



# TEMP2000S

Thermal Shock Tester Controller

# SERIES



# Installation Manual

※ This manual is commonly used for TEMP2500S,TEMP2700S

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# 1. Cautions (Instructions) for safety

Thank you for purchasing our company's thermal shock tester controller (TEMP2000S).  
This manual describes the method of Instruction of the product.



## Symbol marks for safety

(A) It means the "Handle with care" or "Cautions" In case of violation of this point, it may cause the death, severe injury or the extreme damage on the product.



(1) Product : It is marked on the points to be acknowledged certainly to protect the human body and device.

(2) Instruction manual: It describes the cautions to prevent the cases of endangered situation on the life and body of the user due to the electric shock and so on.

(B) It means "Ground terminal"



Make the ground with the ground surface in case of product installation and manipulation

(C) It means the "supplementary explanation"



It describes the points to supplement the explanation.

(D) It describes the "references"



The information to supplement the explanation is described



## Cautions in this instruction manual

- (A) Please deliver for the end user to possess always and keep it in the place accessible at any time.
- (B) Use the product after full understanding of this operation manual.
- (C) This instruction manual is the description on the details of function of the product and the other points besides the instruction manual shall not be warranted.
- (D) A part or whole of this manual shall not be edited or copied for use.
- (E) The descriptions in this manual may be changed randomly without pre notice or warning.
- (F) Even though this manual is made with full effort, it will be appreciated if you inform to the point of purchase (dealer shop) in case of finding the deficiencies, mistake and omission in the description.



### Cautions for the safety and modification (Change) of the product

- A. Please use this product after full understanding on the safety cautions in this manual for the protection and safety of the product of the system to be connected for use.
- B. Our company is not responsible for the use and handling and every loss incurred due to the negligence without following this manual.
- C. Please install at the outside of this product when the additional protection and safety circuit is installed separately for the protection and safety for this product and the system connected to this system.
- D. The internal modification (Change) and addition to this product are prohibited.
- E. Do not disassemble, repair and modify of this product because it becomes the reasons for electric shock, fire and malfunction.
- F. In case of changing the part or the consumables of this product, please contact to the sales department of our company.
- G. Do not contact to the moisture with this product. It may cause the failure on this product.
- H. Do not apply the strong impact on this product. It may cause the damage and failure on this product.



### For the exemption of this product

- A. We are not responsible for any warranty on this product besides the defined cases in The quality assurance condition of our company.
- B. We are not responsible for the direct or indirect damages on the user of any third party due to the not expectable defect or the natural disaster in use of this product.



### With regard to the quality assurance condition of this product

- A. The warranty period shall be one year from the purchasing of this product. Free of charge repair is available only for the cases of out of order occurred from normal use conditions.
- B. The repair by the failure created after the warranty period of the product shall be processed in real cost (Payment) according to the defined condition by our company.
- C. The out of order occurred within the warranty period shall be repaired at the actual cost for the following cases in spite of within the warranty period.
  - (1) Out of order due to the mistake or fault of the user (Ex: Initialization by losing The password and etc.)
  - (2) Out of order due to the natural disaster (Ex: Fire and flood and etc)
  - (3) Out of order due to the movement of product after installation.
  - (4) Out of order due to the random disassemble, change or damage on the product.
  - (5) Out of order due to the electric power instability.
  - (6) Others
- D. Please contact to the purchasing points or sales part of our company when after sales service is necessary because of the failure on the product.

## 1.1 Checking the product

- ▶ When the product is purchased, please check damages on the exterior of the product.

### 1.1.1 Checking the specification of the ordered product

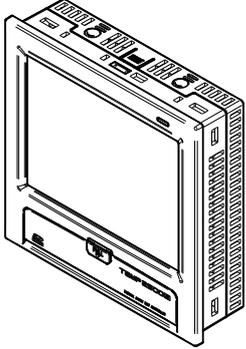
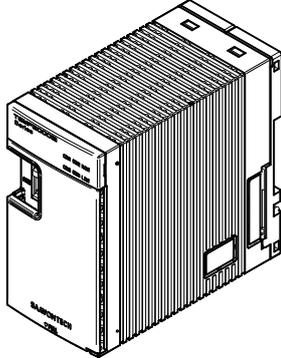
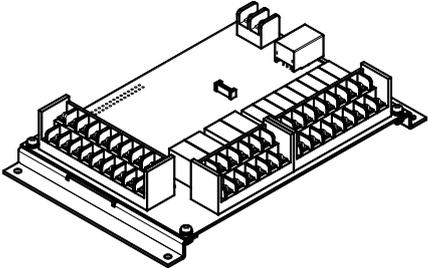
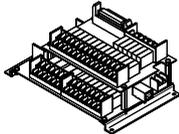
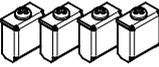
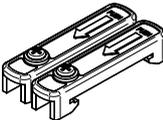
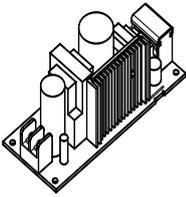
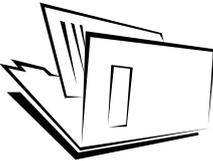
- ▶ Check whether the purchased product is identical with the ordered specification.  
How to check: Check the model name specification code marked on the right of the packing box and on the left label of product case.

TEMP2□00S – 0□/SD/□  
                                   ①                                  ②                                  ③

No.	title	symbol	content
①	Display part LCD size	5	Display part 5.7 inch
		7	Display part 7.5 inch
②	I/O Board	0	I/O1 (Relay 12 points +DI 16 points)
		1	I/O1, 2 (Relay 32 points +DI 16 points)
③	Option section	CE	Ethernet communication

### 1.1.2 Check the package

► Check whether the following contents are included

Main body of TEMP2000S – Display part		Main body of TEMP2000S – Control part		I/O1 BOARD		
						
SD card (In case of option selection)	I/O2 BOARD (In case of option selection)	Fixing mount	End bar	Cable (2m) PC⇔ Display part (MP0310CX)	Cable (1m) Control part⇔ I/O1 (MP0310CW)	Cable (3m) Display part⇔ Control part (MP0310CV)
						
SMPS(Product for independent selling)	T102000(Product for independent selling)	Instruction manual				
						

### 1.1.3 How to treat the damaged parts

► In case of product damage after checking the exterior of the product as shown in the above or the accessories are missed, please contact to the purchasing point or the sales part of our company.

## 1.2 Exterior and how to install

### 1.2.1 Installation location and environment



#### Cautions for the installation location and environment

- A. Please manipulate in electricity on state at the installation of this product on the panel because of the electric shock risk. (Caution for electric shock)
- B. Do not install the product in the following location or environment.
  - A place for contacting the terminal by the human without recognition
  - A place directly exposed for mechanical vibration or impact
  - A place exposed for the corrosive gas or flammable gas
  - A place of temperature fluctuation
  - A place of extremely high (Over 50°C) and low (Under 10°C) temperature
  - A place exposed to the direct sunlight
  - A place influenced with electromagnetic wave
  - A place of moisture (A place with more than 85% of humidity)
  - A place where the flammable stuffs are placed at the surrounding.
  - A place of dusty and salty
  - A place exposed to the ultra violet light
- C. Do not use sharp thing or excessive pressure to manipulate the touch screen.
- D. Please pay attention to the handling of the product because the product is weak to the organic solvent (Chemical substances) as the exterior of the product is made of plastic. (Do not contact the front side of the product to the organic solvent especially.)
- E. Even though the case of this product is made of non flammable material such as ABS/PC, but do not install in the place where there are the stuffs of easy flammability.

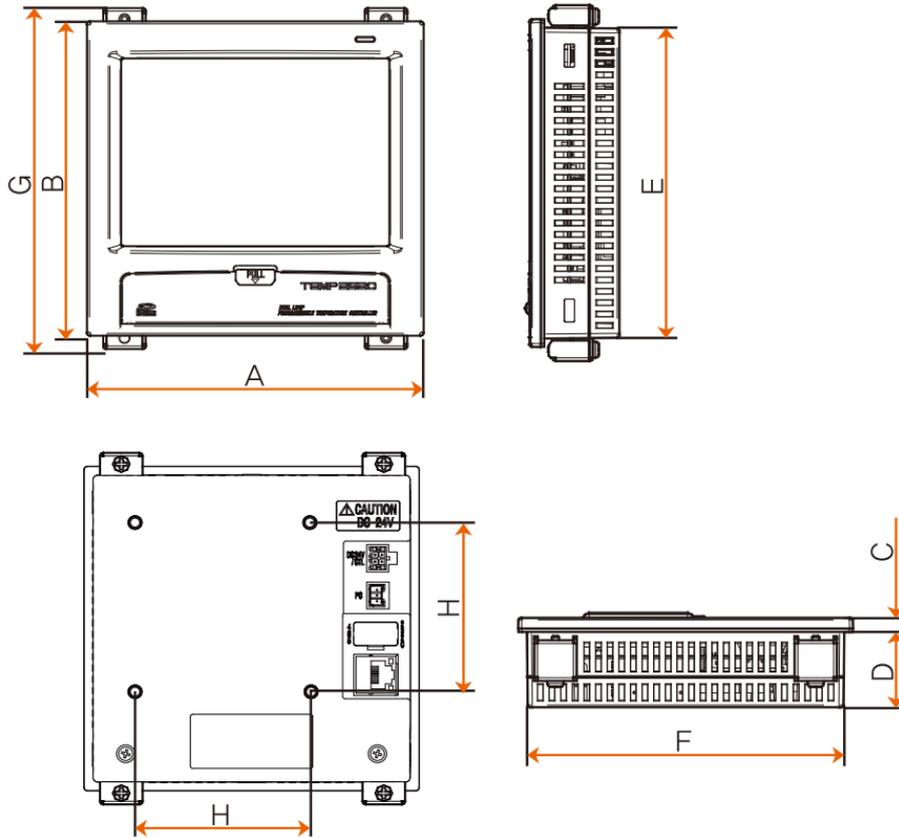


#### Installation Precautions

- A. Don't put the device or the wiring which cause the noise near to this product.
- B. Use the product in 10~50°C, in 20~90% RH (It shall not be dewing.) Don't put the heat radiant device closely.
- C. Don't install the product in declined position.
- D. Keep the product in -5~70°C (It shall not be dewing.).
- E. Especially, use after full warming up (Switch on) when you use the product under 10 °C.
- F. The wiring work shall be made after switching off electric power on the machine.
- G. This product operates in 24V DC, 22V max without special manipulation.
- H. There is a risk of the electric shock or fre when the electric power other than the specifcation.
- I. Don't work with wet hands. It has the risk of electric shock.
- J. Follow up the basic cautions to reduce risk of fre, electric shock and injury during using.
- K. Refer to the installation procedure regarding to the description for ground. However, do not make the ground on the water supply pipe, gas pipe, phone line and lightening rod. There is a risk of explosion and fre.
- L. Do not switch on before finishing the connection of the devices. It may cause the failure.
- M. Do not close the heat radiating hole on this product. It may cause the Failure
- N. I/O BOARD must be installed inside the equipment, and please fix and tighten firmly with bolt and nut in the fixation hole on the board before use.
- O. This product can be used under the following environmental conditions.
  - Indoor
  - Altitude up to 2000m
  - Pollution degree II
  - The level of excessive voltage protection category II

1.2.2 External dimension (Unit : mm)

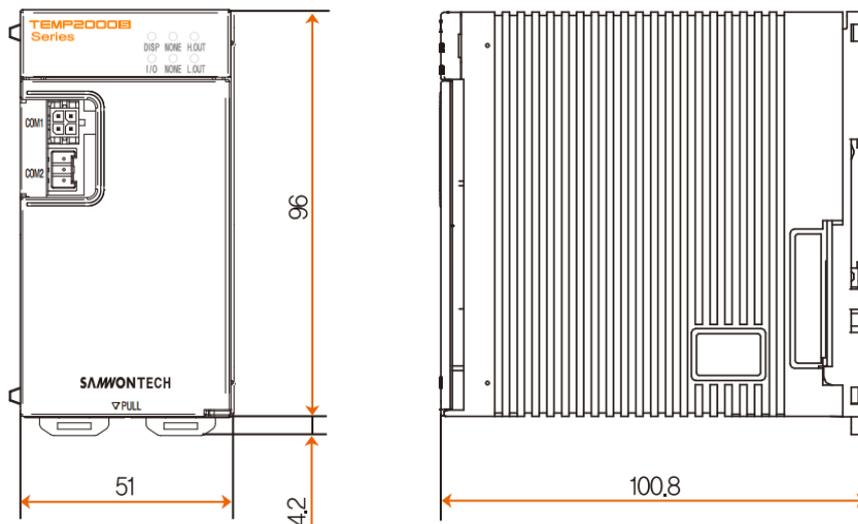
1.2.2.1 External dimension of display part for each model



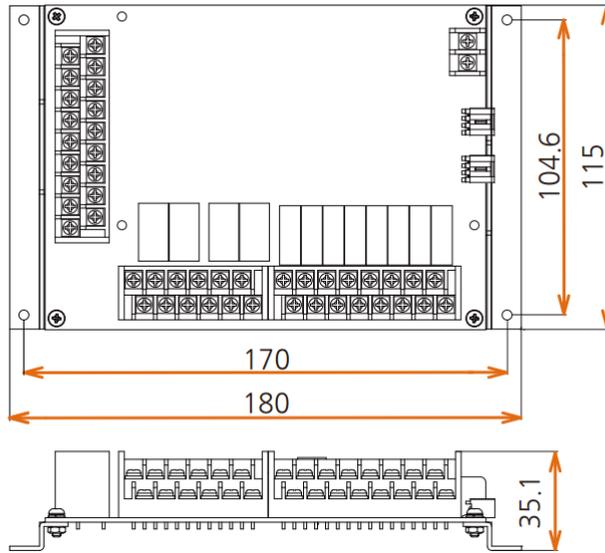
Unit : mm

Model name	A	B	C	D	E	F	G	H
TEMP2500S	144	144	6.5	33.5	136.5	136.5	156	75
TEMP2700S	203	180	6.8	38.2	172.5	195.5	192	75

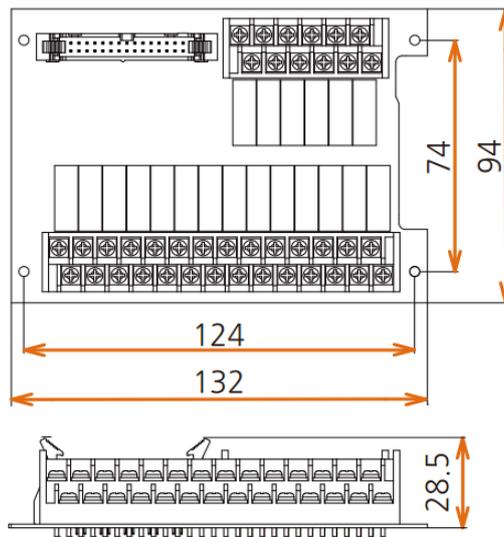
1.2.2.2 External dimension of control part



1.2.2.3 I/O1 board external dimension

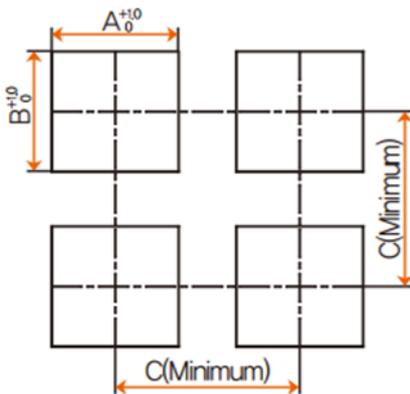


1.2.2.4 I/O2 board external dimension



1.2.3 Panel cutting dimension

In case of general attachment



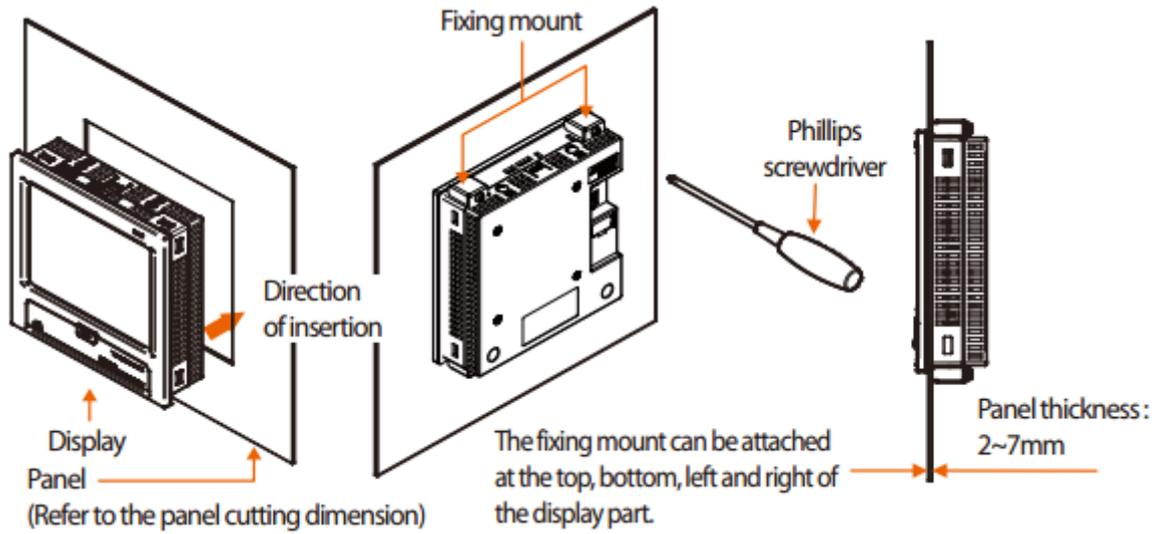
※ Panel cutting dimension for each model Unit : mm

Model name	A	B	C
TEMP2500S	137.5	137.5	250
TEMP2700S	196	173	308.5

## 1.2.4 How to attach on the panel mount

### 1.2.4.1 How to install the product

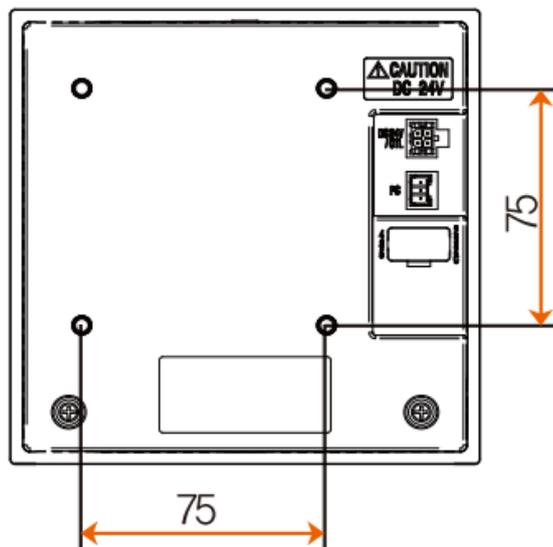
► How to install the TEMP2000S display unit panel



- ① Cut the panel to be installed. Refer to the [1.2.3 panel cutting dimension].
- ② Insert into the hole from the rear side of the product as shown in the above figure.
- ③ Fix this product using the fixing mount at the upper/lower part of the product. (Use the Phillips driver)

► In case of installing with vesa mount

☞ The dimension of vesa (75 \* 75) is same in every product.

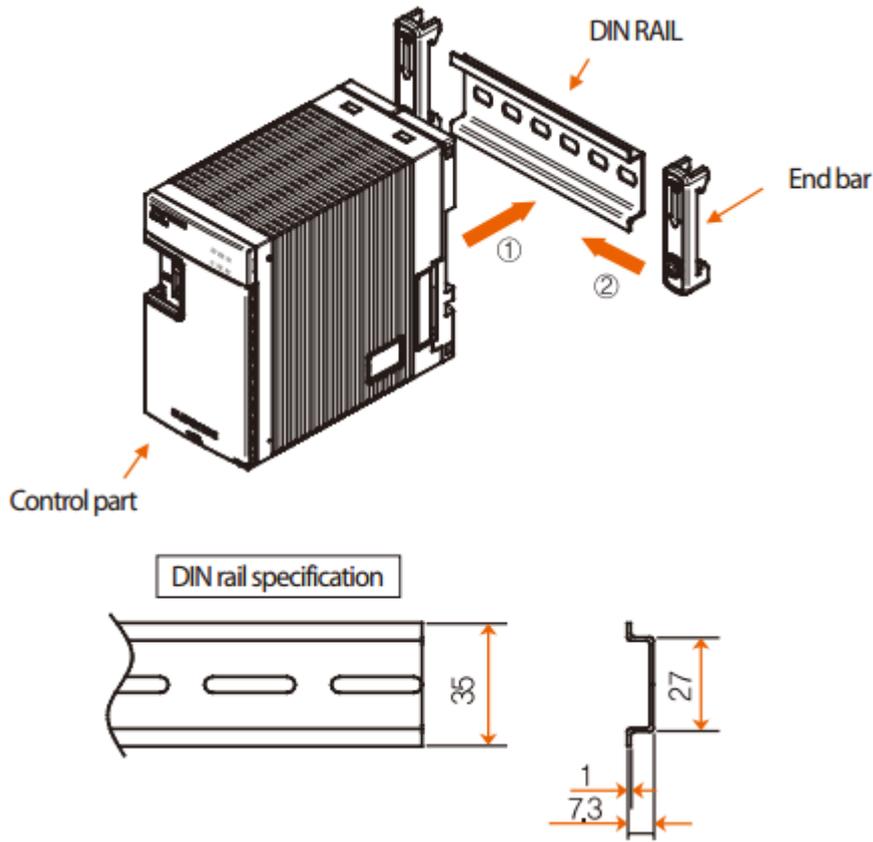


VESA dimension (75 \* 75)

※ Attention  
Apply M4 \* 4L~6L in case of assembling the bolt on the vesa hole.

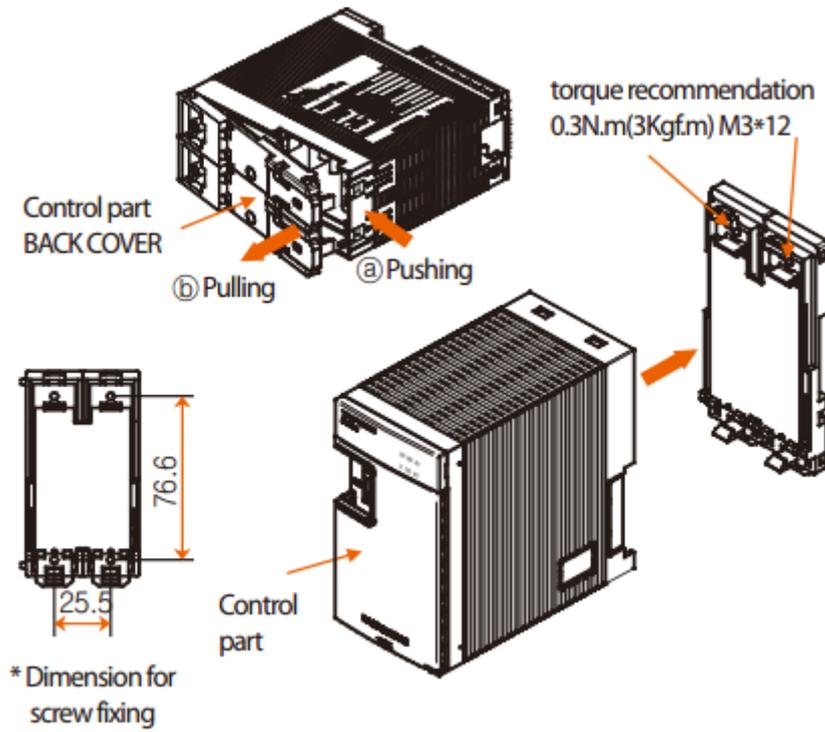
1.2.4.2 How to install the control part

► In case of installing on the DIN rail



- ☞ Install the control part on DIN rail.
- ☞ Fix the control part with end bar from both sides

► In case of installing directly on the wall



- ☞ Separate back cover by pulling part ⓑ on the back cover while ⓐ part on the control panel is pressed.
- ☞ Fix the back cover of control part on the wall with screw.
- ☞ Assemble the main body of control part on the back cover.

## 1.3 Wiring



### Cautions

- ▶ Make the wiring after checking whether the wiring cable is applied for current with tester by switching off the main electric power in every supplied instrument.
- ▶ Never contact to the terminal because of the risk of electric shock during application of the current (Electric power on).
- ▶ Make the wiring after switching off the main electric power certainly.

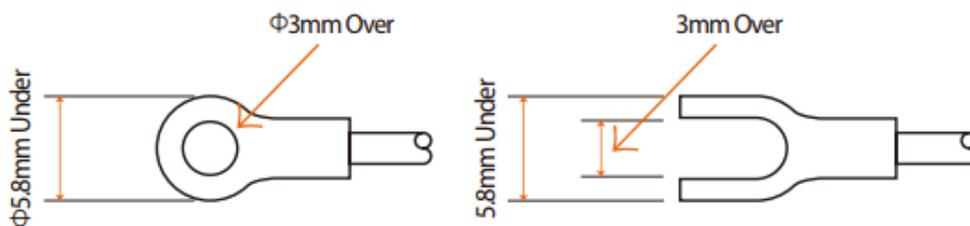
### 1.3.1 How to make the wiring

#### 1.3.1.1 Recommended specification for electric cable

- ▶ Vinyl insulated electric cable KSC3304 0.9~2.0mm<sup>2</sup>

#### 1.3.1.2 Recommended specification for terminal

- ▶ Use the pressed terminal with insulation sleeve which is proper to the M3 screw as shown in picture.

