MAC3 SERIES
Digital controller Instruction Manual
(Excerpt Edition)

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This instruction manual is an excerpt edition. Please visit our web or coutact our agent in details.

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Preface

This instruction manual is intended for those who will be involved in wiring, installation, operation and routine maintenance of the MAC3.
This manual describes the care, installation, wiring, function, and proper procedures regarding the operation of MAC3.
Keep this manual on hand while using this device. Please follow the provided guidance.

1. Matters regarding safety

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

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

⚠"WARNING"

◎This mark indicates hazardous conditions that could cause damage to equipment and/or facilities. Exercise extreme caution as indicated.

⚠"CAUTION"

◎This mark indicates additional instructions and/or notes.

NOTE

⚠"WARNING"

MAC3 is designed for controlling temperature, humidity, and other physical subjects in general
industrial facilities. It must not be used in any way that may adversely affect safety, health, or working conditions.

⚠"CAUTION"

To avoid damage to the connected equipment, facilities or the product itself due to a fault of this instrument, 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 countermeasures.

⚠"WARNING"

- The ⚠ mark on the plate affixed to the instrument:
  On the terminal nameplate affixed to the case of your instrument, the ⚠ mark is printed. This is to warn 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. Use a switch or breaker, which meets the requirements of IEC127.
- 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 shorten the life of the product and/or result in problems with the product.
- Voltage/current that differs from input specification should not be connected to the input terminal. It may shorten the life of the product and/or result in problems with the product.
- Input, output of voltage pulse, and output of electric current are not insulated. Therefore, do not ground an adjusted power terminal when a ground sensor is employed.
- A signal wire's common mode voltage to ground (signal wires other than contact output including power supply and event) should be less than 30V rms, 42.4V peak, and 60 VDC .

⚠"CAUTION"

- All the wires for the interior distribution, except for communication and contact output (including power supply and event), should be less than 30m in length. When the wire's length is 30m or more, or in the case of outdoor wiring, the suitable measure against a lightning surge is required.
- EMC standard (IEC61326) classifies MAC3 into Class A apparatus. Electromagnetic interference may occur when MAC3 is used at a business district or in the home. Please use after taking sufficient measures.

2. Introduction

2-1. Check before use

Before using MAC3, please check the model code, the exterior appearance and accessories. Also, make sure that there are no errors, impairs and shortages.
Confirmation of model code: Check that the product you ordered is being delivered properly.
Check the model code of the main body case against the following code table.

Example of model code

MAC3A−	M	C	F−	E	C−	D	H	T	R	N
1	2	3	4	5	6	7	8	9	10	11

Item

1. Series	MAC3A-: 96×96mm size digital controller MAC3B-: 48×96mm size digital controller
2. Input	M: multi, V: voltage, I: current
3. Control Output 1	C: contact, S: voltage pulse, I: current (4～20mA), V: Voltage (0～10V)
4. Power Supply	F-: 90 - 264V AC, L-: 21.6 - 26.4V DC/AC
5. Event Output	N: none, E: Event Output 1･2 (two points)
6. Control Output 2･Event Output･Optional Selection of DI	N-: none, C-: contact, S-: voltage pulse, I-: current (4～20mA), V: Voltage (0～10V) E-: Event Output 3(one point), D-: external control input (DI4) one point
7. DI	N: none, D: external control input (DI 1,2,3) three points
8. CT Input	N: none, H: CT Input two points
9. Analog Output	N: none, T: current (4～20mA) V: voltage (0～5V)
10. Communication	N: none, R: RS485
11. Program Function	N: none, P: equipped

Example of model code

MAC3D−	M	C	F−	E	C−	D	T	N
1	2	3	4	5	6	7	8	9

Item

1. Series	MAC3C: 72×72mm size digital controller MAC3D-: 48×48mm size digital controller
2. Input	M:multi, V: voltage, I: current
3. Control Output 1	C: contact, S: voltage pulse, I:current (4～20mA) V: Voltage (0～10V),
4. Power Supply	F-: 90 - 264V AC, L-: 21.6 - 26.4V DC/AC
5. Event Output	N: none, E: Event Output 1･2 (two points)
6. Control Output 2･Event Output･Optional Selection of DI	N-: none, C-: contact, S-: voltage pulse, I-: current (4～20mA) V: Voltage (0～10V) E-: Event Output 3(one point), D-: external control input (DI4) one point
7. DI･CT Input	N: none, D: external control input (DI1,2,3) three points, H: CT Input two points
8. Analog Output･Communication	N: none, T: current (4～20mA), V: Voltage (0～5V), R: RS485
9. Program Function	N: none, P: equipped

Check of accessories
Instruction manual: 1 set. 1 unit label 1 set

「NOTE」: Please contact our agencies or business offices if you have any problem.
We welcome any kind of inquiry such as defect of the product, shortage of accessory and so on.

2-2. Caution for use

(1) Do not operate the front panel keys with hard or sharp objects.
Do not fail to touch keys lightly with a fingertip.
(2) Wipe gently with a dry rag and avoid using solvents such as thinner.

3. Installation and wiring

3-1. Installation site (environmental conditions)

⚠"CAUTION"

Do not use this product under the following conditions.
Otherwise, failure, damage and fire may occur.

(1) Where flammable gas, corrosive gas, oil mist or dust generate or grow rife.
(2) Where the temperature is below -10°C or above 55°C
(3) Where the humidity is over 90%RH or where condensation occurs.
(4) Where high vibration or impact occurs
(5) Where inductive interference may easily affect the operation.
Or, in the region of strong electric circuit area.
(6) Where waterdrops or direct sunlight exists.
(7) Where the altitude is above 2,000m.

「NOTE」: The environmental conditions comply with the IEC664.
Installation category isII and the pollution degree is 2.

