

TEMP 2000S

Thermal Shock Tester Controller **SERIES**



Instruction Manual

※ This manual is commonly used for TEMP2500S,TEMP2700S

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* Engineering Unit

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

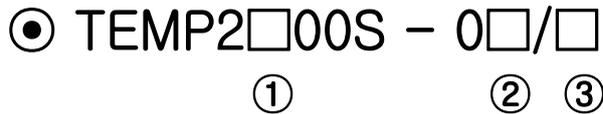
- A. The warranty period shall be one year from the purchasing of this product. Free of charge repair is available only for the cases of out of order occurred from normal use conditions.
- B. The repair by the failure created after the warranty period of the product shall be processed in real cost (Payment) 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

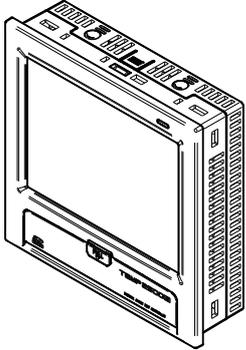
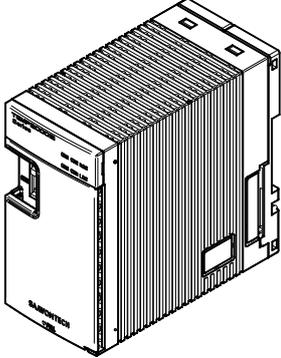
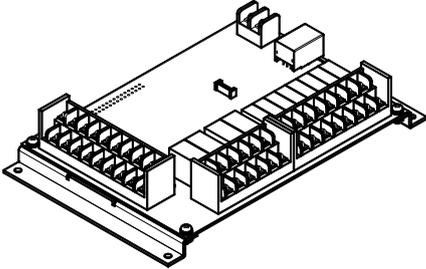
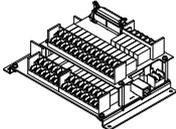
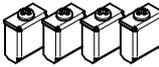
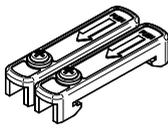
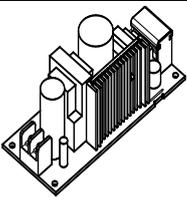
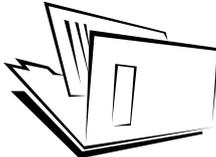
- ▶ Check whether the purchased product is identical with the ordered specification.
How to check: Check the model name specification code marked on the right of the packing box and on the left label of product case.



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	SD	SD card
		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	Cable (1m) Control part⇔ I/O1	Cable (3m) Display part⇔ Control part	
							
SMPS (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.



Period of exchange for the part and expiration

► Please check the corresponding replacing period as shown below and replace prior to the expiration if it is necessary.

- RELAY JQ1P-DC24V, ALD24V Equivalent : Under 300,000 times of ON/OFF
- BATTERY CR2030 3V Equivalent : Under 200,000 hours

☞ The exchange of the product with expiration date, please contact to the purchasing point (Dealer shop) 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℃) and low (Under 10℃) 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

☞ Even though the case of this product is made of non flammable material such as ABS/PC, do not install at the place where the flammable stuffs exist.

