# $MA\ 2\ 0\ C$

# Digital controller

# Instruction manual

Thank you for purchasing SHIMAX products. Please check that the delivered Product is the item you ordered. Please do not begin operating this product until You have read this instruction manual thoroughly and understand its contents.

#### [Notice]

Please ensure that this manual is given to the final user of the instrument.

#### Preface

This instruction manual is meant for those who will be involved in wiring, installation, operation and routine maintenance of the MA20C.

This manual describes the care, installation, wiring, function, and proper procedures regarding the operation of MA20C. Keep this manual on hand while using this device. Follow the guidance provided herein.

#### 1. Matters regarding safety

For matters regarding safety, potential damage to equipment and/or facilities and additional instructions are indicated as follows.

◎This heading indicates hazardous conditions that could cause injury or death of personnel. Exercise extreme caution as indicated.

#### **™** WARNING

OThis heading indicates hazardous conditions that could cause damage to equipment and/or facilities. Exercise extreme caution as indicated.

# **∫** <u>AUTION</u>

 $\odot$  This heading indicates additional instructions and/or notes  $$\Gamma$NOTE_{\circle}$$ 

#### 「<u>∧</u> WARNING」

MA20C is designed for controlling temperature, humidity, and other physical subjects. It must not be used in any way that may adversely affect safety, or working conditions.

# **「**▲ CAUTION」

To avoid damage to the connected equipment, facilities or the product itself due to a fault of the product, safety countermeasures must be taken before usage, such as proper installation of the fuse and the overheating protection device. No warranty, expressed or implied, is valid in the case of usage without having implemented proper safety counter measures.

#### **∫** ▲ CAUTION

- The  $\Lambda$  mark on the plate affixed to the instrument:
- On the terminal nameplate affixed to the case of your instrument, the  $\Lambda$  mark is printed. This is to warm you of the risk of electrical shock which may result if the charger is touched while it is energized.
- The external power circuit connected to the power terminal of this instrument must have a means of turning off the power, such as a switch or breaker.
- Install the switch or breaker adjacent to the instrument in a position which allows it to be operated with ease, and with an indication that it is a means of turning off the power. •Fuse:

Since the instrument does not have a built-in fuse, do not forget to install a fuse in the power circuit to be connected to the power terminal. The fuse should be positioned between the switch or breaker and the instrument and should be attached to the L side of the power terminal.

- Fuse Rating: 250V AC 0.5A/medium lagged or lagged type.
  - Use a fuse, which meets the requirements of IEC127.
- •Load voltage/current to be connected to the output terminal and the alarm terminal should be within the rated range. Otherwise, the temperature will rise and reduce the life of the product and/or result in problems with the product.
- •Voltage different from that of the input specification should not be connected to the input terminal. It may reduce the life of the product and/or result in problems with the product.
- Input, voltage pulse output, and current output are not isolated electrically from inside circuits.

#### **[**▲ CAUTION]

- This instrument has basic insulation between the power supply and the input-output. When enforced insulation is needed, the input/output terminals should be connected A: to a device with no exposed chargers, or B: to a device with basic insulation suitable for the highest voltage of power supply and input/output section.
- This instrument is provided with a vent for heat discharge. Take care to prevent metal or other foreign matter from obstructing the vent. Failure to do so may result in problems with the product and may even result in fire.

• Do not block the vent or allow dust to accumulate. The rise in temperature or insulation failure caused by blocking the vent may result in reducing the life of the product and/or problems with the product.

Repeated tolerance tests against voltage, noise, surge, etc. may lead to deterioration of the instrument.
 No modification or irregular usage is allowed.

#### 2. Introduction

#### 2-1. Check before use

Before using this product, you are required to check the model code, the external view of the product and the accessories to make sure that there is no error; damage, or shortage of delivered items. Confirmation of model code: Check the model codes on the case of the product to ascertain that the delivered item is what you ordered by referring to the following code table.

#### Example of model code

-	
<u>MA20</u> <u>C-</u> <u>M</u> <u>C</u> <u>F-</u> <u>2N-</u> <u>0</u>	
1 2 3 4 5 6 7	
Item	
1.Series MA20 2.Classification C-controller 3.linput M:multi V:voltage I:current	
4. Control output C: contact S: voltage pulse I: current (4 ~ 20mA) V;(0 $\sim$ 10V)	
5. Power Supply F-: 90 – 264V AC L-: 21.6 – 26.4V DC/AC	
6. Option 0N-: without 1N-: alarm output 1 point 2N-: alarm output 2 points	
0D-: external control input (DI) 2 points	
1D-: alarm output 1 point + external control input (DI) 2 points	
0T-: analog output (4 ~ 20mA) 1T-: alarm output 1 point + analog output	
2T-; alarm output 2 point + analog output	
0R-:communication of RS-485	
1R-: alarm output 1 point + communication of RS-485	
1 B -: alarm output 1 point with buzzer 2B-:alarm output 2 point with buzzer	
7. Remarks 0: without 9: with	
Charle of an annual an	

# Check of accessories

Instruction manual: 1 set NOTEJ : Contact our representative or our local office concerning any problems with the product and accessories, or for any inquiry.

(1) Avoid operating the front panel keys with hard or sharp objects.

- (2) To clean, wipe gently with a dry cloth. Avoid using solvents such as thinner.
- 3. Installation and wiring
- 3-1. Installation site (environmental conditions)

Touch the keys lightly with fingertips.

#### **∫** ▲ CAUTION

Do not use this instrument under the following conditions.

- Otherwise, the likelihood of fire and/or other dangerous situations are considerable.
- Where flammable gas, corrosive gas, oil mist or dust that can deteriorate. electrical insulation is generated or is abundant.
- (2) Where the temperature is below  $0^{\circ}$ C or above  $50^{\circ}$ C
- (3) Where the humidity is over 90% RH or where condensation occurs.
- (4) Where highly intense vibration or impact is generated or can affect the operation of the product.
- (5) Near high voltage power lines or where inductive interference can affect the operation of the product.
- (6) Where there are dewdrops or direct sun light.
- (7) Where the altitude is above 2,000m.

