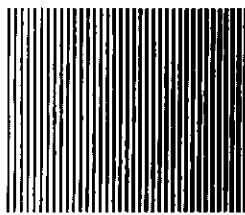# DZ1000 SERIES

DIGITAL INDICATING CONTROLLER

INSTRUCTIONS

Please keep this instruction manual ready to the final user's hand.

Thank you for your purchase of CHINO's digital indicating controller **DZ1000** series.
You are requested to read this instruction manual carefully before using the instrument and operate the instrument correctly.

CONTENTS

CHINO

① CAUTIONS ON SAFETY

⚠ For Safe Use

1. Be Careful with Power Terminals and Other Terminals.

This instrument is designed as a component type. Assemble this instrument into an instrumentation panel or equipment without fail so that users cannot directly touch any power terminals or other terminals. After connections, mount the terminal cover at all times.
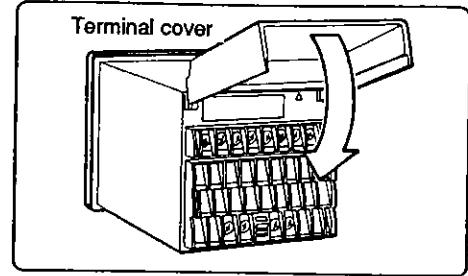
2. Take Safety Measures Separately.

When this instrument is assembled into the final product (equipment) requiring security measures, take safety measures on the final product side to be observed, if a control failure occurred due to a temperature sensor trouble, wrong operation, troubles, or other circumstances.

3. Prepare a Power Switch Separately.

Neither power switch nor fuse is mounted in this instrument. Mount them on the final product side.
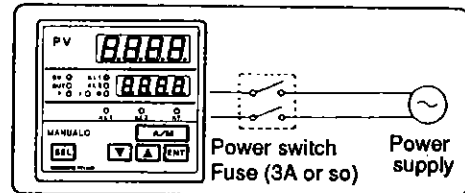
4. Alarm Mark Employed in this Instrument

An alarm mark calling the operator's attention to an electric shock accident is mounted and scribed on the terminal board (rear face). Particularly be careful not to receive any electric shock during connections and inspection.

5. Description Contents of this Instruction Manual

For using this instrument safely, strictly observe the [caution] items and operation methods described in this manual, otherwise negligence of this caution may cause an electric shock accident, damage, and a function drop of the instrument, or damage to the final product (equipment).

CAUTIONS ON SAFETY (WARNINGS)

■ Termination of wiring:

Use crimp style terminals each having an insulation sleeve for wiring at terminal board so as not to allow any falling off or an inter-cable contact. (Terminal screws are M3.5.)

O type Less than 6 More than 3.7 An insulation sleeve is attached.

Y type Less than 6 More than 3.7 An insulation sleeve is attached.

■ Power supply and grounding check:

Check if the power wiring and grounding wiring are connected securely, and also, check if the power voltage of this instrument meets the voltage of feed power source without fail. Then, turn on the feed power source (power distribution board or plug socket) to this instrument.

1. Check → 2. Turning on the power supply

AC85V - 264V
50Hz 60Hz

## ■ Prohibition of a contact inside the case:

Never insert your hand, etc. into the case after drawing out the internal unit for switch selection or other purposes, otherwise an electric shock accident may occur.

Danger!
Never insert your hand.

Case

■ Prohibition of use in a combustible gas atmosphere:

Never operate this instrument at any place where a combustible gas or vapor exists.

■ Repair and check:

For repairing or checking this instrument, please ask your nearest CHINO's sales agent.

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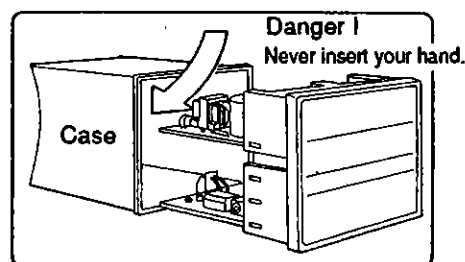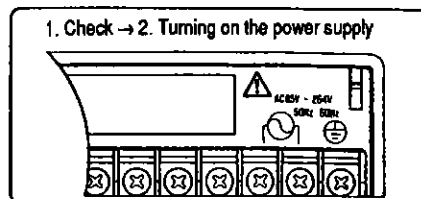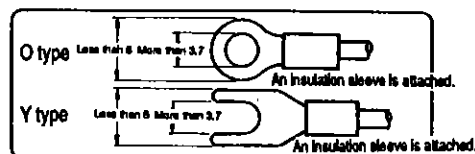
2 NAMES AND FUNCTIONS OF COMPONENT PARTS

Display item guide display
Indicates the display items on the 2nd indicator in run mode.
SV: Lights when a control set value (SV) is displayed.
OUT: Lights when a control output value is displayed.
AL1: Lights when No.1 alarm set value is displayed.
AL2: Lights when No.2 alarm set value is displayed.
P: Lights when a proportional band (P) set value is displayed.
I: Lights when an integral time (I) set value is displayed.
D: Lights when a derivative time (D) set value is displayed.

Status display
AL1: Lights when No.1 alarm occurs.
AL2: Lights when No.2 alarm occurs.
AT: Lights during auto tuning.

Auto/manual display
Lights in manual mode (red LED) and goes out in auto mode.

Select (SEL) key
Switches parameters in run mode or selects either setting mode or run mode.

PV

SV○ AL1○
OUT○ AL2○
P○ I○ D○

AL1 AL2 AT

MANUAL○   A/M

SEL ▼ ▲ ENT

CHINO DZ1000
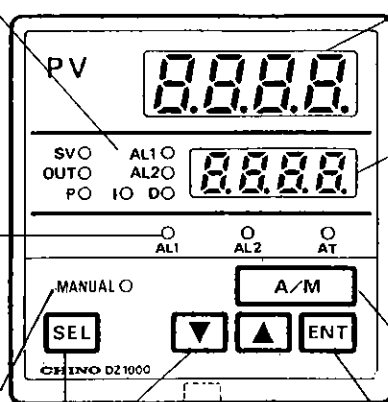
No.1 Indicator
Run mode : Indicates process variables (PV).
Setting mode : Indicates setting items.

No.2 Indicator
Run mode : Indicates control -set value (SV), output value, alarm set value, or PID set values.
Setting mode: Indicates mode No. or set values.

Auto/manual (A/M) key
This key is used for switching the auto mode or manual mode of outputs.

Entry (ENT) key
This key is used for setting desired constants or desired functions to be selected.

Internal unit lock
The internal unit can be drawn out by inserting the attached internal unit puller.

Up (▲) key, down (▼) key
These keys are used for changing set values or selecting setting modes.

3 OPERATION PROCEDURE

The operation procedure for this instrument is shown below.   Initial set values are preset at the delivery time from the factory.   Refer to page 16 ~ 18.

① Preparation

1. Check the model of your instrument. .... page 4
2. Mount the instrument to the panel (equipment) .... page 4
3. Connections (Keep the power supply turned off) .... page 5

Draw the internal unit out of the case .... page 7

② Selection of internal unit switches

1. Measuring range selection (temperature, voltage, current)
2. Selection of measuring units (°C ↔ °F)
3. Selection of control systems (PID system ↔ 2-position system)
4. Selection of control modes
   (Select the reverse action for heating control, etc., or select the direct action for cooling control, etc.)
5. Selection of the control output types
   (Control output multi instrument only)

page 7 ~ 9

Return the internal unit into the case.

Turn on the instrument power supply.

③ Key operation

1. SV (control set value) setting .... page 12
2. Set other values as occasion demands .... page 12, 13
   For the entire diagram of setting mode parameters and comments on parameter terms, refer to page 14, 16, 17 and 18.

④ Run

Turn on the power supply of the final control equipment last.
Now, the instrument starts running.

⑤ End

Turn off the instrument power supply and final control equipment power supply.

4 PREPARATION

4.1 Confirmation of the Model of Your Instrument

Confirm the model of your instrument by the label.
(The setting method depends upon the models.)

DZ10☐☐-☐☐☐

Model

```
MODEL  DZ10U0-A00
NO.    DZ95ZA001
```

Serial No.