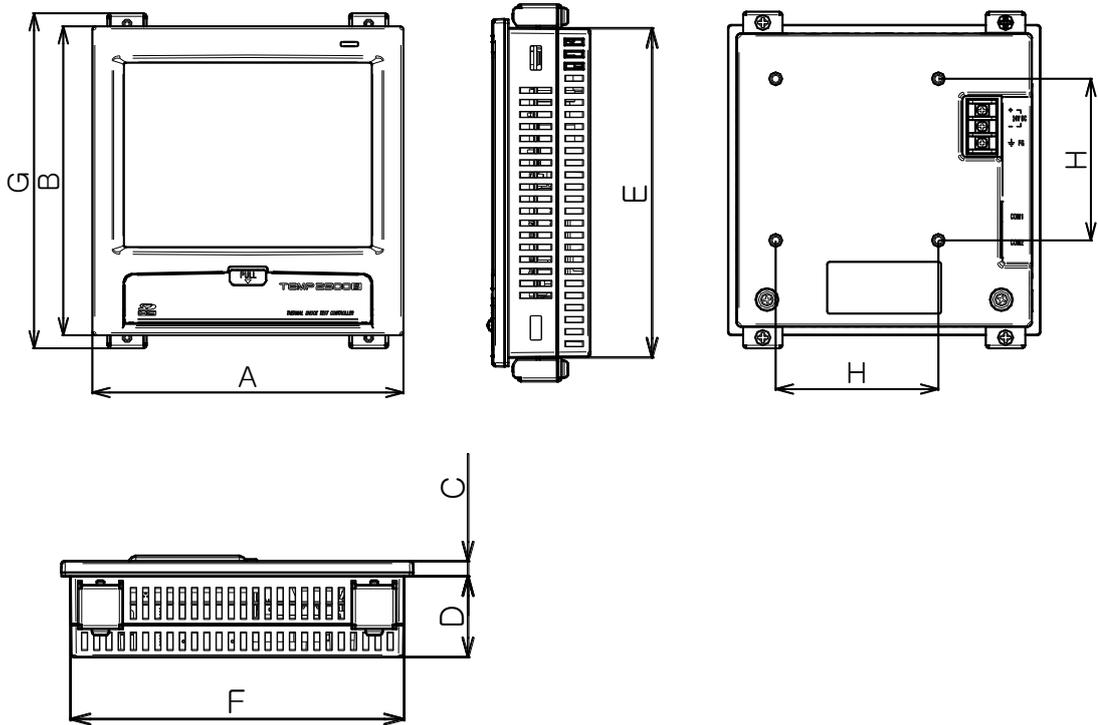


Installation Precautions

- A. Don't put the device or the wiring which cause the noise near to this product.
- B. Use the product in 10~50℃, in 20~90% RH (The dew shall not be made) Don't put the excessive heating device at near.
- C. Don't install the product in declining.
- D. Keep the product in -5~70℃ (The dew shall not be made), Especially, use after full warming up when it is used in under 10.
- E. The wiring work shall be made after switching off electric power on the machine.
- F. This product operates in 24V DC, 22VA max without special manipulation. There is a risk of the electric shock or fire when the electric power other than the specification.
- G. Don't work with wet hands. It has the risk of electric shock.
- H. Follow up the basic cautions to reduce risk of fire, electric shock and injury during using.
- I. The installation and the use shall be made according to the specified methods in instruction manual.
- J. Refer to the installation procedure regarding to the description for ground. However, do not make the ground on the water pipe, gas pipe, phone line and lightning rod. There is a risk of explosion and fire.
- K. Do not switch on before finishing the connection of the devices. It may cause the failure.
- L. Do not close the ventilation hole on the product. It may cause the failure.
- M. 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.
- N. The level of excessive voltage protection is category II and the use environment is degree II.

1.2.2 External dimension (Unit : mm)

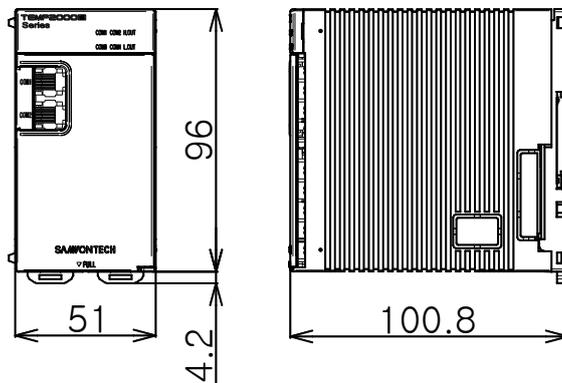
1.2.2.1 External dimension of display part for each model