#### $\lceil \text{NOTE} \rfloor$ : The environmental conditions here comply with the installation

#### category II and the pollution degree 2 set by IEC664.

#### 3-2. Mounting

1

- (1) Machine the mounting hole by referring to the panel-cut illustration in Section 3-3.
- (2) Applicable thickness of the mounting panel is  $1.2 \sim 3.2$ mm (With metal fittings, it can be  $1.0 \sim 4.0$ mm)
- (3) As this product provides mounting fixture, insert the product into the panel.

When ground thermocouples are used, the control output terminal should not be connected to earth. (If connected, wraparound causes errors.)

# SHIMAX CO.,LTD.

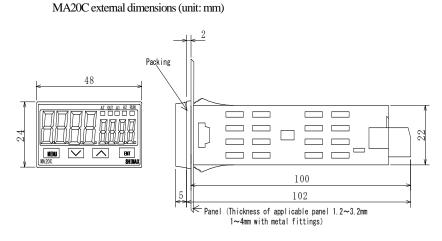
(5) The mes produce provides mounting instance, insert the produce into the parter.

NOTE: MA20C is a panel set-up type. Please use the product after setting up to the panel.

MA20CF-1BE August 2008

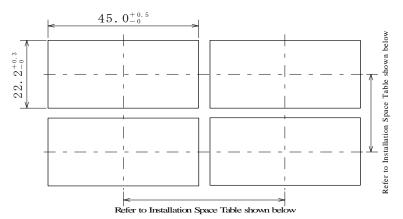
<sup>2-2</sup> . Caution for use

3-3. External dimension and panel cutout



MA20C panel cutout (unit : mm)

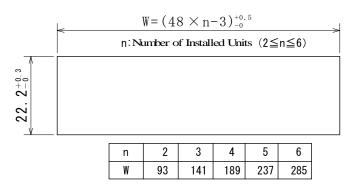
Individual Installation for one unit and more than one unit closely mounted each in one hole



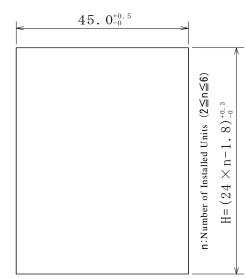
Min. Installation Space According to Thickness of the Panel

Thickness of	Installation Space	Thickness of	Installation Space	Installation Space
	1	THERICSS OF	-	1
Panel	(Vertical)	Panel	(Vertical)	(Horizontal)
1.0	25.0	2.3	24.0	More than 48.0 as for
1.2	25.0	2.8	24.0	horizontal direction
1.6	24.4	3.2	24.0	More than 66.0 with
2.0	24.0			metal fittings
	a			11 1 0 10 44

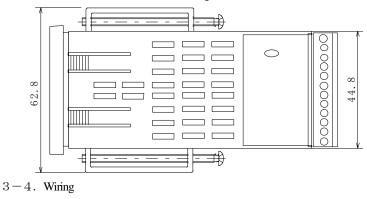
Horizontally Consecutive Installation in One Hole (Max. 6 units) Non-application of IP66



Vertically Consecutive Installation in One Hole (Max. 6 units) Non-application of IP66



#### External View of Installation with Metal fittings



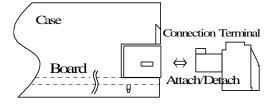
# 「▲ WARNING」

 $\ensuremath{\textcircled{}}$  To prevent electrical shock, turn off electricity during wiring operation.

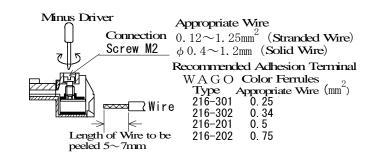
OAvoid touching the wired terminals and chargers while supplying power.
(1) Wing operation should be done according to the instruction of the terminal anangement plan in section 3-5
(2) In case of thermocouple input, choose the compensation wire suitable to the thermocouple type.
(3) In case of R.T.D. input, leads should be less than 5Ω in resistance and three leads should have the same resistance.

(4) Input signal line should not be laid in the same wire or duct as that of the high voltage line.(5) Shield wiring (single point grounding) is effective for static induction noise.

- (6) Short interval twisted pair wire for input signal is effective for electromagnetic induction noise.
- (7) When wiring, the connector terminal can be removable if it is pulled right and left one after the other as shown in the drawing bellow.

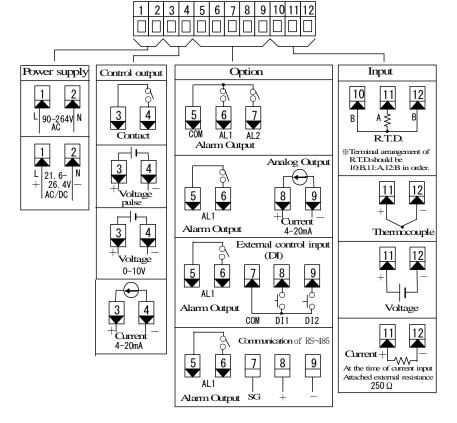


- (8) To avoid wiring slip and short circuit, use the suitable cable, insert it thoroughly, and fasten the connection screws tightly with a minus driver.
  - Tightening torque: 0.2 ~ 0.25N•m (recommended performance) 0.3 N•m (guaranteed performance)



3-5. Terminal arrangement plan

2

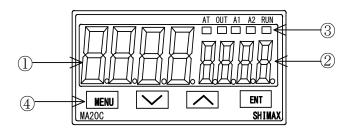


n	2	3	4	5	6
Н	46. 2	70. 2	94. 2	118.2	142. 2

[NOTE] : Metal fittings are needed for each unit in case of vertically consecutive installation in one hole.

[NOTE] : When input type is thermocouple or voltage a shoot circuit between 10 and 12 terminals cause measurement errors.

