set the value outside –199.9 to 999.9℃(℉) because the display is composed of a 4-digit section.
: In the case of DC input
±(Scaling low limit to high limit) x Proportional band setting value
Unable to set the value outside –1999 to 9999℃(℉) because the display is composed of a 4-digit section.

• Formula for the manual reset setting range
• For the thermocouple K (-200 to 1370℃) and current proportional band setting value is 1.0%.
Setting value= ±(200＋1370) x 0.01
Therefore setting value will be ±15.7℃.

• For DC voltage, DC current input (Scaling range: -1999 to 9999) and also current proportional band setting value is 1.0%.
Setting range = ±(1999+9999) x 0.01
Therefore setting range will be ±119

• Note
Under PID or ON /OFF action control, activation does not occur even if the manual reset value is set.
.



• Sets the Alarm 1 (A1) output action point for CH1.
• Setting range : (See Table 7.2-1)

Unable to set when " No alarm" is selected in Alarm 1 (A1) action type selection.

(Table 7.2-1)

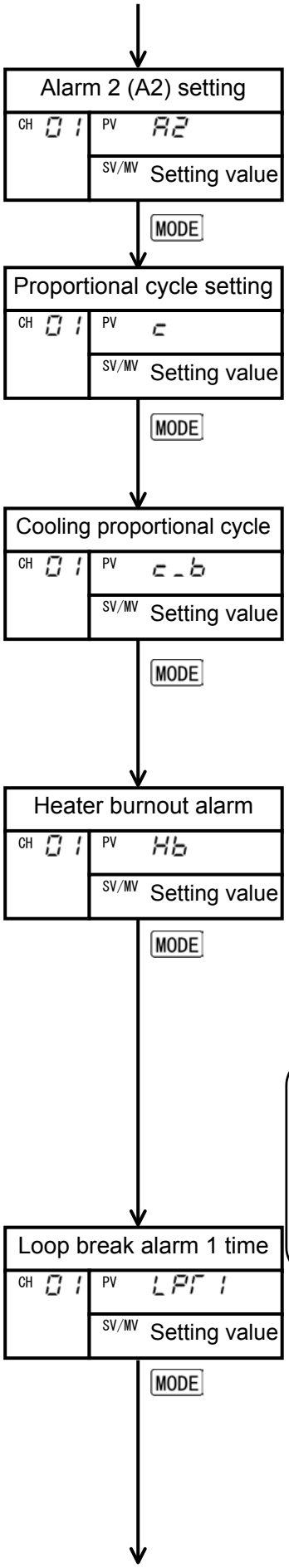
Thermocouple and RTD input	
Alarm type	Setting range
No alarm	
High limit alarm (Deviation)	-200 to 200 or -199.9 to 200.0℃(℉) *1
High limit alarm with standby (Deviation)	-200 to 200 or -199.9 to 200.0℃(℉) *1
Low limit alarm (Deviation)	-200 to 200 or -199.9 to 200.0℃(℉) *1
Low limit alarm with standby (Deviation)	-200 to 200 or -199.9 to 200.0℃(℉) *1
High/ low limits alarm (Deviation)	0 to 200 or 0.0 to 200.0℃(℉) *1
High/ low limits alarm with standby (Deviation)	0 to 200 or 0.0 to 200.0℃(℉) *1
High/ low limit range alarm (Deviation)	0 to 200 or 0.0 to 200.0℃(℉) *1
High/ low limit range alarm with standby (Deviation)	0 to 200 or 0.0 to 200.0℃(℉) *1
Process high alarm	Input range min. value to max. value
Process high alarm with standby	Input range min. value to max. value
Process low alarm	Input range min. value to max. value
Process low alarm with standby	Input range min. value to max. value

DC voltage and DC current input	
Alarm type	Setting range
No alarm	
High limit alarm (Deviation)	-1999 to 2399 *1, *2
High limit alarm with standby (Deviation)	-1999 to 2399 *1, *2
Low limit alarm (Deviation)	-1999 to 2399 *1, *2
Low limit alarm with standby (Deviation)	-1999 to 2399 *1, *2
High/ low limits alarm (Deviation)	0 to 2399 *1, *2
High/ low limit alarm with standby (Deviation)	0 to 2399 *1, *2
High/ low limit range alarm (Deviation)	0 to 2399 *1, *2
High/ low limit range alarm with standby (Deviation)	0 to 2399 *1, *2
Process high alarm	Scaling low limit value to high limit value
Process high alarm with standby	Scaling low limit value to high limit value
Process low alarm	Scaling low limit value to high limit value
Process low alarm with standby	Scaling low limit value to high limit value

*1: **Alarm action does not work if set to 0 or 0.0.**

*2: Setting range of Alarm 1(A1) changes depending on the setting range of COT-200 (Scaling low limit to high limit).
Since the deviation alarm setting range of CCT-235 is ±20% of [0 to 10000], the deviation alarm setting range of COT-200 is ±20% of [scaling low limit value to high limit value.]

• **When the setting range of COT-200 is –1999 to 9999,**
±(1999+9999) x 0.2 = ±2399
However, since COT-200 display is made of a 4-digit section, it is unable to set the value below –1999 in the negative side (-).
Therefore the alarm setting range will be "-1999 to 2399" or "0 to 2399".