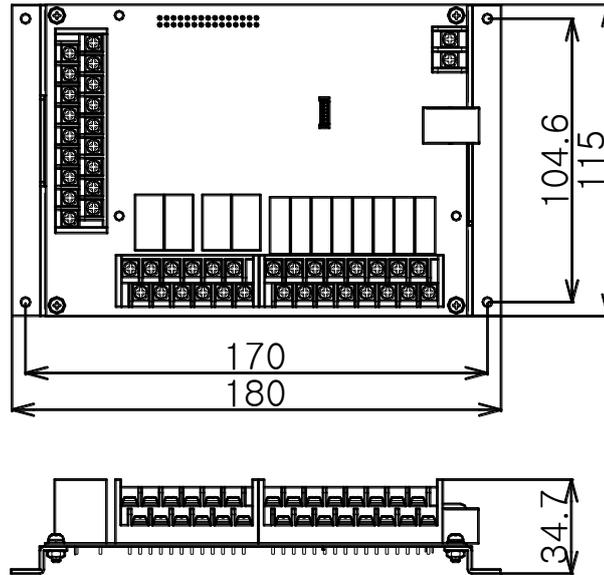
Unit : mm

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

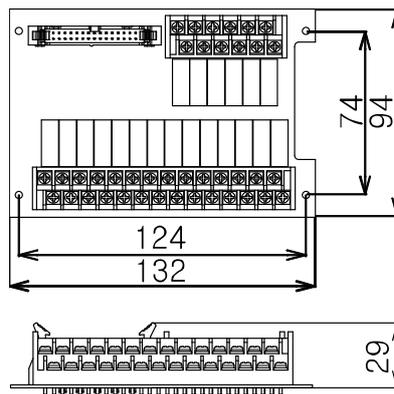
1.2.2.2 External dimension of control part



1.2.2.3 I/O1 board external dimension

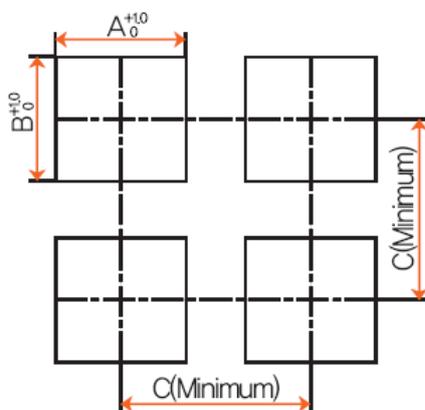


1.2.2.4 I/O2 board external dimension



1.2.3 Panel cutting dimension

► In case of general attachment



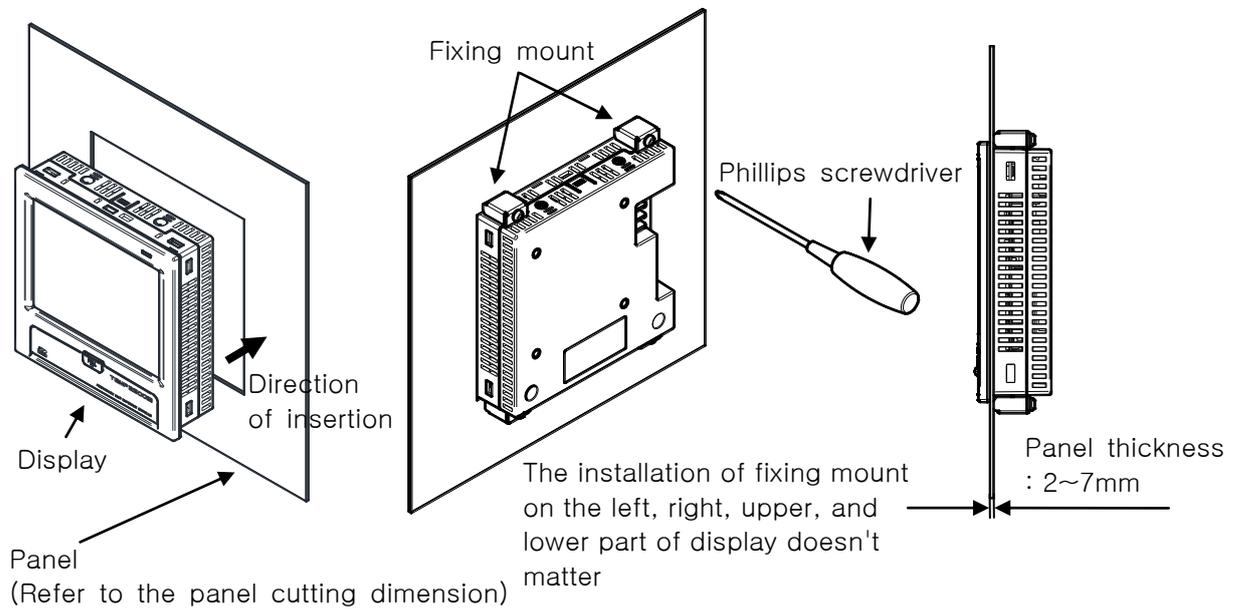
※ Panel cutting dimension for each model Unit : mm