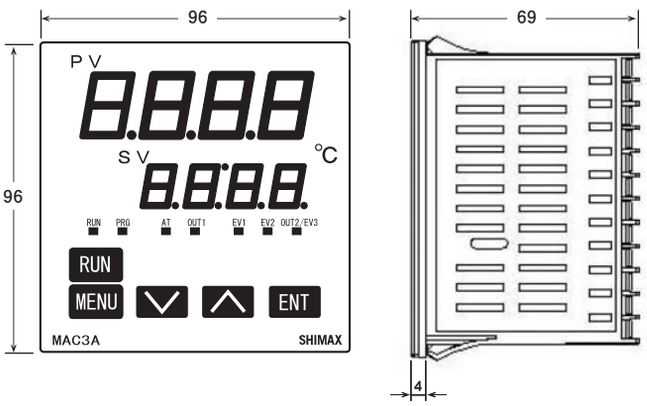
3-2. Mounting

(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 ~ 2.8mm.
(3) As this product provides mounting fixture, insert the product into the panel.

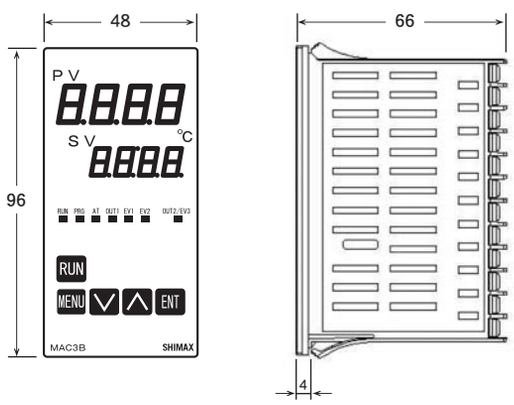
3-3. External dimension and panel cutout

MAC3 external dimensions (unit : mm)

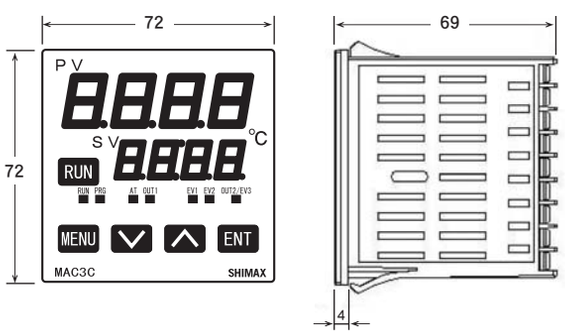
MAC3A



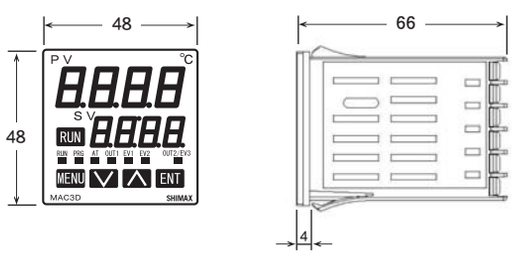
MAC3B



MAC3C

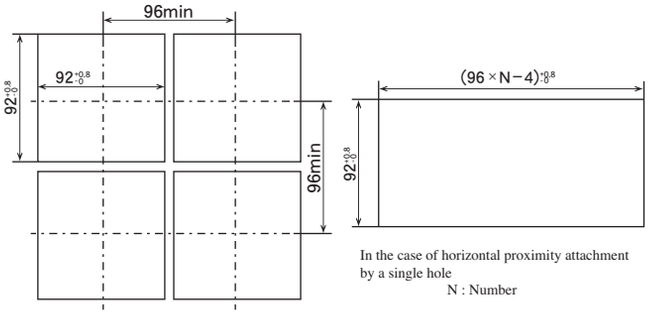


MAC3D



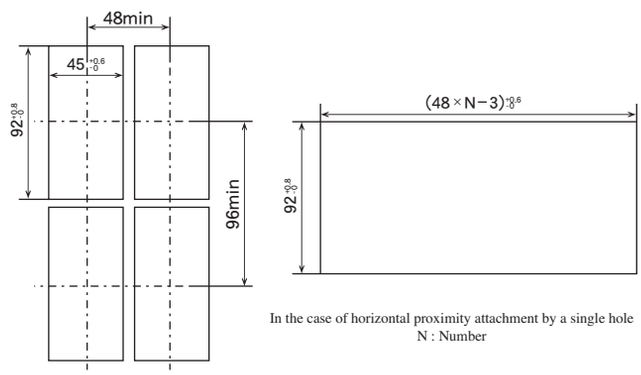
MAC3 panel cutout (unit : mm)

MAC3A 96×96size



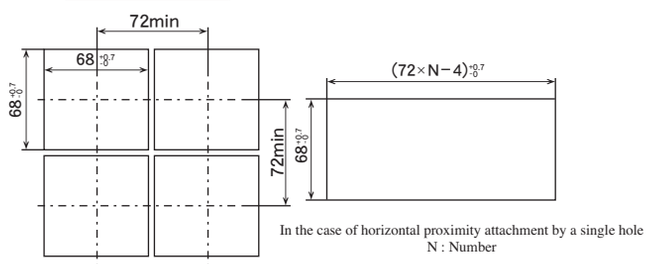
In the case of horizontal proximity attachment by a single hole
N : Number

MAC3B 48×96size



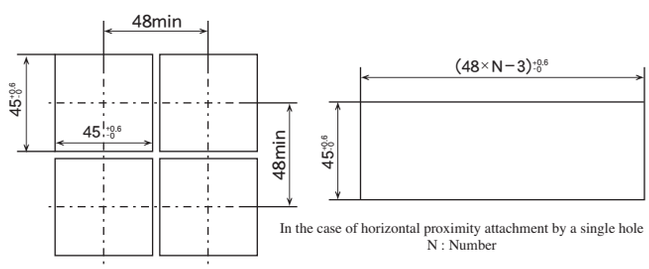
In the case of horizontal proximity attachment by a single hole
N : Number

MAC3C 72×72size



In the case of horizontal proximity attachment by a single hole
N : Number

MAC3D 48×48size



In the case of horizontal proximity attachment by a single hole
N : Number

「NOTE」: Proximity attachment by a single hole is possible only in the case of horizontal direction.
When an apparatus that was attached in vertical direction is removed, a dedicated detachment tool is required.