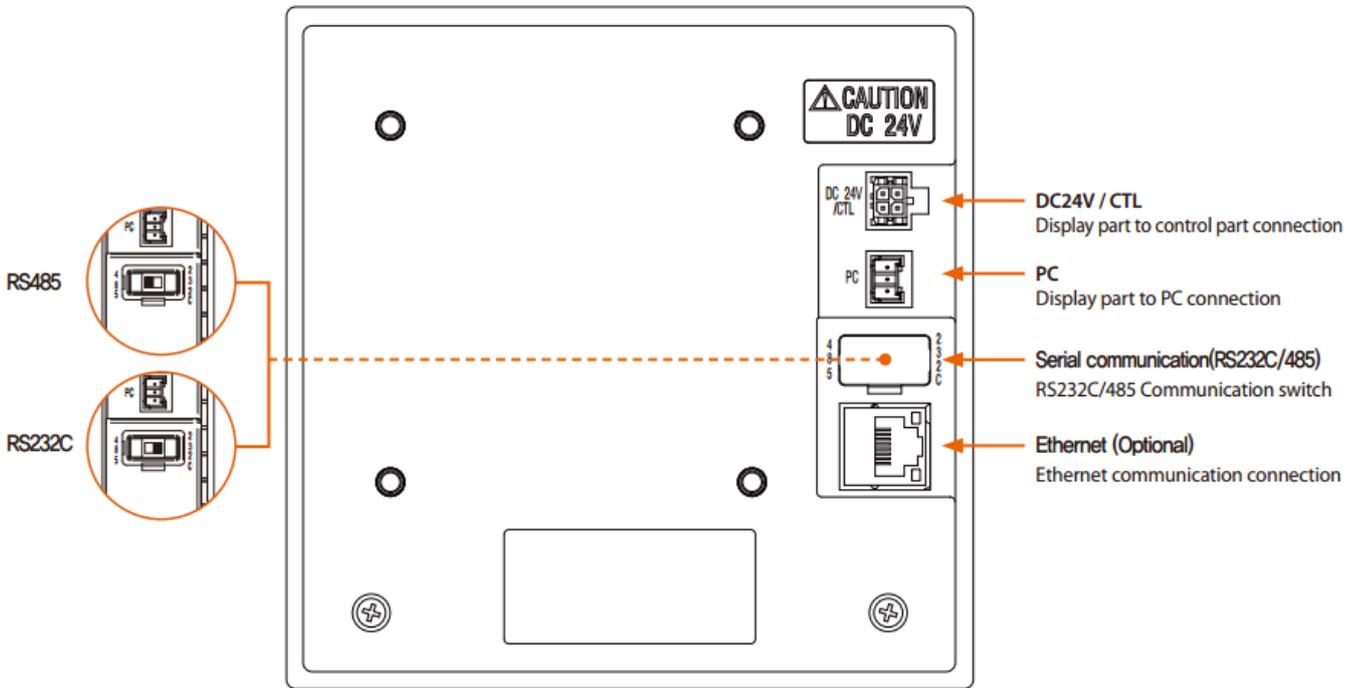


#### 1.3.1.3 Solution for noise

- ▶ Source of noise
  - A. Relay and contact point
  - B. Solenoid coil and solenoid valve
  - C. Electric power line
  - D. Induced load
  - E. Inverter
  - F. Commutates in motor
  - G. Phase angle control SCR.
  - H. Wireless communication device
  - I. Welding machine
  - J. High pressure ignition device and etc
- ▶ Solution for noise
  - A. Make the wiring with caution for the following points from the noise creation source.
  - B. Make the wiring for the input circuit with placing the gap from the power circuit and ground circuit.
  - C. Use the shield wire for the noise from the electrostatic induction.
  - D. Connect the shield wire to the ground terminal according to the necessity not to make the 2 point ground.
  - E. Make the wiring in tight twisting for the noise from the electric induction.
  - F. If necessary, refer to [1.3.3.5 The Use of Assistant Relay]

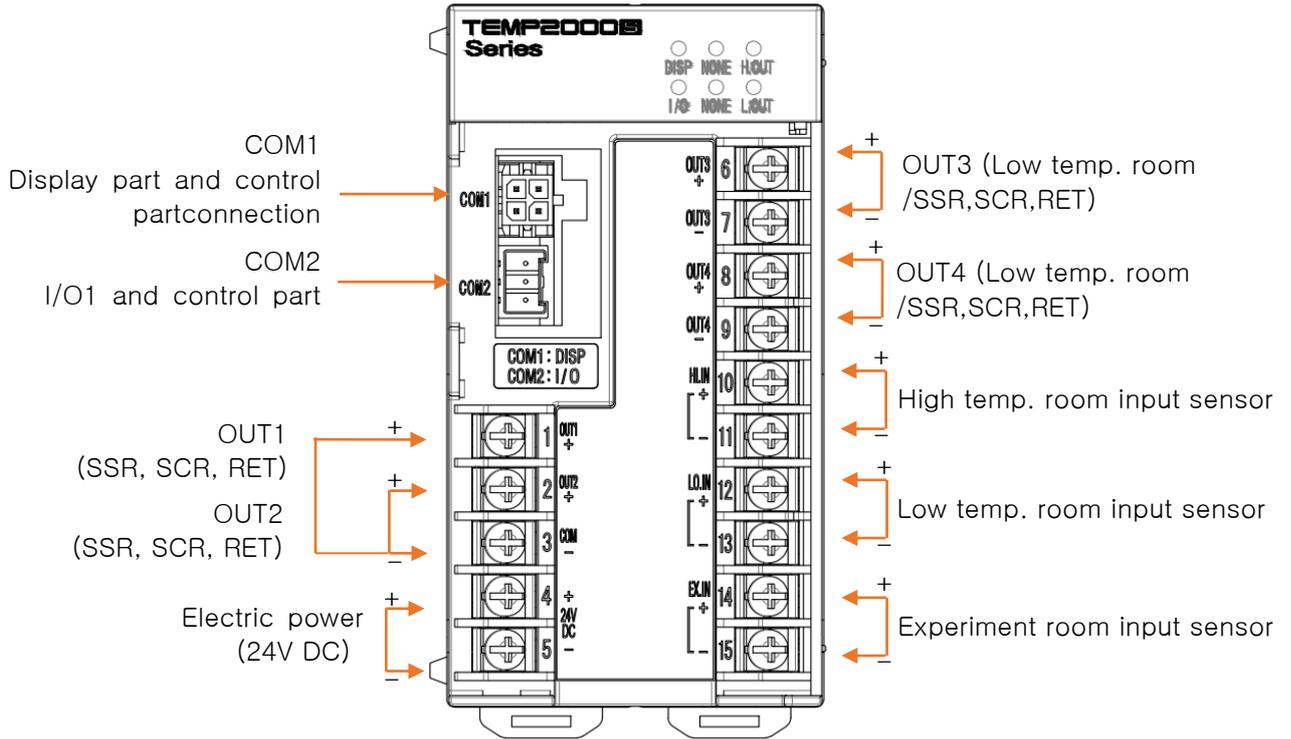
1.3.2 Terminal layout

1.3.2.1 TEMP2500S/TEMP2700S display part terminal

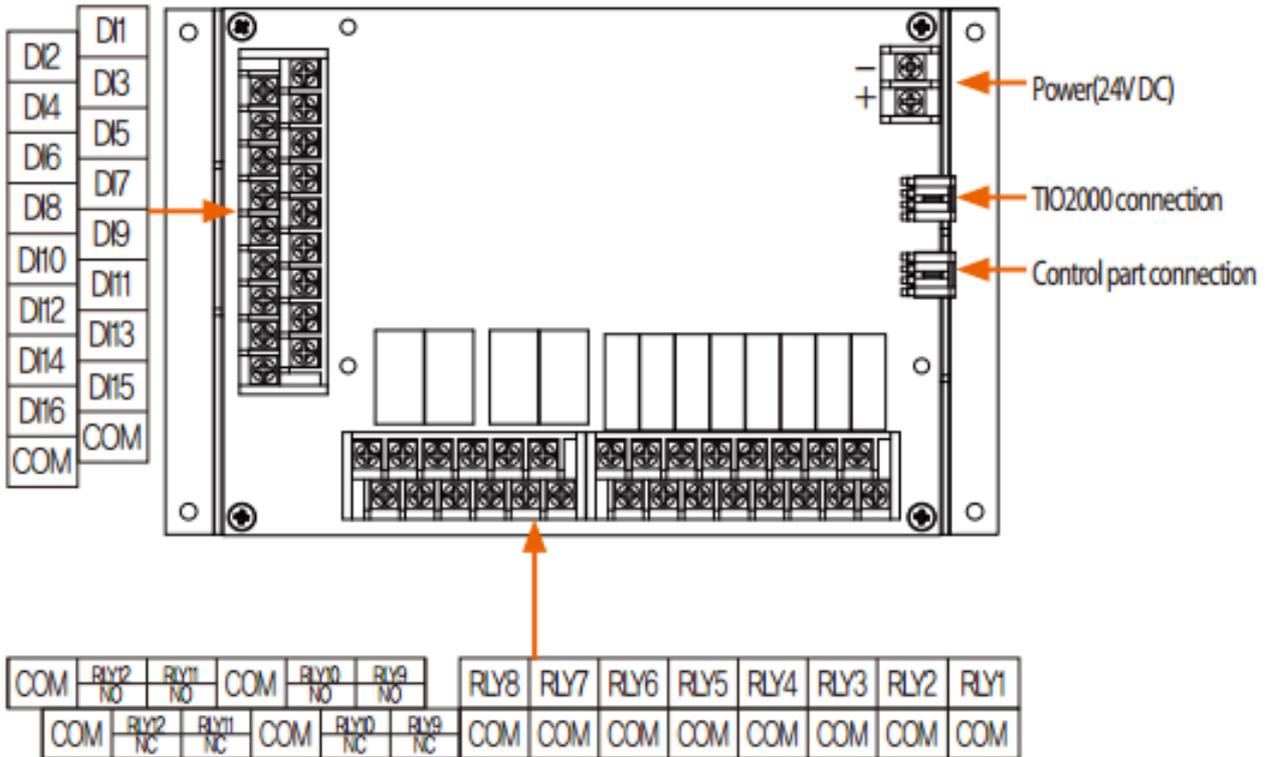


▶ RS232C/485 and Ethernet can not be used at the same time.

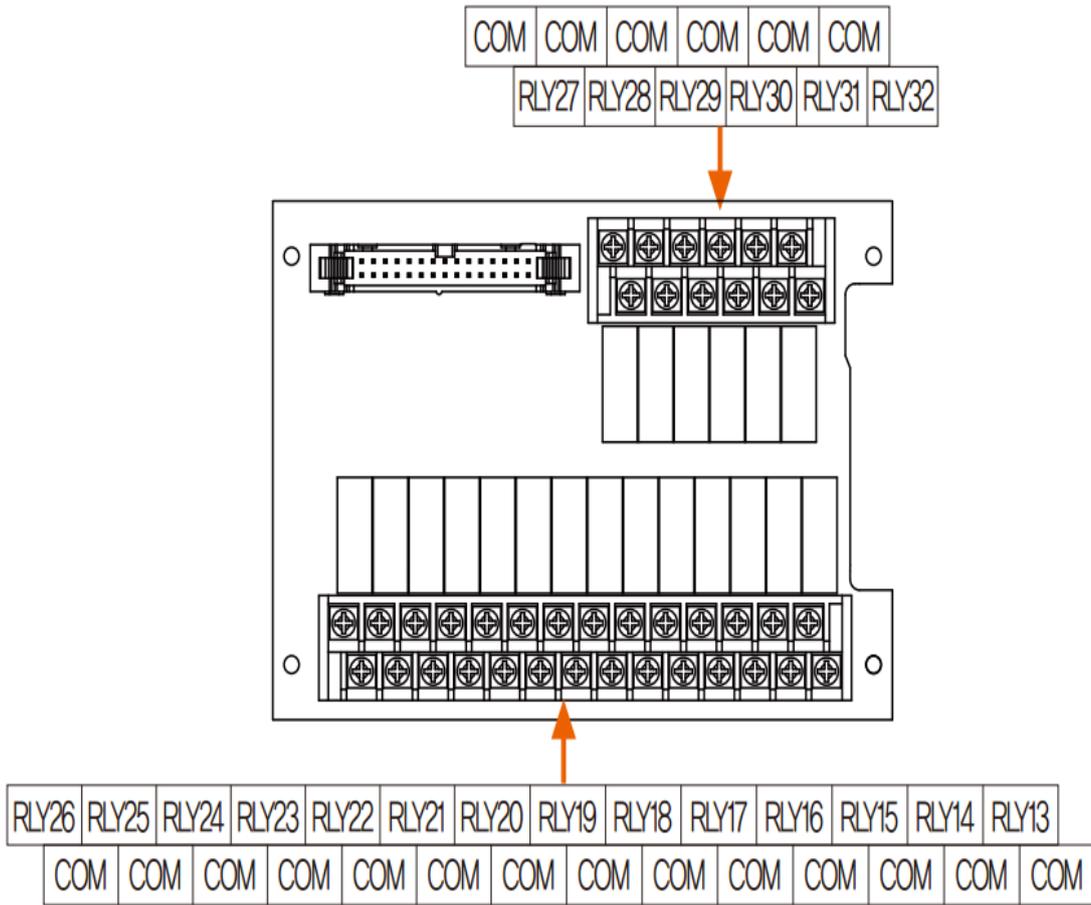
1.3.2.2 Control part terminal



1.3.2.3 I/O1 board terminal



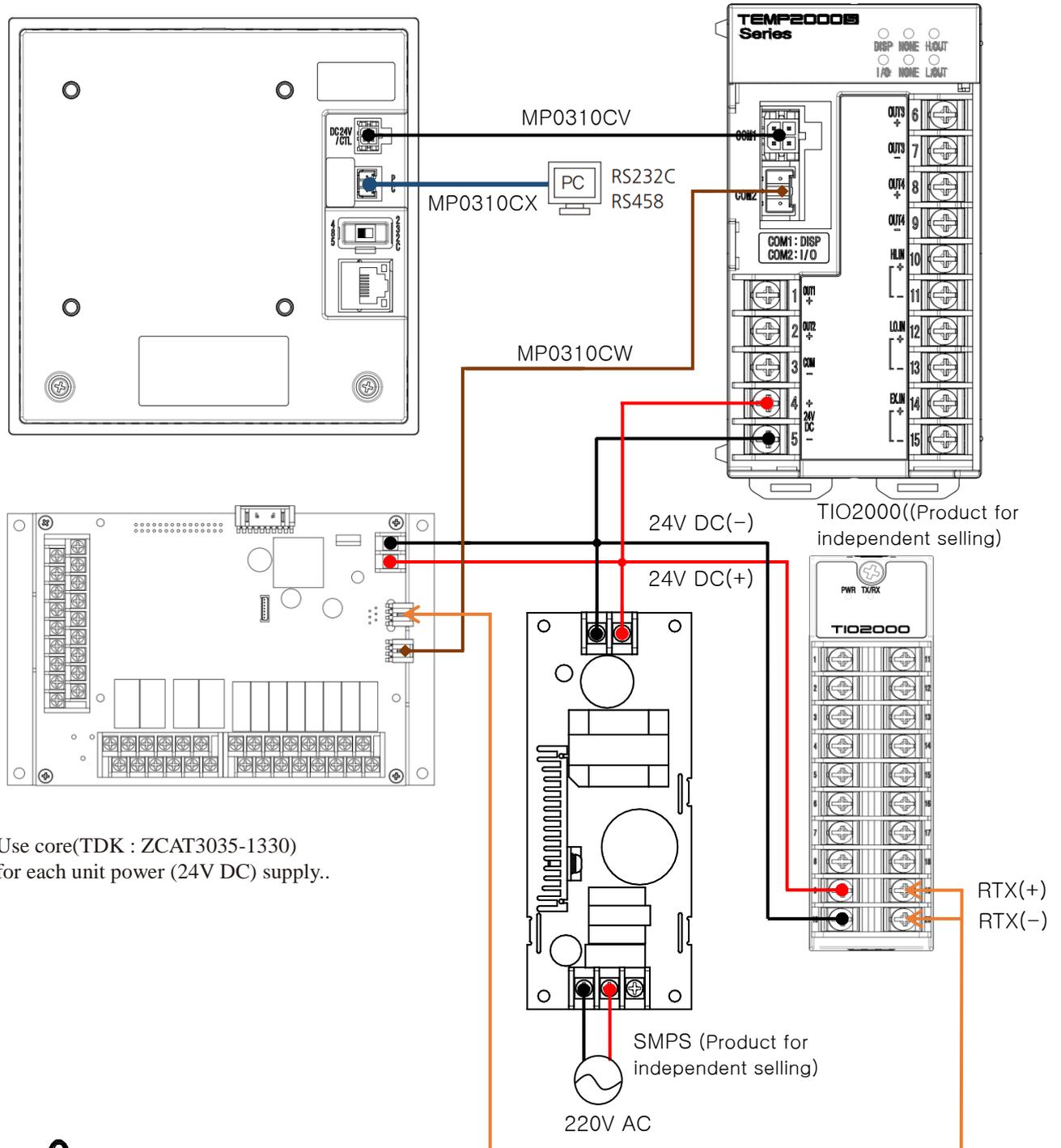
1.3.2.4 I/O2 BOARD terminal



### 1.3.3 Electric power wiring

- ▶ For electric power cable, make wiring using the cable with equivalent performance of vinyl insulation cable (KSC 3304).

☞ How to make electric wire for TEMP2000S



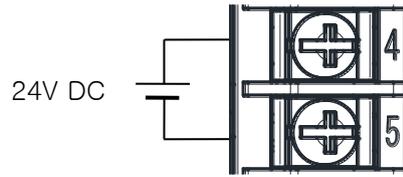
- ▶ Use core(TDK : ZCAT3035-1330) for each unit power (24V DC) supply..



#### Cautions

When wiring the MP0310CV / CW / CX cable, wire the cable so that no more than 0.5kg of force is applied to the cable. Pulling with excessive force may result in connection failure or disconnection.

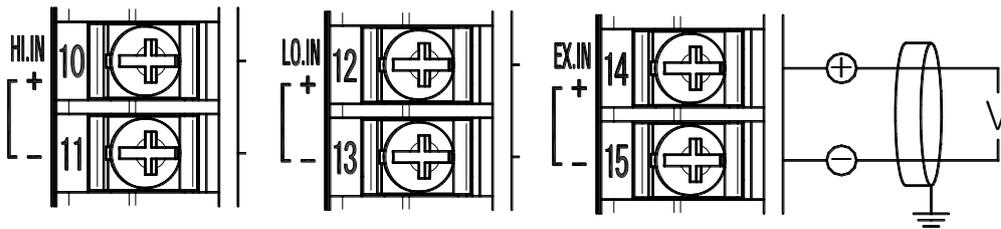
☞ How to connect the electric power for control unit



1.3.3.1 Connection of measurement input (Analog input)

- ▶ Switch “OFF” the power of TEMP2000S main body and external power supply certainly for connecting the measurement input because of electric shock risk.
- ▶ Use the shield attached input cable and the shield shall be grounded by one point.
- ▶ Connect the signal line for measurement input by placing the gap between with electric power cable or ground circuit.
- ▶ Use the electric cable with less cable resistance and cable with no resistance difference among 3 lines.

A. DC VOLTAGE INPUT

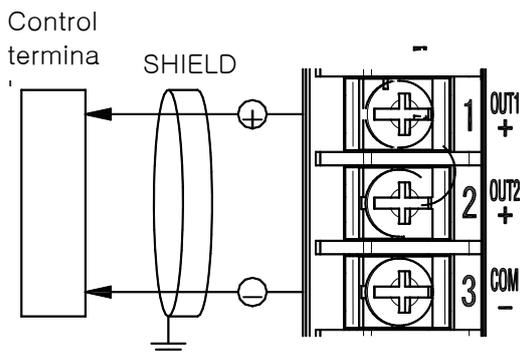


The 3rd class grounding

1.3.3.2 Control output (ANALOG OUTPUT) wiring

- ▶ Connect using caution for output polarity. The misconnection becomes a reason for failure in main body.
- ▶ Use the shield attached output cable and the shield shall be grounded by one point.
- ▶ The COM(-) terminal of OUT1 and OUT2 is used for common terminal of COM(-) regardless of the type.

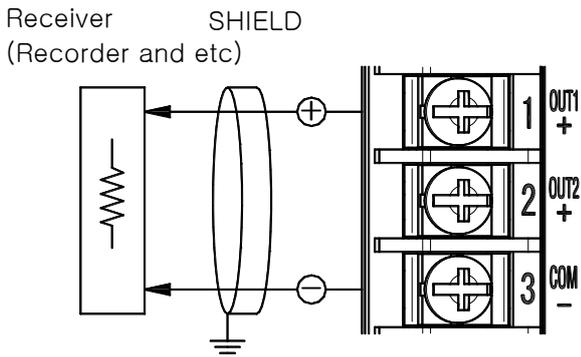
A. OUT1 and OUT2 electric voltage pulse output (SSR)



- ▶ Use COM for OUT1, OUT2 output terminal. 24V DC is output voltage checking in unloaded state in case of stop or 0% control power. Check the output voltage after connecting the load (SSR).

The 3rd class grounding SSR : 24V DC(12V DC min, 600Ω min)

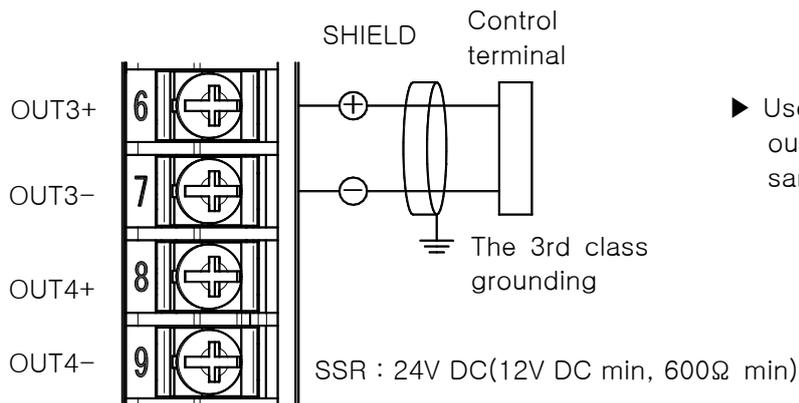
B. OUT1 and OUT2 electric current output (SCR/RET)



► Use common COM for OUT1,OUT2 output terminal. Connection method is same.

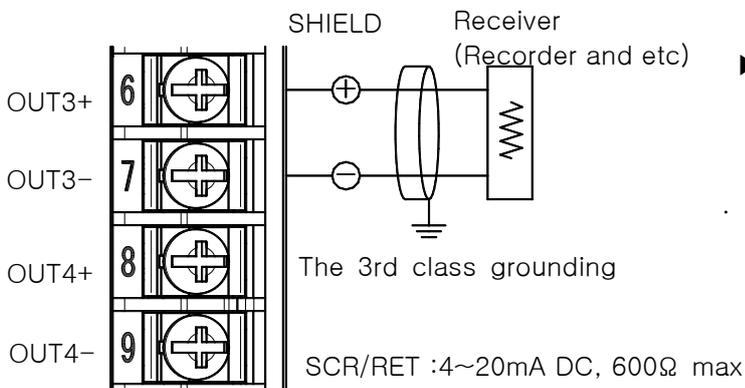
The 3rd class grounding SCR/RET : 4~20mA DC, 600Ω max

C. OUT3 and OUT4 voltage pulse output (SSR)



► Use independent COM for OUT3,OUT4 output terminal. Connection method is same.

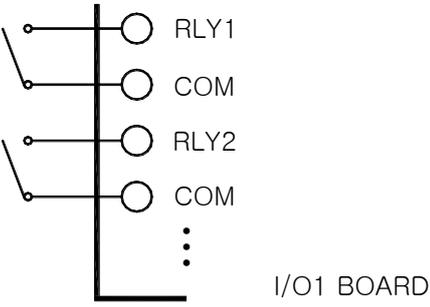
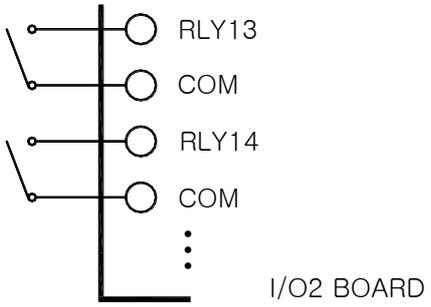
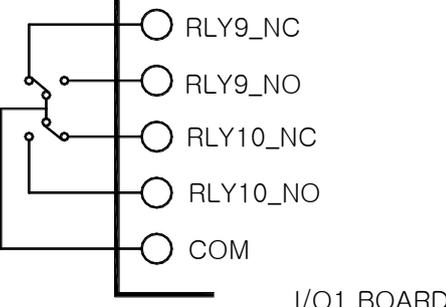
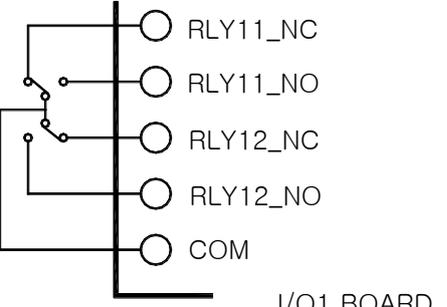
D. OUT3, OUT4 electric current output (SCR/RET)



► Use independent COM for OUT3,OUT4 output terminal. Connection method is same.

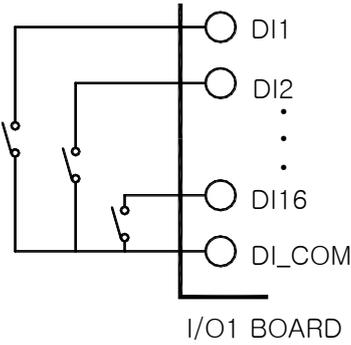
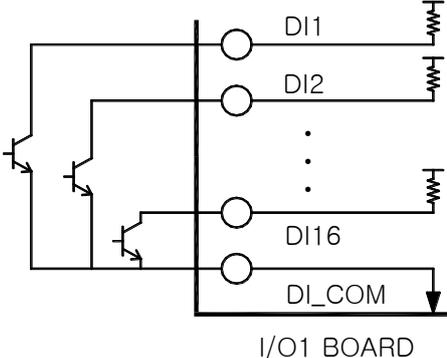
1.3.3.3 Connection for external contact point output

- ▶ Switch “OFF” the power of TEMP2000S main body and external power supply certainly for connecting the measurement input because of electric shock risk.
- ▶ Contact point output : Under 30V DC 1A, 250V AC 1A for Normal and Open

Under 30V DC 1A, 250V AC 1A	Under 30V DC 1A, 250V AC 1A
 <p>I/O1 BOARD</p>	 <p>I/O2 BOARD</p>
NO (Normal Open): Under 30V DC 1A, 250V AC 1A NC (Normal Close): Under 30V DC 1A, 250V AC 1A	NO (Normal Open): Under 30V DC 1A, 250V AC 1A NC (Normal Close): Under 30V DC 1A, 250V AC 1A
 <p>I/O1 BOARD</p>	 <p>I/O1 BOARD</p>

1.3.3.4 Connection of contact input (DI)

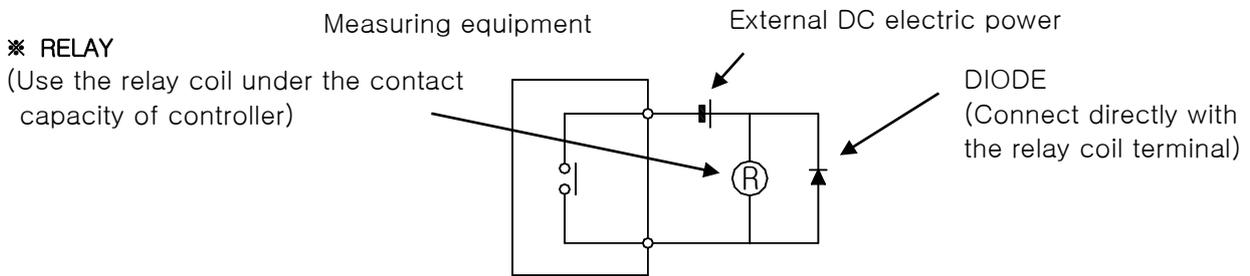
- ▶ Use the dry contact point for the external connection point (Relay contact point).
- ▶ Use the dry contact with sufficient opening and closing capacity for the terminal voltage (About 5V) in case of OFF and electric current (About 1mA) in case of ON.
- ▶ Use the both terminal voltage under 2V, and under 100 $\mu$ A of leak current in case of contact point ON when the open collector is used.

Relay contact point input	Transistor contact point input
 <p>I/O1 BOARD</p>	 <p>I/O1 BOARD</p>

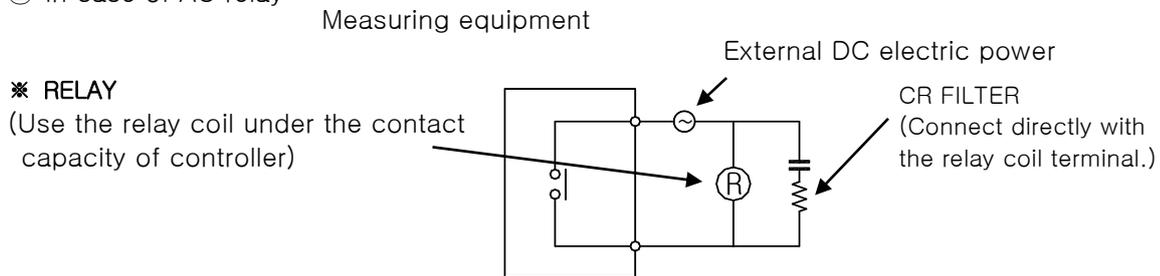
1.3.3.5 Use of sub relay

- ▶ “ON/OFF” the load by using the sub relay when the resistance load exceeds the relay specification of the product.
- ▶ Constitute the spark removing surge suppressor and insert parallel with the CR filter (In case of using AC) or diode (In case of using DC.) certainly because the use of the same inductance (L) load such as sub relay or solenoid valve becomes a reason for mal function or failure in the relay.
- ▶ CR filter recommendation
  - ☞ Sungho Electronics Co., Ltd: BSE104R120 25V (0.1 $\mu$ +120 $\Omega$ )
  - ☞ Hana Parts Co., Ltd : HN2EAC
  - ☞ Songmi Electric Equipment Co., Ltd : CR unit 953, 955 etc
  - ☞ Jiwol Electric Equipment Manufacturing Co., Ltd : SKV, SKVB etc
  - ☞ Shinyoung Communication Industry Co., Ltd : CR-CFS, CR-U etc

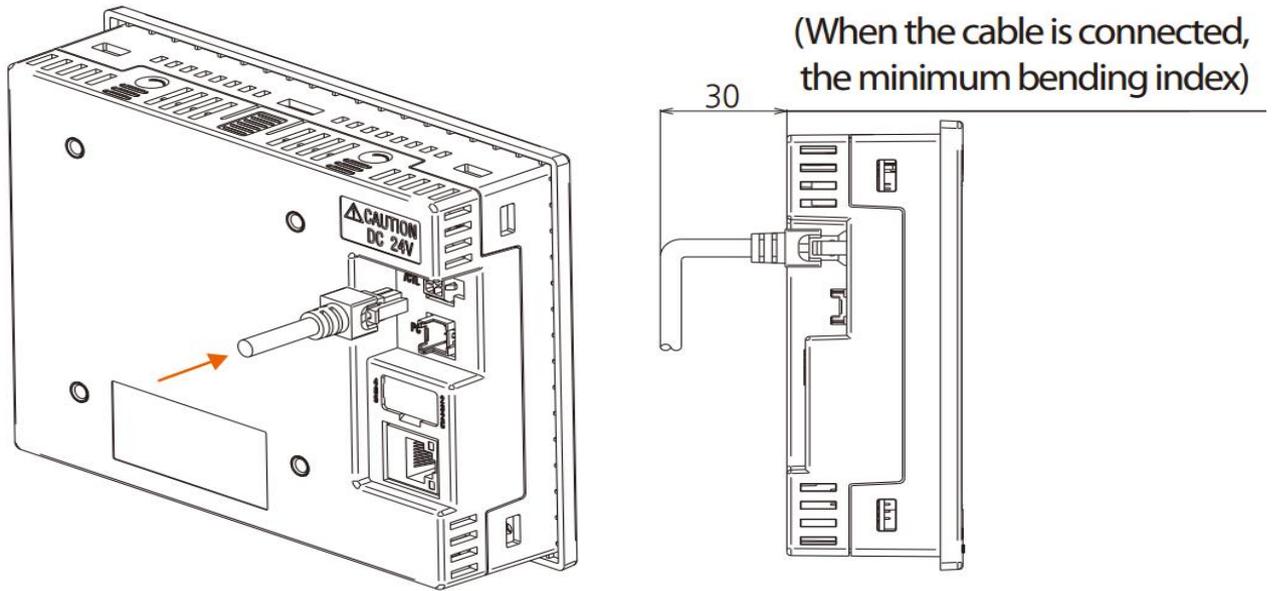
① In case of DC relay



② In case of AC relay

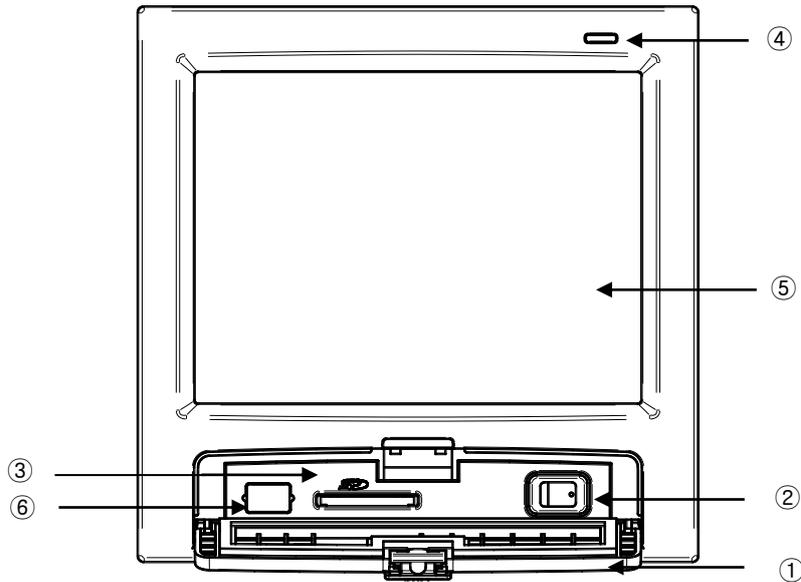


1.3.3.6 How to connect the communication for TEMP2500S/2700S display part



## 1.4 Display function and name

### ▶ TEMP2500/2700S display part



- ① Cover (The user can find the electric power switch and SD card insertion part when the cover is open.)
- ② TEMP2000S display part electric power switch
- ③ SD card insertion part
- ④ Lamp (Lighting in “OFF” of backlight/Run : Green, Stop : Red)
- ⑤ Screen display part
- ⑥ Manufacturer service port (Do not use.)