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

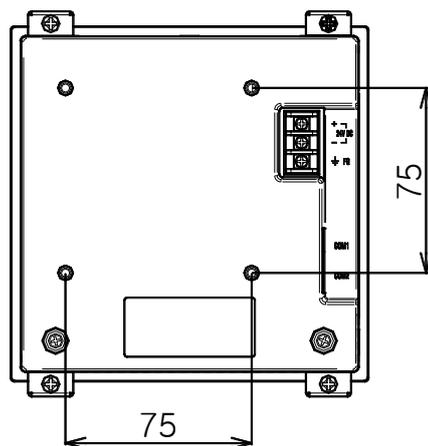
► How to install the TEMP2000S display unit panel



- 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.

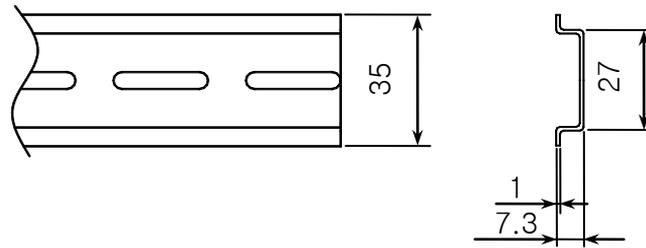


VESA dimension (75 * 75)

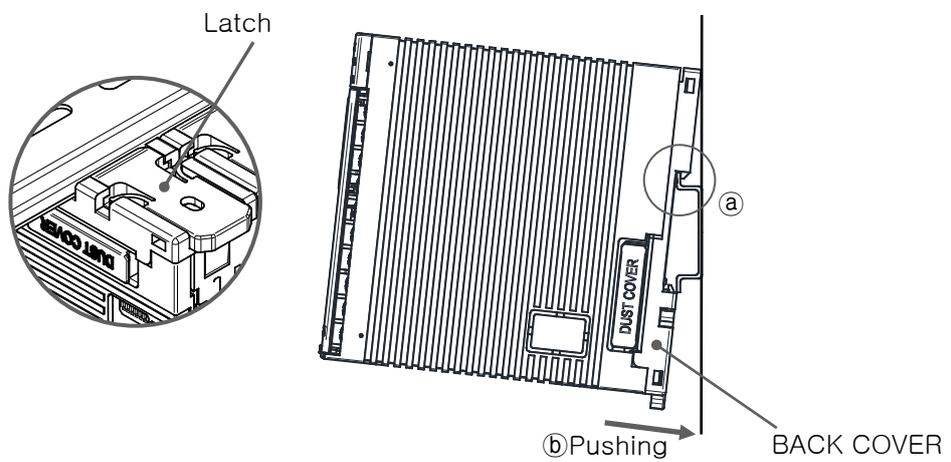
※ Attention
Apply M4 * 4L~6L in case of assembling the bolt on the vesa hole.

1.2.4.2 How to install the control part

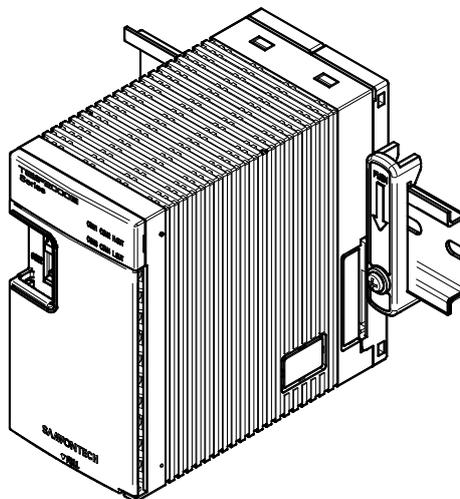
- ▶ In case of installing on the DIN rail
 - 1) DIN rail preparation