(Note):
[CT input (heater disconnection alarm)] is not applicable when the control output is type 62 or type 63.
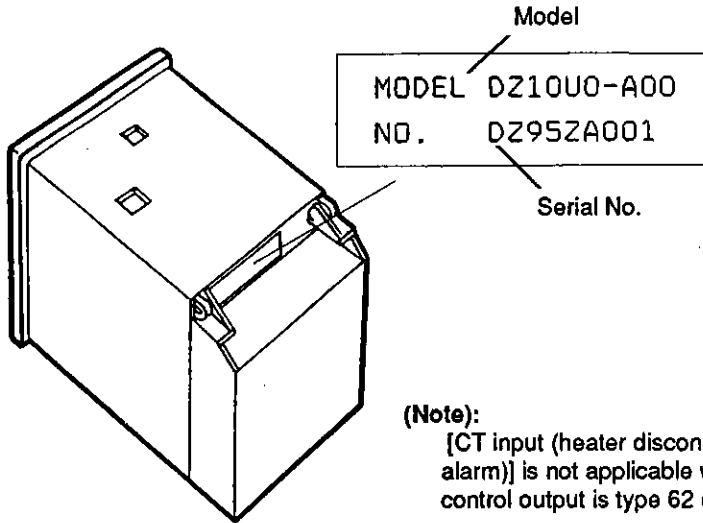
Control output
1: On-off pulse type PID system (Type 61)
2: On-off servo type PID system (Type 62)
3: Current output type PID system (Type 63)
5: SSR drive pulse type PID system (Type 65)
U: Control output multi type
   (Type 61, 63, 65 switching)

External input (option)
0: None
1: CT input (Note: Heater disconnection alarm)
2: A/M external switching
3: CT and A/M external switching

Communication interface (option)
0: None
R: RS-232C
A: RS-422A
S: RS-485

Transmission output (option)
0: None
1: 4 ~ 20mA (DC)
2: 0 ~ 1V (DC)
3: 0 ~ 10V (DC)
4: Others

Remote signal input (option)
(Remote/local selection)
0: None
5: 4 ~ 20mA (DC)
6: 0 ~ 1V (DC)
7: 0 ~ 10V (DC)
8: Others

4.2 Mounting to Panel (equipment)

This instrument is mounted to a panel (instrument panel) for use.

1. Mounting position

⚠ **Caution**

Ambient temperature and humidity range
- Temperature range : −10 ~ +50°C
- Humidity range : Lower than 90%RH

Mount the instrument in an environment where the ambient temperature and humidity are stable within the above ranges.

Ambient environment

Don't mount the instrument in the following environments.
1. A dusty place
2. A corrosive gas atmosphere
3. A place subjected to vibrations and shocks

Mounting place, etc.
1. Don't mount the instrument at a place where the instrument is exposed to the direct sunlight because of the characteristics of display device (LED), otherwise the visibility deteriorates.
2. Don't mount the instrument at a place subjected to powerful noises.

2. External dimensions and panel cutout
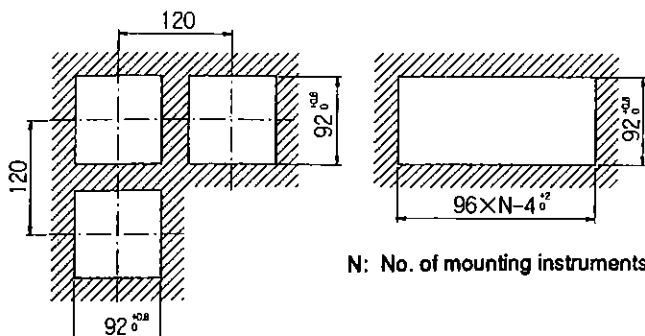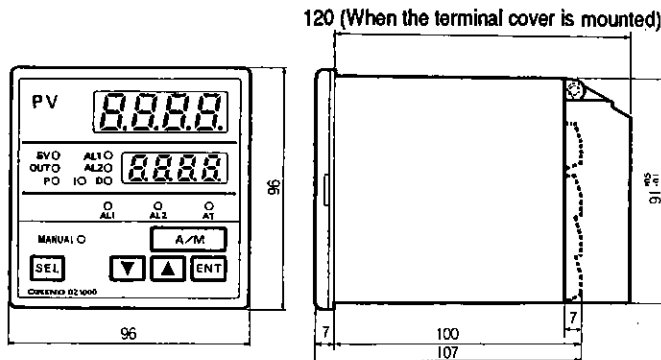
120 (When the terminal cover is mounted)

96 × N−4

N: No. of mounting instruments.

3. Mounting method to panel

Fasten the instrument to the panel by two attached mounting brackets until these brackets turn idly.

Mounting bracket

Panel

Mounting bracket
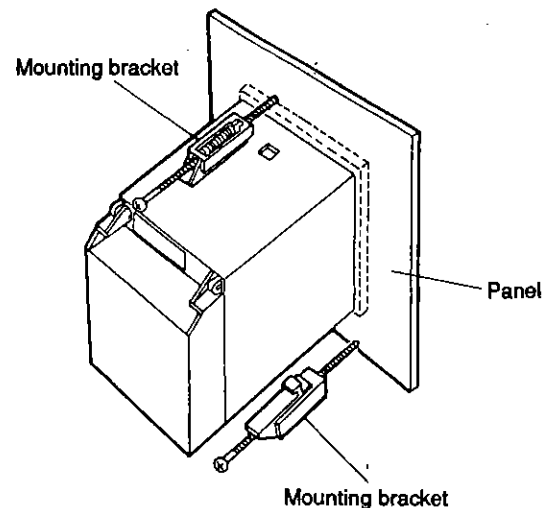
4.3 Connections

● On-off pulse type, current output type, and SSR drive pulse type

Connection of heater disconnection alarm (detection)
- Applicable to on-off pulse type and SSR drive pulse type only
- 50Hz or 60Hz setting is necessary

Heater — C T — 0.0~5.0A

CR input terminal (Option)

Alarm output terminal
AC100V0.2A
200V0.1A
AL1 (Alarm 1)
AL2 (Alarm 2)

Control output terminal
Current output type, SSR drive pulse type
On-off pulse type
(H) (C) (L)

⚠ Be careful not to receive an electric shock accident.

Power & ground terminals
AC85~264V
50Hz.60Hz
Protective grounding

Transmission output terminal (Option)

Remote/local (R/L) switching terminal (Option)