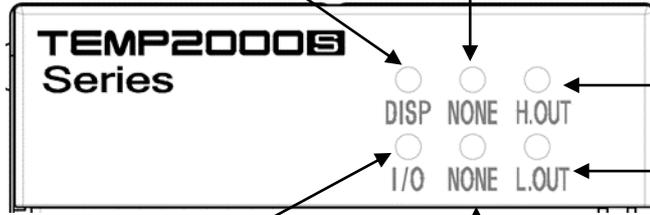
## 1.5 Control part LED

- ▶ DISP LED blinks when the communication between display part and control part are connected.
- ▶ I/O LED blinks when the communication between control part and I/O board are connected.
- ▶ According to the control output in the high temperature room, H.OUT LED is flickered on and off.
- ▶ According to the control output in the low temperature room , L.OUT LED is flickered on and off.

### (A) Control part

The display LED for the Communication with the display part and the main unit

LED unused



The display LED for the output in the high temperature room

The display LED for the output in the low temperature room

The display LED for the Communication with the main part and the I/O1 BOARD

LED unused

## 2. System Setup

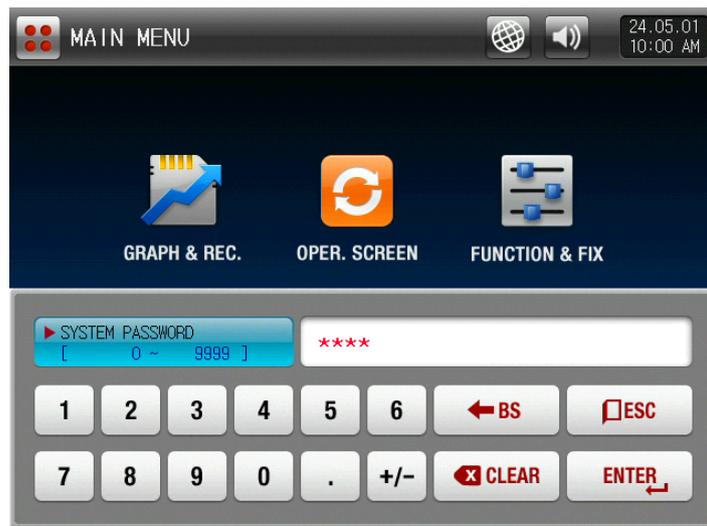
### 2.1 Main Screen

- ▶ The basic screen is like below.



[Pic. 2-1] Main screen

- ▶ Press ① and ② in [Pic. 2-1 Main Screen] in sequence, [Pic. 2-2 Password Input Screen] is displayed.
- ▶ When the password is input in [Pic. 2-2 password input screen], it is converted to [Pic. 2-3 system parameter setting screen].
- ☞ The password is set in '0' when it is outgoing from factory.
- ☞ Set the password in [14. Basic screen display setting] certainly at the necessity of blocking the access of the general user.



[Pic. 2-2] Password input screen

► The setup screen for system parameter is like below.



[Pic. 2-3] The setup screen for system parameter

SYMBOL	Item	Function	Note
	INPUT SET	Setting of parameter related with the type of input sensor and sensor input	
	OUTPUT SET	Setting of parameter related with the output type and output	
	INNER SIGNAL	Setting of parameter related with inner signal	
	EQUIPMENT SET	The setup for parameter related the equipment configuration	
	LOGICAL SIGNAL	Setting of parameter related with logical signal	
	ALARM SIGNAL	Setting of parameter related with alarm signal	
	PID GROUP	Setting of parameter related with PID	
	COMMUNICATION	Setting of parameter related with communication	
	DO CONFIG	Setting of parameter related with I/O board relay output signal	
	DI CONFIG	Setting of parameter related with external contact point input signal	
	PICTURES VIEW	Setting of parameter related with user JPG setting screen	
	INITIAL SETTING	Setting of parameter related with the basic setting for screen configuration	

⚠ The device may be mal-operation in case of changing the setting data is changed into wrong data inside the system screen.

## 2.2 System parameter setting sequence

▶ The sequence of parameter setting in priority for product installation is as follows.

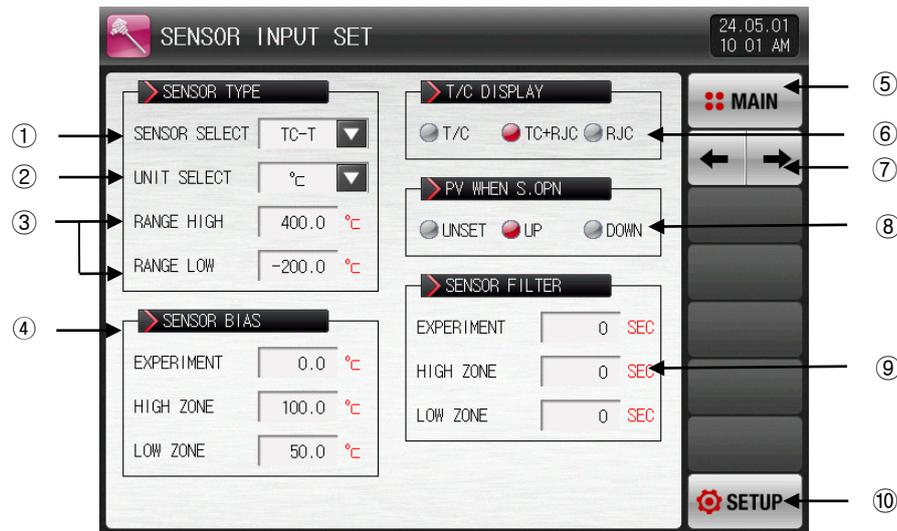
Setting order	SYMBOL	Item	Function	Note
1		INPUT SET	① Sensor type setting ② Setting of range of sensor using ③ Other parameter setting	PAGE 28
2		OUTPUT SET	① Output type setting ② Output direction setting ③ Other parameter setting	PAGE 35
3		DO CONFIG	DO configuration parameter setting	PAGE 65
4		COMMUNICATION	Parameter setting	PAGE 62

## 3. Sensor input

### 3.1 Sensor input setting

#### 3.1.1 Sensor input screen 1

- ▶ The sensors shall be set at first certainly because when the sensor selected, the parameters will be initialized.
- ▶ Operating is sensor group, sensor type, upper limit range and lower limit, display unit, shall not be changed.

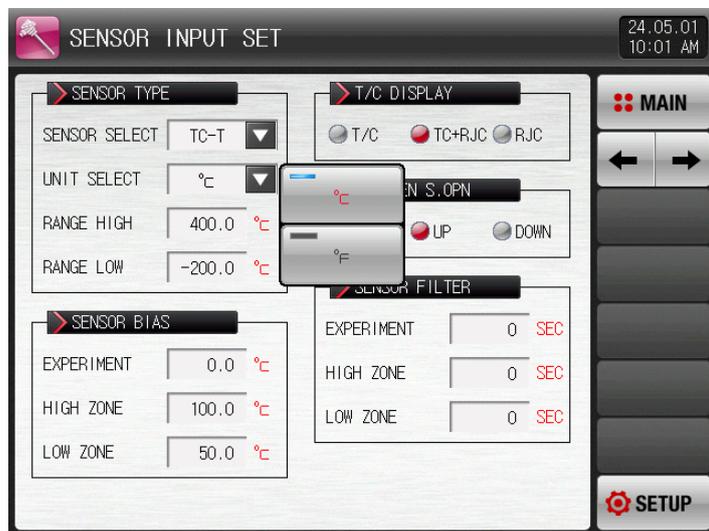


[Pic. 3-1] The first setup screen for sensor input

- ① Setting of the input sensor type.
  - ☞ The setting screen is displayed as shown in [Pic. 3-2 Sensor type setting screen(T/C setting case)].
  - ☞ Refer to [Table 3-1. The first setup screen for sensor input]
- ② Set the display unit.
  - ☞ The setting screen is displayed as shown in [Pic. 3-3 Display unit setting screen(T/C setting case)].
  - ☞ Refer to [Table 3-1. The first setup screen for sensor input]
- ③ Setting the use range of the sensor.
  - ☞ The EU and EUS related parameter such as auto tuning and alarm can be changed the motion point and predetermined value when change the value of range lowest (RL) and range highest (RH).
  - ☞ Refer to [Table 3-1. The first setup screen for sensor input]
- ④ It modifies the sensor input value in the experiment, high and low temperature room.
  - ☞ The sensor input value can be modified during the operation.
  - ☞ Refer to [Table 3-1. The first setup screen for sensor input]
- ⑤ Move to [Pic. 2-1 Main Screen].
- ⑥ It sets the usage of RJC.
  - ☞ T/C : The temperature of terminal is not compensated and the current measured data shows the [Sensor temperature – Standard contact point temperature]
  - ☞ T/C + RJC : The current measure data shows the sensor temperature in compensation of the standard contact point temperature.
  - ☞ RJC : Display of standard contact point temperature
  - ☞ Refer to [Table 3-1. The first setup screen for sensor input]
- ⑦ Move from the current screen to the next screen.
- ⑧ Setting the operation direction of current data (PV) in case of sensor disconnection.
- ⑨ It sets the sensor filter time in the experiment, high and low temperature room.
  - ☞ Setting of the sensor filter time when high frequency noise is included into the input signal.
- ⑩ Move to [Pic. 2-3 System parameter setting screen].



[Pic. 3-2] In case of sensor setting screen



[Pic. 3-3] Display unit setting screen

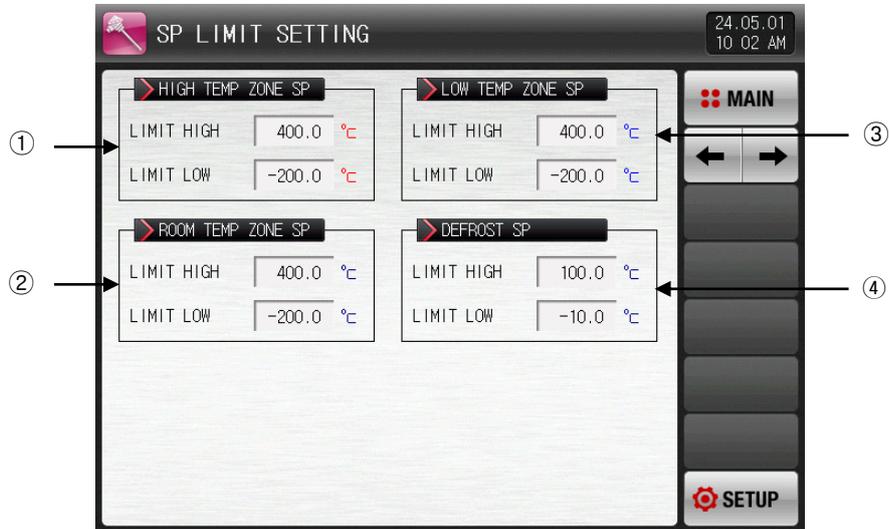
Table 3-1. The first screen parameter for sensor input setup

Parameter	Setting range	Unit	Initial data
SENSOR SELECT	TC-K1, TC-K2, TC-J, TC-E, TC-T, TC-R, TC-B, TC-S, TC-L, TC-N, TC-U, TC-W, TC-PLA, TC-C	ABS	TC-T
UNIT SELECT	°C, °F	ABS	°C
RANGE HIGH	EU(0.0 ~ 100.0%) Range Low < Range high	EU	EU(100.0%)
RANGE LOW		EU	EU(0.0%)
SENSOR BIAS (EXPERIMENT)	EUS (-100.0 ~ 100.0%)	EUS	EUS(0.0%)
SENSOR BIAS (HIGH ZONE)	EUS (-100.0 ~ 100.0%)	EUS	EUS(0.0%)
SENSOR BIAS (LOW ZONE)	EUS (-100.0 ~ 100.0%)	EUS	EUS(0.0%)
T/C DISPLAY	T/C, T/C+RJC, RJC	ABS	TC+RJC
PV WHEN S.OPN	UNSET, UP, DOWN	ABS	UP
SENSOR FILTER (EXPRIMENT)	0 ~ 120 SEC	ABS	0
SENSOR FILTER (HIGH ZONE)	0 ~ 120 SEC	ABS	0
SENSOR FILTER (LOW ZONE)	0 ~ 120 SEC	ABS	0

### 3.2 Temperature Limit Setup

#### 3.2.1 The second screen for sensor input

► The temperature setup range cannot be changed during the operation.



[Pic. 3-4] The modification screen for sensor input by

- ① It sets the range of temperature setup in high temperature room.
  - ☞ The EU and EUS related parameter such as auto tuning and alarm can be changed the motion point and predetermined value when change the value of range lowest (RL) and range highest (RH).
  - ☞ Refer to [Table 3-2. The second setup screen parameter for sensor input].
- ② It sets the range of temperature setup in room temperature room.
  - ☞ Refer to [Table 3-2. The second setup screen parameter for sensor input].
- ③ It sets the range of temperature setup in low temperature room .
  - ☞ Refer to [Table 3-2. The second setup screen parameter for sensor input].
- ④ It sets the range of temperature setup for defrosting.
  - ☞ Refer to [Table 3-2. The second setup screen parameter for sensor input].

Table 3-2. modification screen parameter for sensor input by section

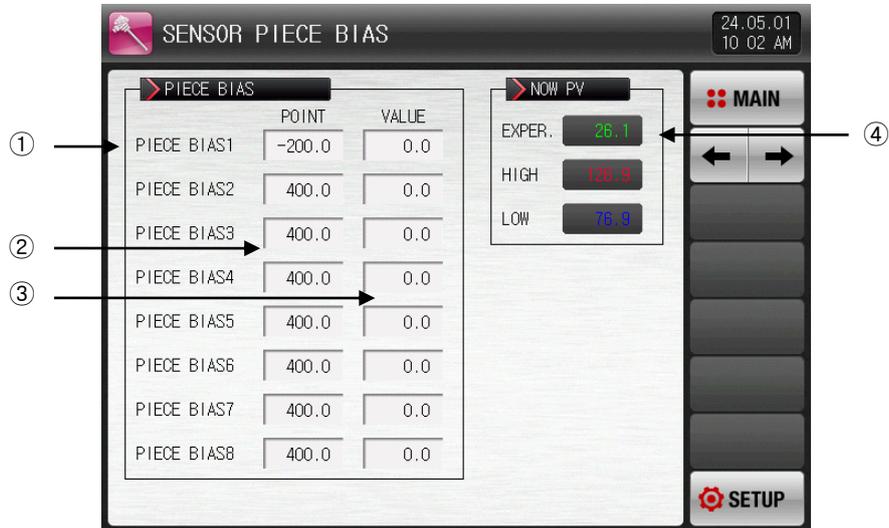
Parameter	Setup Range	Unit	Initial Value
LIMIT HIGH(HIGH)	EU(0.0 ~ 100.0%)	EU	EU(100.0%)
LIMIT LOW(HIGH)	Limit Low < Limit High	EU	EU(0.0%)
LIMIT HIGH(ROOM)	EU(0.0 ~ 100.0%)	EU	EU(100.0%)
LIMIT LOW(ROOM)	Limit Low < Limit High	EU	EU(0.0%)
LIMIT HIGH(LOW)	EU(0.0 ~ 100.0%)	EU	EU(100.0%)
LIMIT LOW(LOW)	Limit Low < Limit High	EU	EU(0.0%)
LIMIT HIGH(DEFROST)	EU(0.0 ~ 100.0%)	EU	100.0
LIMIT LOW(DEFROST)	Limit Low < Limit High	EU	-10.0

\* The setup above can limit the setup of target temperature, pre-heated/cooled temperature and defrosting in the pattern setup screen.

### 3.3 Sectional sensor input calibration

#### 3.3.1 The third screen for sensor input

- ▶ It adjusts input ranges of temperature.
- ▶ The calibration each range is made in a linear equation method the calibration points.



[Pic. 3-5] Screen for sensor input calibration for each range

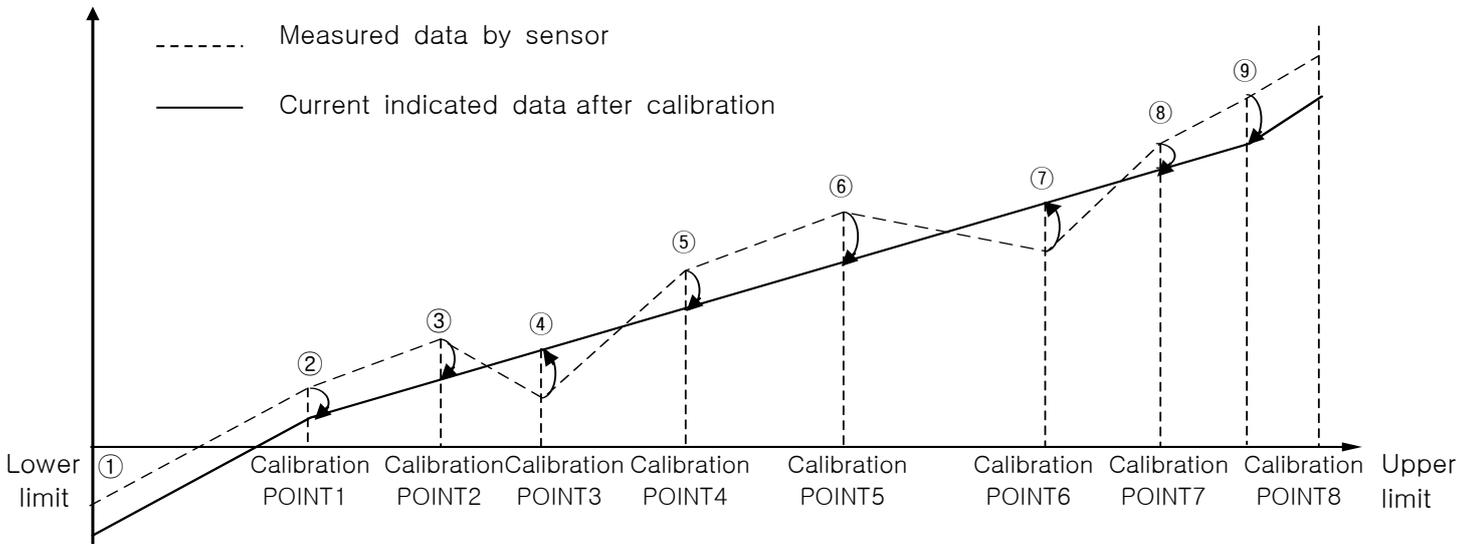
- ① Setting of the calibration for temperature.
  - ② Setting of the temperature in each standard point requiring the temperature setting.
  - ③ Setting the calibration temperature in each standard temperature.
  - ④ Display of the temperature with input calibration.
- ☞ Impossible to change by touching as it for reading only.

Table 3-3. The modification screen parameter of sensor input by section

Parameter	Setting range	Unit	Initial data
PIECE BIAS1 value PIECE BIAS2 value PIECE BIAS3 value PIECE BIAS4 value PIECE BIAS5 value PIECE BIAS6 value PIECE BIAS7 value PIECE BIAS8 value	EUS(-10.0 ~ 10.0%)	EUS	EUS(0.0%)
PIECE BIAS1 point PIECE BIAS2 point PIECE BIAS3 point PIECE BIAS4 point PIECE BIAS5 point PIECE BIAS6 point PIECE BIAS7 point PIECE BIAS8 point	EU(0.0 ~ 100.0%) PV of lower range ≤ PV of Input calibration1 point ≤ PV of Input calibration2 point ≤ PV of Input calibration3 point ≤ PV of Input calibration4 point ≤ PV of Input calibration5 point ≤ PV of Input calibration6 point ≤ PV of Input calibration7 point ≤ PV of Input calibration8 point ≤ PV of upper range	EU	EU(0.0%) EU(100.0%) EU(100.0%) EU(100.0%) EU(100.0%) EU(100.0%) EU(100.0%) EU(100.0%)

### 3.4 Sectional input calibration setting.

► It displays the range input calibration.



► Calculation for each calibration section

① Temperature at the lower limit ~ calibration 1 point after calibration

$$= \text{Measured data by sensor} + \text{calibration 1 point}$$

② Temperature at the calibration 1 point~ calibration 2 point after calibration

$$= \text{Measured data by sensor} + (\text{Measured data by sensor} - \text{calibration 1 point}) \times \frac{(\text{calibration 2 value} - \text{calibration 1 value})}{(\text{calibration 2 point} - \text{calibration 1 point})} + \text{calibration 1 value}$$

③ Temperature at the calibration 2 point~ calibration 3 point after calibration

$$= \text{Measured data by sensor} + (\text{Measured data by sensor} - \text{calibration 2 point}) \times \frac{(\text{calibration 3 value} - \text{calibration 2 value})}{(\text{calibration 3 point} - \text{calibration 2 point})} + \text{calibration 2 value}$$

④ Temperature at the calibration 3 point~ calibration 4 point after calibration

$$= \text{Measured data by sensor} + (\text{Measured data by sensor} - \text{calibration 3 point}) \times \frac{(\text{calibration 4 value} - \text{calibration 3 value})}{(\text{calibration 4 point} - \text{calibration 3 point})} + \text{calibration 3 value}$$

## ⑤ Temperature at the calibration 4 point~ calibration 5 point after calibration

$$= \text{Measured data by sensor} + (\text{Measured data by sensor} - \text{calibration 4 point}) \times \frac{(\text{calibration 5 value} - \text{calibration 4 value})}{(\text{calibration 5 point} - \text{calibration 4 point})} + \text{calibration 4 value}$$

## ⑥ Temperature at the calibration 5 point~ calibration 6 point after calibration

$$= \text{Measured data by sensor} + (\text{Measured data by sensor} - \text{calibration 5 point}) \times \frac{(\text{calibration 6 value} - \text{calibration 5 value})}{(\text{calibration 6 point} - \text{calibration 5 point})} + \text{calibration 5 value}$$

## ⑦ Temperature at the calibration 6 point~ calibration 7 point after calibration

$$= \text{Measured data by sensor} + (\text{Measured data by sensor} - \text{calibration 6 point}) \times \frac{(\text{calibration 7 value} - \text{calibration 6 value})}{(\text{calibration 7 point} - \text{calibration 6 point})} + \text{calibration 6 value}$$

## ⑧ Temperature at the calibration 7 point~ calibration 8 point after calibration

$$= \text{Measured data by sensor} + (\text{Measured data by sensor} - \text{calibration 7 point}) \times \frac{(\text{calibration 8 value} - \text{calibration 7 value})}{(\text{calibration 8 point} - \text{calibration 7 point})} + \text{calibration 7 value}$$

## ⑨ Temperature at the calibration 8 point ~ temperature at the upper limit after calibration

$$= \text{Measured data by sensor} + (\text{Measured data by sensor} - \text{calibration 8 point})$$

## 4. Control & Transmitting output

### 4.1 General control output setup

#### 4.1.1 The first screen for output setup

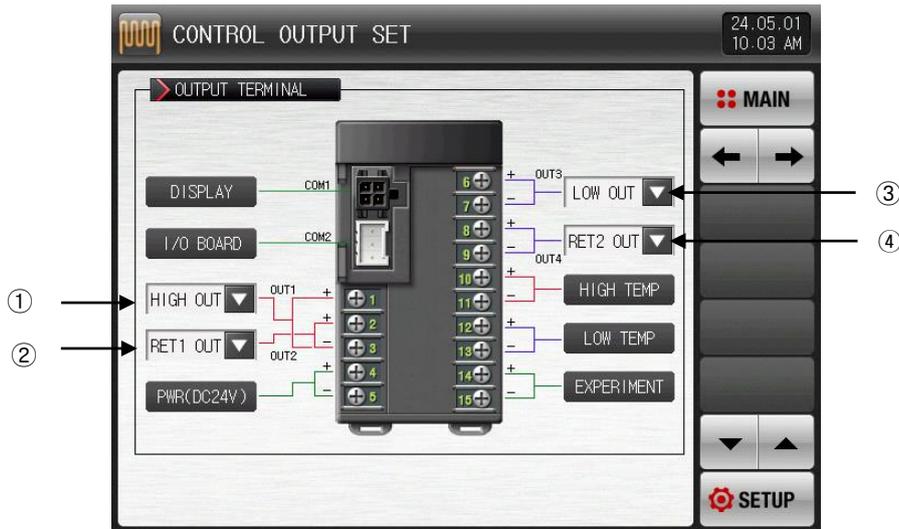
- ▶ It sets the type of output for temperature control.



[Pic. 4-1] The first screen for control output

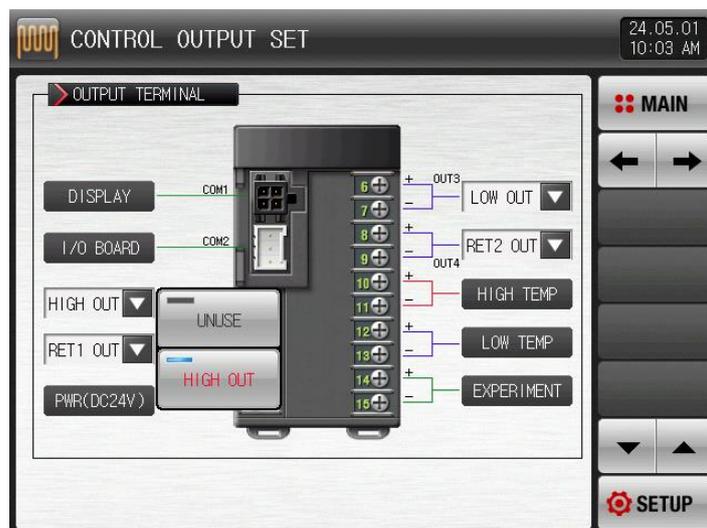
- ① It sets the type of output of OUT1 output terminal.
  - ☞ For SSR, it displays like [Pic. 4-3 The setup screen for SSR output terminal].
  - ☞ For SCR, it displays like [Pic. 4-4 The setup screen for SCR output terminal and transmission output terminal].
- ② It sets the type of output of OUT2 output terminal.
  - ☞ For SSR, it displays like [Pic. 4-3 The setup screen for SSR output terminal].
  - ☞ For SCR, it displays like [Pic. 4-4 setup screen for SCR output terminal and transmission output terminal].
- ③ It sets the type of output of OUT3 output terminal.
  - ☞ For SSR, it displays like [Pic. 4-5 The setup screen for SSR output terminal].
  - ☞ For SCR, it displays like [Pic. 4-6 setup screen for SCR output terminal and transmission output terminal].
- ④ It sets the type of output of OUT4 output terminal.
  - ☞ For SSR, it displays like [Pic. 4-5 The setup screen for SSR output terminal].
  - ☞ For SCR, it displays like [Pic. 4-6 SCR screen for SCR output terminal and transmission output terminal].
- ⑤ Moving from current screen to the next screen.
- ⑥ The page moves up/down from the present screen.