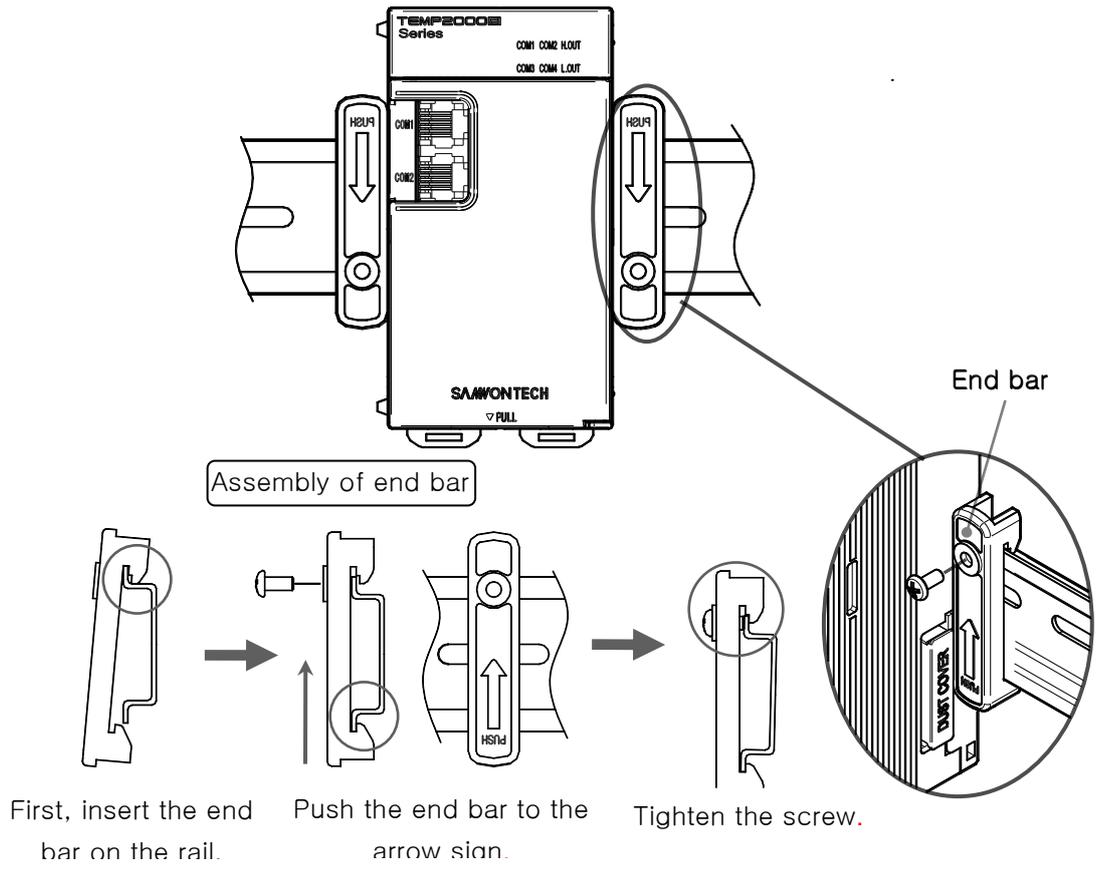
- 2) Like picture, insert ① on the back cover into the rail and push into ②, then install the latch involved with the rail.