- 4. Description of front panel
- 4-1. Drawing and the name of parts.



4-2. Description of parts on the front panel

- ①: Display section of measured value (PV) (red) Measured value (PV) and type of setting on each setting screen are displayed.
- 2: Display section of target value (SV) (yellow) Target value (SV) and set value on each setting screen are displayed.
- ③: Monitor LED section
  - (1) Control output monitor LED OUT (yellow) At the time of contact or voltage pulse output, LED lights up with output ON, and turns off with output OFF. At the time of current output, LED turns off with 0% output, lights up with 100% output, and blinks between 0% and 100% according to ratio.
  - (2) Alarm output monitor LED A1, A2 (red) LED lights up when assigned alarm output turns ON.
- 5. Description of screens
- 5-1. How to move to another screen

- (3) Auto tuning action monitor LED AT (yellow) When ON is chosen on AT screen, or when AT is chosen in the external control input (DI), AT starts operating and LED blinks, and turns off when AT is cancelled or automatically completed.
- (4) RUN monitor LED RUN (yellow) When RUN is chosen on action mode screen or in the external control input (DI), LED lights up and turns off with Stby. When Manual output is chosen on output monitor screen or in the external control input (DI), LED blinks.

(4): Key-switch section

(1) MENU) key

Press key to move on to the next screen in each screen.

Press 🖼 key for three seconds on the basic screen and the screen jumps to the lead screen of Mode 1. Press MENU key for three seconds on the lead screen of each of Mode screens and the screen jumps to the basic screen

(2)  $\mathbf{\nabla}$  (DOWN) key

One press of  $\mathbf{\nabla}$  key decreases the set value by one. By pressing the key, the value continues decreasing.

During setting, a dot beside the least decimal place is blinking.

(3) (UP) key

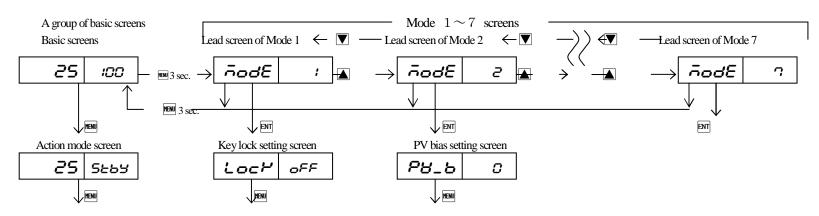
One press of *key* increases the set value by one. By pressing the key, the value continues increasing. During setting, a dot beside the least decimal place is blinking.

(4) ENT (ENTRY) key

Press  $\mathbb{E}$  key to resister the setting changed by  $\triangle$  or  $\mathbf{\nabla}$  key. (A dot beside the least decimal place stops blinking.)

Press ENT key on the control output screen for three seconds to choose between automatic output and manual output.

Press ENT key on the lead screen of each of Mode screens and the screen moves to a setting screen.



Press 🖻 key on the basic screen to move to another basic screen.

Press 🔤 key on the basic screen for three seconds to jump to the lead screen of Mode 1.

Press 🛋 key on the lead screen of Mode 1 to move to the lead screen of Mode 2, Mode 3 in order. (When there is no option assigned to Mode 4 ~ Mode 7, it skips)

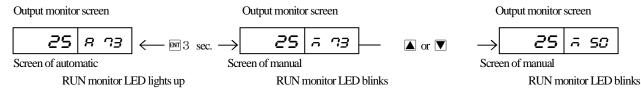
Press 💌 key on the lead screen of Mode 1 to move to the lead screen of Mode 7, Mode 6 in order. (When there is no option assigned to Mode 4 ~ Mode 7, it skips)

Press Err key on the lead screen of Mode 1 ~ 7 to move to the first setting screen of each Mode.

Press 🖼 key on the first setting screen of each Mode to move to the next setting screen.

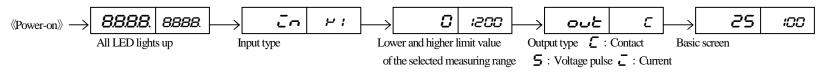
5-2. How to set

To change settings, display an appropriate screen and change the setting (value or function) by pressing 🛦 or 💌 key. Then press 🔤 key to resister the setting. On the output monitor screen of a group of basic screens, the type of control output can be chosen from "automatic" or "manual"... Display the output monitor screen and press Em key for three seconds to transfer from automatic to manual. Then by pressing 🛋 or 💌 key, settings can be changed. In this case, 🔤 key doesn't have to be pressed to resister the settings. To shift back from manual to automatic, press 🖭 key for three seconds as well. (Note: Switchover between automatic output and manual output cannot be done unless Key Lock is OFF or when STBY and AT are active.)