3-4. Wiring

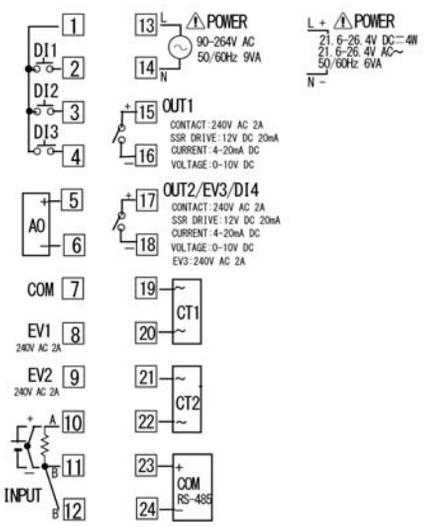
⚠"WARNING"

◎ Do not turn on electricity while wiring to avoid an electric shock.
◎ Do not touch a terminal or live part while turning on electricity.

(1) Make sure that wiring operation is properly done in line with a terminal wire diagram of section 3-5.
(2) Choose a suitable compensation lead wire in the case of thermocouple input.
(3) In the case of resistance bulb input, resistance value of each lead wire must be less than 5Ω and that of three lead wires must be equal.
(4) Do not wires an input signal line inside of an electric wire pipe or a duct same with the high voltage line.
(5) Shield wiring (single point grounding) is effective against static induction noise.
(6) Wiring twisted at equal short intervals is effective against electromagnetic induction noise.

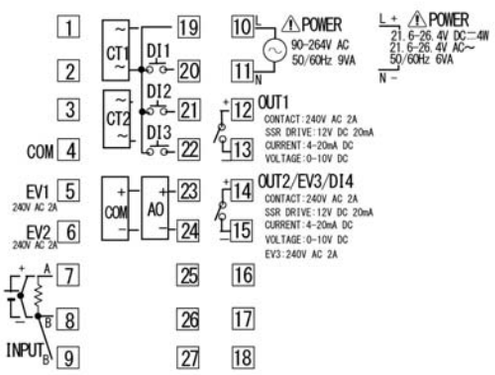
3-5. Terminal arrangement diagram

3-5. Terminal arrangement plan of MAC3A and MAC3B



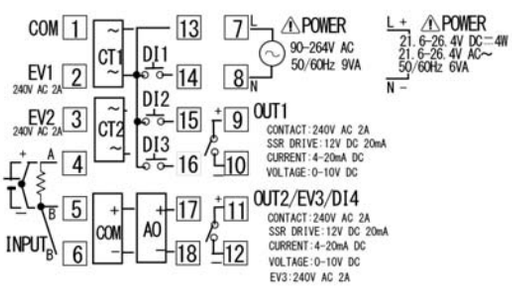
「NOTE」: If input type is thermocouple or voltage, errors may occur when terminal 11 and terminal 12 terminal are short-circuited

Terminal arrangement plan of MAC3C



「NOTE」: If input type is thermocouple or voltage, errors may occur when terminal 8 and terminal 9 terminal are short-circuited

Terminal arrangement plan of MAC3D



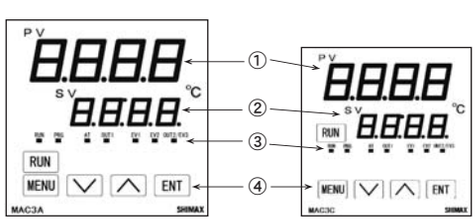
「NOTE」: If input type is thermocouple or voltage, errors may occur when terminal 5 and terminal 6 terminal are short-circuited

4. Description of front panel

4-1. Names of front panel.

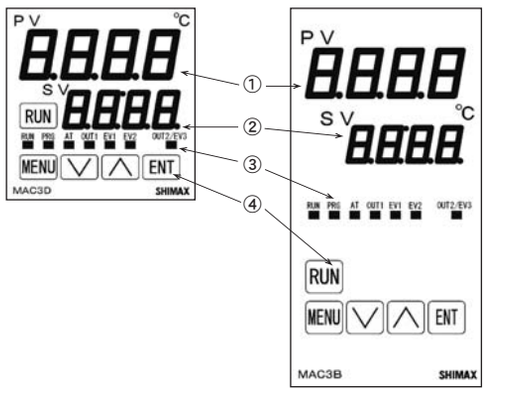
MAC3A 96×96size front

MAC3C 72×72size front



MAC3D 48×48size front

MAC3B 48×96size front



4-2. Explanation of front panel section

① : Display of measured value (PV) (red)
Measured value (PV) and type of setting is displayed on each setting screen.

② : Display of target value (SV) (green)
Target value and set value are displayed on each setting screen.

③ : Monitor LED

(1) RUN monitor LED RUN (green)
If RUN is performed with RUN key, operation mode1 screen, external control input (DI), and communication, it lights up, and put out by standby (reset). It blinks, if a manual output is chosen in output monitoring screen or external control input (DI).

(2) Program functional monitor LED PRG (green)
Lights up at the time of program control's standby or flat part control. Puts out at the time of FIX control selection.

(3) Auto tuning operation monitor LED AT (green)
If AT is chosen in ON or external control input (DI), blinks during AT execution. Lights up when AT is on standby, and puts out with AT automatic termination or release.

(4) control out put 1 monitor LED OUT1 (green)
At the time of a contact or a voltage pulse output, the it lights up with ON and lights off with OFF. Lights off with 0% power output, and lights up with 100% power.
And blinks in intermediate ratio.

(5) Event output monitors LED EV1 and EV2 (yellow)
Lights up when the allotted event output turns to ON.