Auto/manual (A/M) switching terminal (Option)
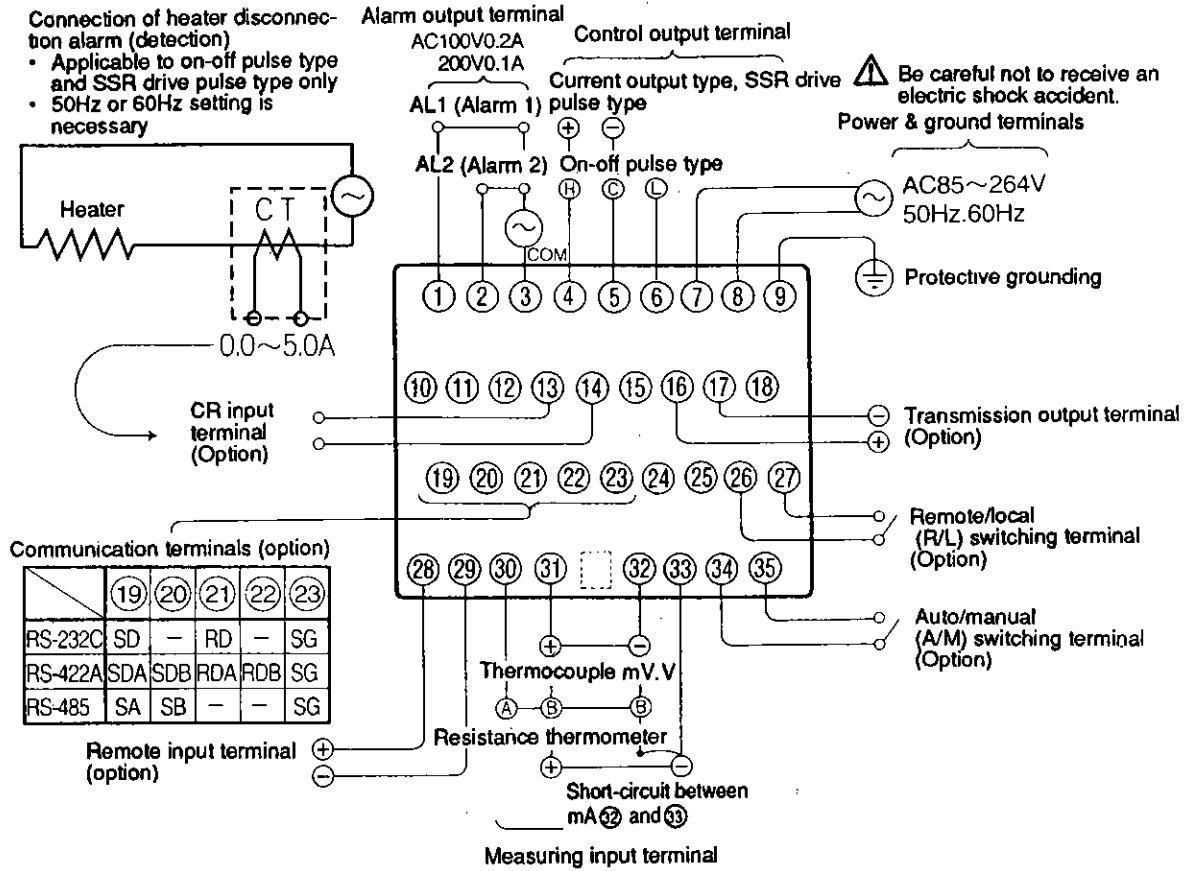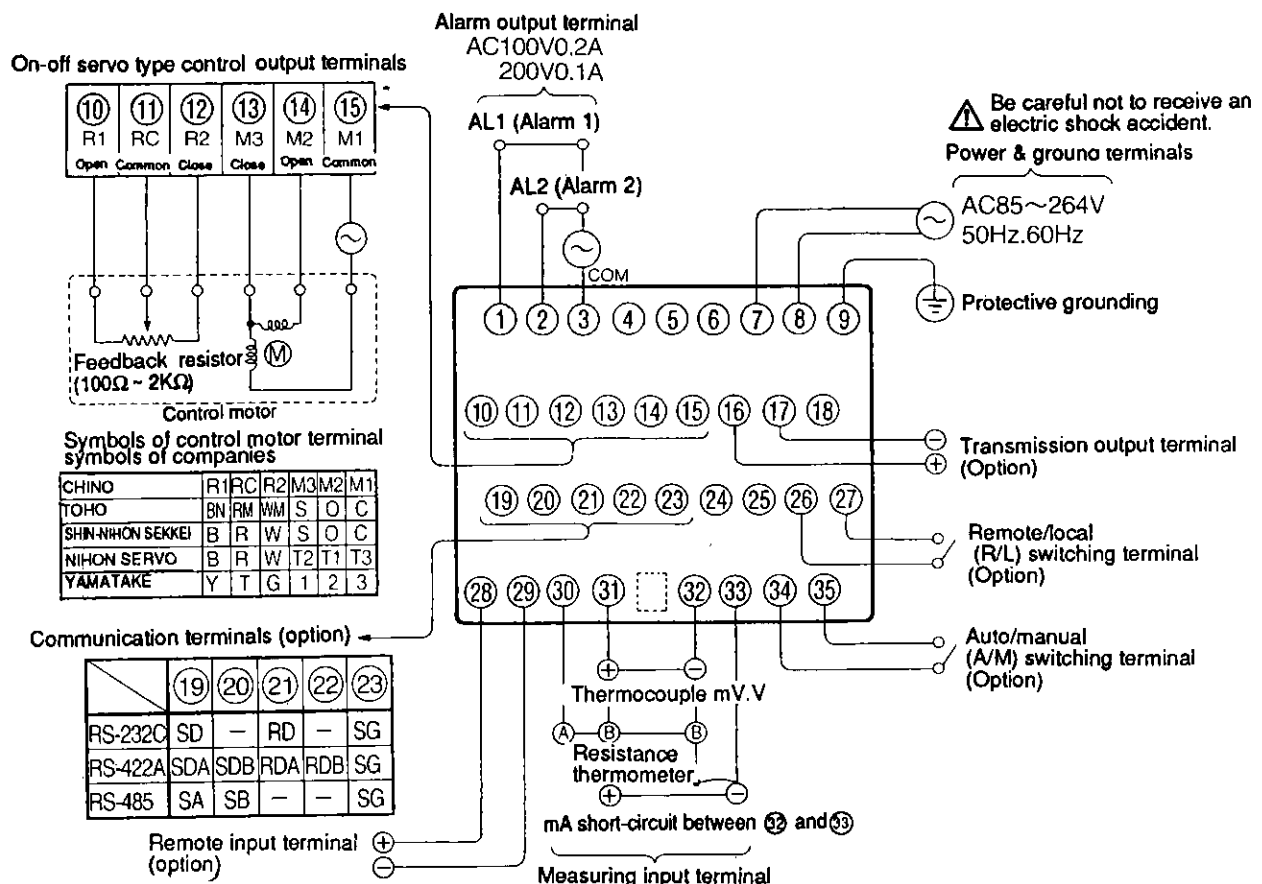
Thermocouple mV.V

Resistance thermometer

Short-circuit between mA③② and③③

Measuring input terminal

Communication terminals (option)

	⑲	⑳	㉑	㉒	㉓
RS-232C	SD	—	RD	—	SG
RS-422A	SDA	SDB	RDA	RDB	SG
RS-485	SA	SB	—	—	SG

Remote input terminal (option)

● On-off servo type

On-off servo type control output terminals

⑩	⑪	⑫	⑬	⑭	⑮
R1	RC	R2	M3	M2	M1
Open	Common	Close	Close	Open	Common

Feedback resistor (M) (100Ω ~ 2KΩ)
Control motor

Symbols of control motor terminal symbols of companies

	R1	RC	R2	M3	M2	M1
CHINO	R1	RC	R2	M3	M2	M1
TOHO	BN	RM	WM	S	O	C
SHIN-NIHON SEKKEI	B	R	W	S	O	C
NIHON SERVO	B	R	W	T2	T1	T3
YAMATAKE	Y	T	G	1	2	3

Communication terminals (option)

	⑲	⑳	㉑	㉒	㉓
RS-232C	SD	—	RD	—	SG
RS-422A	SDA	SDB	RDA	RDB	SG
RS-485	SA	SB	—	—	SG

Remote input terminal (option)

Alarm output terminal
AC100V0.2A
200V0.1A
AL1 (Alarm 1)
AL2 (Alarm 2)

⚠ Be careful not to receive an electric shock accident.

Power & ground terminals
AC85~264V
50Hz.60Hz
Protective grounding

Transmission output terminal (Option)

Remote/local (R/L) switching terminal (Option)

Auto/manual (A/M) switching terminal (Option)

Thermocouple mV.V

Resistance thermometer

mA short-circuit between ㉜ and㉝

Measuring input terminal

- 5 -

⚠ Cautions on connections

1. Be careful with strong electric circuits and noises

Don't mount this instrument at the following places, although this instrument provides various noise suppression measures.

- Strong electric circuit or powerful noise generation source
  Separate the instrument more than 50cm from a strong electric circuit, if input signals are parallel with the strong electric circuit.
  This instrument is designed to be resistible against noises on condition that the protective grounding terminal is connected correctly.
  Connect the protective grounding terminal correctly, otherwise the noise preventive characteristic deteriorates.

2. Be careful with fluctuations of power voltage.

This instrument uses a free power supply (85V AC ~ 264V AC).
Don't connect this instrument to the following power supplies.
- A power supply whose voltage fluctuates abruptly
- A power supply whose waveforms are distorted noticeably

3. Don't apply any excessive voltage to input terminals.

Don't apply a voltage exceeding ±8V or power voltage to the input terminals, otherwise the instrument will be broken.

4. Be careful with fastening of terminals.

- Solder lead wires correctly, and fasten the screws securely to terminals.   Connect the grounding wire securely.   (Use crimp style terminals each having an insulation sleeve.)
  Don't connect any jumper wire.
- Neither power switch nor fuse is mounted as a built-in device.   Mount these devices externally.

5. Relay contact protective device

No contact protective device is built in for relay outputs (on-off pulse type, on-off servo type) of this instrument.
Mount a contact protective device externally according to the load capacity.
If the contact protective device is not mounted externally, malfunction of relay contacts occurs within a short time due to deposition or other failures to shorten the relay life noticeably.
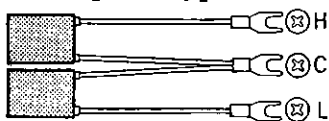Since the relay of this instrument is small, mount a buffer relay outside the instrument.

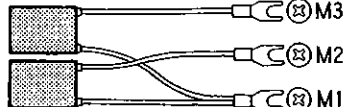### External mounting contact protective device (option)
- For light load (Article code CX–CR1)
  $0.01\mu F + 120\Omega$
- For heavy load (Article code CX–CR2)
  $0.5\mu F + 47\Omega$
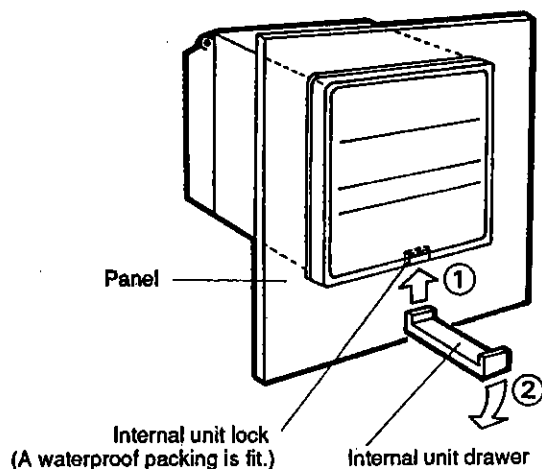
Names of mounting terminals
On-off pulse type

On-off servo type

5 SELECTION OF INTERNAL SWITCHES

5.1 How to Draw Out the Internal Unit

> Since the front panel of this instrument conforms to IEC529 [IP65], it is difficult more or less to draw out the internal unit.