• Sets the Alarm 2 (A2) output action point for CH1.
• Setting range : The same as the Alarm 1 (A1).
Alarm 2 (A2) cannot be set when "No alarm" is selected in Alarm 2 (A2) action type selection.

• Sets the proportional cycle for CH1.
• Setting range : 1 to 120 seconds (Setting the proportional cycle in DC current output type is an invalid action.)
* **In the case of relay contact output type, if the proportional cycle setting is short, it may shorten the relay contact life, because contact frequency increases.**

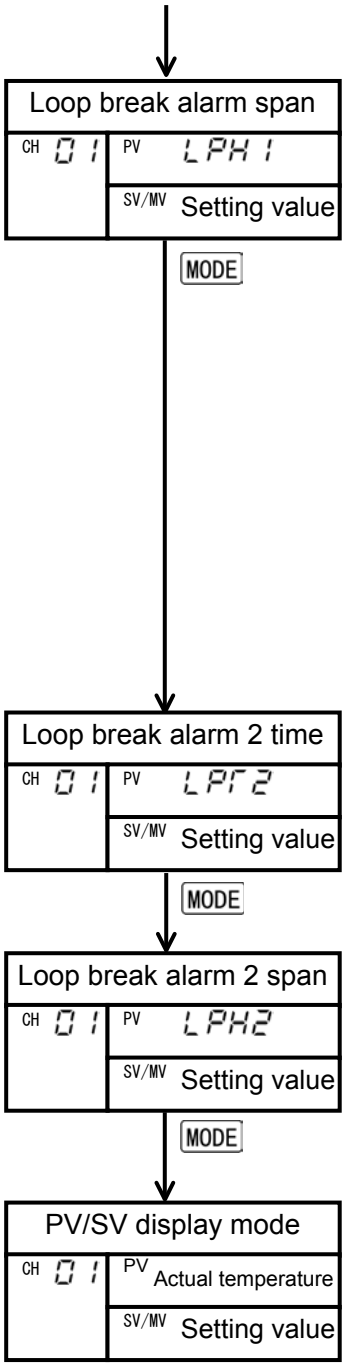
• Sets the cooling proportional cycle for CH1
• Setting range : 1 to 120 seconds (Setting the proportional cycle in DC current output type is an invalid action.)
It is settable only when CCT-235 is heating /cooling control output type.
* **In the case of relay contact output type, if the proportional cycle setting is short, it may shorten the relay contact life, because contact frequency increases.**

• Sets Heater burnout alarm (heater current value).
• Setting range When W (20A) : 0.0 to 20.0A
When W (50A) : 0.0 to 50.0A
It is unable to set Heater burnout alarm when option "W" is not applied to the CCT-235.

⚠ Caution

• Heater burnout alarm does not work if the value is set to 0.0.
• It is recommended that heater current value should be set around 80% of the value considering the voltage fluctuation.
• Alarm output cannot be self-held.

• Sets the Loop break alarm time for CH1.
• Setting range: 0 to 200 minutes.



• Sets the Loop break alarm span for CH1.
• Setting range Thermocouple and RTD : 0.0 to 100.0℃(℉)
DC voltage and DC current input: 0 to 1199

However, in the case of DC voltage and DC current input, Loop break alarm 1 span setting range is changeable depending on the COT-200 setting range (Scaling low limit to high limit).
Since the CCT-235 Loop break alarm 1 span setting range is 10% of 0 to 10000, 10% of COT-200 scaling low limit to high limit becomes the setting range of Loop break alarm 1 span.

*** When the setting range of COT-200 is –1999 to 9999,**
(1999+9999) x 0.1=1199.8
Therefore the setting range will be 0 to 1199.

• Sets the Loop break alarm 2 time for CH1.
• Setting range : 0 to 200 minutes

• Sets the Loop break alarm 2 span for CH1.
• Setting range : The same as Loop break alarm 1 span

• Loop break alarm
The alarm will be activated when the process variable (PV) does not rise as much as the span within the preset time after the manipulated variable reaches to 100% or output high limit value.

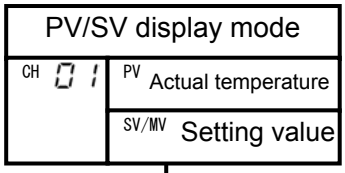
The alarm will also be activated when the process variable (PV) does not fall as much as the span within the preset time after the manipulated variable reaches to 0% or output low limit value .
When the control action is Direct (Cooling), the alarm acts conversely.

(4) Auxiliary function setting mode

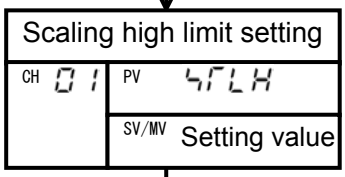
If the MODE key is pressed while the ▼ key is being pressed, the auxiliary function setting mode is selected.

Setting value (numerical value) can be increased or decreased by pressing the ▲, ▼ or FAST keys.

By pressing the MODE key, the setting value is registered and the setting item is changed.