► The following figure is a screen to check/set the setting on the product with graphic.



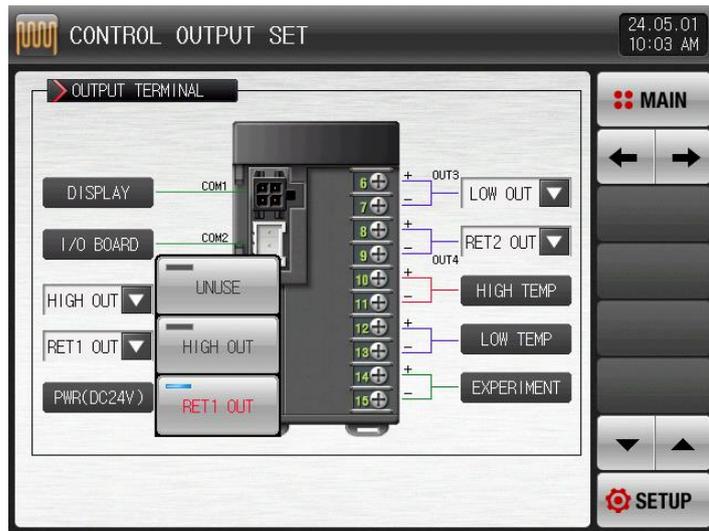
[Pic. 4-2] The setup screen for output terminal

- ① When set OUT1 as SSR in [Pic. 4-1 The first screen for output terminal]
    - ☞ The setup screen is displayed like [Pic. 4-3 The setup screen for SSR output terminal].
  - ② When OUT2 as SCR in [Pic. 4-1 The first screen for output terminal]
    - ☞ The setup screen is displayed like [Pic. 4-4 SCR The setup screen for SCR output terminal and transmission output terminal].
  - ③ When OUT3 as SSR in [Pic. 4-1 The first screen for output terminal]
    - ☞ The setup screen is displayed like [Pic. 4-5 The setup screen for SSR output terminal].
  - ④ When OUT4 as SCR in [Pic. 4-1 The first screen for output terminal]
    - ☞ The setup screen is displayed like [Pic. 4-6 The setup screen for SCR output terminal and transmission output terminal].
- When set SSR in OUT1 output terminal, the setup screen for high temperature output and unused is displayed like this.



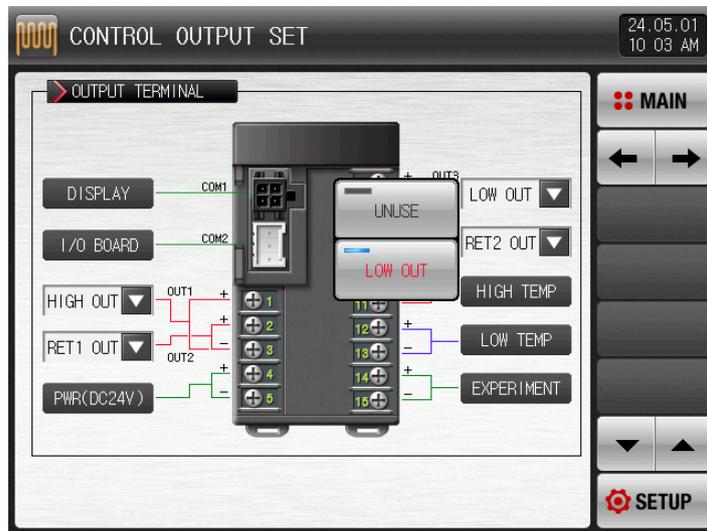
[Pic 4-3] SSR Output terminal setting Display

- ▶ When set SCR in OUT2 output terminal, the setup screen for high temperature output and transmission output is displayed like this.



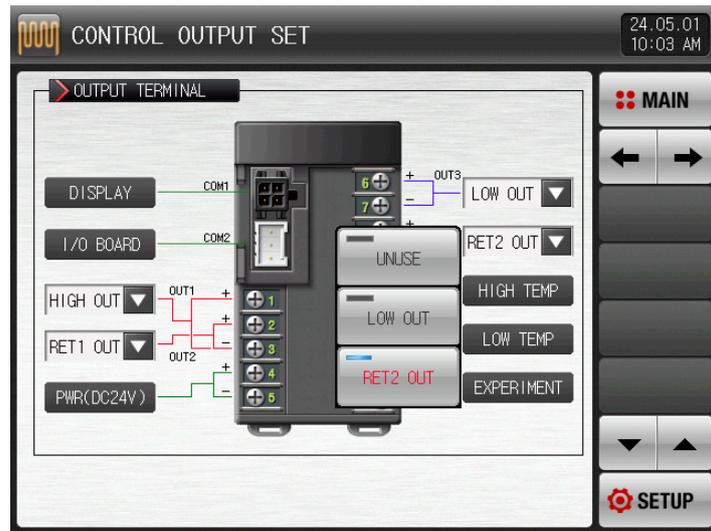
[Pic. 4-4] The setup screen for SCR output terminal and transmission output terminal

- ▶ When set SSR in OUT3 output terminal, the setup screen for low temperature room output and unused is displayed like this.



[Pic. 4-5] SSR Output terminal setting display

- ▶ When set SCR in OUT4 output terminal, the setup screen for low temperature output and transmission output is displayed like this.



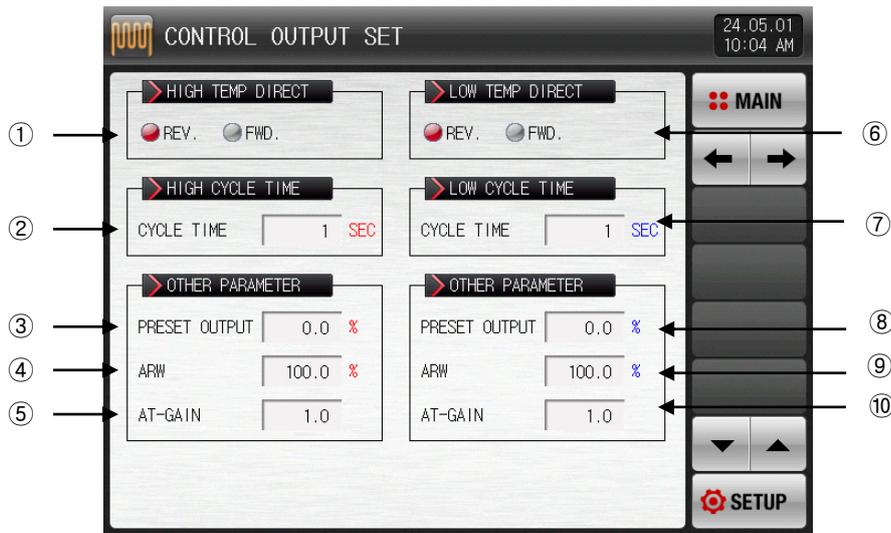
[Pic. 4-6] The setup screen for SCR output terminal and transmission output terminal

Table 4-1. The display screen parameter of output terminal

Parameter	Setup Range		Unit	Initial Value
OUT1	SSR	HIGH OUT, UNUSE	ABS	HIGH OUT
	SCR	HIGH OUT, TRANSMISSION 1, UNUSE		
OUT2	SSR	HIGH OUT, UNUSE	ABS	TRANSMISSION 1
	SCR	HIGH OUT, TRANSMISSION 1, UNUSE		
OUT3	SSR	LOW OUT, UNUSE	ABS	LOW OUT
	SCR	LOW OUT, TRANSMISSION 2, UNUSE		
OUT4	SSR	LOW OUT, UNUSE	ABS	TRANSMISSION 2
	SCR	LOW OUT, TRANSMISSION 2, UNUSE		

4.1.2 The second screen for output setup

► It sets the control related parameter.



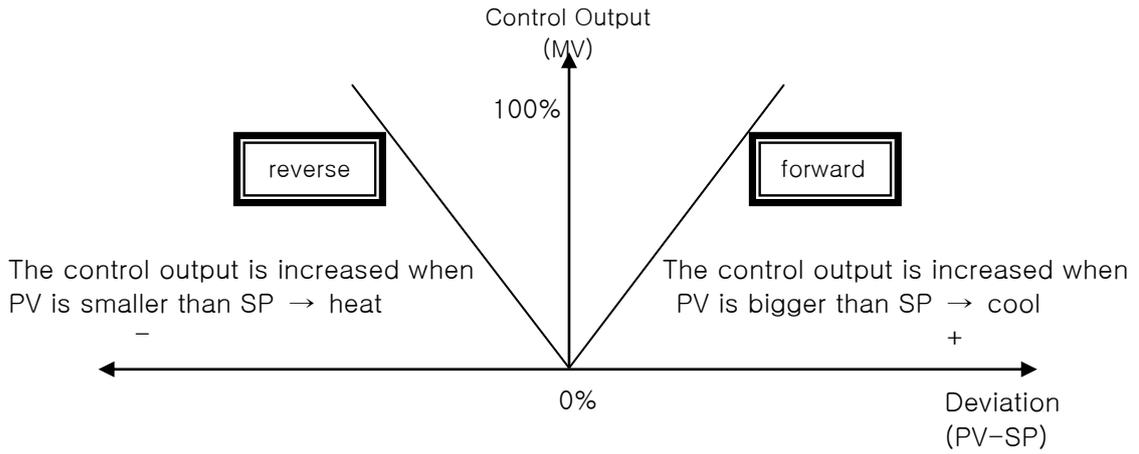
[Pic. 12-7] The second screen for output setup

- ① It sets the motion type of PID control in high temperature room.  
 ☞ Refer to [4.1.2.1 Operation direction]
- ② When the control output in high temperature room is “SSR(SOLID STATE RELAY)”, it sets the cycle for control output motion.
- ③ When the operation is stopped(STOP) or the sensor is open (S.OPN), it cuts the output of PID and outputs the emergency power.
- ④ It sets the overcharge prevention rate which is applied when the overcharge prevention function is on.  
 ☞ Refer to [4.1.2.3 Overcharge prevention]
- ⑤ Use to control the PID data at once depending on the characteristics of the system after autotuning.  
 ☞ Control output = PID x Control time constant (Gain)  
 ☞ Refer to [4.1.2.4 Control time constant]
- ⑥ It sets the motion type of PID control in low temperature room.
- ⑦ When the control output in high temperature room is “SSR(SOLID STATE RELAY)”, it sets the cycle for control output motion.
- ⑧ When the operation is stopped(STOP) or the sensor is open (S.OPN), it cuts the output of PID and outputs the emergency power.
- ⑨ It sets the overcharge prevention rate which is applied when the overcharge prevention function is on.
- ⑩ Use to control the PID data at once depending on the characteristics of the system after Auto tuning.

Table 4-2. The second screen parameter for output setup

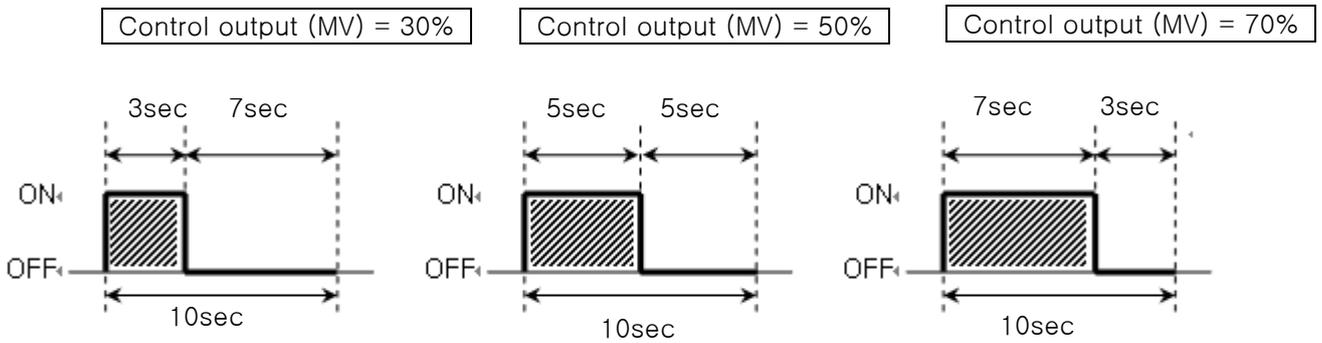
Parameter	Setup Range	Unit	Initial Value
HIGH TEMP. ROOM DIRECT	REVERSE, FORWARD	ABS	REVERSE
HIGH TEMP. ROOM CYCLE TIME	1~300 SEC	ABS	1
HIGH TEMP. ROOM PRESET OUTPUT	-5.0~105.0%	%	0.0
HIGH TEMP. ROOM ARW	0.0(AUTO) ~ 200.0%	%	100.0
HIGH TEMP. ROOM AT-GAIN	0.1~10.0	ABS	1.0
LOW TEMP. ROOM DIRECT	REVERSE, FORWARD	ABS	REVERSE
LOW TEMP. ROOM CYCLE TIME	1~300 SEC	ABS	1
LOW TEMP. ROOM PRESET OUTPUT	-5.0~105.0%	%	0.0
LOW TEMP. ROOM ARW	0.0(AUTO) ~ 200.0%	%	100.0
LOW TEMP. ROOM AT-GAIN	0.1~10.0	ABS	1.0

4.1.2.1 Motion Direction



4.1.2.2 Output cycle

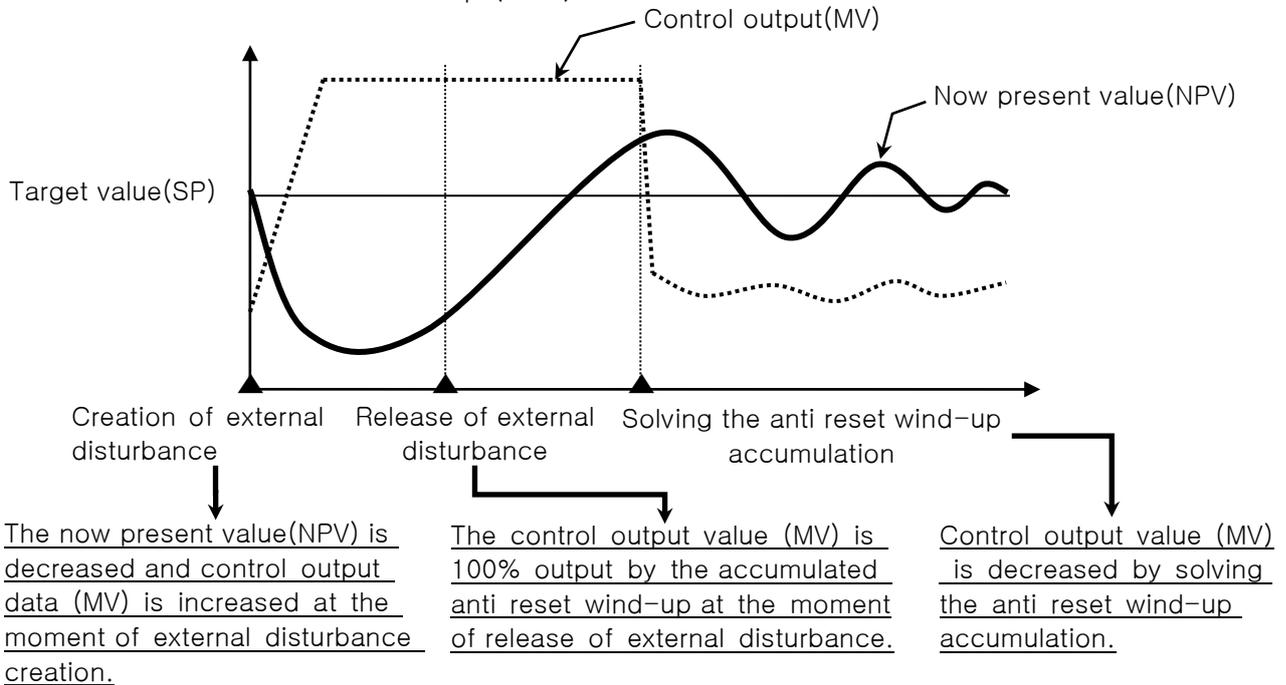
- ▶ It is applied when the control output type is “SSR (Solid State Relay)”.
- ▶ It means the time of 1 cycle of “ON/OFF” in the set time.
- ▶ “SSR” when output period is 10 seconds



4.1.2.3 Anti reset wind-up

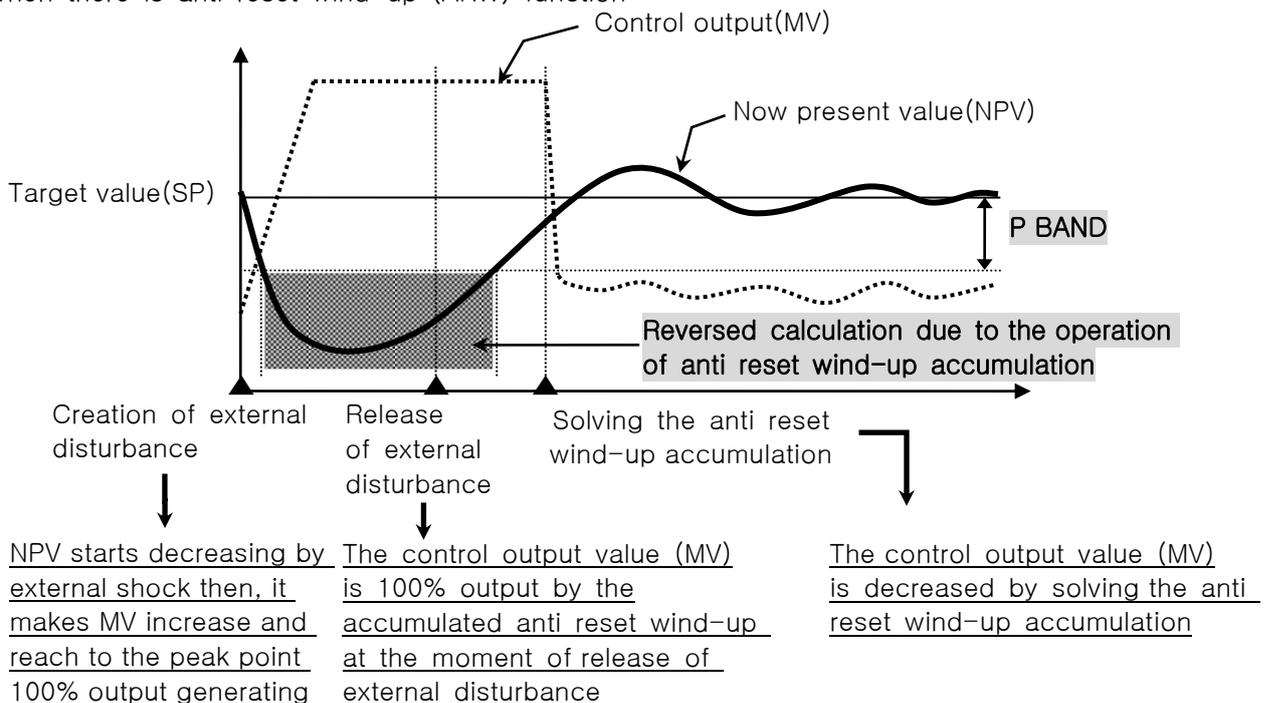
- ▶ It is one of the methods for effective control in case of external disturbance.
  - ☞ It is a function to inhibit the over shoot by anti reset wind-up when the control output reached to the maximum point.
- ▶ When I = 0, it is not operated in the PID setting data.

☞ When there is no anti reset wind-up (ARW) function



- ▶ The over shoot is big as the time to solve the anti reset wind-up accumulation gets longer even though the external disturbance is released and it takes time for now present value to be stabilized.

☞ When there is anti reset wind-up (ARW) function



Reverse calculate the integral term until NPV enters  $\pm P$  BAND, and reduce the integral term dissolve time after disturbance released. It reduce overshoot, and NPV is stabilized quickly.

## ◆ Ex)

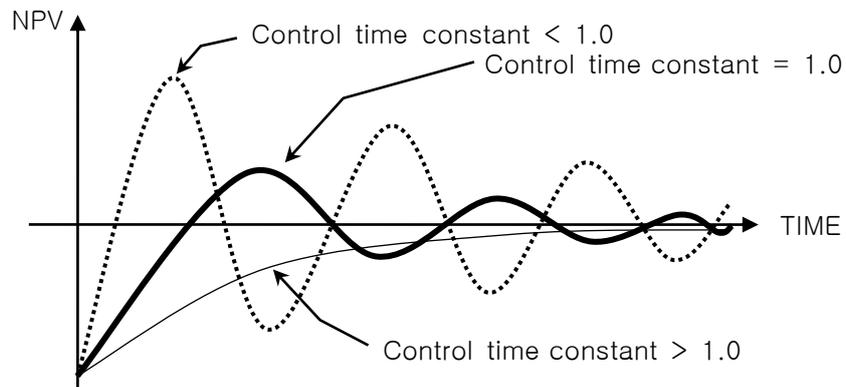
what is the P Band for input upper limit (RH) = 100.0°C, Input lower limit (RL) = -100.0°C, Proportional band (P) = 10.0%, anti reset wind-up (ARW) = 200%?

Answer)

- ① Input range Control upperconstant (RH) - Input lower limit (RL)  
= 100.0°C - (-100.0°C) = 200.0°C
- ② Input range Proportionaltime band (P) = 200.0°C x 10.0% = 20.0°C
- ③ **P Band** = ② x Anti reset=wind-up (ARW) = 20.0°C x 200% = 40.0°C

## 4.1.2.4 Control time constant

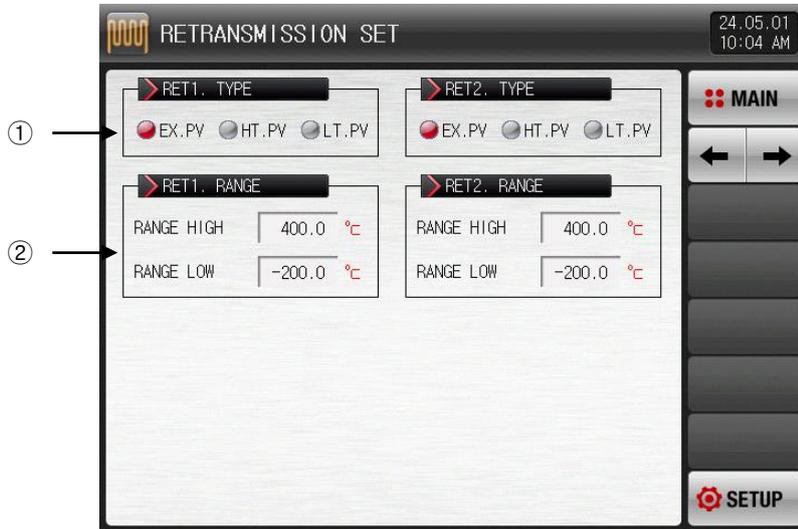
- ▶ It is used to change the control characteristics based on the set PID value after auto tuning.
- ▶ It can control the control time constant depending on the object of control and characteristics.
  - ☞ Control time constant < 1.0  
The response speed is fast, but the hunting is severe.
  - ☞ Control time constant > 1.0  
The over shoot is reduced, but the response speed becomes slower.



## 4.2 Transmission Output Setup

### 4.2.1 The third screen for output setup

- ▶ This is the screen to set the type of transmission output.
- ▶ The transmission output can be selected and set among PV of experiment, high and low temperature room.



[Pic. 4-8] The third screen for output setup

- ① It sets the output type of transmission 1 and 2.
- ② It sets the lowest and highest output range of transmission 1 and 2.

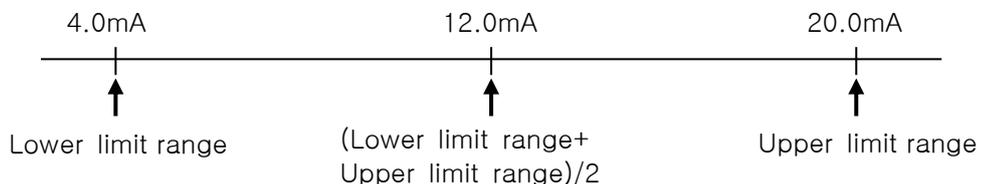
Table 12-3. The third screen parameter for output setup

Parameter	Setup Range	Unit	Initial Value
RET. TYPE	Experiment PV, High temp. PV, Low temp. PV	ABS	Experiment PV
RET. RANGE HIGH	EU(0.0~100.0%) RET. Range Low < RET. Range High	EU	EU(100.0%)
RET. RANGE LOW		EU	EU(0.0%)

### 4.2.2 Output depending on the transmitting type.

- ▶ The transmitting output is in 4~20mA.
- ▶ Set after attaching the 250Ω resistor (Accurate resistor) at both ends of transmitting output when 1~5 V is used for transmitting output.

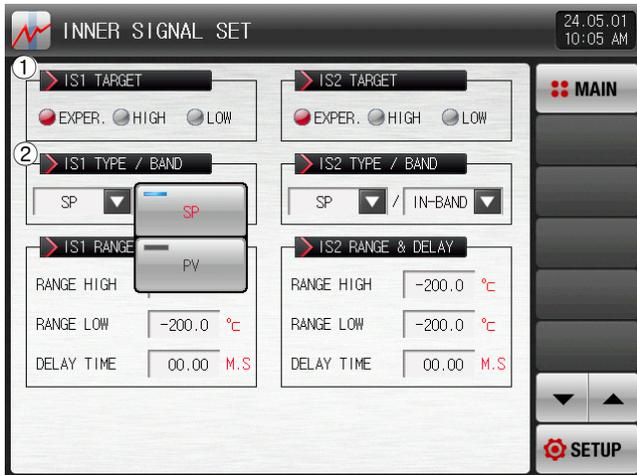
☞ When the type of transmission output is one of experiment PV, high temp. PV and low temp. PV,



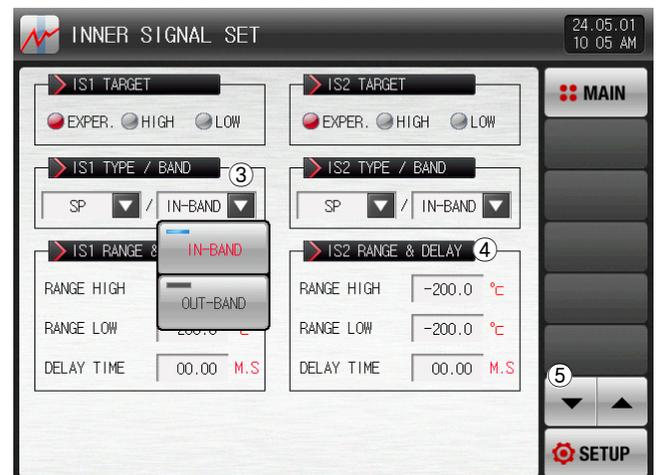
## 5. Inner signal

### 5.1 Inner signal setup

- ▶ It is a screen to set the object of application, type and operation of each inner signal.
- ▶ Setting of 16 (IS1~IS16) inner signal operations is available.
- ▶ The operation range and delay time of inner signal can be set in [Pic. 5-1] The first setup screen for inner signal, [Pic. 5-2] The second setup screen for inner signal

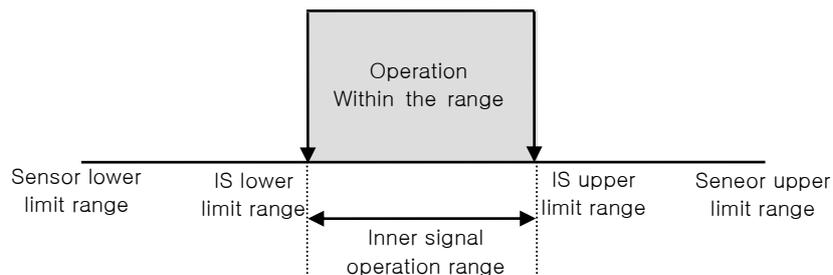


[Pic. 5-1] The first setup screen for inner signal

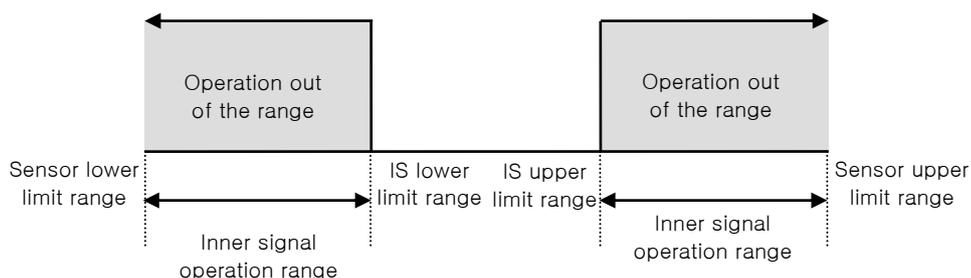


[Pic. 5-2] The second setup screen for inner signal

- ① It sets the subject to apply the inner signal.
- ② Setting the application type of inner signal.
  - ☞ SP : Present set value
  - ☞ PV : Present value
    - It has EUS 0.5% fixed hysteresis when PV is selected.
- ③ Setting of inner signal band
  - ☞ IN-BAND : The operation of inner signal is “ON” when the selected application from application type of inner signal (SP, PV) is located in of the upper and lower limit of operation range.