Panel

Internal unit lock
(A waterproof packing is fit.)   Internal unit drawer

1. When the internal unit is mounted to the panel; (See the above figure.)

① A water-proof packing is fit to the internal unit lock. Remove this packing, and insert the L part of the attached internal unit drawer to the internal lock.

② By pressing the internal unit drawer under this condition, the instrument front panel is protruded by 2 ~ 3mm to be ready for removing the internal unit.

③ After setting the internal unit switches, return the internal unit into the case by slowly pushing it in parallel after aligning the guide rail inside the case to meet the PCB of the internal unit. Fit the water-proof packing securely.

2. When the internal unit is not mounted to the panel;

① A water-proof packing is fit to the internal unit lock. Remove this packing, and insert the L part of the attached internal unit drawer to the internal lock, while pressing the case by the left hand and holding the attached internal unit drawer by the right hand.

② By oscillating the internal unit drawer rightward or leftward under this condition, the instrument front panel is protruded by 2 ~ 3mm to be ready for removing the internal unit.

③ After setting the internal unit switches, return the internal unit into the case by slowly pushing it in parallel after aligning the guide rail inside the case to meet the PCB of the internal unit. Fit the water-proof packing securely.

5.2 Mounting Position of Internal Switches

The internal unit is provided with selector switch 1 (SW1), selector switches 2 (SW2), and a short-circuit switch which is added to the control output multi type instrument only. Select these three switches if necessary.

⚠ Caution

Be careful since the set values of all parameters are reset to the initial set values, if selector switch 1 (measuring range selection) and switch No.1 (auxiliary switching of measuring range) and No.2 (switching of measuring unit) of selector switches 2 are switched after setting all parameters by key operation.
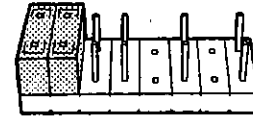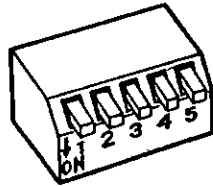
Short-circuit switch (mounted on the control output multi type instrument only)
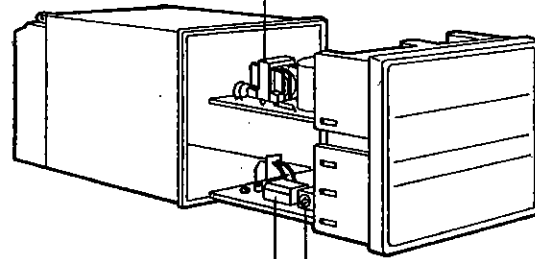
Selector switch 2 (SW.2)   Selector switch 1 (SW.1)

These switches other than No.5 switch are turned off (set to the upper notches) at the delivery time from the factory.
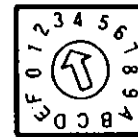
5.3 Switching of Control Functions, etc. (Selector switches 2 (SW.2))

Switch No.	Switching contents		Switch on-off selection
1	Auxiliary switching of measuring ranges (See the switching of measuring ranges)		ON or OFF
2	Switching of measuring ranges	°C	OFF
		°F	ON
3	Switching of control systems	PID system	OFF
		2-position system	ON
4	Switching of control modes	Reverse action (heating)	OFF
		Direct action (cooling)	ON
* 5	Switching of the types of control output (Combined with short-circuit switch)	Current output type (type 63)	OFF
		Pulse type (Type 61, 65)	ON

* Applies to the control output multi type instrument only.
Don't operate this switch for other instruments, otherwise the instruments don't function normally.

5.4 Switching of Measuring Ranges

This switch is preset to arrow 3 (K: −200°C ~ 1370°C) at the delivery time from the factory.

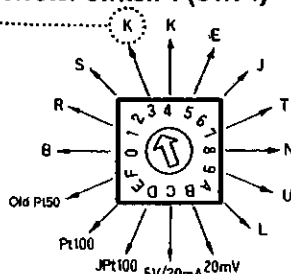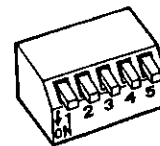Use a small (−) screwdriver for turning this switch.

Selector switch 1 (SW. 1)

Selector switches 2 (SW2)
These switches other than switch No.5 are turned off (preset to the upper notch) at the delivery time from the factory.

Input type		Input range		SW.1	SW.2 No.1
Thermocouple	B	0 ~ 1820 °C	32 ~ 3300 °F	0	OFF
	R	0 ~ 1760 °C	32 ~ 3200 °F	1	
	S	0 ~ 1760 °C	32 ~ 3200 °F	2	
	K	−200 ~ 1370 °C	−300 ~ 2450 °F	3	
	K	−200 ~ 500 °C	−300 ~ 900 °F	4	
	E	−200 ~ 700 °C	−300 ~ 1250 °F	5	
	J	−200 ~ 900 °C	−300 ~ 1650 °F	6	
	T	−200 ~ 400 °C	−300 ~ 700 °F	7	
	N	0 ~ 1300 °C	32 ~ 2350 °F	8	
	U	−200 ~ 400 °C	−300 ~ 700 °F	9	
	L	−200 ~ 900 °C	−300 ~ 1650 °F	A	
Voltage	m V	−20 mV ~ 20 mV (Initial value 0.0 ~ 20.0)		B	OFF
	V	−5 V ~ 5 V (Initial value 1.00 ~ 5.00)		C	
Current	m A	0 mA ~ 20 mA (Initial value 4.0 ~ 20.0)			O N
Resistance thermometer	J Pt100	−200 ~ 649 °C	−300 ~ 1200 °F	D	OFF
	J Pt100	−200 ~ 200 °C	−300 ~ 300 °F		O N
	Pt100	−200 ~ 660 °C	−300 ~ 1200 °F	E	OFF
	Pt100	−200 ~ 200 °C	−300 ~ 300 °F		O N
	Old Pt50	−200 ~ 649 °C	−300 ~ 1200 °F	F	OFF

5.5 Switching of Control Output Types (Applies to the control output multi type instrument only)

In case of the control output multi type instrument, the following control outputs are selectable by selecting two switches of selector switches 2. (Type 63 is selected at the delivery time from the factory)

Control output type	Nomination
On-off pulse type PID system (Relay contact output)	Type 61
Current output type PID system	Type 63
SSR drive pulse type PID system	Type 65

1. Switching of short-circuit switch
Draw out two sockets upward and relocate them to a desired control output position. (Select No.5 of selector switch 2)

- Switching position of type 63 (Preset status at the delivery time from the factory)
- Switching position of type 61
- Switching position of type 65
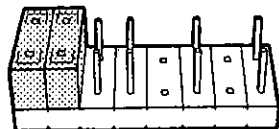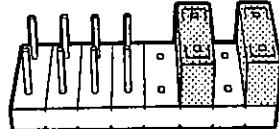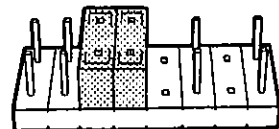
2. Selection of No.5 of selector switches 2
Set No.5 switch to OFF (upper) or ON (lower). (Select the short circuit switch, too)

OFF (Upper): Type 63 (Preset status at the delivery time from the factory)

ON (Lower): Type 61, type 65
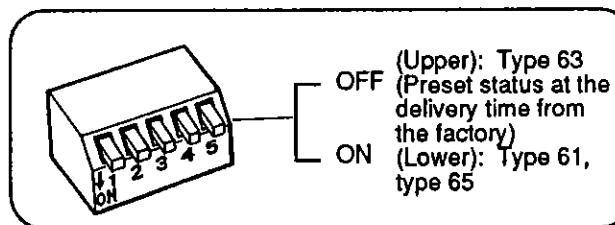
⚠ Cautions

1. Select two switches without fail. The instrument does not function if one switch only is selected.
2. This selection cannot be done if this instrument is specified to type 61, 62, 63, or 65. (Applicable to the control output multi type instrument only. See the type check on page 4.)
3. The control output multi type instrument cannot be selected to on-off servo type (type 62).

6 SWITCHING METHOD OF RUN DISPLAY SCREEN

6.1 Switching Method of Run Display Screen

By turning on the power supply, PV (process variable) is indicated on No.1 indicator, while SV (control set value) is displayed on No.2 indicator with display item guide SV lit.
This screen is called SV display screen. In addition to this SV display screen, the run display screen comprises output value display screen (OUT) → alarm value 1 display screen (AL1) → alarm value 2 display screen (AL2) → proportional band display screen (P) → integral time display screen (I) → derivative time display screen (D), and these screens are developed sequentially, each time SEL key is pressed once. (The displayed screen can be confirmed by the display item guide.)