(6) Control out put 2/event output 3 monitors LED OUT2/EV3 (yellow)
When control output 2 is chosen, it operates like control output 1 monitor LED does.
When event output 3 is chosen, it operates like event output monitor LED does.

④: Key-switch section

(1) MENU (MENU) key
Press this key to move onto the next screen among the screens.
Press MENU (MENU) key for three seconds on the basic screen, then it jumps to the lead screen of Mode 1. Press MENU key for three seconds on the lead screen of each Mode screens, then it jumps to the basic screen.Press MENU key for three seconds on the lead screen of FIX or PROG, then it jumps to the basic screen.When a program control option is added, press MENU (MENU) key for three seconds on the screen of operation mode 2, then it jumps to the screen of operation Mode 1.

(2) ▼ (DOWN) key
Press ▼ (DOWN) key one time, and the shown value decreases by one numerical value.
One time press of ▼ key decreases by one numerical value. By pressing the key continuously, the value as well consecutively decreases. A decimal point of the smallest digit blinks at this time. This shows that a setting change is in progress. In PROG, used as a shift key between each step setting screens (Steps 1-25), lead screen. Also used as a shift key between lead screen in each mode screens.

(3) ▲ (UP) key
Press ▲ (UP) key one time, and the shown value increases by one numerical value.
By pressing continuously, the value By pressing the key continuously, the value consecutively increases. A decimal point of the smallest digit blinks at this time. This shows that a setting change is in progress. In PROG, used as a shift key between each step setting screens (Steps 1-25), lead screen. Also used as a shift key between lead screen in each mode screens. (1～40step will be added from ver1.3)

(4) ENT (ENTRY/REGISTER) key
The setting data changed on each screen is determined (the decimal point of the minimum digit is also lighted off).
When a program control option is added, press ENT (ENT) key for three seconds on the screen of operation mode 1, then it jumps to the screen of operation Mode 2.
Press ENT key for 3 seconds on the output monitoring screen,then the shift between manual output and automatic output is carried out.
Press the key for 3 seconds on the basic screen, then it shifts to FIX or PROG head screen.
Push at FIX-PROG and each mode screens' lead screen, then shifts to setting screen.

(5) RUN (RUN OPERATION/STOP) key
Push for 3 seconds at STBY (control stop), then FIX or PROG control starts.
Push for 3 seconds while FIX or PROG is in operation, then control is stopped.

5. Description of screens

5-1. How to move to another screen

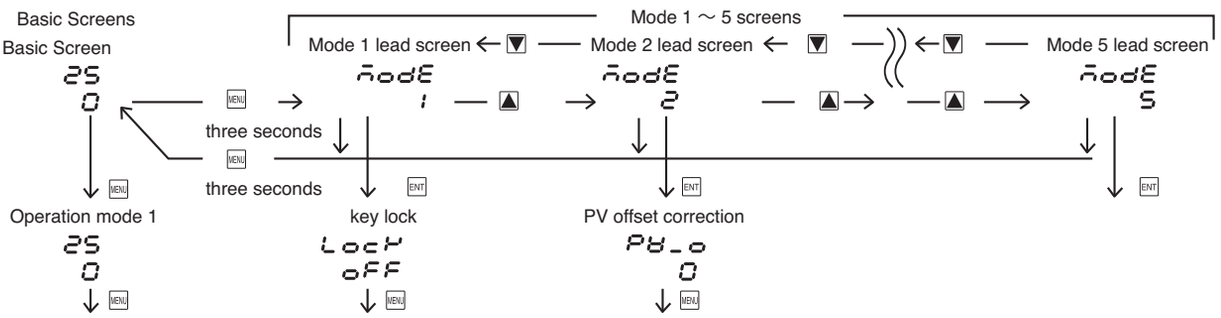
Basic Screen

25 ⟵ MENU 3 seconds ⟵ SEt

25 ⟶ ENT 3 seconds ⟶ FCtL (constant value control) lead screen of setting screens or ProG (Program control) lead screen of setting screens

SEt

Press the ENT key for 3 seconds on a basic screen, then it shifts to the lead screen of FCtL (constant value control) setting screens, or to the lead screen of ProG (program control) setting screens.
Press the MENU key for 3 seconds on FCtL or ProG the lead screen of setting screens, then it shifts to the basic screen. The shift is also possible when the program option is added and FCtL is chosen on the operation mode 2 screen. The shift is possible when the program option is added and ProG is chosen on the operation mode 2screen.



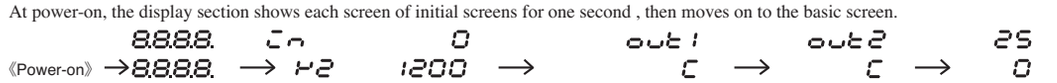
Every time you press the MENU key on a basic screen, it shifts to each screen of the basic screens.
Press the MENU key for 3 seconds on a basic screen, then it shifts to the lead screen of mode 1 screens.
Press the ▲ key on the lead screen of mode 1 screens , then it further advances to mode 2, and mode 3. (Notes: If no corresponding option is found, the mode 4 - 9 is skipped)
Press the ▼ key on the lead screen of mode 1 screens , then it further advances to mode 9, and mode 8. (Notes: If no corresponding option is found, the mode 4 - 9 is skipped)
Press the MENU key for 3 seconds on the lead screen of mode 1～ 9 screens, then it shifts to the basic screen.
Press the ENT key on the lead screen of mode 1～ 9 screens, then it shifts to the first setting screen of each screens.
Press the MENU key on the the first setting screen of each screens, then it shifts to the next screen. Every time you press the MENU key, it shifts to the next setting screen.