- ☞ OUT-BAND : The operation of inner signal is “ON” when the selected application from application type of inner signal (SP, PV) is located out of the upper and lower limit of operation range.



- ④ Setting of the upper, lower limit of the operation range and delay time.
- ▶ Delay time : Setting of the delay time to be applied in inner signal operation
  - ▶ hysteresis : This is the deviation applied when the inner signal is outside the operating range.  
It is displayed only when the inner signal application type is PV and does not operate when set to EUS (0.0%).
- ⑤ The screen is moved up/down with 2 inner signal units.

Table 5-1. The setup parameter for inner signal

Parameter		Setup Range	Unit	Initial Value
IS #n TARGET		Experiment room High temp. room Low temp. room	ABS	Experiment room
IS #n TYPE		SP, PV	ABS	SP
IS #n BAND		IN-BAND, OUT-BAND	ABS	IN-BAND
IS #n RANGE	RANGE HIGH	EU(0.00~100.00%) IS #n Range Low≤ IS #n Range High	EU	IS #n RANGE
	RANGE LOW		EU	
Delay time		00.00~99.59 (MIN.SEC)	ABS	00.00
hysteresis		EUS(0.0~5.0%)	EUS	EUS(0.5%)

\* It can be set #n = 1 ~ 16

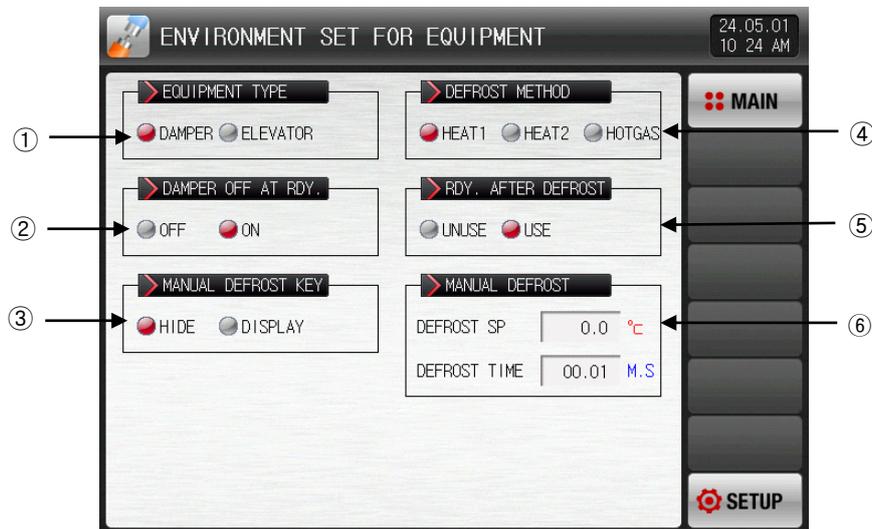
## 5.2 Inner signal operation

▶ The inner signal motion according to the predetermined value	
Setting	Inner signal operation
<ul style="list-style-type: none"> <li>▶ Sensor range = 0.0~100.0 → EUS 0.5% = 0.5</li> <li>▶ Application subject = Experiment room</li> <li>▶ Application type = PV</li> <li>▶ Range Highest = 50.0°C</li> <li>▶ Range Lowest = 30.0°C</li> <li>▶ Motion range = IN-BAND</li> <li>▶ Delayed time = 00.00</li> </ul>	
<ul style="list-style-type: none"> <li>▶ Sensor range = 0.0~100.0 → EUS 0.5% = 0.5</li> <li>▶ Application subject = Experiment room</li> <li>▶ Application type = PV</li> <li>▶ Range Highest = 50.0°C</li> <li>▶ Range Lowest = 30.0°C</li> <li>▶ Motion range = OUT-BAND</li> <li>▶ Delayed time = 00.00</li> </ul>	
<ul style="list-style-type: none"> <li>▶ Sensor range = 0.0~100.0 → EUS 0.5% = 0.5</li> <li>▶ Application subject = Experiment room</li> <li>▶ Application type = SP</li> <li>▶ Range Highest = 50.0°C</li> <li>▶ Range Lowest = 30.0°C</li> <li>▶ Motion range = IN-BAND</li> <li>▶ Delayed time = 00.10</li> </ul>	
<ul style="list-style-type: none"> <li>▶ Sensor range = 0.0~100.0 → EUS 0.5% = 0.5</li> <li>▶ Application subject = Experiment room</li> <li>▶ Application type = SP</li> <li>▶ Range Highest = 50.0°C</li> <li>▶ Range Lowest = 30.0°C</li> <li>▶ Motion range = OUT-BAND</li> <li>▶ Delayed time = 00.10</li> </ul>	

## 6. Configuration Setup for Equipment

### 6.1 Configuration Setup for Equipment

#### 6.1.1 The setup screen for configuration



[Pic. 6-1] The setup screen for configuration

- ① It sets the type of equipment.
- ② It sets the usage of damper OFF output motion in the ready operational.
- ③ It sets the manual defrosting button display in the operational screen.
- ④ It sets the type of defrosting operation.
  - ☞ Heater1 : It operates the defrosting during the defrosting set time.
  - ☞ Heater2 : It operates the defrosting during the defrosting set time from the defrosting predetermined value = Low temperature room command.
  - ☞ Hot gas : The defrosting output is “ON” during the defrosting set time.
- ⑤ It sets the stand-by motion after the defrosting with “Heater1” and “Heater2”.
- ⑥ It sets the set time and motion time in the manual defrosting operation.

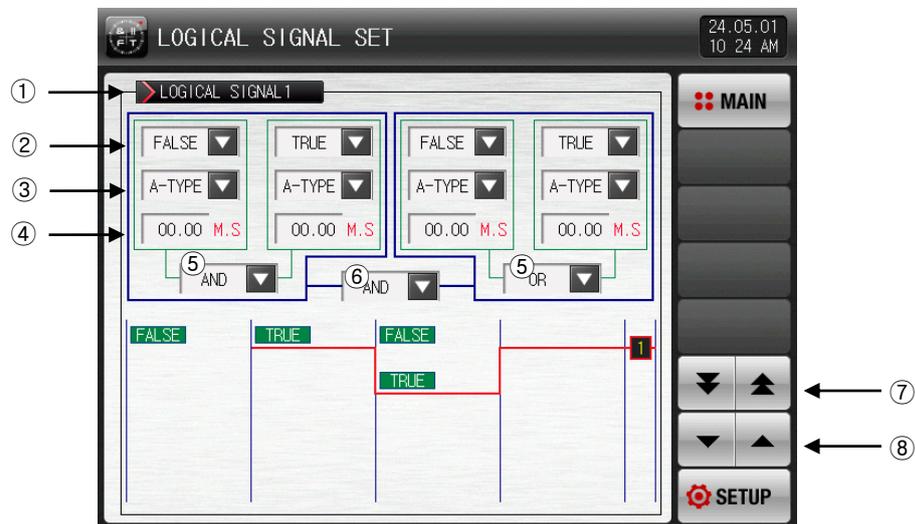
Table. 6-1. The parameter for configuration setup

Parameter	Setup Range	Unit	Initial Value
EQUIPMENT TYPE	DAMPER, ELEVATOR	ABS	DAMPER
DAMPER OFF AT RDY.	OFF, ON	ABS	ON
MANUAL DEFROST KEY	HIDE, DISPLAY	ABS	HIDE
DEFROST METHOD	HEAT1, HEAT2, HOTGAS	ABS	HEAT1
RDY AFTER DEFROST	UNUSE, USE	ABS	USE
DEFROST SP	Limit low defrost ~ Limit high defrost	EU	0.0
DEFROST TIME	00.01 ~ 99.59(MIN.SEC)	ABS	00.01

## 7. Logic signal

### 7.1 Logic signal setting

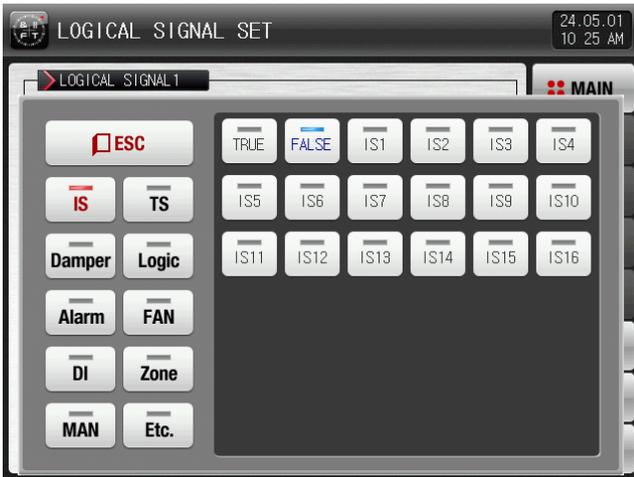
- ▶ It is a screen to set the logic signal.
- ▶ The logic signal can be set up to 32



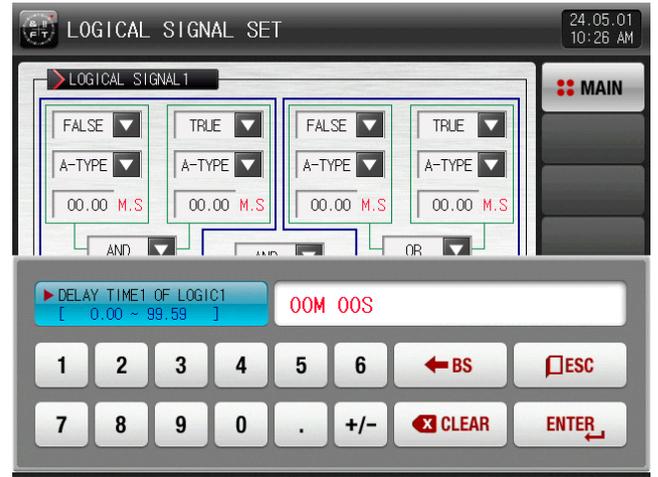
[Pic. 7-1] Logic signal setting screen

- ① Set to operation condition for logic signal
- ② Select to applicable object of logic signal
  - ☞ Refer to [Table 7-1]
- ③ Set to output method of application of the operation signal
  - ☞ A-Contact : Output contact is connected, when signal of applicable object is activated
  - ☞ B-Contact : Output contact is disconnected, when signal of applicable object is activated
- ④ Set to delay time when the output of the application of the logic signal is activated
- ⑤ Set to applicable operator when logic signal works.
- ⑥ Set to applicable operator for two logic groups calculated from number ⑤
- ⑦ Moving to the next or previous screen of eight using the up/down button
- ⑧ Moving to the next or previous screen using the up/down button

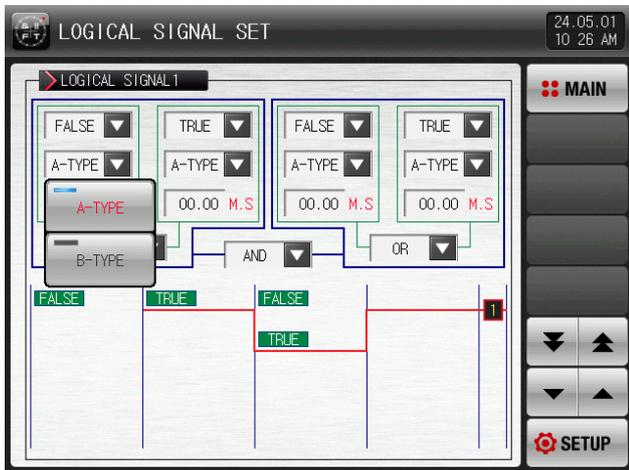
- ▶ It does not apply to delay time and method of output when selecting a TRUE / FALSE



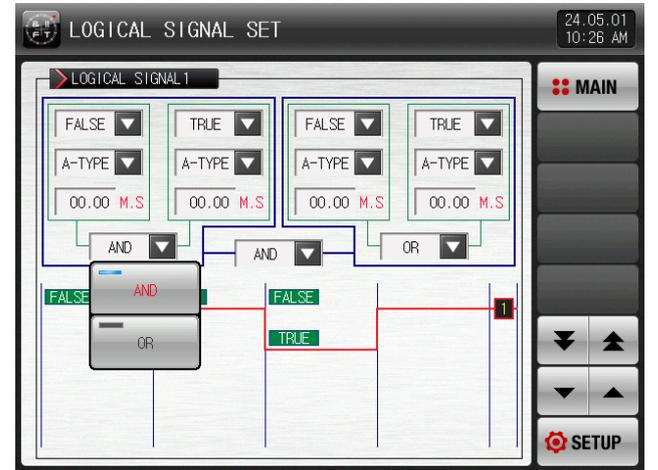
[Pic. 7-2] Applicable object of logic signal setting screen



[Pic. 7-3] Setting screen of the sensing method of the logic signal



[Pic. 7-4] Logic signal delay time setting screen



[Pic. 7-5] Logic signal operator setting screen

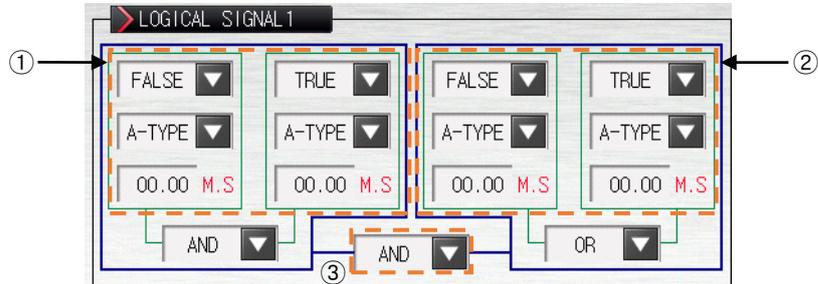
Table 7-1. Forms of logic signal parameter

Parameter	Setting range		Unit	data
	Display	Logic type		
Logic signal#n applicable object	IS	TRUE, FALSE, IS1 ~ IS16	ABS	FALSE
	TS	TRUE, FALSE, TS1 ~ TS4	ABS	FALSE
	Damper	TRUE, FALSE, HD.ON, HD.OFF, RD.ON, RD.OFF, LD.ON, LD.OFF	ABS	FALSE
	LOGIC	TRUE, FALSE, LOG1 ~ LOG32	ABS	FALSE
	ALARM	TRUE, FALSE, AL1 ~ AL8	ABS	FALSE
	FAN	TRUE, FALSE, H.FAN, R.FAN, L.FAN	ABS	FALSE
	DI	TRUE, FALSE, DI1 ~ DI16	ABS	FALSE
	Zone	TRUE, FALSE, H.ZONE, R.ZONE, L.ZONE	ABS	FALSE
	MAN	TRUE, FALSE, MAN1~MAN12	ABS	FALSE
ETC.	TRUE, FALSE, RUN, H.SOPN, L.SOPN, EXSOPN, H.WAIT, L.WAIT, PTEND, N2GAS, DFR, ERROR, 1.REF, 2.REF, U-KEY, SOL.V	ABS	FALSE	
Logic signal#n output method	A-Contact, B-Contact		ABS	A-Contact
Logic signal#n delay time	00.00 ~ 99.59 (MIN.SEC)		ABS	00.00
Logic signal#n operator	AND, OR		ABS	AND

\* #n : 1 ~ 32

## 7.2 Logic signal operation

- ▶ AND : When both ON, the logic output relay is “ON”
- ▶ OR : Arithmetic output relay is “ON” , when more than one of logic signal object outputs are “ON” .
- ▶ TRUE : Outputs of logic signal applicable object are calculated to “ON”
- ▶ FALSE : Outputs of logic signal applicable object are calculated to “OFF”



[Pic. 7-6] Operating mode of logic group signal

☞ When select to B-contact as output condition, operation of the ON / OFF is reversed

Example) Logic group signal parameter

①

Logic group 1		Output
IS1	T.RUN	
OFF	OFF	OFF
OFF	ON	OFF
ON	OFF	OFF
ON	ON	ON

<Logic group 1 AND Output>

②

Logic group 2		Output
AL1	U-KEY	
OFF	OFF	OFF
OFF	ON	ON
ON	OFF	ON
ON	ON	ON

<Logic group 2 OR Output>

③

Logic group 1 Output <AND> Logic group 2 Output		Output
Logic group 1 Output	Logic group 2 Output	
OFF	OFF	OFF
OFF	ON	OFF
ON	OFF	OFF
ON	ON	ON

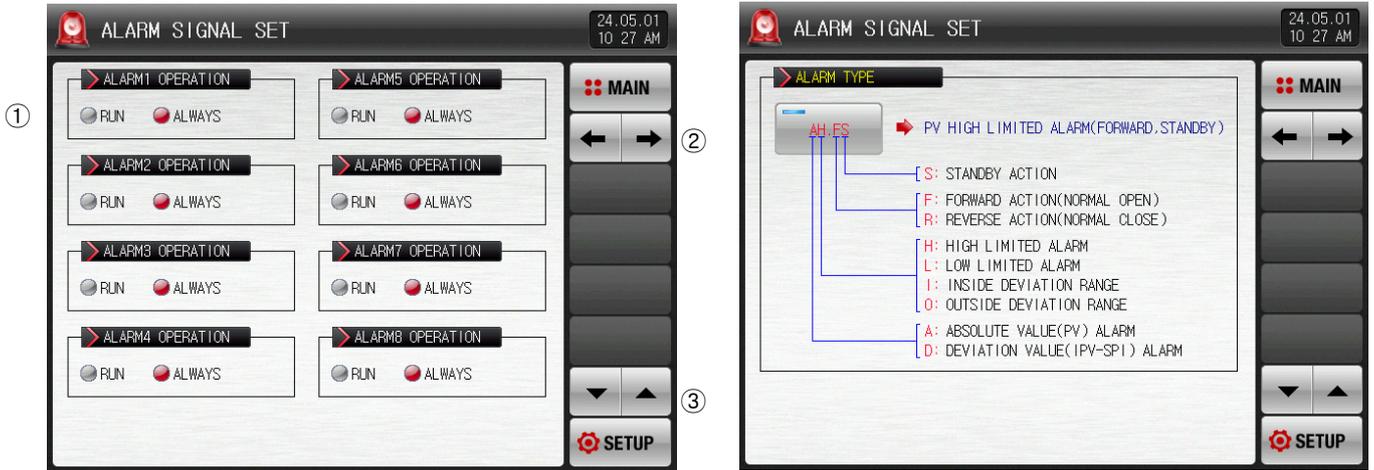
<Logic group 1 and Logic group 2 AND Output>

## 8. Alarm signal

### 8.1 Alarm signal setting

#### 8.1.1. The first screen for alarm signal setup

► This is the screen to set the alarm signal.



[Pic. 8-1] The first screen for alarm signal setup

① Setting of alarm operation

- ☞ Run : The alarm operation is performed only during operation.
- ☞ ALWAYS : The alarm operation is performed always regardless of operation/stop.

② Moving from current screen to next screen

Table 8-1. The first screen parameter for alarm signal setup

Parameter	Setup Range	Unit	Initial Value
ALARM OPERATION	RUN, ALWAYS	ABS	ALWAYS

### 8.1.2 The second screen for alarm signal setup

- ▶ This is the screen to set the alarm signal.
- ▶ It can set 8 signals.
- ▶ The alarm signal is activated by the setup in the alarm type, and there are 20 kinds of alarms.



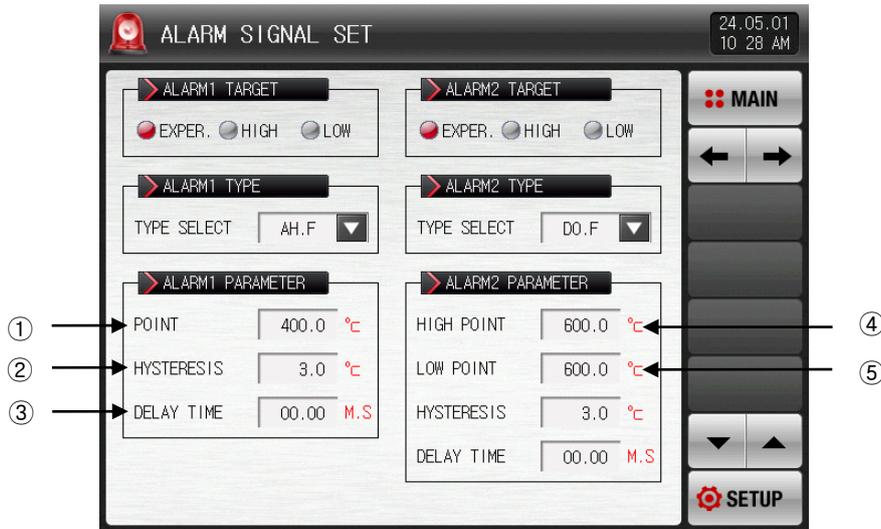
[Pic. 8-2] The second screen for alarm signal setup-1



[Pic. 8-3] The second screen for alarm signal setup-2

- ① It sets the subject to apply the alarm signal. (Experiment room, High temp. room, Low temp. room )
- ② It sets the subject of alarm signal.
- ③ The screen is moved up/down with 2 alarm signal units.
- ④ Select the type of alarm signal.  
 ➤ Refer to [Table 8-3 The Alarm Type].

- ▶ When the alarm type was set in AH.F and DO.F in [Pic. 8-3 The second screen for alarm signal setup-2], the following screen is displayed.



[Pic. 8-4] The second screen for alarm signal setup-3

- ① Setting of alarm setting data.
- ② Setting of hysteresis data to be applied to release after alarming.
- ③ Setting of delay time to be applied during alarm signal operation.
- ④ Setting of upper limit deviation data in alarming for deviation.
- ⑤ Setting of lower limit deviation data in alarming for deviation

Table 8-2. The second screen for alarm signal setup

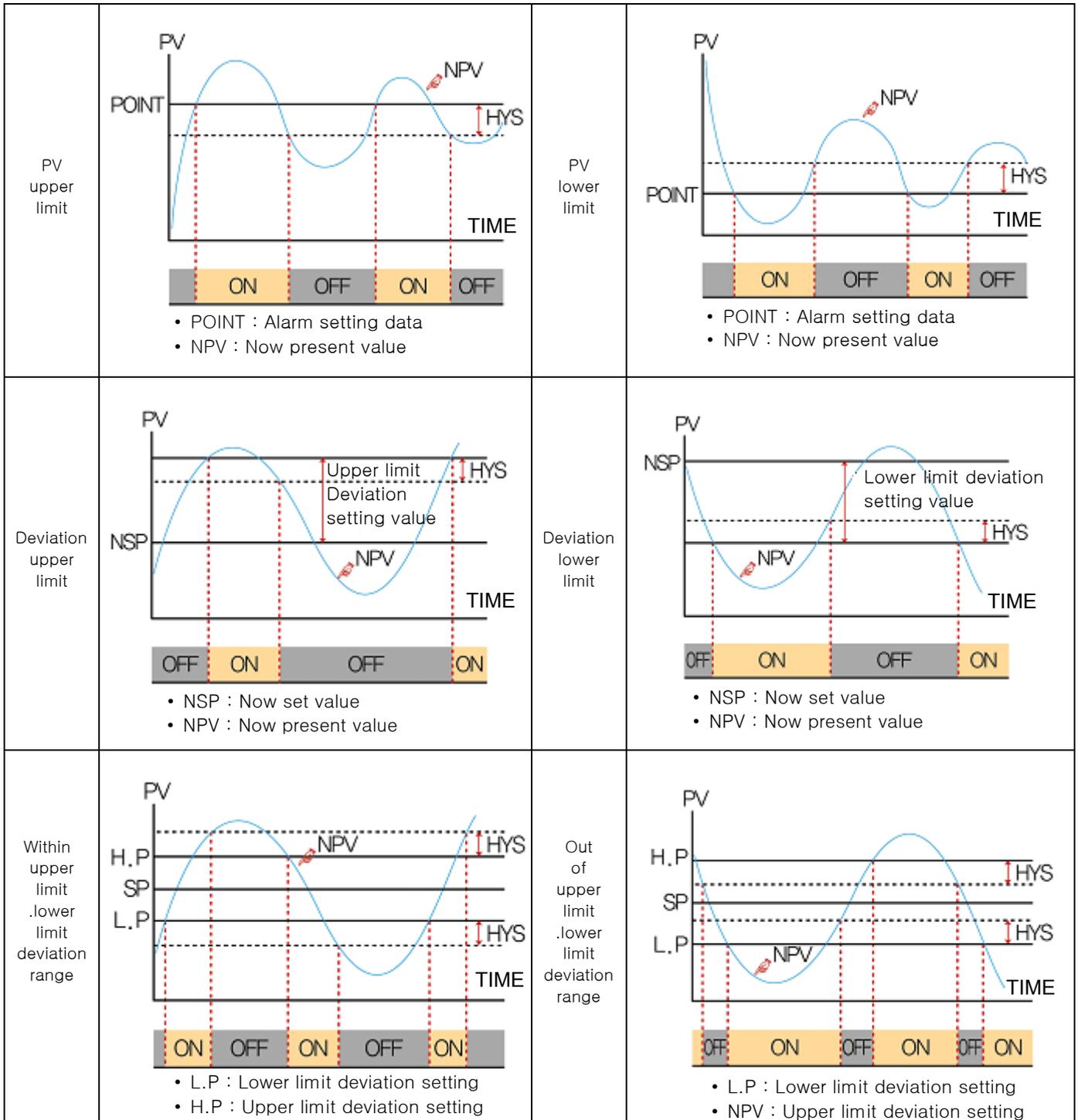
Parameter	Setup Range	Unit	Initial Value
ALARM#n TARGET	Experiment room High temperature room Low temperature room	ABS	Experiment room
ALARM#n TYPE	No use, AH.F, AL.F, DH.F DL.F, DH.R, DL.R DO.F, DI.F, AH.R AL.R, AH.FS, AL.FS DH.FS, DL.FS, DH.RS DL.RS, DO.FS, DI.FS AH.RS, AL.RS	ABS	No use
ALARM#n PARAMETER	EU(-5.0~105.0%)	EU	EU(100.0%) (Alarm#n Type = In case it is not the deviation alarm)
ALARM#n HIGH POINT	EUS(-100.0~100.0%)	EUS	EUS(0.0%) (Alarm EUS(0.0%) (Alarm#n Type = In case it is the deviation alarm)
ALARM#n LOW POINT		EUS	
ALARM#n HYSTERESIS	EUS(0.0~100.0%)	EUS	EUS(0.5%)
ALARM#n DELAY TIME	0.00~99.59 (MIN.SEC)	ABS	00.00

\* #n : 1 ~ 8

Table 8-3. Alarm type

Display	Alarm type		Output direction		Standby motion	
	Absolute data operation	Deviation motion	Normal operation	Reverse operation	Yes	No
AH.F	Indicated data upper limit		■		■	
AL.F	Indicated data lower limit		■		■	
DH.F		Deviation upper limit	■		■	
DL.F		Deviation lower limit	■		■	
DH.R		Deviation upper limit		■	■	
DL.R		Deviation lower limit		■	■	
DO.F		Out of upper limit.lower limit deviation range	■		■	
DI.F		Within upper limit.lower limit deviation range	■		■	
AH.R	Indicated data upper limit			■	■	
AL.R	Indicated data lower limit			■	■	
AH.FS	Indicated data upper limit		■			■
AL.FS	Indicated data lower limit		■			■
DH.FS		Deviation upper limit	■			■
DL.FS		Deviation lower limit	■			■
DH.FS		Deviation upper limit		■		■
DL.RS		Deviation lower limit		■		■
DO.FS		Out of upper limit.lower limit deviation range	■			■
DI.FS		Within upper limit.lower limit deviation range	■			■
AH.RS	Indicated data upper limit			■		■
AL.RS	Indicated data lower limit			■		■

## 8.2 Alarm signal operation

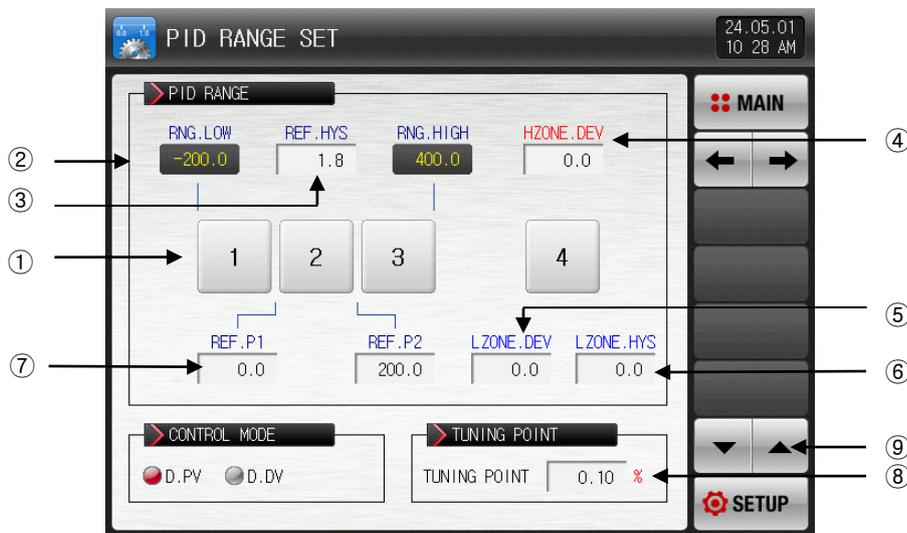


## 9. PID group

### 9.1 PID application scope setup

#### 9.1.1 The first setup screen for PID application range

- ▶ It consists of 4 PIDs.
- ▶ In the operation, the high temperature room is displayed as red and the low temperature room is displayed as blue on that PID number.