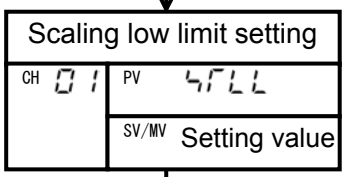


▼ + MODE (For approx. 3 seconds)



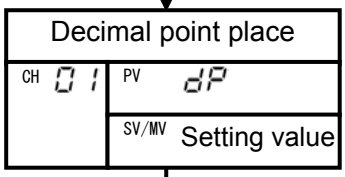
MODE

- Sets the scaling high limit for CH1.
  It can only be set when the input type is DC voltage or DC current.
- Setting range : Scaling low limit to 9999
  As the COT-200 display is made of a 4-digit section, the value cannot be set over 9999.



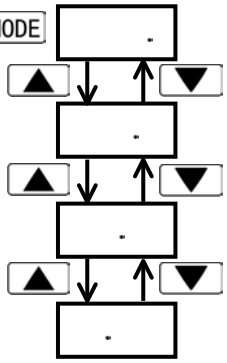
MODE

- Sets the scaling low limit for CH1.
  It can only be set when the input type is DC voltage or DC current.
- Setting range : -1999 to scaling high limit
  As the COT-200 display is made of a 4 digit section, the value cannot be set the value below –1999.



- Selects the decimal point place
  It can only be set when the input type is DC voltage or DC current.

MODE

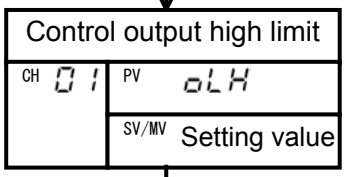


: XXXX. (No decimal point)

: XXX.X (1 digit after the decimal point)

: XX.XX (2 digits after the decimal point)

: X.XXX (3 digits after the decimal point)



- Sets control output high limit for CH1.
- Setting range : Control output low limit to 105%
  (The setting over 100% is valid only when the output type is DC current.)

MODE

Control output low limit

CH 01 PV oLL

SV/MV Setting value

MODE

• Sets the control output low limit for CH1.
• Setting range : -5% to control output high limit
(Setting below 0% is valid only when the output type is DC current.)

Control output ON/OFF action hysteresis

CH 01 PV HYS

SV/MV Setting value

MODE

• Sets the control output ON/OFF action hysteresis for CH1.
• Setting range : Thermocouple and RTD input : 0.1 to 100.0℃(℉)
: DC voltage and DC current input:1 to 1199

However, in the case of DC voltage and DC current input, control output ON/OFF action hysteresis setting range is changeable depending on the COT-200 setting range (Scaling low limit to high limit).
Since the CCT-235 control output ON/OFF action hysteresis setting range is 10% of 0 to 10000, 10% of COT-200 scaling low limit to high limit becomes the setting range of control output ON/OFF action hysteresis.

* When the setting range of COT-200 is –1999 to 9999,
(1999+9999) x 0.1=1199.8
It is unable to set 0 as for control output ON/OFF action hysteresis.
Therefore the setting range will be 1 to 1199.

• Note
This setting item is only available for control output ON/OFF action.

Cooling action mode

CH 01 PV cACT

SV/MV Action mode

MODE

• Selects the cooling action from air cooling, oil cooling and water cooling.
It can only be set when output type is Heating/ Cooling control.

AIr : Air cooling

oIL : Oil cooling

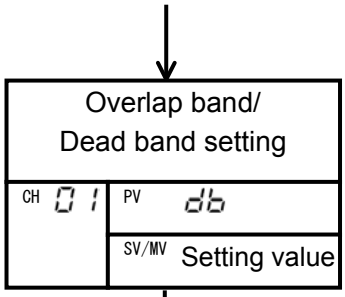
WAT : Water cooling

Cooling control output ON/OFF action hysteresis

CH 01 PV HYSb

SV/MV Setting value

• Sets the cooling control output ON/OFF action hysteresis for CH1.
• Setting range : The same as control output ON/OFF action hysteresis
It can only be set when output type is Heating/ Cooling control.

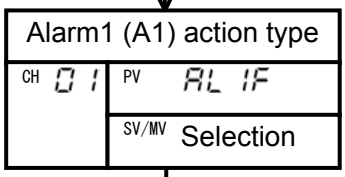


- Sets the overlap band/ dead band values of heating control and cooling control sides for CH1.
  + Setting value : Dead band, - Setting value : Overlap band
- Setting range : ±100.0% of heating side proportional band

It can be set within the range below.
Thermocouple and RTD input: -199.9 to 999.9℃(℉)
DC voltage and DC current input: -1999 to 9999
It can only be set for the Heating/ Cooling control output.

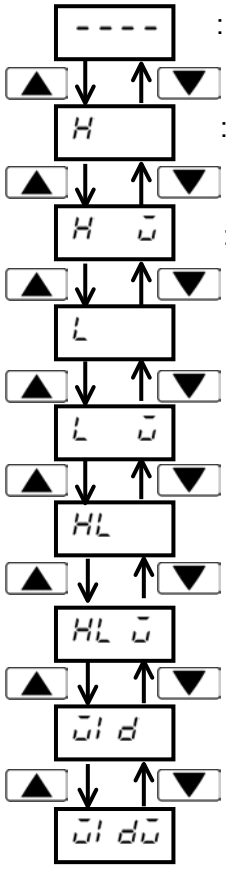
MODE

- **Formula for the Overlap/ Dead band setting range**
  - **In the case of thermocouple K (-200 to 1370℃), and when heating side proportional band setting value is 2.5%**
    Setting range = ±(200 +1370) x 0.025
    Therefore the setting range will be ±39.2℃.
  - **In the case of DC voltage and DC current output, and when heating side proportional band setting value is 5.0%**
    Setting range = ±(1999 + 9999) x 0.05
    Therefore the setting range will be ±599℃.