Switching method of run display screen
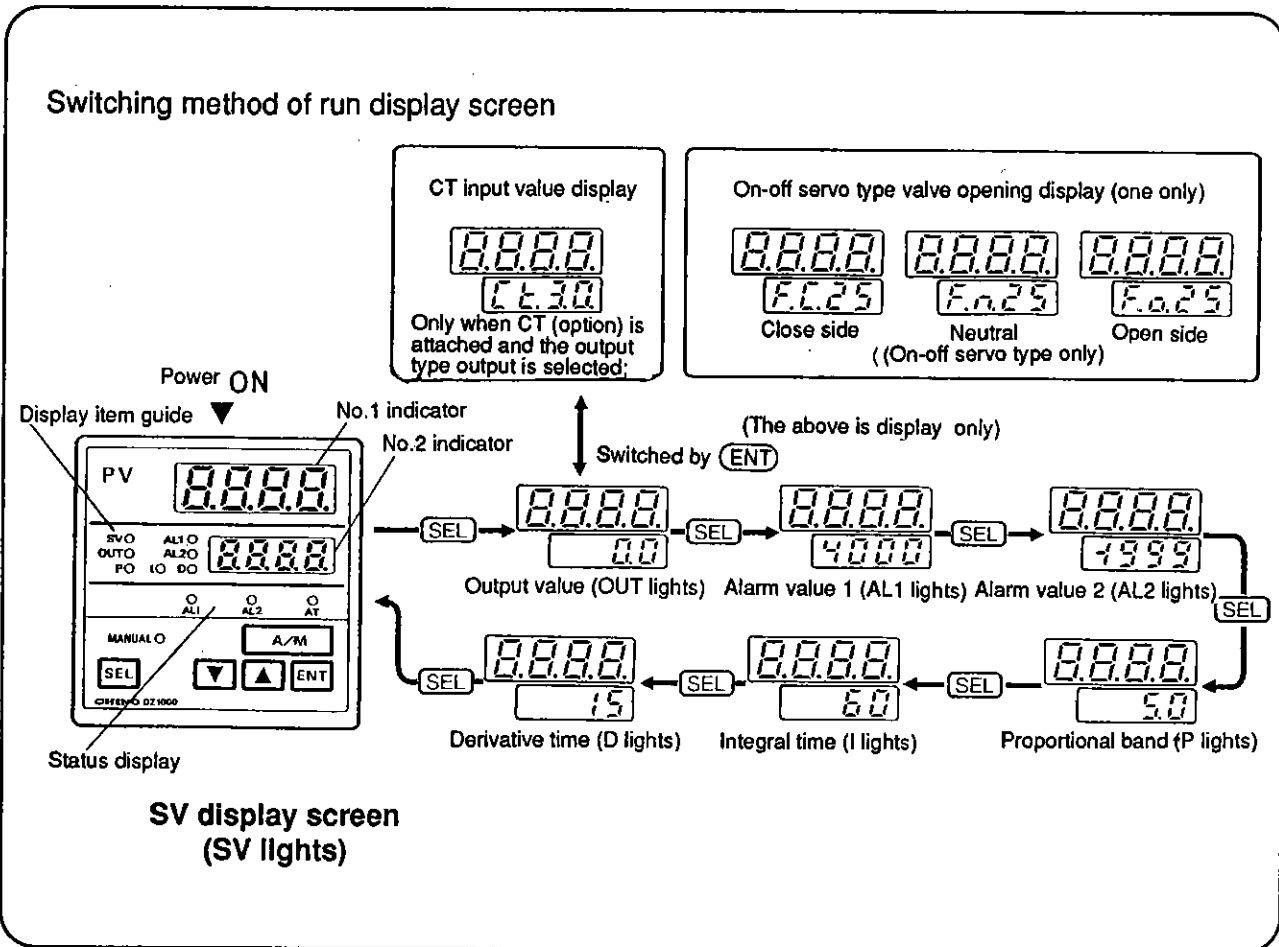
6.2 Status Display
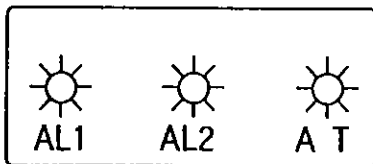
AL1 (red) : Lights when an alarm occurs in alarm 1, and goes out when no alarm occurs.

AL2 (red) : Lights when an alarm occurs in alarm 2, and goes out when no alarm occurs.

AT (green): Lights during PID auto tuning and goes out when auto tuning ends.

6.3 Switching Method of Auto/Manual ((A/M))

The instrument is normally used in the auto mode (auto run) when this mode is switched to manual by pressing (A/M) key, the MANUAL LED lights, and the control output can be operated manually. This auto/manual modes can be switched in all run display screens other than the setting mode screen.

Auto/manual switching method
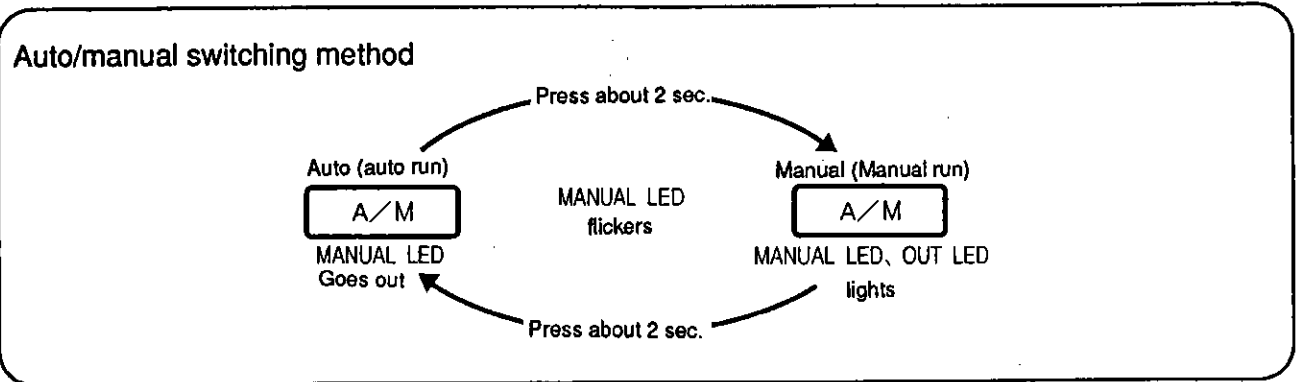
Other parameters can be set during manual run.