[Pic. 9-1] PID application range setting screen #1

- ① Press the number to move to the setup screen of the corresponding PID group.
  - ☞ Press  $\leftarrow \rightarrow$  button to move to the setup screen of PID group.
- ② Range Highest, Range Lowest : It displays the section to the SPAN.
  - ☞ It is only for read so it cannot be changed.
- ③ Boundary value HYS: It sets the hysteresis range which is applied if change PID number during the operation.
- ④ High temperature room DEV: It sets the deviation value to use PID deviation during the operation in high temperature room.(DEV:0.0 setup means no motion)  
 $|SP - PV| >$  In the high temperature room DEV, it controls as PID 4 group.
- ⑤ Low temperature room DEV: It sets the deviation value to use PID deviation during the operation in low temperature room.(DEV:0.0 setup means no motion)  
 $|SP - PV| >$  In the low temperature room DEV, it controls as PID 4 group
- ⑥ Low temperature room HYS: When operate as low temperature room deviation PID(PID4), it sets the hysteresis range which is applied if change to zone PID.
- ⑦ Boundary value 1~2: It sets the boundary value to classify zone PID to all range.
- ⑧ Tuning standard value: It set the auto tuning point which is applied in auto tuning.
- ⑨ The page is moved up/down at this screen.

Table 9-1. The first screen parameter for PID group setup

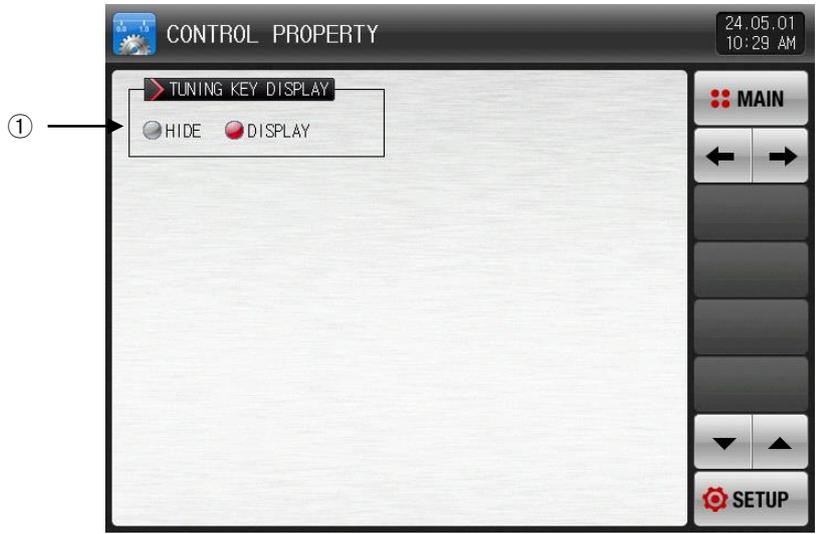
Parameter	Setting range	Unit	Initial data
REF. P1	Range Lowest ≤ REF.P1 < REF.P2 ≤ Range Highest	EU	Range Lowest + (Range Lowest + Range Highest)/3
REF. P2		EU	Range Lowest + 2(Range Lowest + Range Highest)/3
REF. HYS	EUS(0.0 ~ 10.0%)	EUS	EUS(0.3%)
H ZONE. DEV	EUS(0.0 ~ 20.0%)	EUS	EUS(0.0%)
L ZONE. HYS	EUS(0.0 ~ 20.0%)	EUS	EUS(0.0%)
CONTROL MODE	D.PV, D.DV	ABS	D.PV
TUNING POINT	0.01 ~ 1.00%	%	0.10

► Operation example depending on PID control method.

D.DV control	Explanation
	<ul style="list-style-type: none"> <li>► The overshoot is small in D.DV control because the control output data(MV) changing rate is less moved and the time to reach to the target set value (TSP) is a little bit delayed.</li> <li>► It is good if it is applied to the equipment reacting sensitively to the control output data(MV) changing rate.</li> </ul>
D.PV control	Explanation
	<ul style="list-style-type: none"> <li>► The overshoot is small in D.DV control because the control output data(MV) changing rate is big and the time to reach to the target set value (TSP) is speedier than D.DV control</li> <li>► It is good if it is applied to the equipment reacting sensitive to the control output data(MV) changing rate.</li> </ul>

9.1.2 The second screen for PID application range setup

► This is the screen to set the parameter related control features in case of PID control



[Pic. 9-2] The second screen for PID application range setup

① It sets the usage of auto tuning in the operational screen.

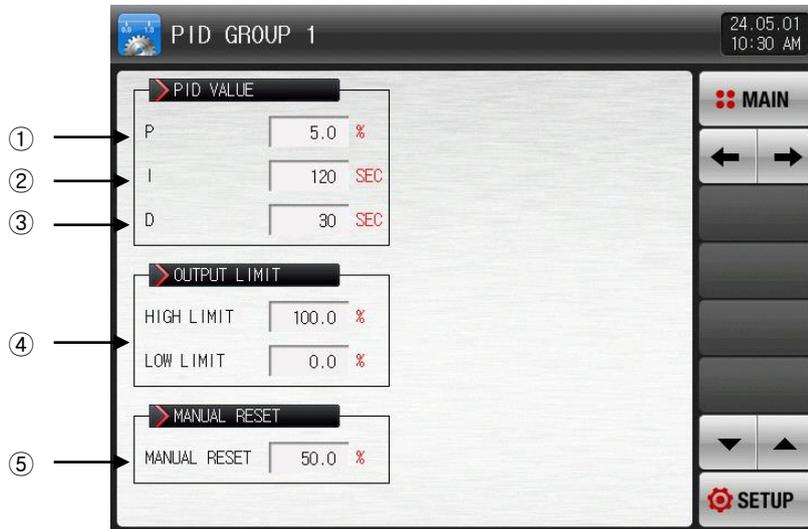
Table 9-2 The second screen parameter for PID group setup

Parameter	Setup Range	Unit	Initial value
TUNING KEY	HIDE, DISPLAY	ABS	DISPLAY

## 9.2 PID Group Setup

### 9.2.1 The screen for PID group setup

- ▶ It is a screen to set the details for each PID group
- ▶ PID group is set from 1 to 4.



[Pic 9-3] The screen for PID group setup

- ① Proportion (P) : It controls to the direction to reduce the deviation between Set Value (SP) and Present Value (PV).
    - ☞ When proportion integer is large, indication value (PV) approaches quickly to set value (SP). However it may have a negative influence on the stability of control due to the control output (MV) fluctuation.
    - ☞ When proportion integer is small, indication value (PV) approaches slowly and stably to set value (SP), but it may cause residual deviation.
  - ② Integral time (I) : When the integral time becomes longer, the time to approach to the set value (SP) is extended as the control output value (MV) becomes smaller. When the integral time becomes shorter, the time to approach to the set value (SP) is shortened as the control output value (MV) becomes larger. The integral motion removes the residual deviation to be created in poperation.
    - ☞ The control is impossible when the integral time is too short.
  - ③ Derivative (D) time : It prevents the change of deviation (PV-SP) by calculating the control output (MV) corresponding to the deviation (PV-SP) change rate.
    - ☞ The approach to set value (SP) becomes speeder and it prevents the abrupt change or external disturbance in present value (PV).
  - ④ Output high limit·low limit: Setting the upper limit value of the Heating and Cooling in output operation range.
    - ☞ When the output upper limit is changed, it is applied to the control output value (MV) in auto tuning.
  - ⑤ Manual reset : When the integral time(I) is "0" in PID control, it sets the value to be applied to the integral time item manually in PID calculation.
- ▶ Output limit parameter is displayed only when PID control ( $P \neq 0$ ).
  - ▶ When ON / OFF control, HYS parameter is displayed only when ON / OFF control ( $P = 0$ ).

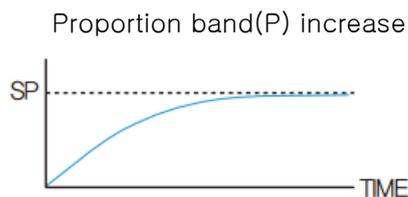
Table 9-3. The screen parameter for PID group setup

Parameter	Setting range	Unit	Initial value
P #n	0.0(ON/OFF control)~1000.0%	%	5.0
I #n	0~6000 SEC	ABS	120
D #n	0~6000 SEC	ABS	30
HIGH LIMIT #n	0.0~100.0 %	%	100.0
LOW LIMIT #n	#n output Low Limit < #n output High Limit	%	0.0
MANUAL RESET #n	-5.0~105.0 %	%	50.0
High HYS. ON/OFF #n	EUS(0.0~10.0%)	EUS	EUS(0.5%)
Low HYS. ON/OFF #n	EUS(0.0~10.0%)	EUS	EUS(0.5%)

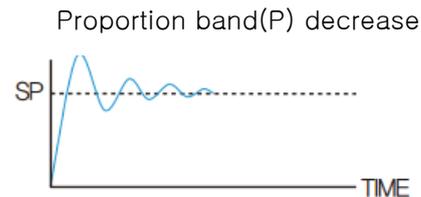
\* #n : 1 ~ 4

\* But, if n=4, the initial value of proportional band, integral time, rate time and the highest and lowest hysteresis of ON/OFF is "0".

- ▶ Proportion band(P) : It controls to the direction to reduce the deviation between Now Present Value (NPV) and target value (SP)

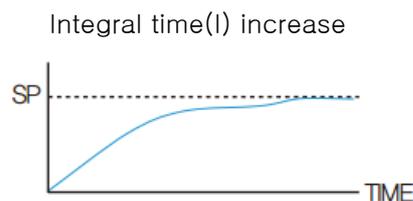


Now Present Value (NPV) approaches to the target value (SP) faster, but overshoot and hunting are taken place.

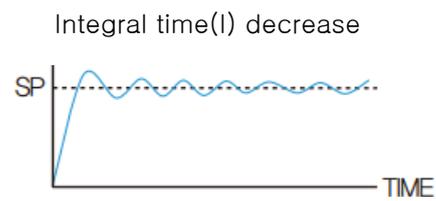


Now Present Value (NPV) approaches slowly to the target value (SP), but overshoot is reduced.

- ▶ Integral time(I) : It controls to the direction to reduce the residual deviation which can be taken place in proportion(P) control

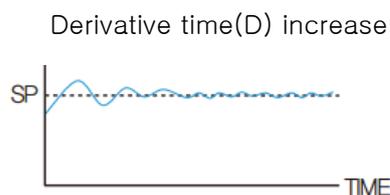


The approaching time of Now Present Value (NPV) to the target value (SP) becomes longer, but overshoot and hunting are reduced

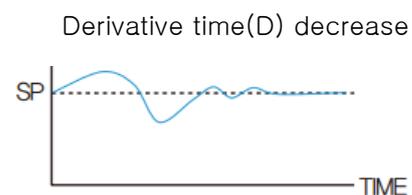


The hunting is created and Now Present Value (NPV) approaches to the target value (SP) faster, but it can reach to the uncontrollable condition

- ▶ Derivative time(D) : It controls to the direction to reduce the changing rate of deviation between the Now Present Value (NPV) and target value (SP) in abrupt temperature change.



The overshoot and undershoot are decreased, but minor hunting can be taken place..

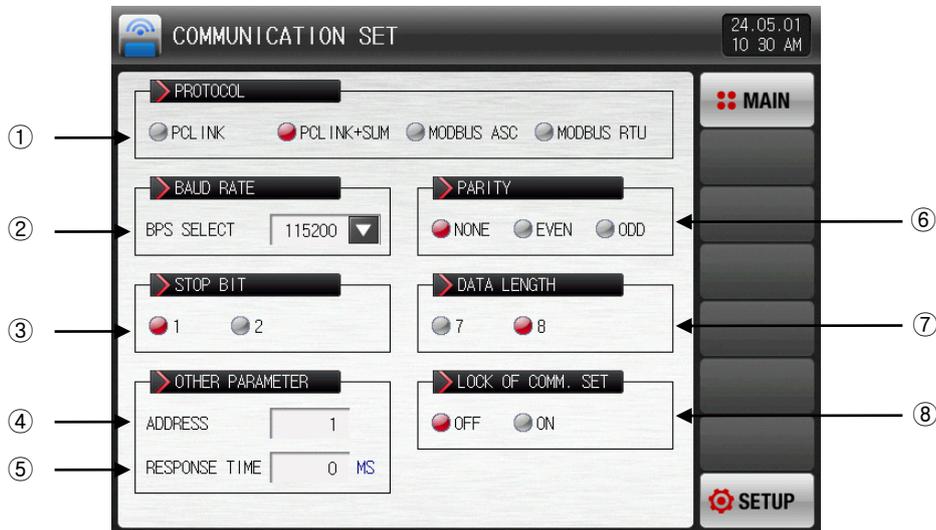


The overshoot and undershoot are created and it takes time for Now Present Value (NPV) to reach to the target value (SP).

## 10. Communication

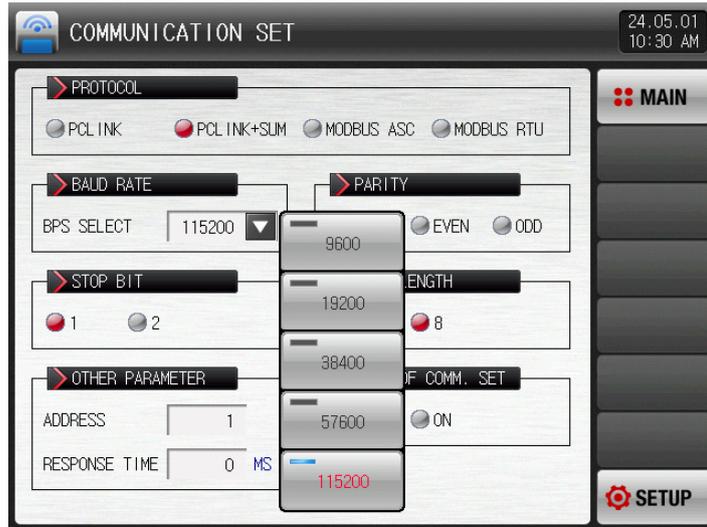
### 10.1 The communication Environment Setup (RS232C / RS485)

- It sets the communication protocol and condition.



[Pic. 10-1] The setup screen for communication environment (RS232C / RS485)-1

- ① It sets the communication protocol.
- ② It sets the communication speed.
  - ☞ Refer to [Pic. 10-2 The setup screen for communication environment(RS232C / RS485)-2]
- ③ It sets the stop beat.
- ④ It sets the communication address.
  - ☞ In case of RS485 communication, it can be used by defining address differently up to maximum 99.
- ⑤ It sets the response time.
- ⑥ It sets the parity.
  - ☞ NONE : No parity
  - ☞ EVEN : Even number parity
  - ☞ ODD : Odd number parity
- ⑦ It sets the data length.
  - ☞ The data length is fixed in 7, when communication protocol is set in MODBUS ASC.
  - ☞ The data length is fixed in 8, when communication protocol is set in MODBUS RTU.
- ⑧ It sets the lock of communication set



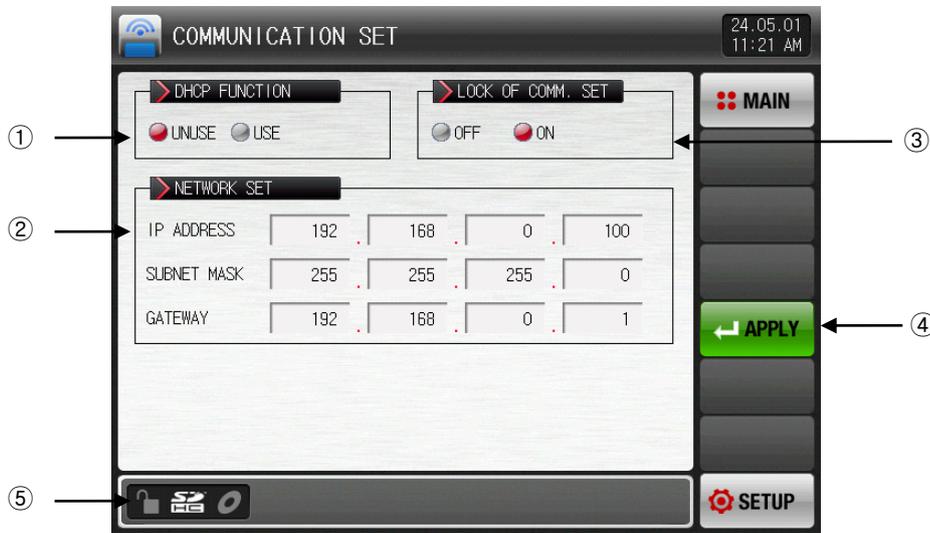
[Pic. 10-2] The setup screen for communication environment (RS232C / RS485)-2

㉨ 10-1. The screen parameter for communication setup

Parameter	Setting range	Unit	Initial value
PROTOCOL	PCLINK, PCLINK+SUM, MODBUS ASC, MODBUS RTU	ABS	PC LINK + SUM
BAUD RATE	9600, 19200, 38400, 57600, 115200	ABS	115200
STOP BIT	1, 2	ABS	1
PARITY	NONE, EVEN, ODD	ABS	NONE
DATA LENGTH	7, 8	ABS	8
ADDRESS	1 ~99	ABS	1
RESPONSE TIME	0~10	ABS	0
Lock of communication set	OFF, ON	ABS	OFF

## 10.2 The communication Environment Setup (Ethernet)

► It sets the communication condition of Ethernet.



[Pic. 10-3] The setup screen for communication environment (Ethernet)

① It sets the usage of DHCP.

☞ When the subject for Ethernet communication has DHCP function, IP address, subnet mask and gateway address is assigned automatically with DHCP.

② When not use DHCP, it sets IP address, subnet mask and gateway.

③ Manual setting of network IP

④ If applied after set IP address, subnet mask and gateway, Ethernet communication is available.

⑤ It displays the communication status of Ethernet.

☞ ETHERNET PARAMETER APPLY : Ethernet normal operation

☞ ETHERNET COMM. READY : Ready for Ethernet

☞ NET ADDRESS ERROR : Incorrect net address

☞ CONNECTION ERROR : No connection of Ethernet cable or in failure

☞ DHCP FAIL : Ethernet communication error

### ㉨ 10-2. The screen parameter for communication setup (Ethernet)

Parameter	Setting range	Unit	Initial value
DHCP FUNCTION	UNUSE, USE	ABS	UNUSE
IP ADDRESS	1 ~ 255	ABS	192.168.0.100
SUBNET MASK	1 ~ 255	ABS	255.255.255.0
GATEWAY	1 ~ 255	ABS	192.168.0.1
Lock of communication set	OFF, ON	ABS	OFF



► When select the option of Ethernet communication, the serial communication using RS232C/485 is not available.

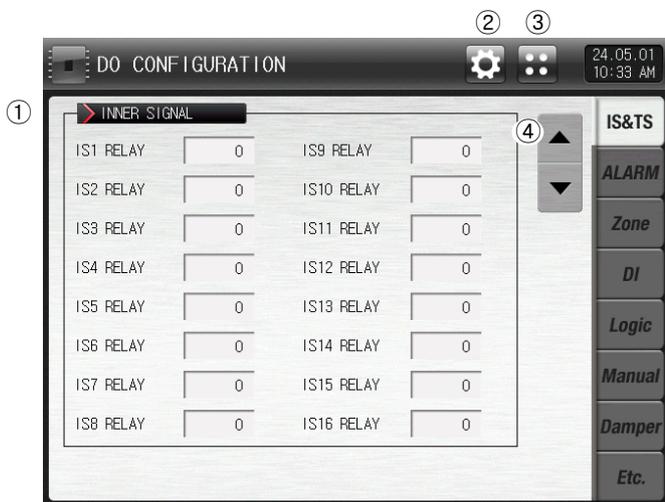
# 11. DO relay output

## 11.1 Relay No. and parameter setting

- ▶ When various states created during operation are output to the I/O relay board, the relay number for the corresponding state is set
- ▶ If the set relay number is duplicated, the relay operates (“OR” condition) when any of the set signals is output.
- ▶ Relay number 13~32 can be used when I/O2 board option is added.
- ▶ Relay numbers 33 to 56 can be used when connecting additional TIO2000-B. (Change DO option in ‘System Initial Settings’ after connecting TIO2000-B)

### 11.1.1 The setup screen for inner signal/time signal relay

- ▶ The relay operates (“OR” condition) when any signal out of the set signals is output when the set relay number is overlapped.



[Pic. 11-1] The setup screen for inner signal



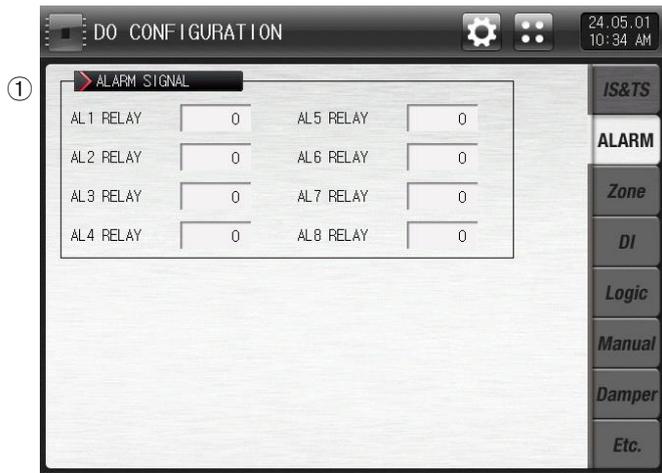
[Pic. 11-2] The setup screen for time signal relay

- ① Setting the relay number of inner signal. (IS1~IS16)
- ② Move to [Pic. 2-3 System parameter setting screen]
- ③ Move to [Pic. 2-1 Main screen]
- ④ Moving from current screen to the next screen
- ⑤ Setting the relay number of time signal. (TS1~TS4)

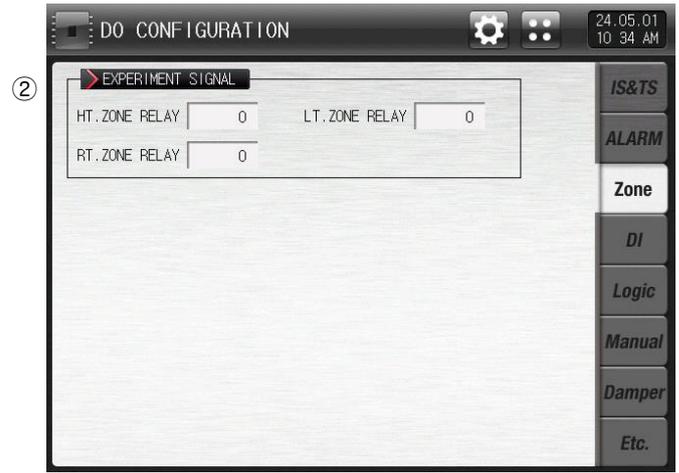
Table 11-1. The setup screen parameter for inner signal/time signal relay

Parameter	Setting range	Unit	Initial data
IS1 ~ IS16 RELAY	0~32	ABS	0
TS1 ~ TS4 RELAY	0~32	ABS	0

11.1.2 The setup screen of alarm signal/ experiment room signal



[Pic. 11-3] The setup screen of alarm signal



[Pic. 11-4] The setup screen of experiment signal

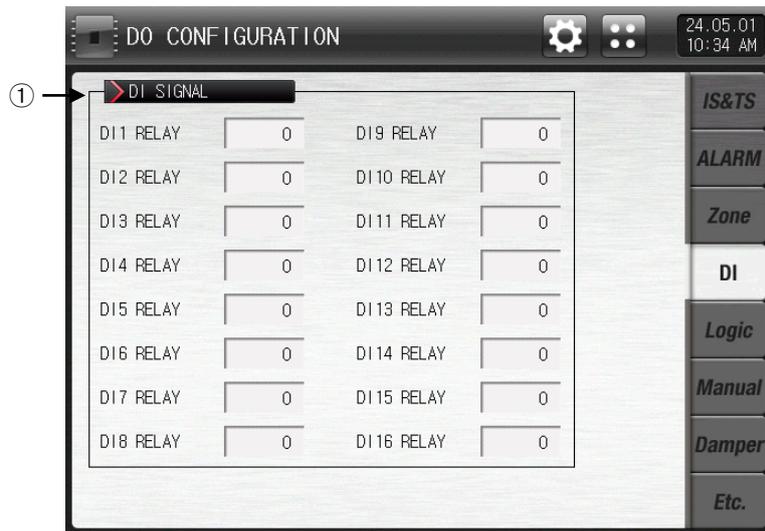
- ① It sets the alarm signal relay. (AL1 ~AL8)
- ② It sets the experiment room signal relay. (High temp. room , Low temp. room , Room temp. room)  
 ☞ The set relay is "ON" depending on the application of experiment room operation.

Table 11-2. The setup screen parameter for alarm signal/ experiment room signal/ fan signal relay

Parameter	Setup Range	Unit	Initial Value
Alarm Signal 1~4 Relay	0~32	ABS	0
EXPERIMENT SIGNAL (High temp. room, Low temp. room, Room temp. room )	0~32	ABS	0

### 11.1.3 The setup screen for DI signal relay

- ▶ It sets the relay number to the DI signal.
- ▶ DI signal transmit the set actual contact point output in DI error creation for corresponding number.



[Pic. 11-5] DI signal relay setting screen

① It sets the DI signal relay.(DI1~DI16)

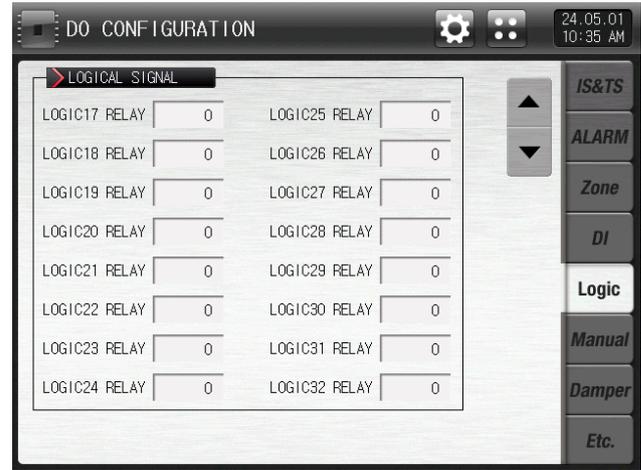
☞ Only when the motion is set as “error” in [12.1.1 DI The first screen for function and motion setup] and [12.1.2 The second screen for DI function and motion setup], DI signal is activated.

Table 11-3. The setup screen parameter for DI signal relay

Parameter	Setting range	Unit	Initial value
DI SIGNAL 1~16 RELAY	0~32	ABS	0

### 11.1.4 The setup screen for logical signal / manual signal

- ▶ It is a screen to set the Logical relay signal.
- ▶ The Logical signal can be set up to 32.