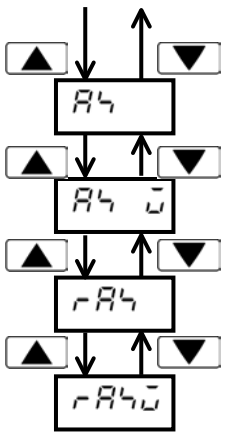


- Selects the Alarm1 (A1) action type.

MODE



: No alarm
: High limit alarm
: High limit alarm with standby
: Low limit alarm
: Low limit alarm with standby
: High/Low limits alarm
: High/Low limits alarm with standby
: High/Low limit range alarm
: High/Low limit range alarm with standby



: Process high alarm

: Process high alarm with standby

: Process low alarm

: Process low alarm with standby

Alarm 2 (A2) action type

CH 01 PV A2TY

SV/MV Selection

- Selects the Alarm 2 (A2) action type for CH1.
- Type selection : The same as those of Alarm 1.

MODE

Alarm 1 (A1) hysteresis

CH 01 PV A1HY

SV/MV Selection

- Sets the Alarm 1 (A1) hysteresis for CH1.
- Setting range Thermocouple and RTD input : 0.1 to 100.0℃(℉)
  DC voltage and DC current input : 1 to 1199

However, in the case of DC voltage and DC current input, Alarm 1 (A1) hysteresis setting range is changeable depending on the COT-200 setting range (Scaling low limit to high limit).
Since the CCT-235 Alarm 1 (A1) hysteresis setting range is 10% of 0 to10000, 10% of COT-200 scaling low limit to high limit becomes the setting range of Alarm 1 (A1) hysteresis.

MODE

- **Formula for the Alarm 1 (A1) hysteresis setting**

In the case of DC voltage and DC current input,
When scaling range is –1999 to 9999
Setting range =(1999+9999) x 0.1
Therefore the setting range will be 1 to 1199.

Alarm 2 (A2) hysteresis

CH 01 PV A2HY

SV/MV Selection

- Sets the Alarm 2 (A2) hysteresis for CH1.
- Setting range :The same as those of Alarm 1 (A1) action hysteresis.

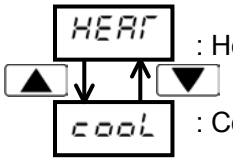
MODE

Control action mode

CH 01 PV cnT

SV/MV Selection

- Selects the control action (Heating or Cooling) for CH1.



: Heating action

: Cooling action

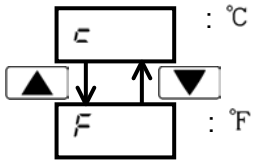
PV filter time constant
CH 01 PV FILT
SV/MV Setting value

- Sets the PV filter time constant for CH1.
  When Process variable varies because of disturbance etc, increases the value gradually and finds the setting value at the level it does not fluctuate. If the value is too large, it affects control result owing to the response delay.
- Setting range : 0.0 to 10.0 seconds

MODE

Temperature unit selection
CH 01 PV c_F
SV/MV Selection

- Selects the temperature unit for CH1.
  It is unable to select the unit in the case of DC voltage and DC current input.



MODE

Sensor correction setting
CH 01 PV 5o
SV/MV Setting value

- Sets the sensor correction value for CH1.
- Setting range Thermocouple and RTD input : -100.0 to 100.0℃(℉)
  DC voltage and DC current input : -1199 to 1199

However, in the case of DC voltage and DC current input, sensor correction setting range can be changed depending on the COT-200 setting range (Scaling low limit to high limit).
Since the CCT-235 sensor correction setting range is ±10% of 0 to10000, ±10% of COT-200 scaling low limit to high limit becomes the setting range of sensor correction.

MODE

- **Formula for the sensor correction setting range**
  In the case of DC voltage and DC current scaling range is –1999 to 9999.
  Setting range =±(1999+9999) x 0.1
  Therefore the setting range will be ±1199.

- **Sensor correction function**
  When a sensor cannot be set at a location where control is desired, the sensor measuring temperature may deviate from the temperature in the controller location. When controlling with plural controllers, the accuracy of sensors or different load capacities affects the control.
  Therefore the measuring temperature (input value) sometimes does not accord with the same setting value.
  In such a case, the control can be set with the desired value by shifting the input value of the sensors.