5-2. Setting Method

To change settings, display an appropriate screen and change the setting (value or function) by pressing ▲or ▼key.
On the output monitor screen of basic screens, you can change the control output from “Automatic” to “manual” ,and save its change of setting. Display the output monitor screen, and then press ENT key for three seconds to shift from Automatic to Manual. Then by pressing ▲or ▼key, you can adjust to the desirable output value. In this case, no need to press ENT key in order to determine the change of setting.
Press ENT key for three seconds as well to shift back to Automatic. Excluding when a keylock is OFF, Automatic⇔Manual switchover does not work while STBY<RST> and AT are in operation.
In the case of two-output type, the switchover between automatic and manual is operatable through output 1 and output 2. The setting is altered simultaneously.

5-3. Power-on and initial screen display

At power-on, the display section shows each screen of initial screens for one second , then moves on to the basic screen.



C:Contact S:Voltage pulse C:Current U:Voltage ※1 ※2 This is the display when C: contact is choosen.
※2 Output 2 Displays only optional addition.

5-4. Explanation of each screen

(1) Basic Screens

Basic Screen

25
0

Executed SV initial value：Sensor input 0
Linear input Lower limit of scaring range
Setting range：Sensor input Within measuring range
Linear input With in scaring range
Within SV limiter besides

MENU key

Targeted value (PV) is displayed on the upper row as four-digit ,and target d value (SV) is displayed on the lower row also as four-digit.
(Notes:hereinafter, measured value and targeted value are referred to as ”PV” and “SV”)
At the time of FIX, execution SV is displayed and change of setting is possible.
PROG’s SV is just displayed ,and change of setting is impossible.

Action Mode 1 screen

25
Stby

Initial value: Stby (stanby) (Initial value at the time of constant value control)
rSt (reset) (Initial value at the time of program control)
Setting range: Stby (rSt) Control stop [Output OFF (0%)] operation
run conduct of control operation

MENU key

Choose run (RUN) by ▲ key. Decide by ENT key, then Monitor LED’s RUN lights up to start control operation.

Choose Stby (rSt) by ▼key、Decide by ENT key, hen Monitor LED’s RUN lights off and becomes control stop [Output OFF (0%)] conducting.
Priority is given to DI when RUN is allotted to external control input. DI Key operation cannot be performed unless allotment is canceled.
When measuring range, a unit, scaling, and output characteristics are changed it is initialized a Stby (rSt) is displayed.

Output 1 monitoring screen

25
100.0

manual output setting range : 0.0-100.0% (within output limiter)
At the time of automatic output, monitor display only.
Refer to Item 5-2 about automatic ⇔ manual switchover, and setting method at the time of manual operation.

MENU key

A manual output is canceled when an operation mode is made into Stby (rSt).
When a power source is intercepted and re-switched on, it returns to the condition just before intercepting.

PID No. monitoring screen

25
P2_1 Chosen PID No. is displayed when FIX is in operation.
PID No. chosen at each step and on-going step No. are displayed by tums when PROG is in operation.

MENU key PID No. of output 1 is displayed in the first digital, and PID No. of output 2 is displayed in the third digital. The third digital is shown as _ when there is no output 2 option.
This screen is not displayed in the state of STBY (RST).

Execution SV setting screen

F_SU Initial value: 1
1 Setting range: 1、2、3、4

MENU key

AT (Auto Tuning) execution screen

AT Initial value: oFF
oFF Setting range: oFF、on

AT is performed by ON selection ,and canceled by OFF selection.
Not displayed at the time of STBY (RST), a manual output, and P (proportional band) =OFF.
Except in the setting of keylock OFF, AT is unable to perform in scale over. (At the time of DI allotment, execution of AT by DI can be performed.)

MENU key Even in such a case,halfway release is performed on this screen.
Release of AT, STBY (RST), EV operating point, setting of keylock, and mode 5 ～ 9screen are operateable with key.
Except in th setting of AT normal end, execution of AT is canceled compulsorily at the time of STBY (RST) selection and AT release setup.

EV1 (event 1) operating-point setting screen

EU 1 Initial value: upper limit absolute value measuring range Scaling upper
1200 lower limit absolute value measuring range Scaling lower limit

upper limit deviation	2000
lower limit deviation	-999
within deviation	0
outside deviation	2000
CT1 or CT2	0.0
guarantee	0

Setting range: upper limit absolute value within measuring range within scaling
lower limit absolute value within measuring range within scaling limit

MENU key

upper limit deviation	-999~2000 unit
lower limit deviation	-999~2000 unit
within upper-lower limit deviation	0~2000 unit
outside upper-lower limit deviation	0~2000 unit

The operating point of the alarm type allotted to EV1 is set up.
No option, No display when non, So, run, StP, P_E, End, HoLd, ProG, d_SL, and u_SL are allotted to EV1.
The operation mode of each deviation alarm is run.
Effective at the time of automatic output.
Each deviation alarm serves as PV's deviation to Execution SV.
Event operation other than each deviation alarm is always effective.

EV2 (event 2) operating-point setting screen

EU2
0 Initial value,setting range, contents are the same with EV1

MENU key

Latching release screen

LAtch Initial value: rSt 1
rSt 1 Setting range: rSt 1 release EV1
rSt2 release EV2
rSt3 release EV3
ALL release all EVs at a time

MENU key

On the latching setting screen of each EV mode,rSt and ALL which chose on are displayed. If latching is on once EV is outputted, EV output state is maintained even if EV is in the state of OFF. When EV is in a latching state, decimal point of the minimum digit blinks, and it shows that release of EV is possible. If ENT key is pressed, EV is released and a decimal point lights off.
However, release is impossible when a state is in EV power range.

Return to basic screen

(2) FIX (constant value control) setting screens

At the time of no program option and with program option and FCt is chosen on Action mode2 screen of basic screens,lead screen of FIX setting screens is displayed when ENT key is pressed for 3 seconds.
If ENT key is pressed for 3 seconds on lead screen, it returns to basic screen.

basic screen 25 ⟷ ENT three seconds ⟶ lead screen of FIX setting FCt
basic screen 0 ⟵ MENU three seconds ⟵ lead screen of FIX setting SEt

FIX lead screen

FCt
SEt No setting on this screen.