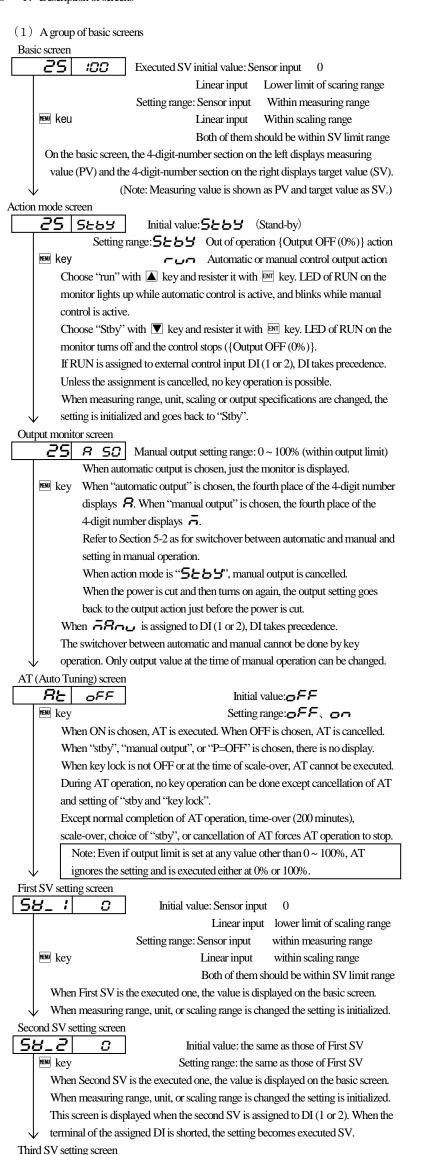


5-3. Power-on and initial screen display

At power-on, the display section s nd each, then moves on to the basic s



#### 5-4. Description of screens



d SV set	ting screen	
3_3	0	Initial

Alarm 1 operating point setting scre		
<b>B</b> : :200 Initial v		1 .1
<b>R</b> : :200 Initial v	0	value within measuring range
	higher limit of scalin	
		e value within measuring range
	Higher limit deviation	
HENU key	Lower limit deviation	
	Within deviation	0
	Beyond deviation	2000
	Control loop/discon	
e e		ing range within scaling range
Lower limit abso		ng range within scaling range
Higher limit de		R~ <b>2000</b> unit
Lower limit de		2 <b>000</b> unit
Within higher and le	ower deviation 🛛 🖸	~ <b>2000</b> unit
Beyond higher and	lower deviation <b>D</b>	~ <b>2000</b> unit
Control loop/discon	nection	~ <b>9999</b> seconds
Operating point of the alarm ty	ype assigned to Alarm 1 ca	an be set.
When there is no alarm option	n, or when "AL1 <b>non</b> "	is chosen, there is no display.
Each deviation alarm and cont	trol loop/disconnection ala	rm take effect when action
mode is " <b>م</b> يم" and when '	'automatic output" is chose	en.
Each deviation alarm is PV de	eviation to the executed SV	1
Control/disconnection alarm v	watches time when PV is o	ut of proportional band.
At the time of ON-OFF opera	tion, it watches time when	PV is out of differential gap
Alarm 2 operating point setting scre		01
		ner conditions are the same as
	of Alarm 1.	
MENU key		
✓ Latching cancellation screen		
	iitial value: -52 /	
	e: $-5E$ / cancella	tion of alarm 1
	-562 cancella	
	<b><i>Q</i>!</b> simultaneous ca	
When <b>-</b> is chosen on	<b>R!_!</b> simultaneous ca	
	latching setting screen of	each alarm mode, -5E
number and RLL are	latching setting screen of e displayed. When latching	each alarm mode, <b>~5</b> & g is " <b>~~</b> ", once alarm
number and <b>RLL</b> are turns on, the alarm outpu	latching setting screen of e e displayed. When latching t condition continues even	each alarm mode, <b>~5</b> & y is " <b>~~</b> ", once alarm if alarm is OFF.
number and <b>RLL</b> are turns on, the alarm outpu On this screen, on-going	latching setting screen of e e displayed. When latching t condition continues even alarm output can be cance	each alarm mode, <b>~5</b> & g is " <b>~~</b> ", once alarm if alarm is OFF. Iled.
number and <b>ALL</b> are turns on, the alarm outpu On this screen, on-going When alarm is in latching c	latching setting screen of e e displayed. When latching tt condition continues even alarm output can be cance condition, a dot beside the l	each alarm mode, <b>~5</b> <u>*</u> g is " <b>~~</b> ", once alarm if alarm is OFF. Iled. east decimal place blinks.
number and <b>ALL</b> are turns on, the alarm outpu On this screen, on-going When alarm is in latching c The blinking indicates that i	latching setting screen of a e displayed. When latching t condition continues even alarm output can be cance condition, a dot beside the l it is possible to cancel the a	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Iled. east decimal place blinks. alarm setting.
number and <b>ALL</b> are turns on, the alarm outpu On this screen, on-going When alarm is in latching c The blinking indicates that i When <b>E</b> key is pressed, the	latching setting screen of a e displayed. When latching tt condition continues even alarm output can be cance condition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Alled. east decimal place blinks. alarm setting. he dot stops blinking.
number and <b>ALL</b> are turns on, the alarm outpu On this screen, on-going When alarm is in latching c The blinking indicates that i When I key is pressed, the However, the condition is w	latching setting screen of a e displayed. When latching tt condition continues even alarm output can be cance condition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Alled. east decimal place blinks. alarm setting. he dot stops blinking.
number and <b>ALL</b> are turns on, the alarm outpu On this screen, on-going When alarm is in latching c The blinking indicates that i When M key is pressed, the However, the condition is w	latching setting screen of a e displayed. When latching tt condition continues even alarm output can be cance condition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Alled. east decimal place blinks. alarm setting. he dot stops blinking.
number and <b>ALL</b> are turns on, the alarm outpu On this screen, on-going When alarm is in latching c The blinking indicates that i When Im key is pressed, th However, the condition is w Back to the basic screen	latching setting screen of a e displayed. When latching tt condition continues even alarm output can be cance condition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Alled. east decimal place blinks. alarm setting. he dot stops blinking.
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number and <b>ALL</b> are turns on, the alarm outpu On this screen, on-going When alarm is in latching c The blinking indicates that i When Im key is pressed, th However, the condition is w Back to the basic screen	latching setting screen of a e displayed. When latching tt condition continues even alarm output can be cance condition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Alled. east decimal place blinks. alarm setting. he dot stops blinking.
number and <b>ALL</b> are turns on, the alarm outpu On this screen, on-going When alarm is in latching c The blinking indicates that i When Im key is pressed, th However, the condition is w Back to the basic screen	latching setting screen of a e displayed. When latching tt condition continues even alarm output can be cance condition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Alled. east decimal place blinks. alarm setting. he dot stops blinking.
number and <b>ALL</b> are turns on, the alarm outpu On this screen, on-going When alarm is in latching c The blinking indicates that i When I key is pressed, th However, the condition is v Back to the basic screen (2) A group of Mode 1 screens Lead screen of Mode 1	a latching setting screen of a e displayed. When latching t condition continues even alarm output can be cance sondition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th vithin alarm output region,	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Alled. east decimal place blinks. alarm setting. he dot stops blinking.