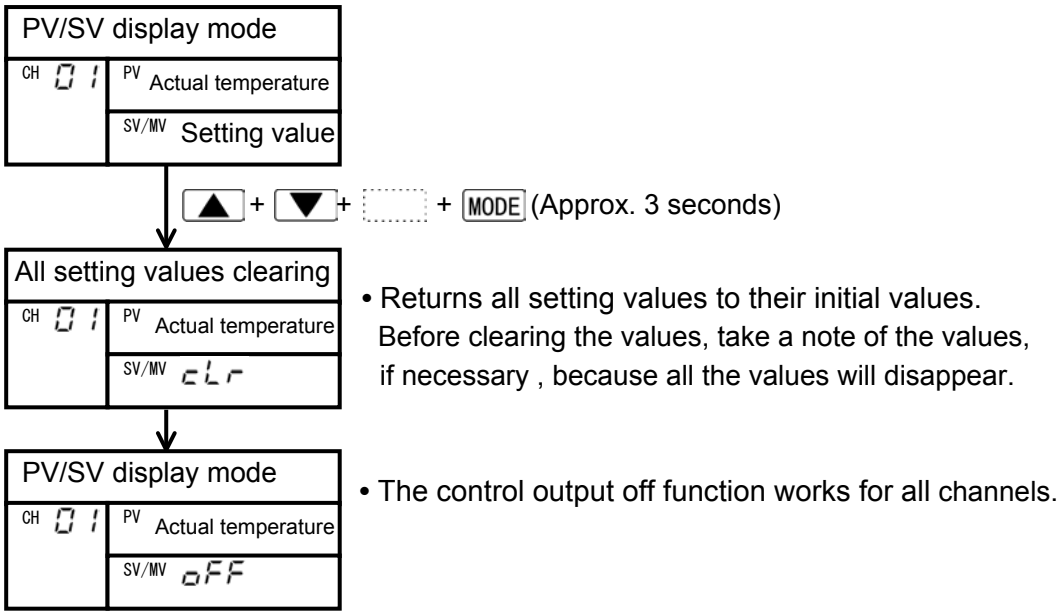
PV/SV display mode
CH 01 PV Actual temperature
SV/MV Setting value

(5) Number of connected units setting mode

Refer to "6. Setup" (P.17)

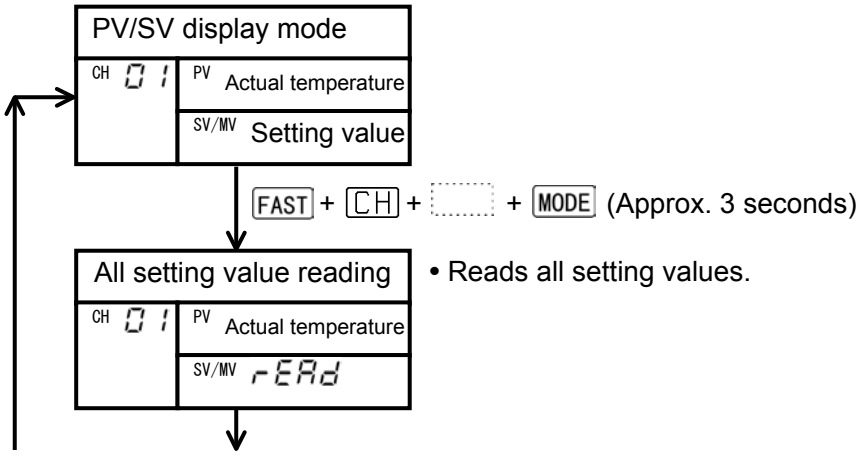
(6) All setting values clearing mode

During the PV/SV display mode, press the MODE key for 3 seconds or greater holding ▲, ▼, and keys. Then the mode turns to the All setting values clearing mode, displaying "clr" on the SV/MV display and all setting values return to the initial value (factory adjusted value).
If the clearing is completed, "clr" disappears, and the mode returns to the PV/SV display mode displaying "oFF". And the control output off function works for all channels.



(7) All setting values reading mode

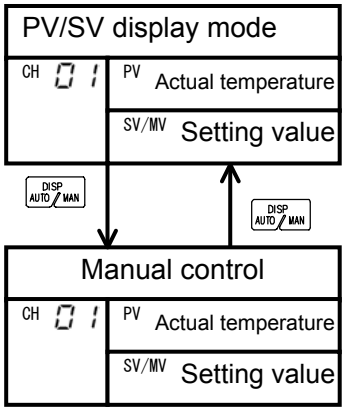
During the PV/SV display mode, press the MODE key for 3 seconds or greater holding the FAST, CH, and keys. Then, the mode switches to the All setting values reading mode, displaying "rEAd" and all setting values are read.
After the reading is completed, "rEAd" on the SV/MV display disappears, and the mode returns to the PV/SV display mode.



(8) Display Auto/ Manual change

The display can be changed manually.

By pressing the [DISP AUTO/MAN] key, Auto or Manual display can be selected.



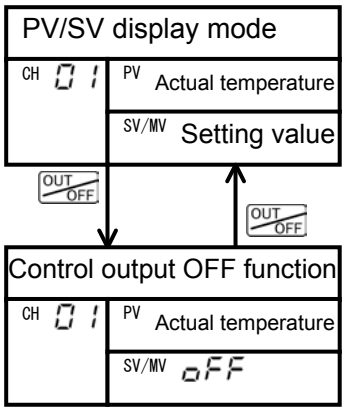
• Shows Auto display (Manual indicator is unlit)
The channel display is changed automatically every 2 seconds.

• Shows manual display (Manual indicator is lit)
Pressing the [CH] key changes the channel display.