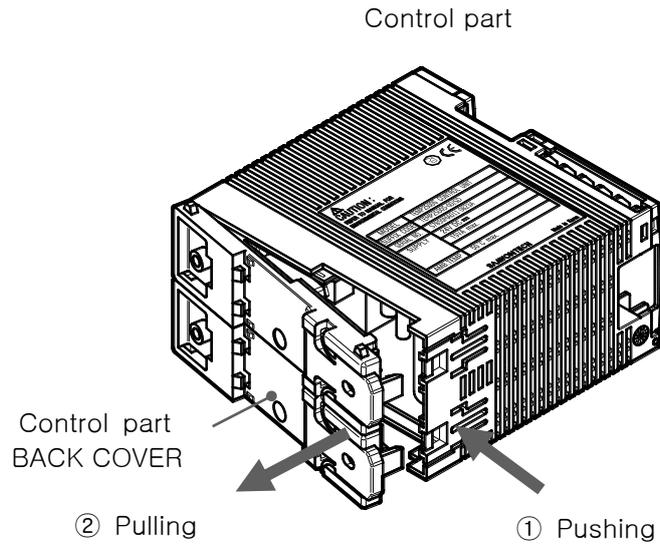
- 3) Below picture is the control part installed in the rail.



4) Both ends of unit is fixed with end bar when the control unit is installed not be moved.



- ▶ In case of installing directly on the wall
 - 1) Separate the back cover like picture.



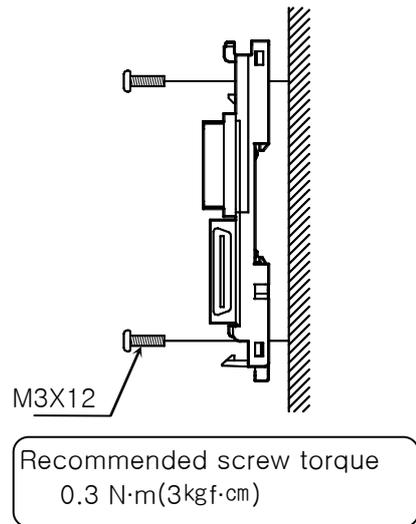
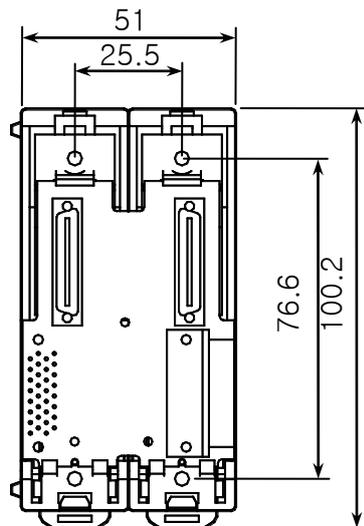
- Push ① on the control part and separate the back cover while pulling ② on the back cover.

2) While considering the screw hole and the size of back cover, check the space to install.

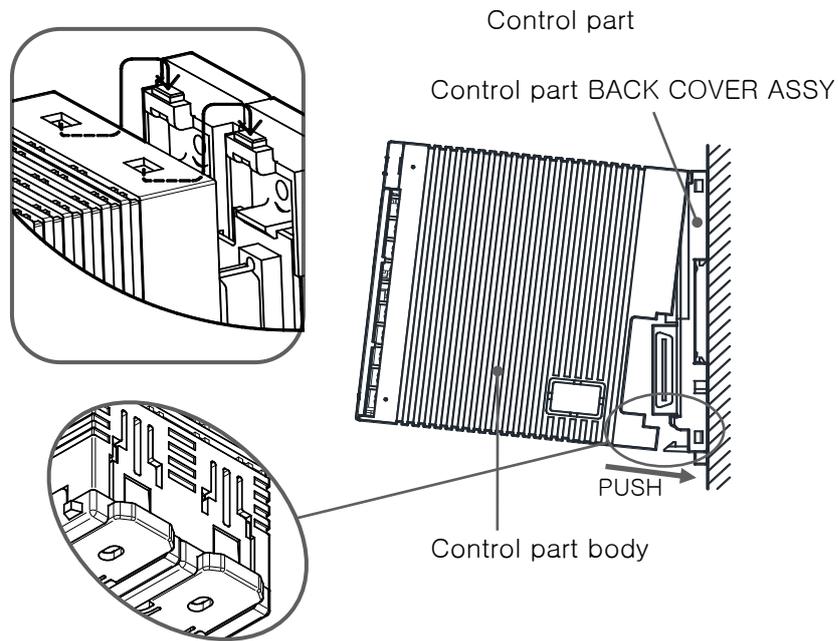
3) Assemble back cover and fix on the wall with screw.