6.4 Setting Method of Control Output Value in Manual Mode
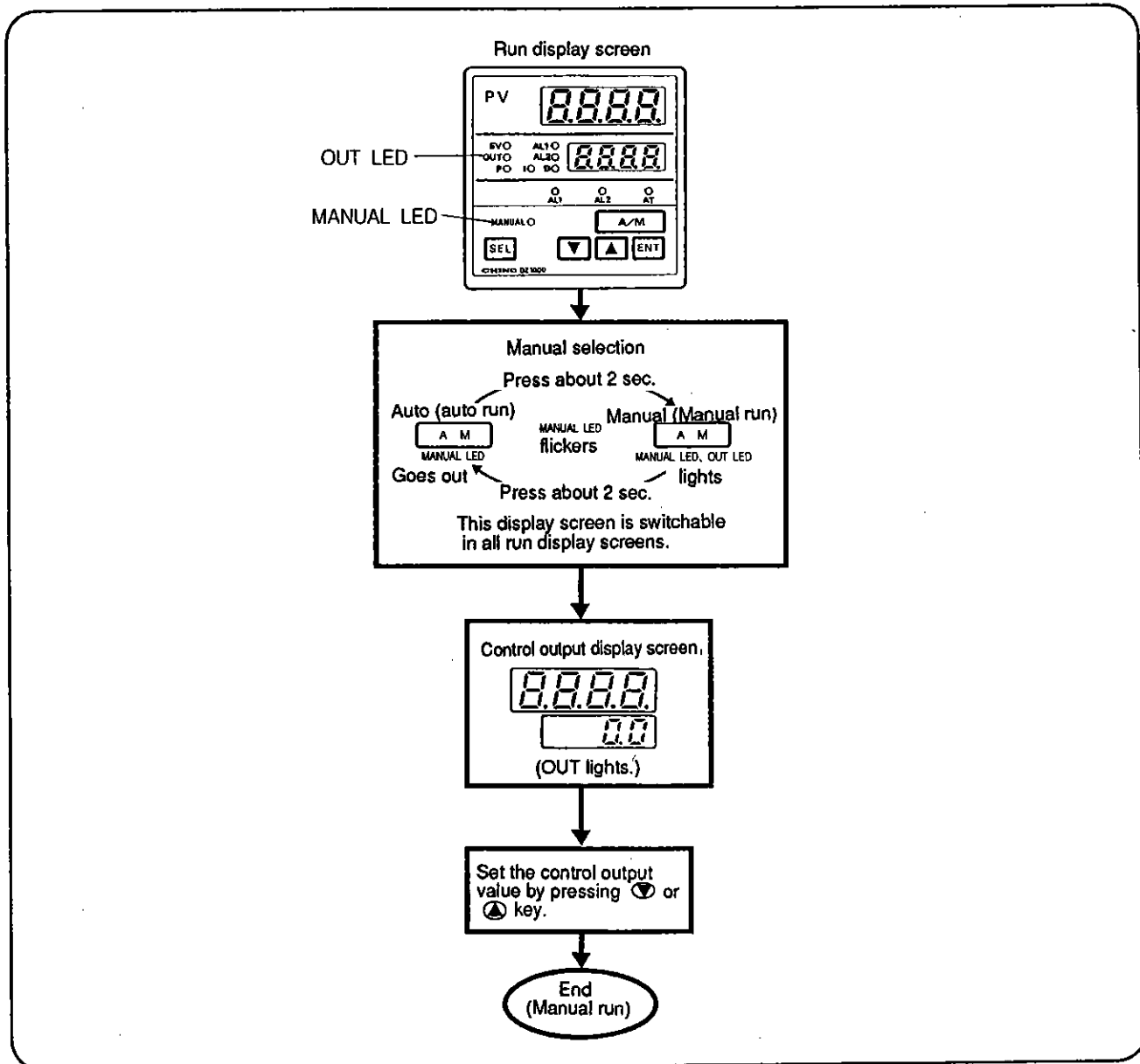
7 KEY OPERATION

7.1 Setting Method of SV (control set value)

By turning on the power supply, the SV display screen is displayed first to indicate PV (process variable) and SC (control set value), and SV ☼ lamp of display item guide lights. (☼ indicates that the display item guide LED lights)

SV display screen

Display item guide

PV

Period flickering position

MANUAL○ A/M
SEL ▼ ▲ ENT

① By pressing ▼ or ▲ key in the SV display screen, the SV setting screen is displayed and the period starts flickering. For resetting the flickering of the period (setting condition), press SEL key.
For canceling, press SEL key.

— How to use common all parameters setting —
The flickering condition of period shows that all parameters are settable.
For setting, make sure that the period flickers.

② Set a desired SV by ▼ or ▲ key.

— How to use common all parameters setting —
▼ (down) key: Numeric decreases when this key is being pressed.
(This key is also used for item shifting)
▲ (up) key : Numeric increases when this key is being pressed.
(This key is also used for item shifting)

③ Check if the set value is correct.
④ Enter the set value by pressing ENT key. (Period goes out)

— How to use common all parameters setting —
After setting a numeric or an item and confirming it as OK, be sure to enter it by pressing ENT key, otherwise the value returns to the value before setting without being entered.
ENT key is not necessary for manual control output setting only.

Now, SV setting (change) ends.

⚠ Caution
The screen returns to the SV value display screen, if no key operation is done for longer than one minute.

Flowchart:

① Set the settable status by ▼ or ▲ key (Period flickers)

② Set SV by ▼ or ▲ key. (Period flickers)

③ OK? (Check) — NO / YES

④ Entry ENT (Period goes out)

End

7.2 Setting Method of Alarm and PID

Select AL1 (alarm 1), AL2 (alarm 2), P (proportional band), I (integral time) and D (derivative time) items in the display item guide by pressing SEL key, and set them by the same key operation as in SV setting. (For OUT (control output), refer to the last page)

• Development of display item guide

SV ☼ → OUT ☼ → AL1 ☼ → AL2 ☼ → P ☼ → I ☼ → D ☼
SEL   SEL   SEL   SEL   SEL   SEL   SEL

Make sure the selected run screen by the lighting in the display item guide before starting the setting operation.
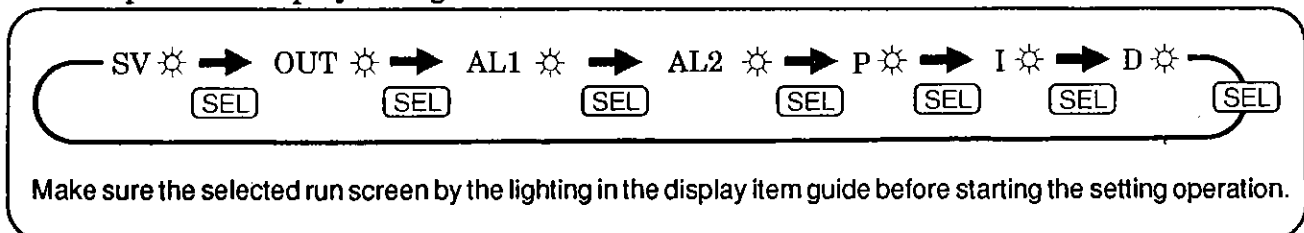
(Example) Setting of Alarm 1, 2 (Alarm point, alarm type, alarm dead band)

This instrument is provided with alarm (AL1) and alarm 2 (AL2) alarm output terminals as the standard equipment. Set the [alarm value] [alarm type] and [alarm dead band] to them, respectively. (For setting the heater disconnection alarm, setting of the power frequency in mode 3 is necessary.)

(Setting of alarm value)   Power ON (SV display screen)   (Setting of alarm type and dead band)

Alarm value side (left flow):

Alarm (AL1 lights)

[SEL] Twice

Set to be settable by ▼ or ▲ key. (Period flickers)

Set an alarm value by ▼ or ▲ key. (Period flickers)

OK ? Check — NO

YES

Entry (ENT) (Period goes out.)

Has the alarm value been set? — YES [SEL] 3 ~ 4 times

NO [SEL] Once

Alarm 2 (AL2 lights) -999

Alarm type side (right flow):

[SEL] Approx. 2sec.

LoCK / mod 1   Mode 1

▲ 3 times

init / mod4   Mode 4

[ENT] 5 times

Develop by ▲ key (Period flickers), and enter it by (ENT) key.

dH / A 1nd   Alarm type of alarm 1

▲

[ENT]

dL / A2nd   Alarm type of alarm 2

▲

[ENT]

2.0 / A 1db   Dead band of alarm 1

[ENT]

2.0 / A2db   Dead band of alarm 2

Set the dead band to be settable by ▼ or ▲ key, set a numeric by ▼, ▲ keys, and enter it by (ENT) key.

[SEL]

[SEL] 2 sec.

Alarm type list (right column):

dH	Deviation higher-limit
dHy	Deviation higher-limit with a standby function
dL	Deviation lower-limit
dLy	Deviation lower-limit with a standby function
AH	Absolute value higher-limit
AHy	Absolute value higher-limit with a standby function
AL	Absolute value lower-limit
ALy	Absolute value lower-limit with a standby function
Ct	Heater disconnection alarm

(Applicable to type 61 and 65 with CT option)

Setting examples

An example of absolute value alarm at both higher-limit and lower-limit

Higher-limit 630°C
SV 600°C
Lower-limit 580°C
30°C
20°C
Occurrence of an alarm   Occurrence of an alarm
Occurrence of an alarm   Occurrence of an alarm
Start

● No alarm occurs at the start time when a standby function is provided.

An example of deviation alarm at both higher-limit and lower-limit

Higher-limit 30°C
SV 600°C
Lower-limit (−)20°C
30°C
20°C
Occurrence of an alarm   Occurrence of an alarm
Occurrence of an alarm   Occurrence of an alarm
Start

● No alarm occurs at the start time when a standby function is provided.

An example of heater disconnection alarm

CT output
5.0A
CT alarm value
0.0A
Heater power ON
No alarm occurs at the start time.
Occurrence of an alarm

• The alarm type of heater disconnection alarm is the absolute value lower-limit alarm.
• By setting CT, the alarm is automatically set to the lower-limit alarm.
Setting range: 0.1 ~ 5.0(A)
(No alarm occurs at 0 or 0.0A)

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7.3 Parameters of Setting Mode

■ Parameter flow chart

Power ON (SV display screen)

By pressing (SEL) key for about 2 seconds, the instrument returns to the SV display screen from all screens. The instrument also returns to the SV display screen, if key operation is not done for longer than one minute.

(SEL) key About 2sec.

(Reverse turning in case of (▽) key.)

LoCH	EnG	oPt	in it	GZFb
ñod 1	ñod2	ñod3	ñod4	ñod5
Mode 1 Key lock	Mode 2 AT, fuzzy, output	Mode 3 Option	Mode 4 Input and alarm	Mode 5 On-off servo

Mode 1

(ENT)

Display one of
| No lock | Lock 1 | Lock 2 |

Operation returns to mode 1 by pressing (SEL) key in all screens.

Setting (change) operation procedure

Mode screen (example)
| EnG |
| ñod2 |

Screen to be set is displayed (ENT)

Set the instrument to be the settable condition by (▽) or (△) key. (Period flickers)

Set an item and its value by (▽),(△) keys. (Period flickers)

OK ? — NO / YES

Entry (ENT) (Period goes out.)