(9) Control output OFF function

A function to turn the control output OFF while the power to the instrument is supplied.
The function is used when required to halt the control action or when the unit is not being used in multiple units.

The function works by pressing the [OUT OFF] key during the PV/SV display mode and "oFF" is indicated on the SV/MV display.



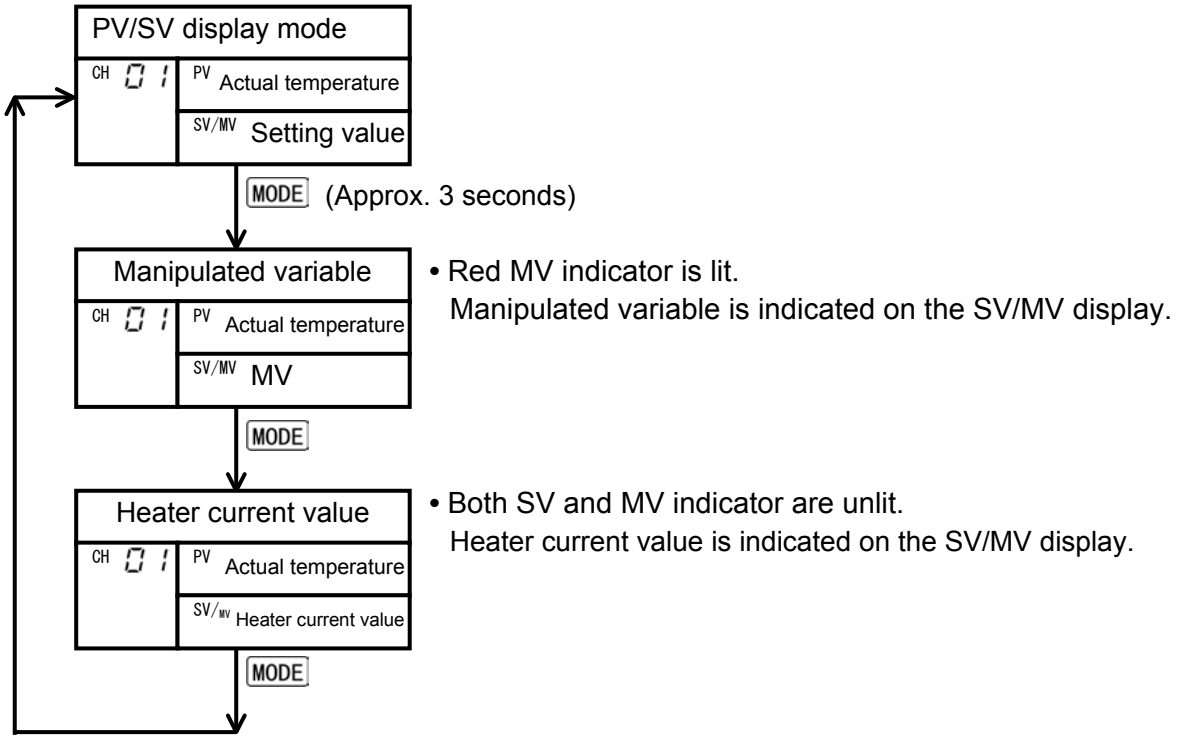
• Control output OFF function works only for the CH1.
"oFF" is indicated on the SV/MV display.

⚠ Notice

Once the control output OFF function has been put into operation, the function is not released even if the power to the unit is turned off and turned on again.
To cancel the function, press the [OUT OFF] key again.

(10) Manipulated variable, Heater current value indication function

To display the manipulated variable (MV), press the MODE key for approx. 3 seconds during the PV/SV display mode. Keep pressing the MODE key until the MV is displayed, ignoring the appearance of Main setting display.
At this time the green SV indicator is unlit, and red MV indicator is lit.
By pressing the MODE key again, heater current value is displayed.
At this time both the SV and the MV indicator are unlit.
However, if the option [W] is not applied to the CCT-235, SV/MV display indicates 0.0.
By pressing the MODE key again, the mode goes back to the PV/SV display mode.



• Red MV indicator is lit.
Manipulated variable is indicated on the SV/MV display.

• Both SV and MV indicator are unlit.
Heater current value is indicated on the SV/MV display.

8. Specification

8.1 Standard specification

Name Console unit
Model COT-200
Mounting method Flush
Setting Input system by membrane sheet key
Display PV display : Red LED 4-digit, Size 8.0 x 14.3 mm (W x H)
SV/MV display : Green LED 4-digit, Size 5.5 x 10.0 mm(W x H)
CH display : Yellow LED 2-digit, Size 4.0 x 8.0 mm(W x H)

Communication error output

When communication error occurs, the red indicator lights, turning the output on.
Relay contact 1a Control capacity 250Vac 3A (Resistive load)
250Vac 1A (Inductive load cos∅=0.4)

Alarm 1 (A1)

The alarm action point is set by ±deviation to main setting (except process value alarm), and when the input exceeds the range, the alarm1(A1) indicator is turned on (red) or off. (High/Low limit range alarm)
One of the alarms is selectable from 13 types of alarm by front key operation:
High limit alarm, Low limit alarm, High/Low limits alarm, High/Low limit range alarm, Process high alarm, Process low alarm, and the standby function is applied to them respectively including No alarm.
Refer to the Instruction manual as for the alarm action drawings.