ENT key Press ENT key, then it shifts to the first setting screen SV1 setting screen.

SV1 setting screen

SU 1 Initial value : At the time of sensor input 0
0 linear input time scaling lower limit
Setting range: sensor input time within measuring range

MENU key linear input time within scaling range
Moreover, within limit of SV limiter.

When SV1 is Execution SV,being reflected in basic screen.
Being initialized when measuring range, unit, and scaling are changed.

SV1 output1 PID No. setting screen

Io 1P Initial value : 1
1 Setting range : 1, 2, 3

MENU key When SV1 is Execution SV, PID No. that will be used for control of output 1 is chosen from 1～3.

SV1 output2 PID No. setting screen

Io2P Initial value : 1
1 Setting range : 1, 2, 3

MENU key When SV1 is Execution SV, PID No. that will be used for control of output 2 is chosen from 1～3.
Displayed when output 2 option is added.

Return to FIX lead screen

(3) Mode 1 screens key lock and SV limiter Setting

Mode 1 lead screen

ModE Press MENU key for 3 seconds on basic screen, then displayed
1 No setting on this screen. Press the ENT key, then it shifts to the first setting screen, keylock setting screen.

ENT key

Keylock setting screen

LocK Initial value : oFF
oFF Setting range : oFF、1、2、3、4

MENU key
1 Only change of Execution SV (basic screen) and keylock is possible.
2 Possible to change numerical value value manualy, and key lock level
3 Only change of a keylock is possible.
4 Only change of a keylock is possible It can be locked RUN key

Notes : Even when keylock is set as 1 and 2, manual output value is possible to change.

SV limiter lower limit setting screen

SU_L Initial value : measuring range lower limit
0 Setting range : measuring range lower limit value~measuring range upper limit value－1 and bLH (SV display turn off)

MENU key Lower limit value of target value is set .
When upper limit value is smaller than lower limit value, the value compulsorily becomes lower limit value +1.

When you choose bLH pressing ▼ at lower limit value, the SV display turn off at basic screen. But it will turn on at the setting screen.

SV limiter upper limit value setting screen

SU_H Initial value : measuring range upper limit
1200 Setting range : SV limiter lower limit value +1~ measuring range upper limit value

MENU key Setting upper limit value of target value is set.

Return to mode1 lead screen.

(4) Mode 2 screens Scale and PV setting

Mode 2 lead screen

Press ▲ key in mode1 lead screen, or press ▼ key in mode3 lead screen, then being displayed.

ENT key — If ENT key is pressed, it shifts to the first setting screen PV offset correction screen.

PV offset correction (PV bias) setting screen

Initial value : 0
S etting range : −500～500 Digits

Used for correction of input errors such as sensor.
If offset correction is performed, control is also performed with the corrected value.

MENU key

PV gain correction setting screen

Initial value : 0.00
Setting range : ±5.00%

Maximum input value is corrected within limit of ±5.00% of measuring range.
If corrected, inclination of spang changes in straight line which connects zero point and correction maximum value.

MENU key

PV filter setting screen

Initial value : 0
Setting range : 0 ～ 9999 seconds

When input change is violent or noise is overlapped, used in order to ease the influences.
In 0 second setting, filter does not function.

MENU key

Mesuring range setting screen

Initial value: multi H2, voltage 0 1, current 4A 1
Setting range: Chosen from 5-5.measuring range code table.

Combination of input type and measuring range is set by code.

MENU key

Temperature unit setting screen

Initial value : C
Setting range : C、F

The temperature unit at the time of a sensor input is set up from C (℃) , F(℉).
Not displayed when the linear input is chosen.

MENU key

Input scaling lower limit value setting screen

Initial value : 0.0
Setting range : -1999 ～ 9989 digits

Scaling lower limit value at the time of linear input is set up.

MENU key

Input scaling upper limit value setting screen

Initial value : 100.0
Setting range : -1989 ～ 9999 digits

Scaling upper limit value at the time of linear input is set up.

MENU key

NOTE: Suppose that the difference between a lower limit value and upper limit value is 10 or less,or over 10,000. In this setting, upper limit value is compulsorily changed into that of +10 or ± 10000 digits. Upper limit value cannot be set as lower limit value of +10 digits or less,or that of over 10,000 digits.

Input scaling Decimal point position Setting screen

Initial value : the first place after decimal point (0.0)
Setting range : no decimal point 0～the third place after decimal point (0.000)

Decimal point position of input scaling is set .

MENU key

NOTE: The screen of input scaling serves as a monitor at the time of a sensor input.
Setting change cannot be performed.

Return to mode 2 lead screen.

(5) Mode 3 screen Out 1 setting

Mode 3 lead screen

No setup

If ENT key is pressed, it shift to the first setting screen, output 1 proportional band setting screen. In this screens, PID which can be used in output 1, 1～3 related Items and soft start of output 1,and proportional period output characteristics are set up.

ENT key

Output 1 PID1 proportional-band (P) setting screen

Initial value : 3.0%
Setting range : OFF, 0.1 ～ 999.9%

When performing auto tuning, no necessity for a setting basically.
If OFF is chosen, it becomes ON-OFF (two positions) operation.

MENU key

Output 1 PID1 Integral time (I) setting screen

Initial value : 120 seconds
Setting range : 0FF, 1 ～ 6000 seconds

When performing auto tuning, no necessity for a setting basically.
This screen is not displayed at the time of ON-OFF operation.
Becomes P operation or PD operation in I=OFF setting.

MENU key

Output 1 PID1 Derivative time (D) setting screen

Initial value : 30 second
Setting range : 0FF, 1 ～ 3600 seconds

When performing auto tuning, no necessity for a setting basically.
This screen is not displayed at the time of ON-OFF operation.
Becomes P operation or PI operation in D=OFF setting.