number and <b>A</b> ; ; are turns on, the alarm outpu         On this screen, on-going         When alarm is in latching c         The blinking indicates that i         When Im key is pressed, the two on the basic screen         (2) A group of Mode 1 screens         Lead screen of Mode 1         This screen	a latching setting screen of a e displayed. When latching t condition continues even alarm output can be cance sondition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th vithin alarm output region,	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Alled. east decimal place blinks. alarm setting. he dot stops blinking. cancellation is impossible.
number and ALL are turns on, the alarm outpu         On this screen, on-going         When alarm is in latching c         The blinking indicates that i         When Imma key is pressed, the         However, the condition is we         Back to the basic screen         (2) A group of Mode 1 screens         Lead screen of Mode 1         Imma key         This screen	e latching setting screen of a e displayed. When latching t condition continues even alarm output can be cance condition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th within alarm output region,	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Alled. east decimal place blinks. alarm setting. he dot stops blinking. cancellation is impossible.
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number and <i>ALL</i> are turns on, the alarm outpu On this screen, on-going When alarm is in latching c The blinking indicates that i When I Rey is pressed, th However, the condition is v Back to the basic screen (2) A group of Mode 1 screens Lead screen of Mode 1 This screen Markey on the basic There is no setting of	een is displayed when Entry asic screen. on this screen. Provide the screen alarm output can be cance alarm output can be cance to ondition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th within alarm output region, been is displayed when Entry asic screen.	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Alled. east decimal place blinks. alarm setting. he dot stops blinking. cancellation is impossible.
number and <b>ALL</b> are turns on, the alarm output         On this screen, on-going         When alarm is in latching of         The blinking indicates that if         When Imm key is pressed, the         However, the condition is we         Back to the basic screen         (2) A group of Mode 1 screens         Lead screen of Mode 1         This screen         (2) M group of Mode 1 screens         Lead screen of Mode 1         The screen of the basic screen         This screen         (2) M group of Mode 1 screens	een is displayed when Entry asic screen. on this screen. Provide the screen alarm output can be cance alarm output can be cance to ondition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th within alarm output region, been is displayed when Entry asic screen.	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Alled. east decimal place blinks. alarm setting. he dot stops blinking. cancellation is impossible.
number and RLL are turns on, the alarm output         On this screen, on-going         When alarm is in latching c         The blinking indicates that is         When Immage         The black to the basic screen         (2) A group of Mode 1         Street         Immage         Immage         This screet         Immage         There is no setting or         The first setting screet         Key lock setting screet	e latching setting screen of o e displayed. When latching t condition continues even alarm output can be cance sondition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th within alarm output region, een is displayed when m asic screen. on this screen. Press m ke en, Key lock setting screen	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Iled. east decimal place blinks. alarm setting. he dot stops blinking. cancellation is impossible. key is pressed for 3 seconds ey and the screen will shift to
number and <i>ALL</i> are turns on, the alarm outpu On this screen, on-going When alarm is in latching c The blinking indicates that i When I read key is pressed, th However, the condition is v Back to the basic screen (2) A group of Mode 1 screens Lead screen of Mode 1 <i>FodE i</i> This screens Lead screen of Mode 1 <i>FodE i</i> This screens I key on the basic There is no setting of the first setting screen <i>Lochory oFF</i>	a latching setting screen of d e displayed. When latching t condition continues even alarm output can be cance condition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th vithin alarm output region, eeen is displayed when eeen is displayed when m asic screen. on this screen. Press m ke en, Key lock setting screen Initial value: C	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Alled. east decimal place blinks. alarm setting. he dot stops blinking. cancellation is impossible. key is pressed for 3 seconds ey and the screen will shift to
number and RLL are turns on, the alarm output         On this screen, on-going         When alarm is in latching c         The blinking indicates that if         When Im key is pressed, fl         However, the condition is v         Back to the basic screen         (2) A group of Mode 1 screens         Lead screen of Mode 1         Im key         This screen         (2) Key on the basic screen         (2) A group of Mode 1 screens         Lead screen of Mode 1         Im key         Im key	e latching setting screen of d e displayed. When latching t condition continues even alarm output can be cance sondition, a dot beside the l it is possible to cancel the a he alarm is cancelled and th within alarm output region, een is displayed when m asic screen. on this screen. Press m ke en, Key lock setting screen Initial value: Setting range:	each alarm mode, <b>~ 5</b> g is " <b>~~</b> ", once alarm if alarm is OFF. Iled. east decimal place blinks. alarm setting. he dot stops blinking. cancellation is impossible. key is pressed for 3 seconds ey and the screen will shift to