Alarm 2 (A2) The same as the Alarm 1(A1).

Control action

Selects one from PID, PD, ON /OFF action.

PID action (With auto-tuning)

Proportional band : 0.0 to 100.0%(ON/OFF action when set to 0.0)
Integral time : 0 to 3600 seconds (Off when set to 0)
Derivative time : 0 to 3600 seconds (Off when set to 0)
ARW : 0 to100%
Proportional cycle : 1 to 120 seconds
Cooling proportional band : 0.0 to10.0 times the heating side proportional band setting (ON/OFF action when set to 0.0)
Cooling proportional cycle : 1 to 120 seconds
Overlap band, dead band setting:
±(Converted value of the heating side proportional band)
Thermocouple and RTD input : Within -199.9 to 999.9℃(℉)
DC voltage and DC current input: Within 1999 to 9999
Cooling action mode change function:
Air cooling : Linear characteristic
Oil cooling : 1.5th power of linear characteristic
Water cooling: 2nd power of linear characteristic

PD action (Integral time : 0 seconds)

Proportional band : 0.0 to 100.0%(ON/OFF action when set to 0.0)
Derivative time : 0 to 3600 seconds (Off when set to 0)
Proportional cycle : 1 to 120 seconds
Reset Thermocouple and RTD input:
±(Rated scale range x Proportional band setting value)
Within the range -199.9 to 999.9℃(℉)
DC voltage and DC current input:
± (Scaling low limit to high limit) x Proportional band setting value
It is unable to set the value outside the range -1999 to 9999.
ARW : 0 to 100%
Cooling proportional band : 0.0 to 10.0 times the heating side proportional band setting (ON/OFF action when set to 0.0)
Cooling proportional cycle : 1 to 120 seconds
Overlap band and dead band setting
: ± (Converted value of the heating side proportional band)
Thermocouple and RTD input : Within the range -199.9 to 999.9℃(℉)
DC voltage and DC current input: Within the range -1999 to 9999
Cooling action mode change function:
Air cooling : Linear characteristic
Oil cooling :1.5th power of linear characteristic
Water cooling: 2nd power of linear characteristic

ON/OFF action (Proportional band : 0.0%)

Heating side hysteresis Thermocouple and RTD input : 0.1 to 100.0℃(℉)
DC voltage and DC current input :1 to 1199
Cooling side hysteresis : The same as heating side hysteresis

Loop break alarm 1: Detects heater burnout, sensor burnout or abnormality at the operation end. When Loop break alarm is ON, red indicator is lit.

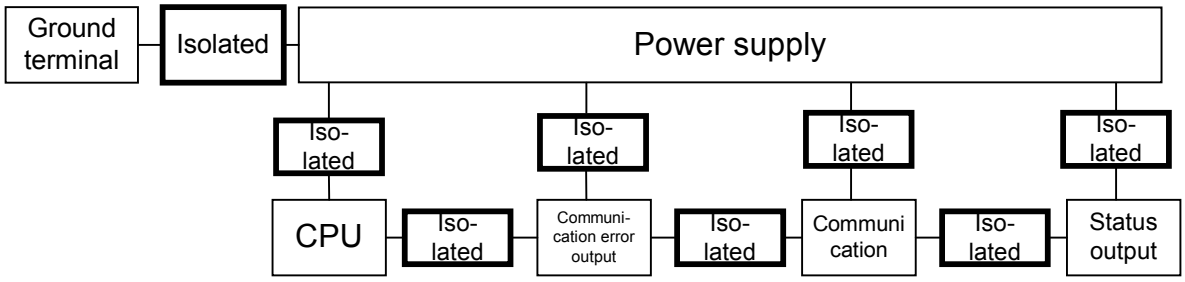
Loop break alarm 2: The same as Loop break alarm 1

Heater burnout alarm: Watches the heater current with CT (current transformer) and detects the burnout.

The setting item of the alarm is displayed only when option “W” is applied to the CCT-235.
Rating : Depends on CCT-235
Setting range : Depends on CCT-235 (No alarm action when set to 0.0)
Action point : Setting value

Sensor burnout alarm : Detects the sensor burnout and turns the control output off.
When sensor burnout alarm is ON, the red indicator is lit.
Power supply voltage : 100 to 240Vac 50/60Hz
Allowable voltage fluctuation: 85 to 264Vac
Ambient temperature : 0 to 50℃
Ambient humidity : 35 to 85%RH (Non-condensing)
Power consumption : Approx. 5VA

Circuit isolation structure



Insulation resistance 10MΩ or greater at 500Vdc
Dielectric strength Between power terminal and ground terminal 1.5kVac for 1 minute
Between power terminal and communication terminal 1.5kVac for 1 minute
Between communication terminal and ground terminal1.5kVac for 1 minute
Weight Approx. 500g
External dimensions 96 x 96 x 110mm (W x H x D)
Material Flame resisting resin : Base, case
Color Light gray : Base, case
Accessories Mounting bracket 1 set
Instruction manual 1 copy
Terminal cover 2 pieces (Option: TC)

8.2 Optional specification

Status output [SO]: When a status signal (Alarm 1 [A1], Alarm 2 [A2], Heater burnout alarm, Loop break alarm, Upscale or Downscale) of any channel of the CCT-235 connected is turned on, the status output is turned on.
Action : ON/OFF action
Output: Open collector Output capacity 24Vdc Maximum 50mA
Dust-proof, Drip-proof [IP]: Dust-proof, Drip-proof specification (IP54)
Terminal cover [TC] : Electrical shock protecting terminal cover, 2 pieces

9. When there is a problem

Check if the power is supplied to the COT-200 and the C series currently used.
The Green POWER (PW) indicator is lit when the power is supplied to the C series.
After checking these, when the unit does not work:
Refer to the “trouble shooting” section in the Instruction manual of the C series and contents described below.