End

Proceed to the next setting screen (ENT)

Mode 2

(ENT)

oL - L — Lower-limit output limiter

(ENT)

oL - H — Higher-limit output limiter

(ENT)

o 5L — Output variable limiter

(ENT)

PULS — Pulse type only — Pulse cycle

(ENT)

o.db — Two-position type only — Output dead band

(ENT)

P.b iA — Sensor correction

(ENT)

P.FLt — Digital filter

(ENT)

At — END / START — A T

(ENT)

FU:Y — ON · OFF — Fuzzy

(ENT)

By pressing (SEL) key, the instrument returns to the mode 2 from all screens.

Mode 3

(ENT)

trnS — Transmission communication option — Transmission type

(ENT)

t.SC.L — Transmission option — Transmission scale (MIN)

(ENT)

t.SC.H — Transmission option — Transmission scale (MAX)

(ENT)

r.SC.L — Remote option — Remote scale (MIN)

(ENT)

r.SC.H — Remote option — Remote scale (MAX)

(ENT)

r.b iA — Remote communication option — Remote shift

(ENT)

Adr S — Communication option — Device No.

(ENT)

rAtE — Communication option — Transmission rate

(ENT)

CoN — Communication option — Communication function

(ENT)

CYCL — CT option — Power frequency

(ENT)

By pressing (SEL) key, the instrument returns to the mode 3 from all screens.

Mode 4

(ENT)

rnG.L — Ratio (zero)

(ENT)

rnG.H — Ratio (span)

(ENT)

St.dP — Linear input — Linear decimal point

(ENT)

SCL.L — Linear input — Linear scale (MIN)

(ENT)

SCL.H — Linear scale (MAX)

(ENT)

SuL.L — SV value limiter (MIN)

(ENT)

SuL.H — SV value limiter (MAX)

(ENT)

A iñd — dH . dHW. dL . dLW . AH . AHW AL . ALW . CT (with CT option only) — Alarm type

(ENT)

A2ñd — Same as specified above — Alarm 2 types

(ENT)

A idb — Alarm dead band

(ENT)

A2.db — Alarm 2 dead bands

(ENT)

By pressing (SEL) key, the instrument returns to the mode 4 from all screens.

Mode 5

(ENT)

Fb.At — FB.AT

(ENT)

Fb.L — FB (zero)

(ENT)

Fb.H — FB (span)

(ENT)

Fb.db — FB dead band

(ENT)

By pressing (SEL) key, the instrument returns to the mode 5 from all screens.

7.4 Combined Adjustment with Final Controlling Equipment
(Applicable to on-off servo type instrument only)

This instrument uses free feedback resistors ($100\Omega \sim 2k\Omega$). However, since the residual components of the feedback resistance of final controlling equipment (control motor, motor-operated valves, etc.,) differ individually, combined adjustment is necessary by combining this instrument with the final controlling equipment at a ratio of 1 to 1. Set the following parameters before setting.

① Mode 5 FB dead band setting:
   Fb–db = 4% (Make sure that the initial value is set to 4%.)
   If this dead band is narrower than specified, hunting is apt to occur to unfavorably affect lives of the final controlling equipment and relays of this instrument. Set the dead band to a large value as much as possible within the controllable range.

② Mode 2 Output limiter (lower-limit, higher-limit) setting
   OL–L (lower-limit) = 0.0%   (Make sure that the initial value is set to 0.0%)
   OL–H (higher-limit) = 100.0%   (Make sure that the initial value is set to 100%)
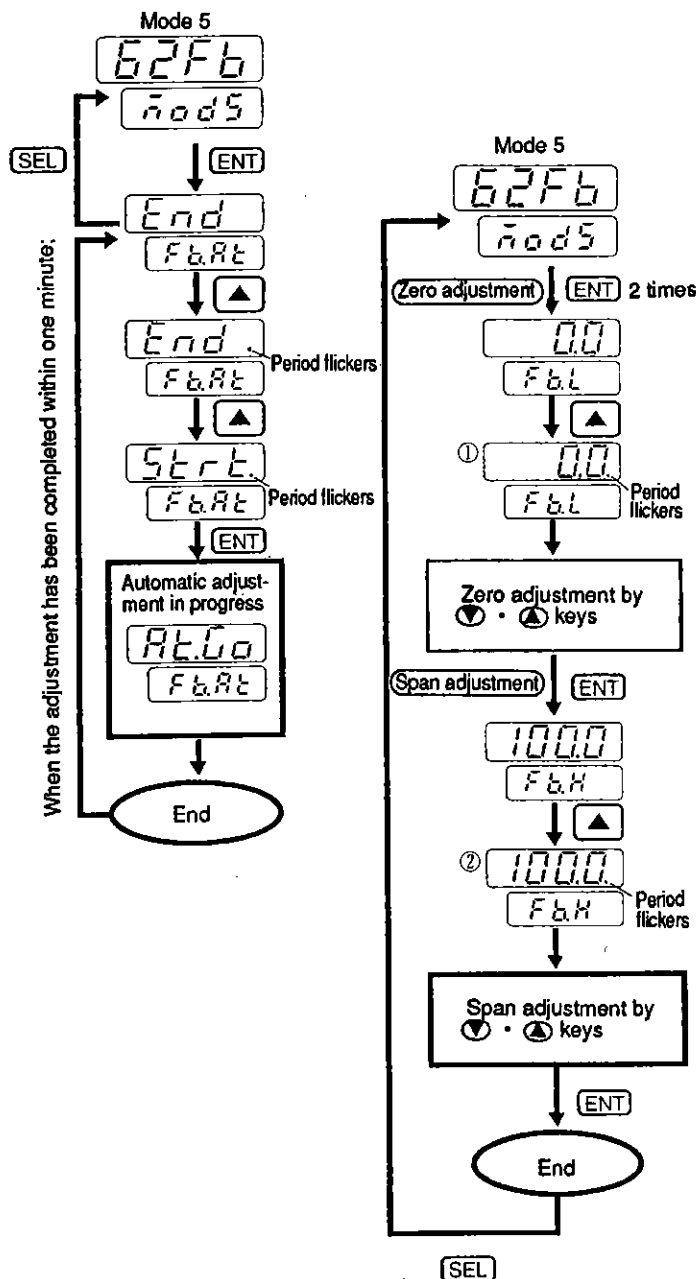
⚠ **Caution**

If this adjustment is not finished within one minute, the display returns to the run screen. (However, the adjustment is continued automatically.)
For checking whether the adjustment has been completed or not, select mode 5 again, and press (ENT) key.
The following display appears, respectively.

When adjustment has been completed;   When adjustment is in progress;

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8.1 Characters of Display

The indicators of this instrument use 7 segments.
Alphabetic characters are represented as shown in the following table, because a part of them are difficult.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
R	b	C	d	E	F	G	H	ι	J	h	L	n̄	n	o	P	/	r	S	t	u	u	y	/	y	≡

8.2 Comments on the Terms of Parameters on Run Display Screen

Parameter names	Initial values	Setting ranges	Remarks
1. Control set value (SV)	0 or 0.0	Optional (measuring range)	Limitable by SV limit setting
2. Control output value (OUT)		−5.0 ~ +105.0%	Settable during manual run. Display only in 2-position control mode (Not settable in manual run)
3. Alarm 1 (AL1)	4000	−1999 ~ +9999	Decimal point position changes according to the input types, linear decimal point, alarm type, etc.
4. Alarm 2 (AL2)	−1999	−1999 ~ +9999	
5. Proportional band (P) 6. Integral time (I) 7. Derivative time (D)	5% 60sec 15sec	0.1 ~ 999.9% 0 ~ 9999sec 0 ~ 9999sec	Not displayed in case of 2-position control mode.
8. Valve opening input value (FB)	Display contents F.C.25 : Numeric display 0 ~ 99% SP display for 100% F.o : Open side relay is attracted. F.C : Closed side relay is attracted. F.n : Neither open side nor closed side relay is attracted (within the dead band)		Displayed during on-off servo output
9. CT input value	CT.30 : 0.0~5.0A		Displayed when pulse output is selected with CT option.