- When fix the back cover on the wall, be careful no foreign materials inserted inside the connector (It can have the bad connection of communication).
- Be careful not to cause the scratch and damage on the exposed board.

Control part BACK COVER



- 4) Insert the main body into the back cover of control part on the wall and push the bottom until the hook is connected.



- After assemble the main body with back cover assy, and then check the assembly is complete around the hook.
- Inadequate assembly can cause the malfunction of communication/function.

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.

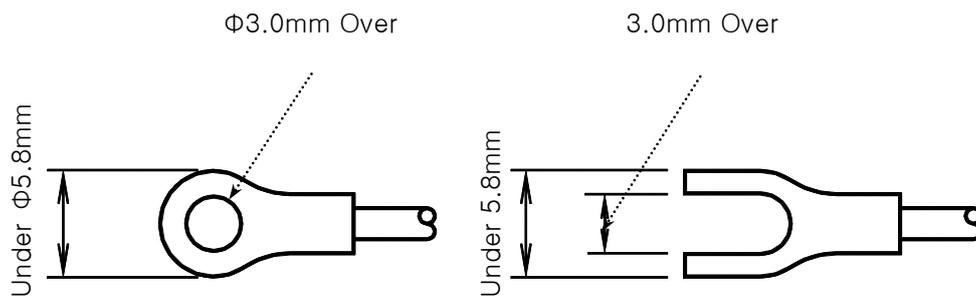
1.3.1 How to make the wiring

1.3.1.1 Recommended specification for electric cable

- ▶ Vinyl insulated electric cable KSC3304 0.9~2.0mm²

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

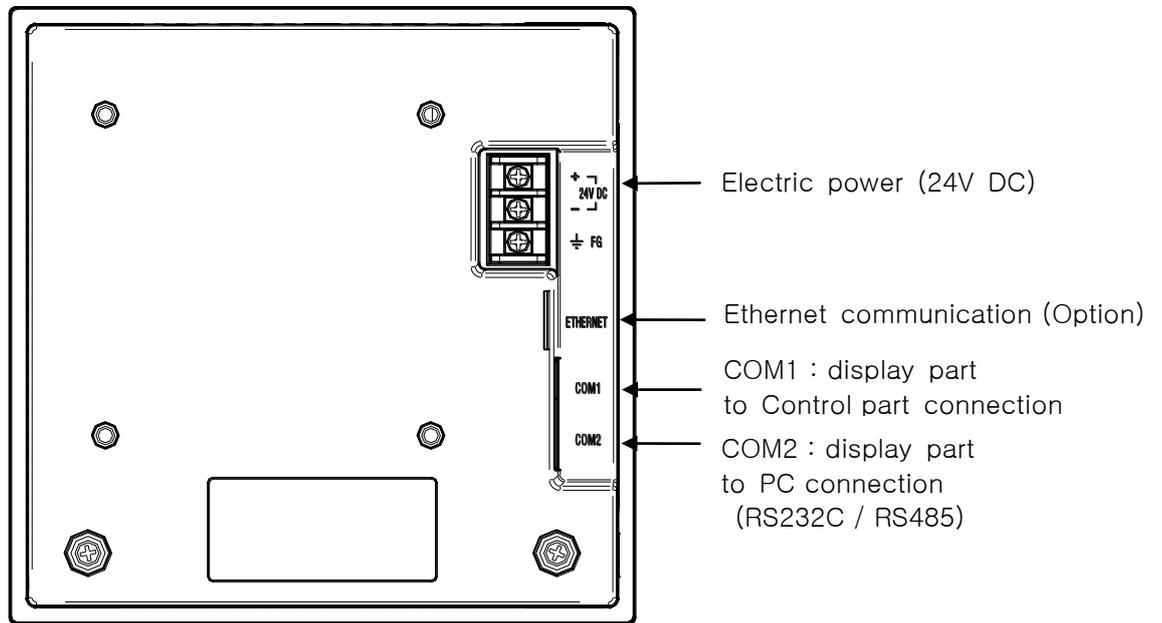
- A. Relay and contact point
- B. Solenoid coil and solenoid valve
- C. Electric power line
- D. Induced load
- E. Inverter
- F. Commutates in motor
- G. Phase angle control SCR.
- H. Wireless communication device
- I. Welding machine
- J. High pressure ignition device and etc