⚠ Warning

Turn the power supplied to the instrument OFF before wiring or checking. Working or touching the terminal with the power switched ON may result in an electric Shock which could cause severe injury or death.

Display problems

• Phenomenon : PV display is instable or abnormal.

Presumed cause	Solution
• The temperature unit (℃/℉) is wrong.	Set the proper temperature unit℃ or ℉. (P.32)
• The sensor correction value is not proper.	Set the proper sensor correction value. (P.32)
• The equipment to generate the noise or inductive interference is near the unit.	Keep the unit away from the instrument generating the noise or inductive interference.

• Phenomenon : Communication error indicator is lit.

Presumed cause	Solution
• Communication cable (CPM) wiring is wrong or broken.	Check the wiring or change the communication cable (CPM). (P.15)
• Data transfer rate of the CPT and COT is not the same one.	Adjust the data transfer rate of the CPT and COT. (P.17)

Key operation problems

• Phenomenon : It is unable to set the values (Main setting, P, I, D, ARW, proportional cycle Alarm 1 or 2).

Presumed cause	Solution
• Auto-tuning is performing.	Cancel the auto-tuning. (P.23)

Control problems

• Phenomenon : Control output remains at ON status.

Presumed cause	Solution
Control output low limit value is set to 100% or greater.	Set the proper value. (P.29)

• Phenomenon : Control output remains at OFF status.

Presumed cause	Solution
Control output high limit value is set to 0% or less.	Set the proper value. (P.28)

If any other problems arise, make inquiries about the problems to the agency or the shop you purchased the unit.

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10. Character table

• Main setting mode

Indication	Setting item	Initial value	Data	Reference
SC	Main setting			(P.22)

• Sub setting mode

Indication	Setting item	Initial value	Data	Reference
AT	Auto-tuning			(P.23)
P	Proportional band			(P.23)
P_b	Cooling side proportional band			(P.23)
I	Integral time			(P.24)
d	Derivative time			(P.24)
ArW	Anti-reset windup			(P.24)
rSET	Manual reset			(P.24)
A1	Alarm 1			(P.25)
A2	Alarm 2			(P.26)
c	Proportional cycle			(P.26)
c_b	Cooling proportional cycle			(P.26)
Hb	Heater burnout alarm (When option [W] is added to CCT-235)			(P.26)
LPT1	Loop break alarm 1 time			(P.26)
LPH1	Loop break alarm 1 span			(P.27)
LPT2	Loop break alarm 2 time			(P.27)
LPH2	Loop break alarm 2 span			(P.27)

• Auxiliary setting mode

Indication	Setting item	Initial value	Data	Reference
SCLH	Scaling high limit			(P.28)
SCLL	Scaling low limit			(P.28)
dP	Decimal point place			(P.28)
oLH	Control output high limit			(P.28)
oLL	Control output low limit			(P.29)
HYS	Control output ON/OFF action hysteresis			(P.29)
cACT	Cooling action mode			(P.29)
HYSb	Cooling control output ON/OFF action hysteresis			(P.29)
db	Overlap band/ Dead band			(P.30)
AL1F	Alarm 1 (A1) action type			(P.30)
AL2F	Alarm 2 (A2) action type			(P.31)
A1HY	Alarm 1 (A1) hysteresis			(P.31)
A2HY	Alarm 2 (A2) hysteresis			(P.31)
cnT	Control action mode			(P.31)
FILT	PV filter time constant			(P.32)
c_F	Temperature unit			(P.32)
Sb	Sensor correction			(P.32)

• Number of connected units setting mode

Indication	Setting item	Initial value	Data	Reference
UnIT	Number of connected units setting			(P.17)

• All setting values clearing mode

Indication	Setting item	Initial value	Data	Reference
CLr	All setting values clearing			(P.33)

• All setting values reading mode

Indication	Setting item	Initial value	Data	Reference
rEAd	All setting values reading			(P.33)

* * * **Inquiry** * * *

For any inquires about the unit, please contact the shop where you purchased or our agency after checking the following.

- Model name ----------COT-200
- Option ----------SO
- Instrument No----------No. XXXXXX

SHINKO TECHNOS CO.,LTD.
OVERSEAS DIVISION

Reg. Office : 2-48, 1-Chome, Ina, Minoo, Osaka, Japan
Mail Address : P.O.Box 17, Minoo, Osaka, Japan
URL : http://www.shinko-technos.co.jp
E-mail : overseas@shinko-technos.co.jp
Tel : 81-72-721-2781
Fax: 81-72-724-1760

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