	З	Only "key lock" can be changed, and there is no display of SV on the basic
		screen.
ſ	Note: H	Even if "key lock" is set as 1 or 2, manual output value can be changed.

SV limit lower value setting screen

 Imit lower value setting screen

 **58\_1 C** 

 Initial value: lower limit of measuring range

 Setting range: lower limit of measuring range ~ higher limit of measuring range - 1

 Lower limit of target value can be set.

 Lower value of SV limit takes precedence over higher value. If higher value is set lower than the lower value, higher value is automatically set at 1 higher than the lower value.

SV limit higher value setting scree

4

**58**\_**3 C** 

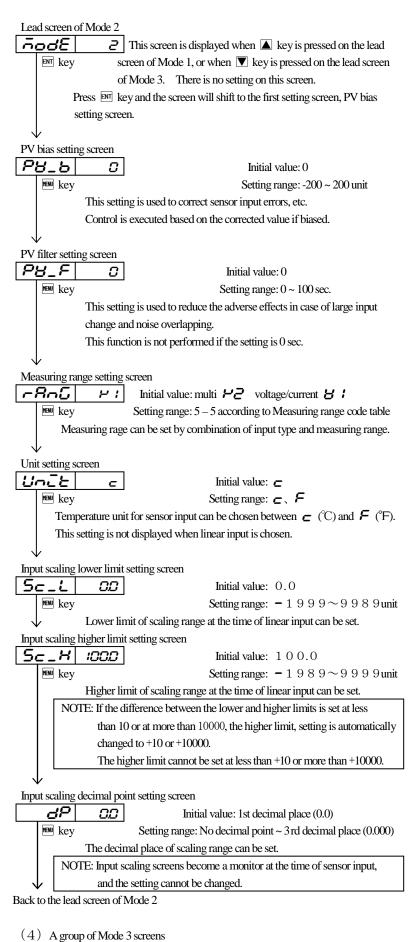
 Initial value: the same as those of First SV

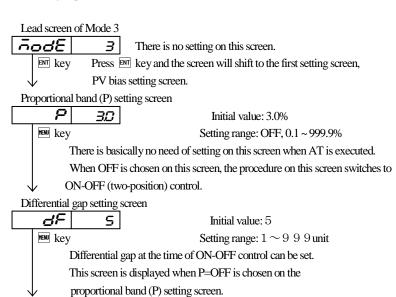
 When Third SV is the executed one, the value is displayed on the basic screen.

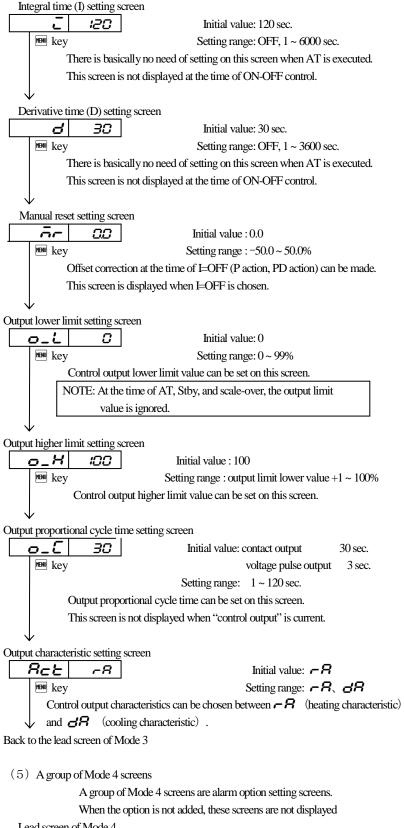
 When measuring range, unit, or scaling range is changed the setting is initialized.

 This screen is displayed when the third SV is assigned to DI (1 or 2). When the terminal of the assigned DI is shorted, the setting becomes executed SV.

# SV initial value setting screen SV initial value setting screen Initial value: higher limit of measuring range Image: SV limit lower value + 1 ~ higher limit of measuring range Higher limit of target value can be set. Back to the lead screen of Mode 1





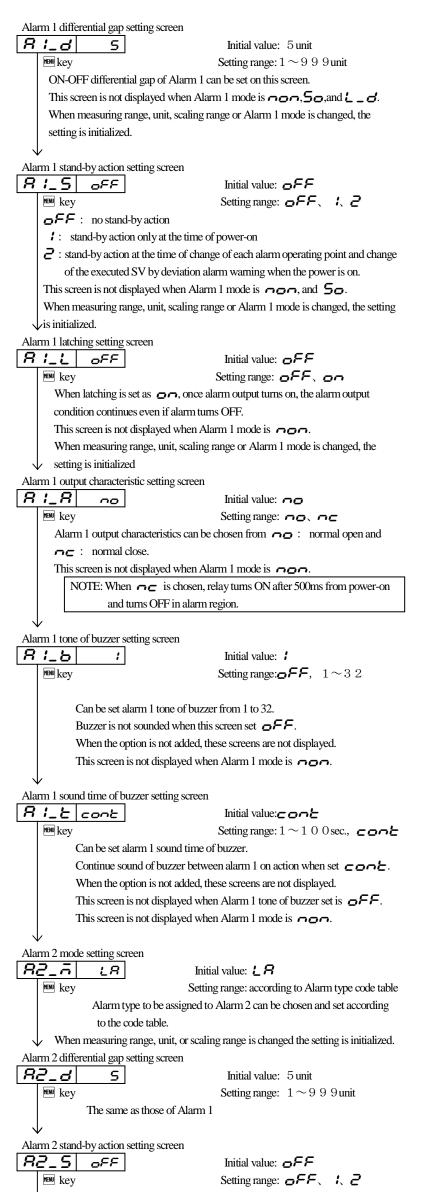


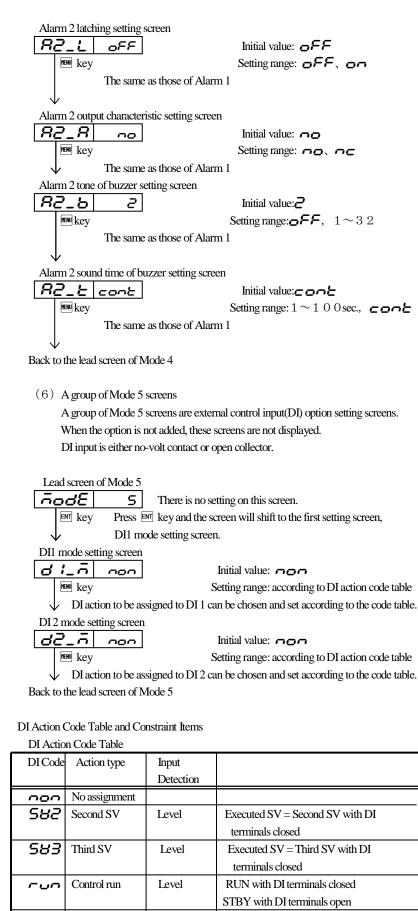
Lea	ad screen o	f Mode 4	
Ē	5 <i>6</i> E	ч	There is no setting on this screen.
	ENT key	Press ENT	key and the screen will shift to the first setting screen
		alarm 1 r	node setting screen.
$\downarrow$	/	Refer to :	5-6. Alarm Action chart regarding actions.
Alar	m 1 mode	setting scree	en
8	1_Ā	HR	Initial value: HR
	🕅 key		Setting range: according to Alarm type code table
		Alarm typ	e to be assigned to Alarm 1 can be chosen and set according to