MENU key

Output1 PID1 manual reset setting screen

Initial value : 0.0
Setting range : −50.0～50.0%

The offset correction at the time of I = OFF (P operation,PD operation]) is performed.
This screen is not displayed at the time of ON-OFF operation.

MENU key

Output 1 PID1 differential-gap setting screen

Initial value : 5
Setting range : 1 ～ 999 unit

The differential gap at the time of ON-OFF operation is set.
Displayed at the time of P=OFF (ON-OFF operation) setup.

MENU key

Output1 PID1 minimum limiter setting screen

Initial value : 0.0
Setting range : 0.0 ～ 99.9%

Output lower limit value of output 1 PID1 is set up.

MENU key

NOTE: At the time of STBY (RST) and scale over output, limiter value is disregarded.

Output 1 PID1 maximum limiter setting screen

Initial value : 100.0
Setting range : output limiter lower limiter values +0.1～100.0%

Upper limit value of output 1 PID1 is set .

MENU key

Output 1 PID2 proportional band (P) setting screen

Initial value : 3.0%
Setting range : OFF, 0.1～ 999.9%

Content is the same with output 1 PID1.

MENU key

Output 1 PID2 integral-time (I) setting screen

Initial value : 120 seconds
Setting range : 0FF, 1～6000 seconds

Contents is the same with output 1 PID1.

MENU key

Output 1 PID2 derivative-time (D) setting screen

Initial value : 30 seconds
Setting range : 0FF, 1～ 3600 seconds

Contents is the same with output 1 PID1.

MENU key

Output 1 PID2 manual reset setting screen

Initial value : 0.0
Setting range : −50.0～50.0%

Contents is the same with output 1 PID1.

MENU key

Output 1 PID2 differential gap setting screen

idF2 Initial value : 5

5 Setting range : 5～999 unit

MENU key Contents is the same with output 1 PID1.

Output 1 PID2 minimum limiter setting screen

loL2 Initial value : 0.0

0.0 Setting range : 0.0～99.9%

MENU key Contents is the same with output 1 PID1.

Output 1 PID2 maximum limiter setting screen

loH2 Initial value : 100.00

100.0 Setting range : output limiter lower limit value +0.1～100.0%

MENU key Contents is the same with output 1 PID1.

Output 1 PID3 proportional band (P) setting screen

1_P3 Initial value : 3.0%

3.0 Setting range : OFF, 0.1～ 999.9%

MENU key Contents is the same with output 1 PID1.

Output 1 PID3 integral-time (I) setting screen

1_I3 Initial value: 120 seconds

120 Setting range: 0FF, 1～ 6000 seconds

MENU key Contents is the same with output 1 PID1.

Output 1 PID3 derivative time (D) setting screen

1_d3 Initial value : 30 seconds

30 Setting range : 0FF, 1～3600 seconds

MENU key Contents is the same with output 1 PID1.

Output 1 PID3 manual reset setting screen

1Ar3 Initial value : 0.0

0.0 Setting range : −50.0～50.0%

MENU key Contents is the same with output 1 PID1.

Output 1 PID3 differential gap setting screen

idF3 Initial value : 5

5 Setting range : 1～999 unit

MENU key Contents is the same with output 1 PID1.

Output 1 PID3 minimum limiter setting screen

loL3 Initial value : 0.0

0.0 Setting range : 0.0～99.9%

MENU key Contents is the same with output 1 PID1.

Output 1 PID3 maximum limiter setting screen

loH3 Initial value : 100.0

100.0 Setting range : output limiter lower limit values +0.1～100.0%

MENU key Contents is the same with output 1 PID1.

Output 1 soft starting time setting screen

1SoF Initial value : OFF

oFF Setting range : OFF, 0.5～120.0 seconds (setting resolution 0.5 second)

This is the function that eases change of output at the time of a power-on and startup.

MENU key Does not function at the time of OFF setup.

Output 1 proportional periodic time setting screen

1_oC Initial value: Contact output 30.0 seconds

30.0 Voltage pulse output 3.0 seconds

MENU key Setting range: 0.5～120.0 seconds (setting resolution 0.5 second)

Proportional periodic time of output 1 is set.
Not displayed when output 1 is current.

Output 1 characteristics setting screen

1Act Initial value: rA

rA Setting range: rA、dA

MENU key Characteristics of control output is chosenfrom rA (heating characteristics) and dA (cooling characteristics)

Return to mode 3 lead screen

(6) Mode 5 screens EVENT setting

Mode 5 screens is the setup screens of event option. Not displayed when option is not added.

Mode 5 lead screen

nodE No setup.

5 Press ENT key, it shifts to the first setting screen, event 1 operation-mode setting screen.

ENT key

Event 1 operation-mode setting screen

E1_A Initial value : non

non Setting range : Chosen from event type character table.

Event type allotted to event 1 is chosen from character table.

MENU key Event type character table

Character	Type	Character	Type
non	No allotment	ct2	Control loop alarm 2
HA	Upper limit absolute value alarm	StP	Step signal
LA	Lower limit absolute value alarm	P_E	Pattern termination signal
So	Scale over alarm	End	Program termination signal
Hd	Maximum deviation alarm	HoLd	Hold signal
Ld	Minimum deviation alarm	ProG	Program signal
Id	Within deviation alarm	u_SL	Up slope signal
od	Without deviation alarm	d_SL	Down slope siganal
run	RUN signal	GuA	Guarantee signal
ct1	Control loop alarm 1		

※ Being initialized if measuring range, scaling, and unit are changed.
※ Deviation alarm is possible to output at the time of RUN+AUTO. In other events, output is always possible.

Event 1 differential-gap setting screen

E1_d Initial value : 5Digits

5 Setting range : 1～999 Digits

ON-OFF differential gap of event 1 is set .

MENU key Not displayed, when the event 1 mode are as follows. non、So、run、StP、P_E、HoLd、ProG、u_SL、d_SL.