[Pic. 11-6] The setup screen for logical signal -1

[Pic. 11-7] The setup screen for logical signal -2

- ① Setting the relay number of logic signal (Logic relay1 ~Logic relay 32)

Table 11-4 The setup screen parameter for logical signal

Parameter	Setting range	Unit	Initial value
Logic relay1 ~Logic relay 32	0~32	ABS	0

- ▶ It is a screen to set the relay number for manual signal.
- ▶ It is used to transmit a certain relay manually.



[Pic. 11-8] The setup screen for manual signal

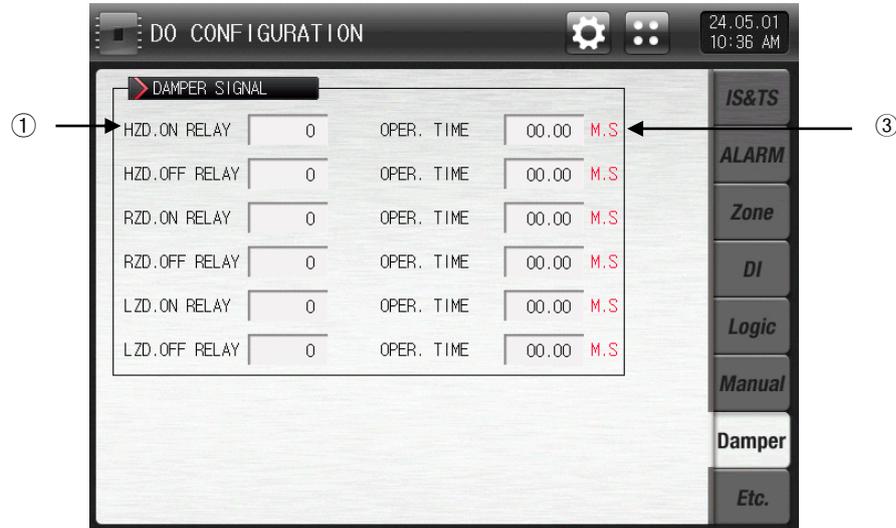
- ① It sets the relay number.
- ② It manually sets the relay of corresponding number as “ON”.
  - ☞ Button motion : After input “5” in manual 1 relay cell, press “manual 1” button to turn on the output of relay 5.

Table 11-5. The setup screen parameter for manual signal

Parameter	Setting range	Unit	Initial value
MAN SIGNAL 1~12 RELAY	0~32	ABS	0

## 11.1.4 Damper Signal Relay Setup

► This is the screen to set the damper signal.



[Pic. 11-9] The first screen for other signal relay setup

① It sets the damper signal relay.

- ☞ HZD. ON RELAY : In the high temperature room operation, set delay is "ON".
- ☞ HZD. OFF RELAY : In other operation, not high temperature room , set delay is "ON".
- ☞ RZD. ON RELAY : In room temperature room operation, set delay is "ON".
- ☞ RZD. OFF RELAY : In other operation, not room temperature room, set delay is "ON".
- ☞ LZD. ON RELAY : In low temperature room operation, set delay is "ON".
- ☞ LZD. OFF RELAY : In other operation, not low temperature room, set delay is "ON".

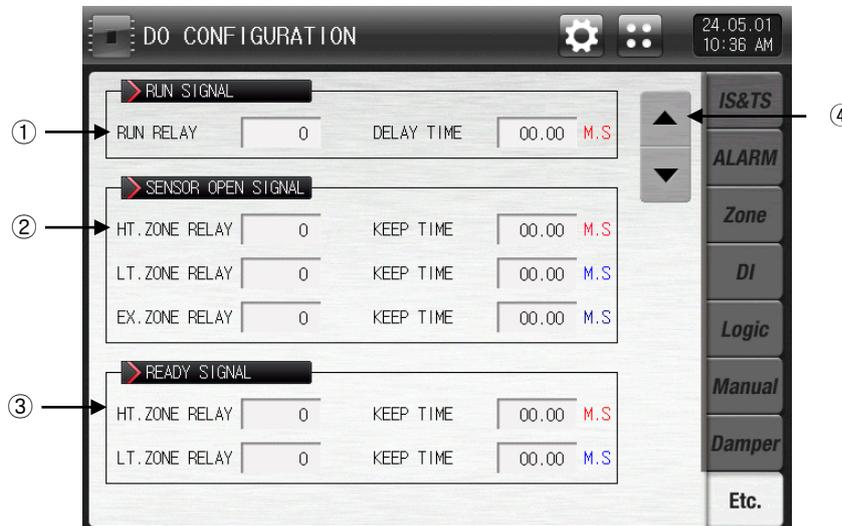
② It sets the damper signal motion time.

- ☞ OPERATION TIME : If the corresponding relay maintains "ON", set delay becomes "OFF" after set time.

## 11.2 Other Signal Relay Setup

### 11.2.1 The first screen for other signal relay setup

- ▶ This is the screen to set the run signal and sensor open signal, ready signal.



[Pic. 11-10] The first screen for other signal relay setup

- ① It sets the run signal relay and delayed time.
  - ☞ RUN RELAY : The set relay is “ON” during the operation.
  - ☞ DELAY TIME : The set relay is “ON” after the set delayed time is passed.
- ② It sets the sensor open signal relay and keep time.
  - ☞ HT. ZONE RELAY : If the sensor is open in high temperature room, set relay is “ON”.
  - ☞ KEEP TIME : The relay is “ON” during the set keep time, and it holds the motion status if the sensor is open even after that.
  - ☞ LT. ZONE RELAY : If the sensor is open in low temperature room, set relay is “ON”.
  - ☞ KEEP TIME : The relay is “ON” during the set keep time, and it holds the motion status if the sensor is open even after that.
  - ☞ EX. ZONE RELAY : If the sensor is open in experiment room, set relay is “ON”.
  - ☞ KEEP TIME: The relay is “ON” during the set keep time, and it holds the motion status if the sensor is open even after that.
- ③ It sets the preparation signal relay and keep time.
  - ☞ HT.ZONE RELAY : When the preparation is activated in high temperature room during the operation, set relay is “ON”.
  - ☞ KEEP TIME: The relay is “ON” during the set keep time, and it keeps that status depending on the preparation requirement even after that.
  - ☞ LT.ZONE RELAY : When the preparation is activated in low temperature room during the operation, set relay is “ON”.
  - ☞ KEEP TIME: The relay is “ON” during the set keep time, and it keeps that status depending on the preparation requirement even after that.
- ④ The page is moved up/down at this screen.

Table 11-5. The first screen parameter for other signal relay setup

Parameter	Setup Range	Unit	Initial Value
RUN RELAY	0~32	ABS	0
DELAY TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
HT. ZONE S.OPEN RELAY	0~32	ABS	0
KEEP TIME	00.00~99.59 (MIN.SEC)	EUS	00.00
LT. ZONE S.OPEN RELAY	0~32	ABS	0
KEEP TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
EX. ZONE S.OPEN RELAY	0~32	ABS	0
KEEP TIME	00.00~99.59 (MIN.SEC)	EUS	00.00
HT. ZONE READY RELAY	0~32	ABS	0
KEEP TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
LT. ZONE READY RELAY	0~32	ABS	0
KEEP TIME	00.00~99.59 (MIN.SEC)	ABS	00.00

▶ This is the screen to set the N2GAS signal and FAN signal, other signal.



[Pic. 11-11] The second screen for other signal relay setup

① It sets the N2 gas signal relay and motion time.

- ☞ N2GAS RELAY : The set relay is “ON” during the low temperature room operation.
- ☞ OPERATION TIME : If N2 gas signal relay keeps the motion status, set relay is “OFF” after the set motion time.

③ ② It sets the fan signal relay.

- ☞ High temp. room: When the high temperature room fan operates, the relay is in the “ON” state when running.  
The high temperature room fan always operates during operation.
- ☞ Low temp. room : When the low-temperature room fan operates, the relay turns “ON” during operation.  
The Low temperature room fan always operates during operation.
- ☞ Room temp. room: When the room temperature room fan operates, the set relay becomes “ON”.  
The room temperature room fan operates during room temperature operation.

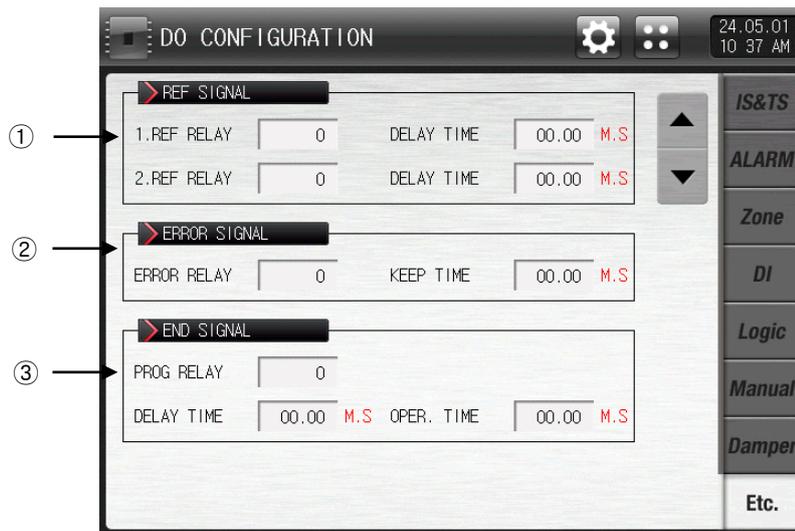
③ It set other signal relay.

- ☞ DEFROST RELAY : The set relay is “ON” during the defrosting operation.
- ☞ SOL RELAY: When the PV of the low temperature room is lower than the REF.POINT, the set relay becomes “ON”.
- ☞ U-KEY RELAY : The button usage is set at [System Configuration]. If set the usage of user button, the user can set the desired relay in [DO relay setup], and then press button to activate the relay and that button is displayed in the operational screen.

Table 11-6. The second screen parameter for other signal relay setup

Parameter	Setup Range	Unit	Initial Value
N2GAS RELAY	0~32	ABS	0
OPER. TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
High temp. room FAN SIGNAL Relay	0~32	ABS	0
Low temp. room FAN SIGNAL Relay	0~32	ABS	0
Room temp. room FAN SIGNAL Relay	0~32	ABS	0
DEFROST RELAY	0~32	ABS	0
SOL RELAY	0~32	ABS	0
REF. POINT	EU(0.0 ~ 100.0%)	EU	EU(0.0%)
U-KEY RELAY	0~32	ABS	0
U-KEY 시그널 동작시간	00.00~99.59 (MIN.SEC)	ABS	00.00

► This is the screen to set the REF signal and error signal, operation close relay



[Pic. 11-12] The third screen for other signal relay setup

- ① It sets the signal relay and delayed time for 1st and 2nd refrigerating motion.
  - ☞ 1.REF relay: The set relay is “ON” during the operation,.
  - ☞ DELAY TIME: The set relay is “ON” after the set delayed time.
  - ☞ 2.REF relay: The set relay is “ON” after the 1.REF refrigerating motion signal.
  - ☞ DELAY TIME: The set relay is “ON” after the set delayed time.
  - ☞ In case of the defrosting using “Heater1” and “Heater2”,the output is “OFF” during the defrosting operation.
  
- ③ It sets the error signal relay and keep time.
  - ☞ When the error is occurred in stop and run time, set relay is “ON”.
  - ☞ The relay keeps “ON” status during the set keep time, and it becomes “OFF” after the keep time.
  - ☞ If error is not recovered during the keep time, the relay keeps “ON”, and then the relay is “OFF” at the moment of error recovery.
  
- ② It sets the operation close relay, delayed time and run time.
  - ☞ PROG RELAY : After close the operation, set relay is “ON”.
  - ☞ DELAY TIME : After the set delayed time, set relay is “ON”.
  - ☞ OPER.TIME : If the close signal relay keeps the motion status, set relay is “OFF” after the set motion time.

Table 11-7. The third screen parameter for other signal relay setup

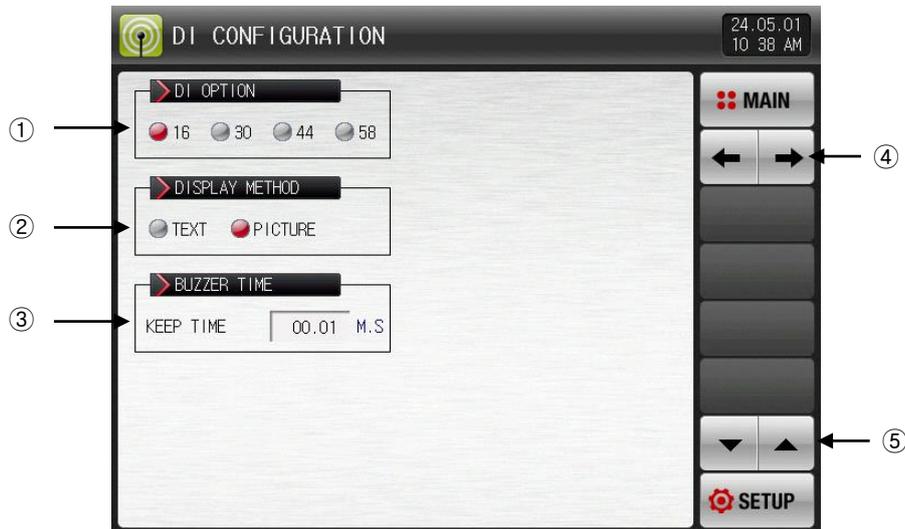
Parameter	Setup Range	Unit	Initial Value
1.REF RELAY	0~32	ABS	0
DELAY TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
2.REF RELAY	0~32	ABS	0
DELAY TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
OPER. TIME	0~32	ABS	0
KEEP TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
PROG RELAY	0~32	ABS	0
KEEP TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
PROG RELAY	00.00~99.59 (MIN.SEC)	ABS	00.00

## 12. DI function and Operation

### 12.1 DI Operation setup

#### 12.1.1 The first screen for DI function and operation setup

▶ DI function and Operation setting



[Pic. 12-1] The first screen for DI function and operation setup

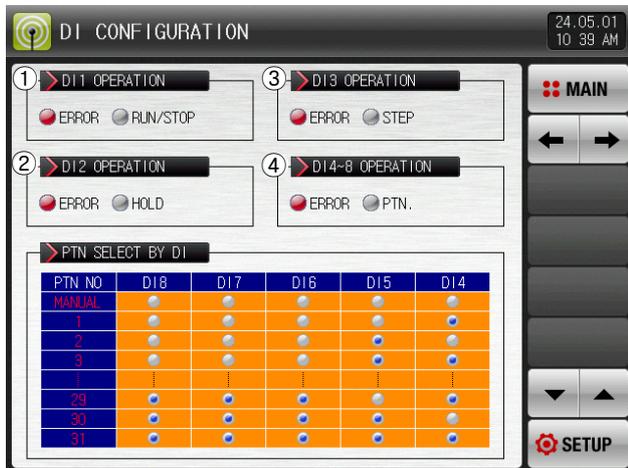
- ① Setting DI options.
  - ☞ 16 : DI 16 points
  - ☞ 30 ~ 58 : DI30 ~ 58 points (Available when additional TIO2000-A is connected)
- ② Setting the error display method in DI error creation.
  - ☞ TEXT : Refer to [Pic. 12-12 The screen with letter signal for DI error]  
When a DI error occurs, the error details are displayed in text.
  - ☞ PICTURE : Refer to [Pic. 12-13 The screen with picture signal for DI error]  
When a DI error occurs, the error details are displayed in photo.
    - The uploaded photo file into the internal memory is displayed into the DI error and basic photo is displayed when it is not uploaded.
- ③ Setting the buzzer ringing time in DI error creation
  - ☞ The buzzer ringing is made in DI error creation in spite of setting into "0"
  - ☞ The buzzer ringing is not made when DI operation method is set in Run/Stop, Hold, Step and Pattern
- ④ Moving from current screen to the next screen
- ⑤ Moving to the next or previous screen using the up/down button

Table 12-1. The first screen parameter for DI function and motion setup.

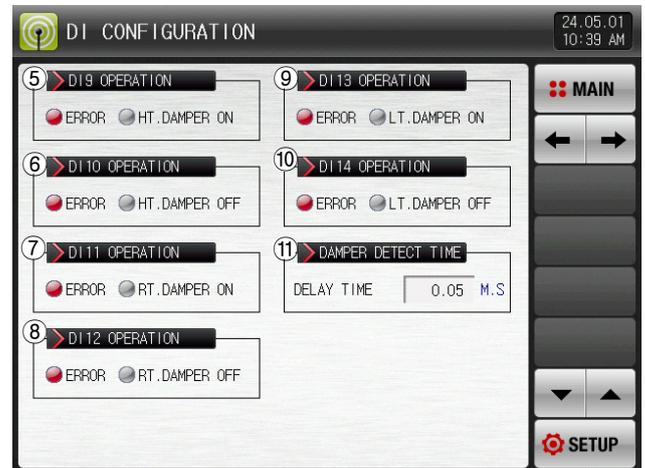
Parameter	Setting range	Unit	Initial data
DI option	16, 30, 44, 58	ABS	16
DISPLAY METHOD	TEXT, PICTURE	ABS	TEXT
KEEP TIME	0.00 ~ 99.59 (MIN.SEC)	ABS	00.01

## 12.1.2 DI function and Operation setting screen 2,3

► It sets the operation method for each DI signal.



[Pic. 12-2] DI function and Operation setting screen 2



[Pic. 12-3] DI function and Operation setting screen 3

- ① Setting the DI1 operation method
  - ☞ Error : Use the DI1 operation for error detection
  - ☞ Run/Stop : Run/Stop : If a DI1 error occurs, operation run and stop when the error is released.
- ② Setting the DI2 operation method
  - ☞ Error : Use the DI2 operation for error detection
  - ☞ Hold : It holds the current operation screen at the DI2 operation and the hold is released at the time of error releasing (It is possible in program operation only.)
- ③ Setting the DI3 operation method
  - ☞ Error : Use the DI3 operation for error detection
  - ☞ Step : Force moving from the current segment to the next segment at DI3 error creation (It is possible in program operation only. )
- ④ Setting the DI4~8 operation method
  - ☞ Error : Use the DI4~8 operation for error detection
  - ☞ Pattern : When DI4~8 error occurs, it is forced to move to the corresponding pattern according to “pattern selection by DI”.
- ⑤ Setting the DI9 operation method
  - ☞ Error : Use the DI9 operation for error detection
  - ☞ HT.DAMPER ON: DI9 motion is used to detect error with high temperature room damper ON.
- ⑥ Setting the DI10 operation method
  - ☞ Error : Use the DI10 operation for error detection
  - ☞ HT.DAMPER OFF: DI10 motion is used to detect error with high temperature room damper OFF.
- ⑦ Setting the DI11 operation method
  - ☞ Error : Use the DI11 operation for error detection
  - ☞ RT.DAMPEER ON: DI11 motion is used to detect error with room temperature damper ON.
- ⑧ Setting the DI12 operation method
  - ☞ Error : Use the DI12 operation for error detection
  - ☞ RT.DAMPER OFF: DI12 motion is used to detect error with room temperature damper OFF.
- ⑨ Setting the DI13 operation method
  - ☞ Error : Use the DI13 operation for error detection
  - ☞ LT.DAMPER ON : DI13 motion is used to detect error with room temperature damper ON.
- ⑩ Setting the DI14 operation method

- ☞ Error : Use the DI14 operation for error detection
- ☞ LT.DAMPER OFF: DI14 motion is used to detect error with room temperature damper OFF.
- ⑪ It sets the damper detection delayed time.
- ☞ DELAY TIME: It detects damper ON/OFF error after the delayed time set in that section.

Table 12-2. The screen 2,3 parameter for DI function and motion setup.

Parameter	Setting range	Unit	Initial data
DI1 Operation method	ERROR, Operation/Stop	ABS	ERROR
DI2 Operation method	ERROR, Hold	ABS	ERROR
DI3 Operation method	ERROR, Step	ABS	ERROR
DI4~8 Operation method	ERROR, Pattern	ABS	ERROR
DI9 Operation method	ERROR, HT.DAMPER ON	ABS	ERROR
DI10 Operation method	ERROR, HT.DAMPER OFF	ABS	ERROR
DI11 Operation method	ERROR, RT.DAMPEER ON	ABS	ERROR
DI12 Operation method	ERROR, RT.DAMPEER OFF	ABS	ERROR
DI13 Operation method	ERROR, LT.DAMPER ON	ABS	ERROR
DI14 Operation method	ERROR, LT.DAMPER OFF	ABS	ERROR
damper detection delayed time	0.00 ~ 99.59(MIN.SEC)	ABS	0.05

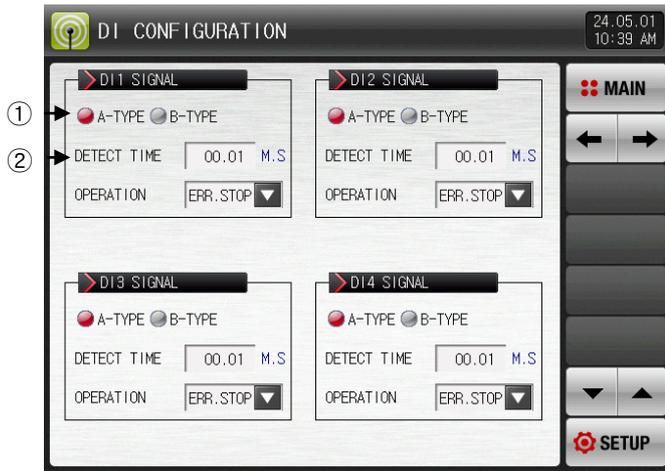
Table 12-3. The error detection motion for DI 9~14 damper

Parameter	High temp. room	Room temp. room	Low temp. room
DI9 HT.DAMPER ON	ON	OFF	OFF
DI10 HT.DAMPER OFF	OFF	ON	ON
DI11 RT.DAMPEER ON	OFF	ON	OFF
DI12 RT.DAMPEER OFF	ON	OFF	ON
DI13 LT.DAMPER ON	OFF	OFF	ON
DI14 LT.DAMPER OFF	ON	ON	OFF

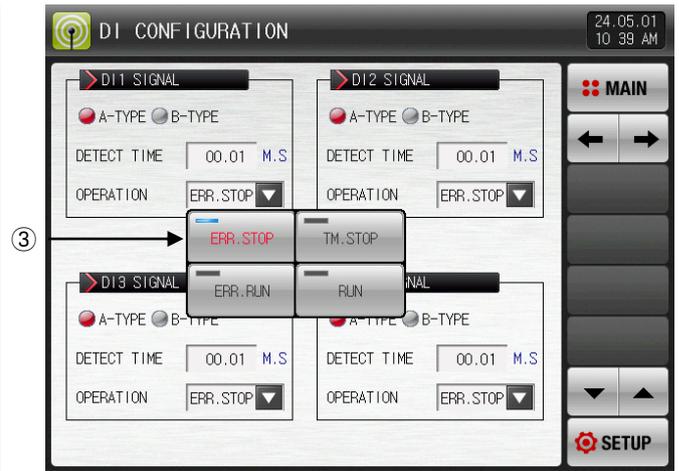
\* When the DI detection type is A point of contact,

### 12.1.3 The fourth Screen for DI function and operation setup

▶ DI function and Operation setting



[Pic. 12-4] The second screen for DI function and operation setup



[Pic. 12-5] The third screen for DI function and operation setup

- ① Select the detection type of that DI between A or B point of contact.
  - ☞ A-TYPE : It senses the input of DI in case of physical DI contact point creation or the external signal is entered.
  - ☞ B-TYPE : It senses the input of DI in case of physical DI contact point release or the External signal is disconnected.
- ② It sets the damper detection delayed time.
  - ☞ DELAY TIME: It detects damper ON/OFF error after the delayed time set in that section..
- ③ Setting the DI1 operation method.
  - ☞ ERROR : Use the DI1 operation for error detection.
  - ☞ TM. STOP : It displays DI error screen in case of DI error creation and stops operation after the set delay time.
  - ☞ ERR. RUN : It displays DI error screen in case of DI error creation and maintains the current operation state.
  - ☞ RUN : It not displays DI error screen in case of DI error creation and maintains the current operation state.
    - The state display lamp and error signal are created in [Operation screen 2].

Table 12-4. The fourth screen parameter for DI function and operation setup

Parameter	Setting range	Unit	Initial value
DI detection method	A- TYPE, B- TYPE	ABS	A- TYPE
DI detection delay time	0.00 ~ 99.59 (MIN.SEC)	ABS	00.01
DI #n SIGNAL	ERR. STOP, TM. STOP, ERR. RUN, RUN	ABS	ERR.STOP

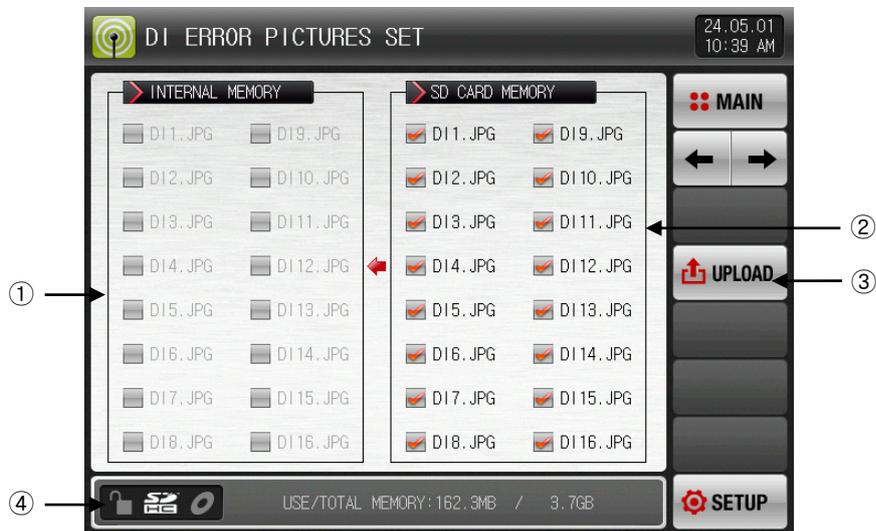
\*#n = 1 ~ 58

Table 12-5. The pattern selection by DI

Pattern number	DI8	DI7	DI6	DI5	DI4
Manual	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	ON	ON
4	OFF	OFF	ON	OFF	OFF
5	OFF	OFF	ON	OFF	ON
6	OFF	OFF	ON	ON	OFF
7	OFF	OFF	ON	ON	ON
8	OFF	ON	OFF	OFF	OFF
9	OFF	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON	OFF
11	OFF	ON	OFF	ON	ON
12	OFF	ON	ON	OFF	OFF
13	OFF	ON	ON	OFF	ON
14	OFF	ON	ON	ON	OFF
15	OFF	ON	ON	ON	ON
16	ON	OFF	OFF	OFF	OFF
17	ON	OFF	OFF	OFF	ON
18	ON	OFF	OFF	ON	OFF
19	ON	OFF	OFF	ON	ON
20	ON	OFF	ON	OFF	OFF
21	ON	OFF	ON	OFF	ON
22	ON	OFF	ON	ON	OFF
23	ON	OFF	ON	ON	ON
24	ON	ON	OFF	OFF	OFF
25	ON	ON	OFF	OFF	ON
26	ON	ON	OFF	ON	OFF
27	ON	ON	OFF	ON	ON
28	ON	ON	ON	OFF	OFF
29	ON	ON	ON	OFF	ON
30	ON	ON	ON	ON	OFF
31	ON	ON	ON	ON	ON

## 12.1.4 DI function and operation settings fifth screen

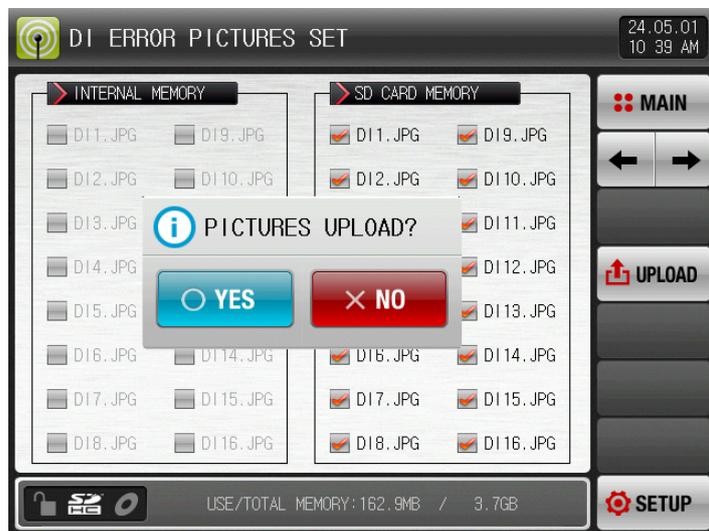
- ▶ Error occurrence photo settings are possible.
- ▶ The setting is available when the display method is “Photo”.
- ▶ The uploaded photo file (JPG) into the internal memory is displayed in DI error and basic photo is displayed when it is not uploaded.
- ▶ The photo can be uploaded when there is a SD card option and refer to 20. User screen



[Pic. 12-6] The setup screen for picture of DI error-1

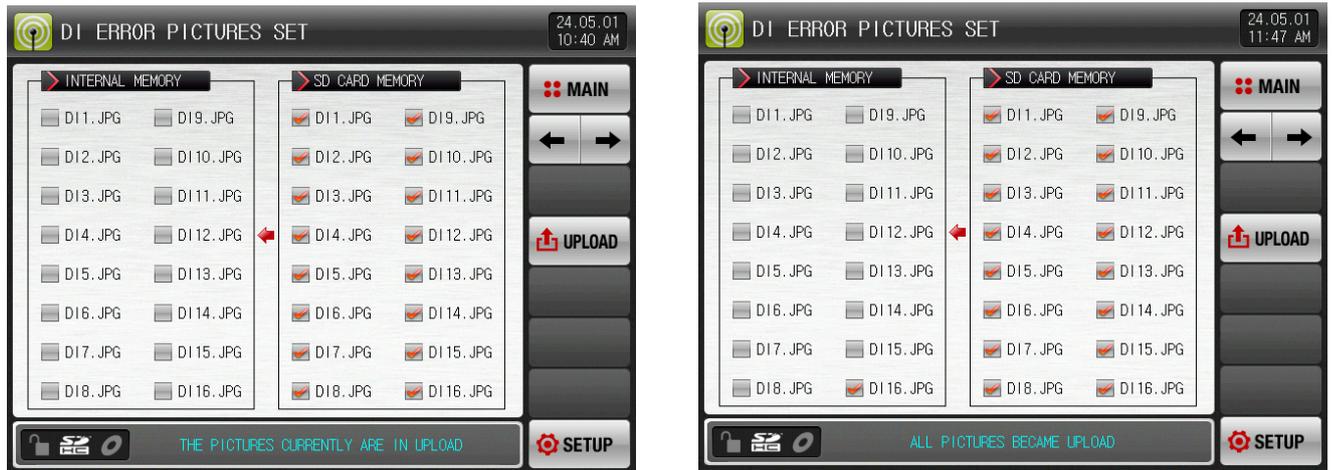
- ① The photo file corresponding of its name to DI out of the saved photo files (JPG) into the memory is displayed and it is inactive (☐) when there is not corresponding file.
- ② The photo file corresponding of its name to DI out of the saved photo files (JPG) into the SD card is displayed.
  - ☞ The file selected is uploaded into the internal memory.
- ③ The photo files (JPG) saved into SD card is uploaded to internal memory.
- ④ Displays the present capacity of SD card.
  - ☞ It is displayed when the SD card is inserted.