		Alarm type to be assigned to Alarm 1 can be chosen and set according to
	/	the code table.
For ala	arm 1 diffe	rential gap setting screen

Alarm type code table Alarm code Alarm type Alarm code Alarm type Not assigned Lower limit deviation non Lď HЯ Higher limit absolute value Гď Within deviation LR Lower limit absolute value Beyond deviation 00 50 Over scale Control loop/disconnection L\_6 Higher limit deviation Нδ

When measuring range, unit, or scaling range is changed the setting is initialized.





Difficult	n Code Table		
DI Code	Action type	Input	
		Detection	
поп	No assignment		
582	Second SV	Level	Executed SV = Second SV with DI
			terminals closed
583	Third SV	Level	Executed SV = Third SV with DI
			terminals closed
run	Control run	Level	RUN with DI terminals closed
			STBY with DI terminals open
-78 <i>-</i> 7	Manual Output	Level	Manual with DI terminals closed
			Automatic with DI terminals open
LLOS	Latching cancel	Edge	Latching cancellation with leading edge
85	Auto tuning	Edge	AT operation with leading edge
Locy	Super Key Lock	Level	Super Key Lock with DI terminals closed
			Cancellation with DI terminals open
• <b>5</b> 82 and <b>5</b> 83 actions are set to be executed during AT operation, the settings			
are executed when AT operation stops			
• When <b>582</b> and <b>583</b> are assigned to each DI and when both of them are set			
to be ave	anted simultaneous	1 <b>CUD</b> :4	as avaguted SV

to be executed simultaneously, **5***H***2** is the executed SV. • *RE* can be executed at the time of RUN-automatic output operation.

• To cancel AT in half way while *R*<sup>*L*</sup> is assigned, choose OFF on AT screen.

AT is cancelled when "STBY" or "manual output" is executed.DI action is still effective even when "key lock" is set at other than OFF.

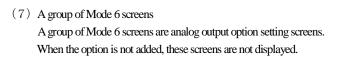
• The same action cannot be assigned to DI 1 and DI 2

• The action assigned to DI takes precedence, and no key operation is possible.

When "super key lock" is executed, the setting is fixed on the basic screen. While DI action can be executed, cancellation of AT or change of SV or manual output value cannot be changed.
At the time of DI input, 12VDC 2mA is added. Switches and transistor should be tolerable to the condition.

The same as those of Alarm 1

- The distance of DI wiring should be within 30 meters
- 6



Lead screen of Mode 6 ñodE 8 There is no setting on this screen. ENT key Press ENT key and the screen will shift to the first setting screen, analog output mode setting screen. Analog output mode setting screen Ro\_Ā Initial value: **P**B PB MENU key Setting range: **PH** (PV), **5H** (executed SV), control output value) Data to be assigned to analog output can be chosen on this screen. When out is down the sate of t Analog output scaling lower limit setting screen 76\_L 0 Initial value: Sensorinput lowerlimit of measuring ange Linear input lower limit of input scaling menu key Setting range: Sensor input lower limit of measuring range ~ higher limit of measuring range -1 Linear input lower limit of input scaling range ~ higher limit of input scaling range -1 Lower limit of scaling range to be assigned to analog output can be set. This screen is not displayed when analog output mode is **Dut**. Analog output scaling higher limit setting screen 85\_X| 1200 Initial value: Sensor input higher limit of measuring range MENU key Linear input higher limit of input scaling Setting range: Sensor input lower limit of measuring range +1~ higher limit of measuring range Linear input lower limit of input scaling range  $+1 \sim$  higher limit of input scaling range Higher limit of scaling range to be assigned to analog output can be set. This screen is not displayed when analog output mode is **aut**. Analog output limit lower value setting screen <u>RL\_L</u> 00 Initial value: 0.0 Setting range:  $0.0 \sim 100.0\%$ MENU key Lower limit of analog output value (4 ~20mA) could be set in %. For examples, 8mA when the setting is 25.0, 1.2mA when the setting is 50.0, 16mA when the setting is 75.0, and 20mA when the setting is 100.0. It is the output value of the lower side. Analog output limit higher value setting screen initial value: 100.0 | RL\_H| 1000 | MENU key Setting range:  $0.0 \sim 100.0\%$ Higher limit of analog output value (4  ${\sim}20mA$ ) could be set in %.  $\mathcal{R}_{L}$  \_  $\mathcal{L}_{L}$  and  $\mathcal{R}_{L}$  \_  $\mathcal{H}$  cannot be set at the same value. Back to the lead screen of Mode 6

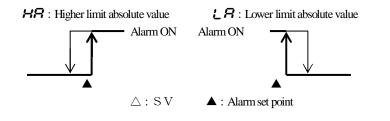
NOTE: Analog output limit can be set in reverse scaling. Examples: Output range:  $0 (4mA) \sim 1200^{\circ}C (20mA)$  can be changed to  $0 (20mA) \sim 1200^{\circ}C (4mA)$  Set 100.0% in  $\textbf{R}_{L} - \textbf{L}$ , and set 0.0% in  $\textbf{R}_{L} - \textbf{H}$ 

(8) A group of Mode 7 screens

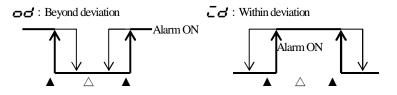
A group of Mode 7 screens are communication of RS-485 option setting screens. When the option is not added, these screens are not displayed. For details, please refer to the instruction manual for communication interface.