Change in measuring range, scaling, unit, and the event 1 mode make it initialize.

Event 1 standby operation setting screen

E1_S oFF Initial value: oFF

Setting range: oFF、1、2

oFF : No standby operation、1 : standby-operation only at the time of a power-on.

2 : Standby-operation in the following cases. ; At the time of power-on.
When each alarm's operating point is changed,
When deviation alarm's SV is performed,
When RUN/STBY (RST) is switched,
When AUTO/MAN is switched.

MENU key

Not displayed, when the event 1 mode are as follows. ; non、So、run、StP、P_E、HoLd、ProG、u_SL、u_SL.

Change in measuring range, scaling, unit, and the event 1 mode make it initialize.

Event 1 latching setting screen

E1_L Initial value : oFF

oFF Setting range : oFF、on

MENU key When latching is set as no once event is output, even if event is OFF state event output state is held. Not displayed when event 1 mode is non .

Being initialized if measuring range, scaling, and unit are changed.

Event 1 output characteristics setting screen

E1_A Initial value : no

no Setting range : no、nc

MENU key Output characteristics event 1 is chosen from no : normal open, nc : normal closing.

Not displayed when event 1 mode is non .

NOTE: If nc is chosen, relay turns to ON about 1.8 seconds later when power source is switched on, and turns to OFF in event output range.

Event 2 mode setting screen

E2_A Initial value : non

non Setting range : Chosen from event type character table.

MENU key Type allotted to event 2 should be chosen from character table.

Change in measuring range, scaling, unit, and the event 1 mode make it initialize.

Event 2 differential-gap setting screen

E2_d — Initial value: 5digit

5 — Setting range:1～999 digit

MENU key — Contents is the same with output 1 PID1. The same as event 1.

Event 2 standby operation setting screen

E2_S — Initial value : oFF

oFF — Setting range : oFF、1、2

MENU key — The same as event 1.

Event 2 latching setting screen

E2_L — Initial value : oFF

oFF — Setting range : oFF、on

MENU key — The same as event 1.

Event 2 output characteristics setting screen

E2_A — Initial value : no

no — Setting range : no、nc

MENU key — The same as event 1.

Return to mode 5 lead screen

5-5. Measuring rangecode table

Input Type			Code	Measureing Range	
				Unit Code c (℃)	Unit Code F (℉)
Multi Input	Thermo Couple	R	r 1	0 ～1700	0 ～3100
		K	K 1	-199.9～ 400.0	-300 ～ 700
		K	K2	0 ～1200	0 ～2200
		K	K3	0.0～ 300.0	0 ～ 600
		K	K4	0.0～ 800.0	0 ～1500
		J	J 1	0 ～ 600	0 ～1100
		J	J2	0.0～ 600.0	0 ～1100
		T	t 1	-199.9～ 200.0	-300 ～ 400
		E	E 1	0 ～ 700	0 ～1300
		S	S 1	0 ～1700	0 ～3100
		*5 U	U 1	-199.9～ 200.0	-300 ～ 400
		N	n 1	0 ～1300	0 ～2300
		*1 B	b 1	0 ～1800	0 ～3300
		*3 Wre5-26	S-26	0 ～2300	0 ～4200
		*4 PLII	PL2	0 ～1300	0 ～2300
	Resistance Bulb Pt100		P 1	-200 ～ 600	-300 ～1100
			P2	-100.0～ 200.0	-150.0～ 400.0
		*6	P3	0.0～ 100.0	0.0～ 200.0
		*6	P4	-50.0～ 50.0	- 60.0～ 120.0
			P5	-100.0～ 300.0	-150.0～ 600.0
			P6	-199.9～ 300.0	-300 ～ 600
			P7	-199.9～ 600.0	-300 ～1100
			P8	0 ～ 250	0 ～ 500
		*6	JP 1	-200 ～ 500	-300 ～ 900
		*6	JP2	-100.0～ 200.0	-150.0～ 400.0
			JP3	0.0～ 100.0	0.0～ 200.0
			JP4	- 50.0～ 50.0	- 60.0～ 120.0
			JP5	-100.0～ 300.0	-150.0～ 600.0
			JP6	-199.9～ 300.0	-300 ～ 600
			JP7	-199.9～ 500.0	-300 ～ 900
			JP8	0 ～ 250	0 ～ 500
	Volatage(mV)	*7 0～ 10	A 1	Scaling Range : -1999～9999 Digit Span : 10～10000Digit Change of decimal point's position is possible (no decimal pont、0.1, 0.01, 0.001)	
		0～100	A2		
		*7 -10～ 10	A3		
		0～ 20	A4		
		0～ 50	A5		
	Voltage(V)	1～ 5	U 1		
		0～ 5	U2		
		-1～ 1	U3		
		0～ 1	U4		
		0～ 2	U5		
		0～ 10	U6		
	Current(mA)	4～ 20	AA 1		
		0～ 20	AA2		

thermo couple B, R, S, K, E, J, T, N : JIS/IEC

resistance bulb Pt100 : JIS/IEC

JPt100 : former JIS

*1 thermo couple Accuracy is not guaranteed below B:400°C (752°F).

*2 thermo couple In K, T, U, accuracy is ± 0.5%FS for 0～-100°C (-148°F) and ± 1.0%FS if it is below-100°C

*3 thermo couple Wre 5-26 : Product of Hoskins Mfg. co.,

*4 thermo couple PLII：Platinel

*5 thermo couple U : DIN43710

*6 resistance bulb accuracy of Pt/JPt ± 50.0°C, 0.0～100.0°C is ± 0.3%FS.

*7 voltage(mV) 0～10mV, accuracy of 0～10mV is ± 0.3% of input range.

*Setup of factory shipment is Multi input : thermo couple K2 0-1200°C

Voltage input : 1-5V A 1 0.0-100.0

Current input : 4-20mA AA 1 0.0-100.0

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