8.3 Comments on the Terms of Setting Mode Parameters

Parameter names	Display	Application limits	Contents
1. Keylock mode (Mode 1)	hEY	None	unLK : Resettable (Initial value unLK) LCK1 : Prohibits a change of parameters and A/M in run mode. LCK2 : Prohibits a change of LCK1+ setting parameters.
2. Output limiter (Mode 2)	oL−L oL−H	PID setting time	Limits the temperature rise and down of input value so that the control output does not become higher than a set value or lower than a set value. Set it by oL−L < oL−H without fail. oL−L : (−5.0 ~ +100.0%) Initial value: 0.0% oL−H : (0.0 ~ 105.0%) Initial value: 100.0%
3. Output variable limiter (Mode 2)	oSL	PID control	Suppresses the variable per control output (0.2sec) to a desired value so as to prevent an abrupt change of output. (0.1 ~ 100.0%) Initial value: 100.0%
4. Pulse cycle (Mode 2)	PULS	Pulse output time	Sets the on-off signal cycle. Set the time to be short for fine control. However, short setting may affect the live of final controlling equipment. (1 ~ 100sec) Initial value: 30sec

Parameter names	Display	Application limits	Contents
5. Output dead band (Mode 2)	`adb`	2-position control time	This parameter is used to prevent chattering of output relays. The dead band (%) is set to the range setting span (temperature input time) or scale setting span (linear input time). Large setting results in a large cycling width. (0.1 ~ 9.9%) Initial value: 0.5%
6. Sensor correction (Mode 2)	`Pb.A`	None	Shifts the entire indicating value is parallel. (−199.9 ~ +999.9%) Initial value 0.0%
7. Digital filter (Mode 2)	`PFlt`	None	Stabilizes the measuring input by setting a delay to the indicating value if the measuring input changes abruptly. If the set value is large, the delay increases, correspondingly. (0.0 ~ 99.9) Initial value: 0.1
8. PID auto tuning (Mode 2)	`At`	PID control	Sets optimum PID constants automatically. When AT is started, the on-off action is repeated 5 times (StP1 ~ 5), and the end display is done after this on-off action.
9. Fuzzy (Mode 2)	`FUZY`	PID control	By turning on this parameter, the overshort can be suppressed by fuzzy operation. However, the effective may be reverse, if the controlled object response is speedy. Be careful since the switching during stable control may cause interferences. (ON-OFF) Initial value OFF
10. Transmission type (Mode 3)	`trnS`	Transmission and communication option	Sets the transmission types selectable out of PV/SV/mV/ rSV/mFB. rSV : Remote input value in remote option mode mFb: Valve opening in on-off servo output Initial value: PV
11. Transmission scale (Mode 3)	`t.SC.L` `t.SC.H`	Transmission option	`t.SC.L` : Sets the minimum value of transmission scale. `t.SC.H` : Sets the maximum scale of transmission scale. (−1999 ~ +9999) Initial value: Scale range *
12. Remote scale (Mode 3)	`r.SC.L` `r.SC.H`	Remote option	`r.SC.L` : Sets the minimum value of remote scale. `r.SC.H` : Sets the maximum value of remote scale. (−1999 ~ +9999) Initial value: Scale range *
13. Remote shift (Mode 3)	`rb.A`	Remote, communication option	Shift setting to remote input. (−199.9 ~ +9999) Initial value: 0.0 *
14. Communication (Mode 3)	`Adr.S` `rAtE` `COn`	Communication option	`Adr.S` : Device number setting. 01 ~ 99) Initial value 01 `rAtE` : Transmission speed setting. (1200/2400/ 4800/9600bps) Initial value: 4800 `COn` : Communication type setting. (Com/rEm/trS) Initial alue Com
15. Power frequency (Mode 3)	`CYCL`	CT option	Power frequency setting. (50/60Hz) Initial value: 50Hz Set this power frequency without fail when CT option is provided.
16. Range (Mode 4)	`rnG.L`	None	Used for setting the measuring range to an actual working range. This span becomes 100% of the proportional band (P) and output dead band in case of temperature input. Set rnG.L < rnG.H without fail. Temperature input: Measuring range mV: −20.0 ~ +20.0 Initial value : 0.0 ~ 20.0 v : −5.00 ~ +5.00 Initial value : 1.00 ~ 5.00 mA: 0.00 ~ 20.00 Initial value : 4.00 ~ 20.00

Asterisk (*): The decimal point position depends upon the input types and setting parameters.

Parameter names	Display	Application limits	Contents
17. Linear decimal point (Mode 4)	$\boxed{5\,\text{\textit{ \textbf{d}}}P}$	Linear input	Sets the decimal point position of linear scale. (0 ~ 3) Initial value 1
18. Linear scale	$\boxed{5\,CL.L}$ $\boxed{5\,CL.H}$	Linear input	Graduates the range setting input to actual indicating value. (−1999 ~ +9999) Initial value SCL.L: 0.0, SCL, H: 100.0 *
19. SV value limiter (Mode 4)	$\boxed{5\,BL.L}$ $\boxed{5\,BL.H}$	None	Sets the limitation of the setting range of control set value (SV). Set to SVL.L < SVL.H without fail. (−1999 ~ +9999) Initial value: Temperature input (range set value) Linear input (Scale set value) *
20. Alarm type 1 Alarm type 2 (Mode 4)	$\boxed{R\,1.\text{\textit{md}}}$ $\boxed{R\,2.\text{\textit{md}}}$	None	Sets alarm types. The following alarm types are prepared for alarm 1 and alarm 2. Select symbols. DH: Deviation higher-limit → dHW: Deviation higher-limit with standby function → dL: Deviation lower limit → dLW: Deviation lower limit with standby function → AH: Absolute value higher-limit → AHW: Absolute value higher limit with standby function → AL: Absolute value lower limit → ALW: Absolute value lower-limit with standby function → CT: Heater disconnection alarm (only when CT function is provided.) (Reference) Deviation alarm with standby function: Even if the value reaches an alarm point at the initialize time by turning on the power supply, the alarm output is turned off to prevent a wrong alarm. Initial value: A1. md dH, A2, md dL
21. Alarm dead band 1 Alarm dead band 2 (Mode 4)	$\boxed{R\,1.\text{\textit{db}}}$ $\boxed{R\,2.\text{\textit{db}}}$	None	Used for preventing chattering of an alarm output by setting the dead bands of the alarm output generation value and alarm output reset value. These dead bands are set by an absolute value. (0.0 ~ 999.9) Initial value: 2.0 *
22. Final controlling equipment adjustment (auto) (Mode 5)	$\boxed{Fb.Rt}$	On-off servo output	Executes the combined adjustment with the final controlling equipment in the auto mode. When Fb.At is started, At.Go is displayed, and the end is displayed when Fb.At ends.
23. Final controlling equipment adjustment (manual) (Mode 5)	$\boxed{Fb.L}$ $\boxed{Fb.H}$ $\boxed{Fb.db}$	On-off servo output	$\boxed{Fb.L}$: Zero adjustment value of the combination with final controlling equipment (0.0 ~ 50.0%) Initial value: 0.0% $\boxed{Fb.H}$: Span adjustment value of the combination with the final controlling equipment (50.0 ~ 100.0%) Initial value: 100.0% $\boxed{Fb.db}$: Dead band set value with the combination with the final controlling equipment (1.0 ~ 20.0%) Initial value: 4.0%

Asterisk (*): The decimal point position depends upon the input types and setting parameters.

9 ERROR DISPLAY AND CONTROL OUTPUT

Display contents	Causes	Controller action		
		Alarm output	Control output	Auto tuning
[8.8.8.8]	• Input value is higher than the scale range of controller • Disconnection (thermocouple, resistance thermometer, mV input)	Higher-limit alarm output	0%	Stop
[8.8.8.8]	• Input value is lower than the scale range of controller	Lower-limit alarm output	0%	
[Er02] Measuring value and alternate display	• A/D, CJ data error		Control is continued (without CJ)	
[Er03] Measuring value and alternate display	• A/D, EOC error		0%	
[Er04] Measuring value and alternate display	• Calibration data error		Controll is continued (Non-adjusted condition)	
[Er05] Measuring value and alternate display	• RAM backup error		Control is continued	

Turn on the power supply once, and turn it on again in case of Er02 and Er03.
Check the setting in case of Er05.   If the condition remains unchanged or if Er04 occurs, please contact your nearest CHINO's sales agent.

10 TROUBLE SHOOTING

Symptoms	Check contents and remedial measures
None of keys is acceptable	Are keys not locked? Check the lock condition in mode 1. (See page 14 and 16)
Manual run is impossible.	Is MANUAL LED (red) lighting? (See page 11)
Process variable (PV) fluctuates	• Check the connections again (See page 5.) • Check for ingress of noises.
No alarm occurs.	• Is the alarm standby set to provided? (See page 13) • Is the alarm type set according to your desired specifications?
Er02 is displayed.	It is possible that temperature compensation unit was broken when assembling the internal unit into the case. Repair is necessary, if so.

● Exchange parts
The electrical life of control relays (on-off pulse type, on-off servo type) employed in this instrument is more than 100,000 times.
Replace them periodically before they reach their lives.
If a trouble occurred, please contact your nearest CHINO's sales agent.

Controller name	Types of control relays, maker names	Q'ty	Electrical life
On-off pulse type	AGP2013 (Manufactured by Matsushita Denko Co.)	1	More than 100,000 times
On-off servo type	AW3013 (Manufactured by Matsushita Denko Co.)	2	More than 100,000 times

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