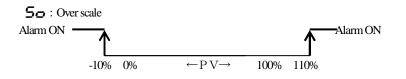
5-5 . Measuring range code table				
Input type		Code	Measuring range	
			Unit code <i>c</i> (°C)	Unit code <i>F</i> (°F)
	R	- 1	0 ~1700	0 ~3100
	Κ	P:	-199.9~ 400.0	-300 $\sim$ 700
	Κ	<i>2</i> 4	0 ~1200	0 ~2200
	J	::	$0 \sim 600$	0 ~1100
Thermo	Т	と /	-199.9~ 200.0	$-300 \sim 400$
Couple	Е	E :	$0 \sim 700$	0 ~1300
	S	5:	0 ~1700	0 ~3100
	U	U:	-199.9~ 200.0	$-300 \sim 400$
	Ν	n 1	0 ~1300	0 ~2300
	В	<b>Ь</b> ¦	0 ~1800	0 ~3300
R.T.D.		P :	$-200 \sim 600$	-300 ~1100
Pt1009	2	P2	-100.0~ 200.0	-150.0~ 400.0
		P3	0.0~ 100.0	0.0~ 200.0
		РЧ	0 ~230	0~450
$0\sim 10\mathrm{mV}$		គ ៖	Scaling range : -1999~	9999 count
0∼100 mV		-72	Span : 10~10000 count	
1~ 5 V		8:	decimal point changeab	le
0∼ 5V		82		
$4\sim 20\mathrm{mA}$		8:	At the time of current ir	nput
$0\sim 20\mathrm{mA}$		82	Attached external resist	ance $250\Omega$ at the $\boldsymbol{B}$ code

5-6 . Drawing of alarm action



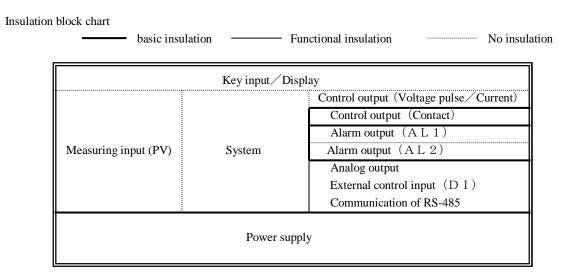






#### 6. Principal Specification

6. Principal Specification					
General specifications					
Supply voltage	: 90 – 264V AC 50/60Hz or 21.6 – 26.4V AC(50/60Hz)/ DC				
Power consumption : 90 – 264V AC 7VA maximum, 24V AC 4VA maximum, 24V DC 3W maximum					
Applicable standard	Safety : IEC1010-1and EN61010-1:2001				
	EMC : EN61326-1:1997+Amendment1:1998+Amendment2:2001 (EMI: Class A, EMS: Annex A)				
	EN61000-3-2:2000 EN61000-3-3:1995+Amendment1:2001				
Use environment					
Tem	perature : $0 \sim 50^{\circ} C_{\gamma}$				
H	umidity : below 90% RH (no condensation)				
I	Altitude : 2000 m above sea level max. Category : II Pollution degree : 2				
Storage temperature	$:-20\sim65^{\circ}C$				
Protective structure	: Only front panel has dust-proof and drip-proof structure. Equivalent to IP66 Applicable standard IEC60529: 1989+Amendment: 1999				
	*IP66 Required thickness of applicable panel: 1.2, 1.6, 2.0, 2.3, 2.8, 3.2mm (1 ~ 4mm with metal fittings)				
Insulation resistance	: Between input/output terminal and power supply terminal 500V DC 20M $\Omega$ min. /1500V AC per minute				
/ withstand voltage	Between analog output or external control input and other input/output terminals 500V DC 20M $\Omega$ min. /500V AC per minute				
Quake resistance	: Frequency 10 ~ 55 ~ 10Hz Amplitude 0.75mm (half)100m/s Direction 3 directions				
	Sweep rate 1 octave/ minute (reciprocation approx. 5 minutes/ cycle) Number of sweep 10 times Applicable standard IEC60068-2-6/1995				
Case material	: PPO				
External detention	: $H24 \times W48 \times D107$ mm (The depth detention of panel inside 100mm)				
Weight	: Approx. 60g (without panel metal fittings)				
Display					
Display accuracy	: $\pm (0.25\%$ FS+1 digit) CJ measurement errors excluded No guarantee at 400°C or below in B thermocouple				
	During EMC test the accuracy is 5% FS				
Display accuracy range	$:23\pm5^{\circ}C$				
Measured value display	range $:-10\% \sim 110\%$ of measuring range ( $-240 \sim 680^{\circ}$ Cin case of the measuring range of R.T.D. $-200 \sim 600^{\circ}$ C)				
Input					
	pudence : $500k\Omega$ min. External resistance range $100\Omega$ max.				
	ture : 1°C (ambient temperature of 18 ~ 28°C) 2°C (ambient temperature of 0 ~ 50°C)				
compensation accura					
R.T.D. Standard cur					
Voltage Input impeda					
	bedance: $250 \Omega$ (The accessories external resistance should be connected to the input terminal.)				
Control					
Control type / rating	: Contact 1a/240V AC 2A (resistive load)				
	: Voltage pulse (SSR drive voltage) / 12V DC $+1.0V \sim -1.5V$ 20mA max.				
	: Current / 4 ~ 20mA DC Load resistance 500 $\Omega$ max.				
Alarm output					
Alarm type/ rating	: Contact 1a/240V AC 2A (resistive load)				
External control input (DI)					
Input type/rating	: No-volt contact or open collector / approx. 12V DC 2mA				
Analog output					
Output rating	: $4 \sim 20 \text{mA DC}$ Load resistance $300 \Omega$ max.				
Insulation	: Control output is not insulated except input, system, key input/display and contact.				
	Not insulated between alarm output AL1 and AL2.				
	The rest are basic insulation or functional insulation. Refer to the insulation block chart shown below.				



The contents of this instruction are subject to change without notice.

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