- ▶ Press  (upload) button in [Pic. 12-6 The setup screen for picture of DI error-1] to upload (☑) only selected picture file in SD card memory to the internal memory.



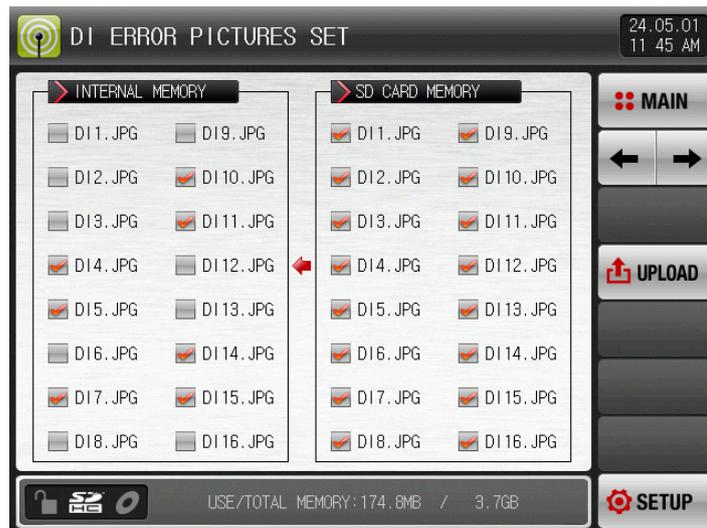
[Pic. 12-7] The setup screen for picture of DI error-2

- ▶ The message, “The pictures currently are in upload” is displayed at the bottom of screen during upload..
- ▶ When the upload is completed, the message, “All pictures became upload.” is displayed.
- ▶ The photo files(☑) are activated for selection at the internal memory when the upload is completed.



[Pic. 12-8] The setup screen for picture of DI error-3

- ▶ When the wanted file is selected (☑), it can be used for screen in case of DI error creation.
- ▶ The basic photo inside the memory is displayed when the error is made from the unselected DI.

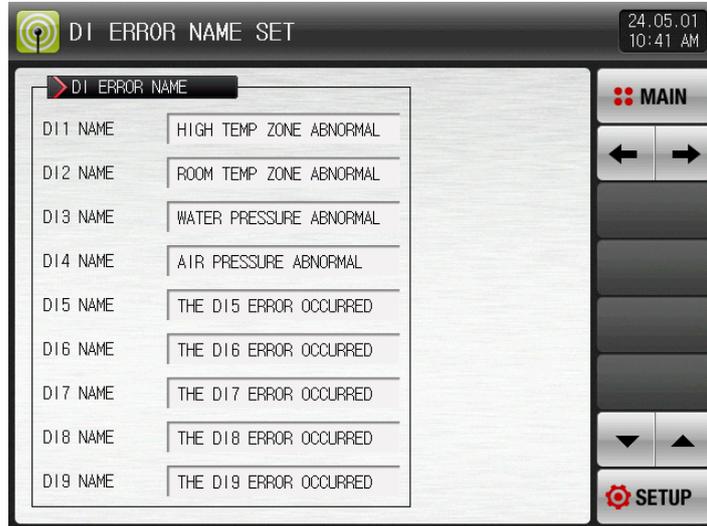


[Pic. 12-9] The setup screen for picture of DI error-4

## 12.2 DI error name

### 12.2.1 DI error name setting

- ▶ The setting is available when the display method is “TEXT”
- ▶ It is a screen to input the DI error name.
- ▶ The DI error name can be put in 24 letters in maximum.



[Pic. 12-10] DI function and operation setting screen



[Pic. 12-11] The setup screen parameter for display name in occurrence DI

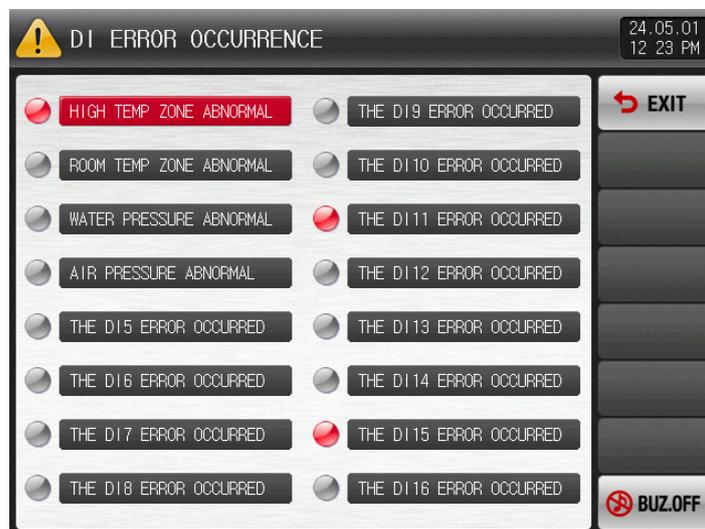
Table 12-6. DI The setup screen parameter for DI error name

Parameter	Setting range	Unit	Initial value
DI #n NAME	0 ~ 9, A ~ Z, Special letter (Maximum 24 letters)	ABS	THE DI#n ERROR OCCURRED

\* #n = 1 ~ 58

### 12.3 DI error creation screen

- ▶ It is a screen in case of DI error creation.
- ▶ It is converted to the operation screen after escaping from the DI error screen when  is touched by user
- ☞ The same DI error creation is neglected for 1 minute when the screen is changed by pressing  button after DI creation.
  - Ex) When it is exit with “EXIT” in creation of DI1, neglect it for 1 minute in spite of DI1 creation. It displays DI error screen when DI1 is created after 1 minute..
  - ※ Here, the neglecting means the DI error screen.
- ▶  button is to block the alarming sound when DI error is occurred
- Ex) The description according to the lamp status
  - ※ DI error no creation (“OFF” state). ( THE D11 ERROR OCCURRED letter,  photo)
  - ※ DI error creation (“ON” state) ( THE D11 ERROR OCCURRED letter,  photo)
  - ※ Release after DI error creation (“OFF” state after “ON”) ( THE D11 ERROR OCCURRED letter,  photo)



[Pic. 12-12] The screen with letter for DI error display method



[Pic. 12-13] The screen with photo for DI error display method

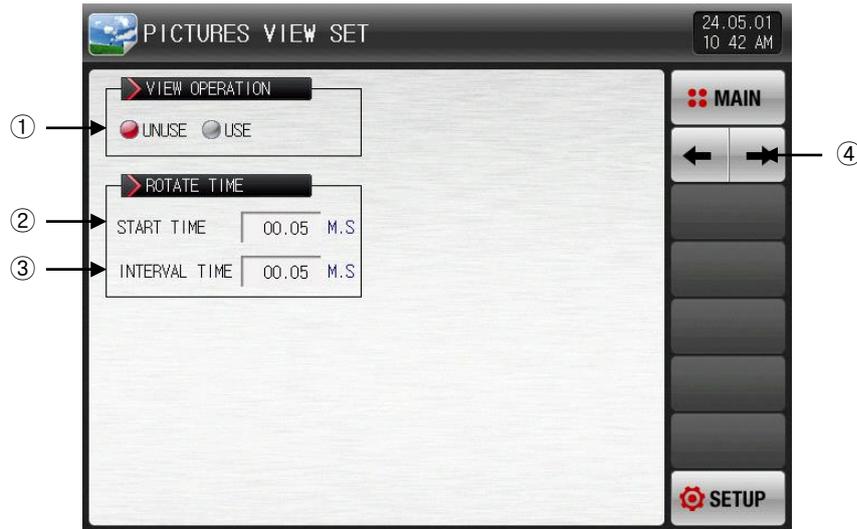
※ DI and DO can be used up to 58 points for DI and up to 56 points for DO when selecting the TIO option.

## 13. User screen

The screen is displayed when only SD card option is selected by user

### 13.1 User screen setup

#### 13.1.1 The first screen for user screen setup



[Pic. 13-1] The first screen for user's screen setup

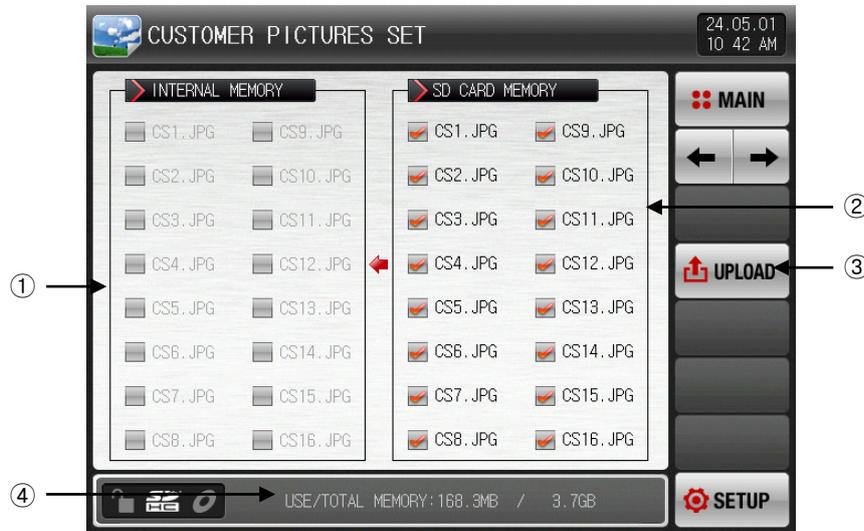
- ① Setting Y/N for using the user screen.
  - ☞ User screen operation is "ON" when more than one selected.
- ② Setting the user screen operation time.
  - ☞ The operation is started when there is no key input during set time.
- ③ Setting the user screen conversion time.
  - ☞ The saved pictures are switched by set time cycle.
- ④ Moving from current screen to the next screen.

Table 13-1. The first screen parameter for user's screen setup

Parameter		Settin range	Unit	Initial vaku
VIEW OPERATION		UNUSE, USE	ABS	UNUSE
ROTATE TIME	START TIME	0.05 ~ 99.59 (MIN.SEC)	ABS	00.05
	INTERVAL TIME	0.01 ~ 99.59 (MIN.SEC)	ABS	00.05

### 13.1.2 The second screen for user screen setup

- ▶ It is a screen to display the photo file (JPG) saved into SD card.
- ▶ When there are no files in SD card, the selection and upload are not available as they are inactive.



[Pic. 13-2] The second screen for user screen setup-1

- ① The photo file corresponding of its name to CS out of the saved hoto files (JPG) into the Memory is displayed and it is inactive (☐) when there is no corresponding file.
- ② The photo file corresponding of its name to CS out of the saved photo files (JPG) into the SD card is displayed.
  - ☞ The file selected with (☑) is uploaded into the internal memory.
- ③ The photo files (JPG) saved into SD card is uploaded to internal memory.
- ④ It displays the capacity of current SD card.
  - ☞ It is displayed when the SD card is inserted.

- ▶ Press  (upload) button in [Pic. 13-2 The second screen for user’s screen setup-1] to upload (☑) only selected picture file in SD card memory to the internal memory.
- ▶ The message, “The pictures currently are in upload” is displayed at the bottom of screen during upload



[Pic. 13-3] The second screen for user screen setup-2

- ▶ When the upload is completed, the message, “All pictures became upload.” is displayed.
- ▶ The photo files (☑) are activated for selection at the internal memory when the upload is completed.



[Pic.13-4] The second screen for user screen setup-3



[Pic.13-5] The second screen for user screen setup-4

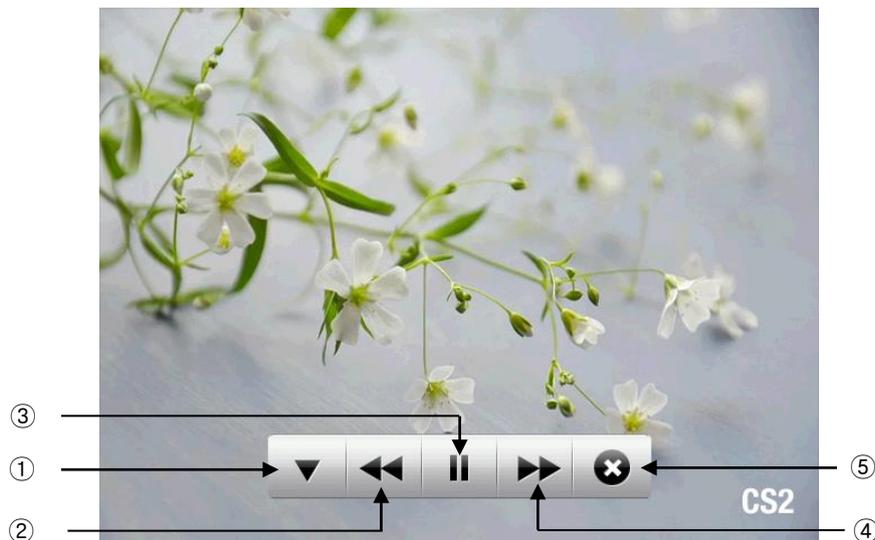
- ▶ When the files (☑) needed from the internal memory is selected, it can be used for user screen in operation of user screen.



[Pic. 13-6] The second screen for user screen setup-5

## 13.2 User screen operation

- ▶ Refer to [Pic.13.1.1 The first screen for user screen setup]
- ▶ 16 photos can be used for user screen.
- ▶ It operates when there is no key input during set time in case of using the user screen.
  - ☞ When there are several pictures saved into internal memory, it displays pictures while switching the screen.
- ▶ If DI error is occurred at the user's screen, DI error page is displayed.
  - ☞ DI error signal is displayed regardless of "letter" or "picture".
- ▶ Touch anywhere at the user's screen to bring up  button.



[Pic. 13-7] User screen -1

- ①  :  is disappeared in the user screen.
- ②  : It moves from the present user screen to the previous user screen.  
- It is not operated when the user file is one.
- ③  : It stops the user screen for a while.
- ④  : It moves from the present user screen to the previous user screen.  
- It is not operated when the user file is one
- ⑤  : Terminate the user's screen, and the screen will return to operation.  
- When the time has elapsed, user screen will work again.



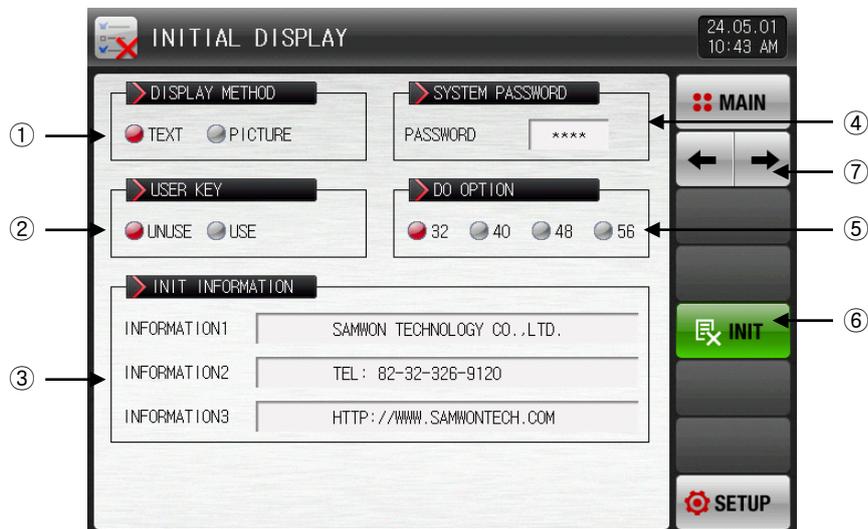
[Pic. 13-8] User screen -2

## 14. System initial setup

### 14.1 Basic screen display setup

#### 14.1.1 Basic screen display setup

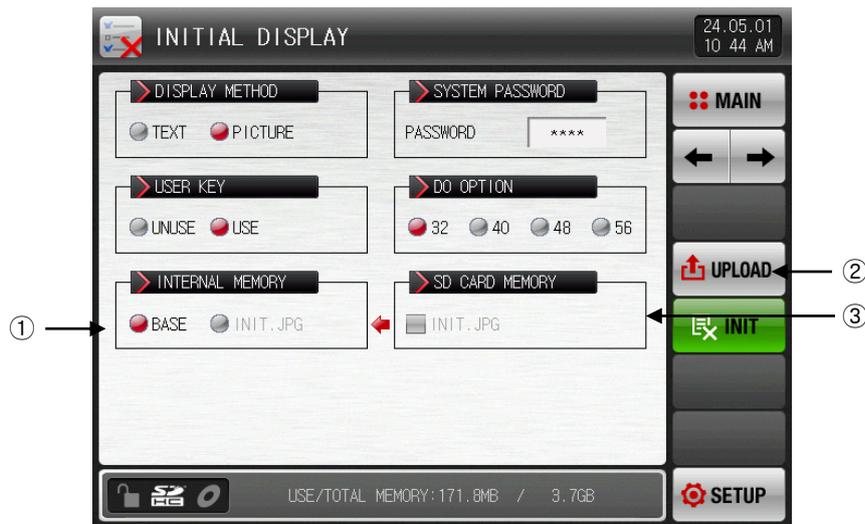
- ▶ It sets the language and system initialization related motions.



[Pic. 14-1] The first screen for system initial setup-1

- ① Setting the display on the initial screen with electric power ON.
- ② It sets the usage of user's button at the operational screen.
- ③ Display the wording on the initial screen with electric power ON.
  - ☞ Setting 1, 2, 3 wording for information is available and maximum 24 characteristics can be input.
  - ☞ Display method is set with letter.
- ④ Setting the password used in system screen entering.
  - ☞ The password was set in "0" when it is delivered from the factory.
- ⑤ Set the DO option.
- ⑥ Changing every parameter into the factory initial state.
- ⑦ Move to next or previous screen.

- ▶ This is the screen to set the display as picture.
- ▶ The function of ①,②,③ can be used when the display pattern is set in 'picture'.



[Pic. 14-2] The first screen for system initial setup-2

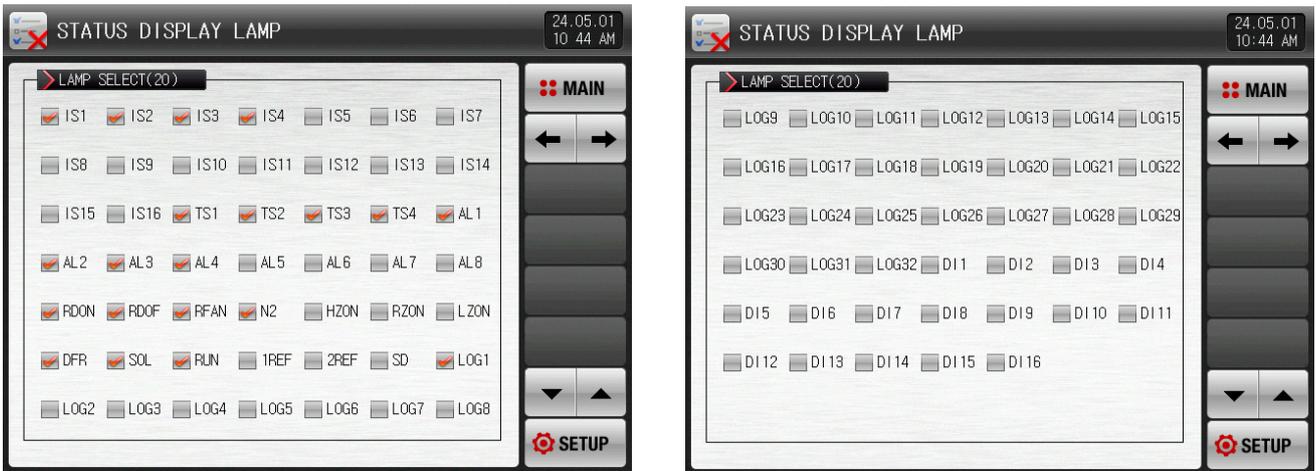
- ① Selection of the photo displayed on the initial screen in electric power ON.
  - ② Upload the INIT.JPG file inside the SD card into the internal memory.
  - ③ Display of Y/N for the INIT.JPG file saved in SD card.
- ☞ The photo file corresponding of its name to INIT.JPG out of the saved photo files (JPG) into the memory is displayed and it is inactive (☐) when there is not corresponding file.

Table 14-1. The first screen parameter for system initial setup

Parameter		Setting range	Unit	Initial data
LANGUAGE SET		ENG, KOR, CHN	ABS	ENG
DISPLAY METHOD		TEXT, PICTURE	ABS	TEXT
SYSTEM PASSWORD		0 ~ 9999	ABS	0
USER KEY		UNUSE, USE	ABS	UNUSE
Initial screen information	Information display 1	0 ~ 9, A ~ Z, Special character (Maximum 24 characters)	ABS	SAMWONTECH CO.,LTD.
	Information display 2	0 ~ 9, A ~ Z, Special character (Maximum 24 characters)	ABS	TEL : 82-32-326-9120
	Information display 3	0 ~ 9, A ~ Z, Special character (Maximum 24 characters)	ABS	HTTP://WWW.SAMWONTECH.COM
INTERNAL MEMORY		Total capacity 28.5MB		

## 14.2 State display lamp setup

- ▶ It is the screen to set the lamp type shown at the first screen of operation.
- ▶ Maximum 20 lamps can be selected.



[Pic. 14-3] The second screen for system initial setup

## 14.3 Initial screen operation

- ▶ The motion of initial screen, the first page when power is “ON”(Display: Letter)
- ▶ Refer to [2.1 Basic operational flow chart]



[Pic. 14-4] Initial screen-1

- ▶ The first page when power is “ON”(Display: Picture).

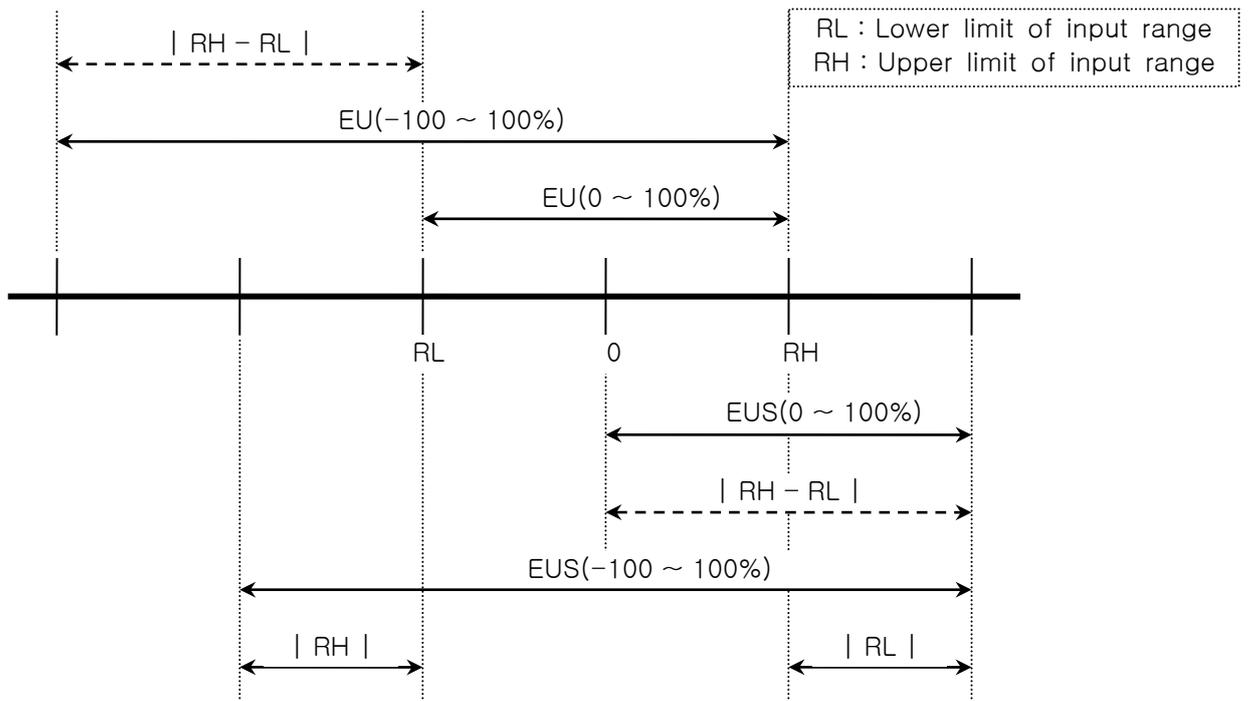


[Pic. 14-5] Initial screen-2

**Engineering Units – EU, EUS**      Units such as EU, EUS are used to explain the parameter of controller

▶ When the sensor type (IN-T) or the upper limit, lower limit of input range is changed, the parameters expressed in EU( ), EUS( ) are changed in proportion to current data. (However, the upper and lower range setting data is initialized.)

- EU( ) : Value of engineering unit depending on the range of instrument
- EUS( ) : Value of engineering unit depending on the span of instrument



▶ Range of EU(), EUS()

	Range	Central point
EU(0 ~ 100%)	RL ~ RH	$ RH - RL  / 2 + RL$
EU(-100 ~ 100%)	$- (  RH - RL  +  RL  ) \sim RH$	RL
EUS(0 ~ 100%)	0 ~ $ RH - RL $	$ RH - RL  / 2$
EUS(-100 ~ 100%)	$-  RH - RL  \sim  RH - RL $	0

(Ex)

- ▶ INPUT = T/C(T)
- ▶ RANGE = -200.0°C(RL) ~ 400.0°C(RH)

	Range	Central point
EU(0 ~ 100%)	- 200.0 ~ 400.0°C	100.0°C
EU(-100 ~ 100%)	- 800.0 ~ 400.0°C	- 200.0°C
EUS(0 ~ 100%)	0.0 ~ 600.0°C	300.0°C
EUS(-100 ~ 100%)	- 600.0 ~ 600.0°C	0.0°C

\* Download the instruction manual and communication manual from the homepage.



SAMWON TECHNOLOGY CO.,LTD.  
202-703 Bucheon Technopark, 192  
Yakdae-dong, Wonmi-gu, Bucheon-si  
Gyeonggi-do  
TEL : 82-32-326-9120  
FAX : 82-32-326-9119  
<http://www.samwontech.com>  
E-mail:[webmaster@samwontech.com](mailto:webmaster@samwontech.com)

Product inquiries and technical consultation , please  
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