- ▶ 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]

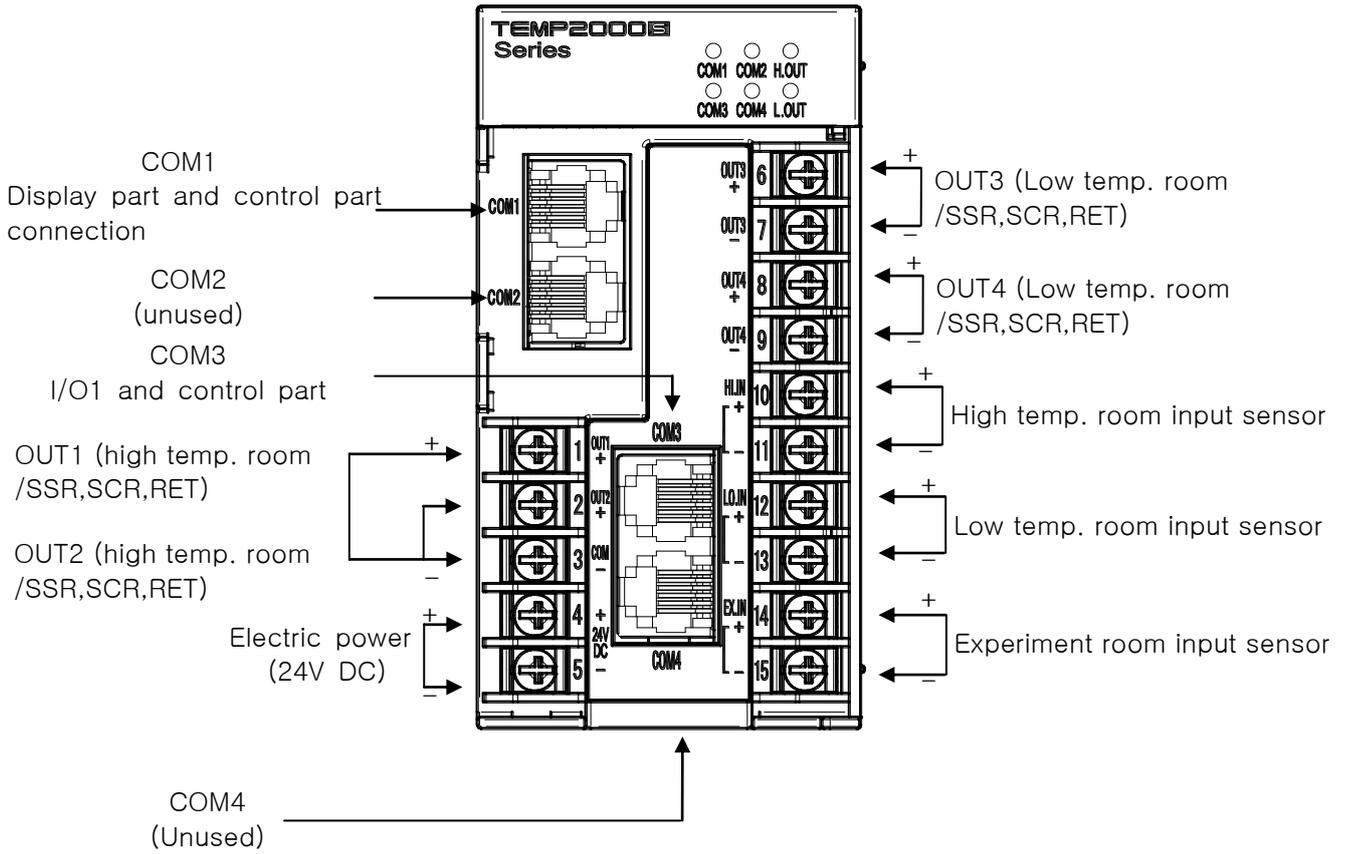
1.3.2 Terminal layout

1.3.2.1 TEMP2500S/TEMP2700S display part terminal

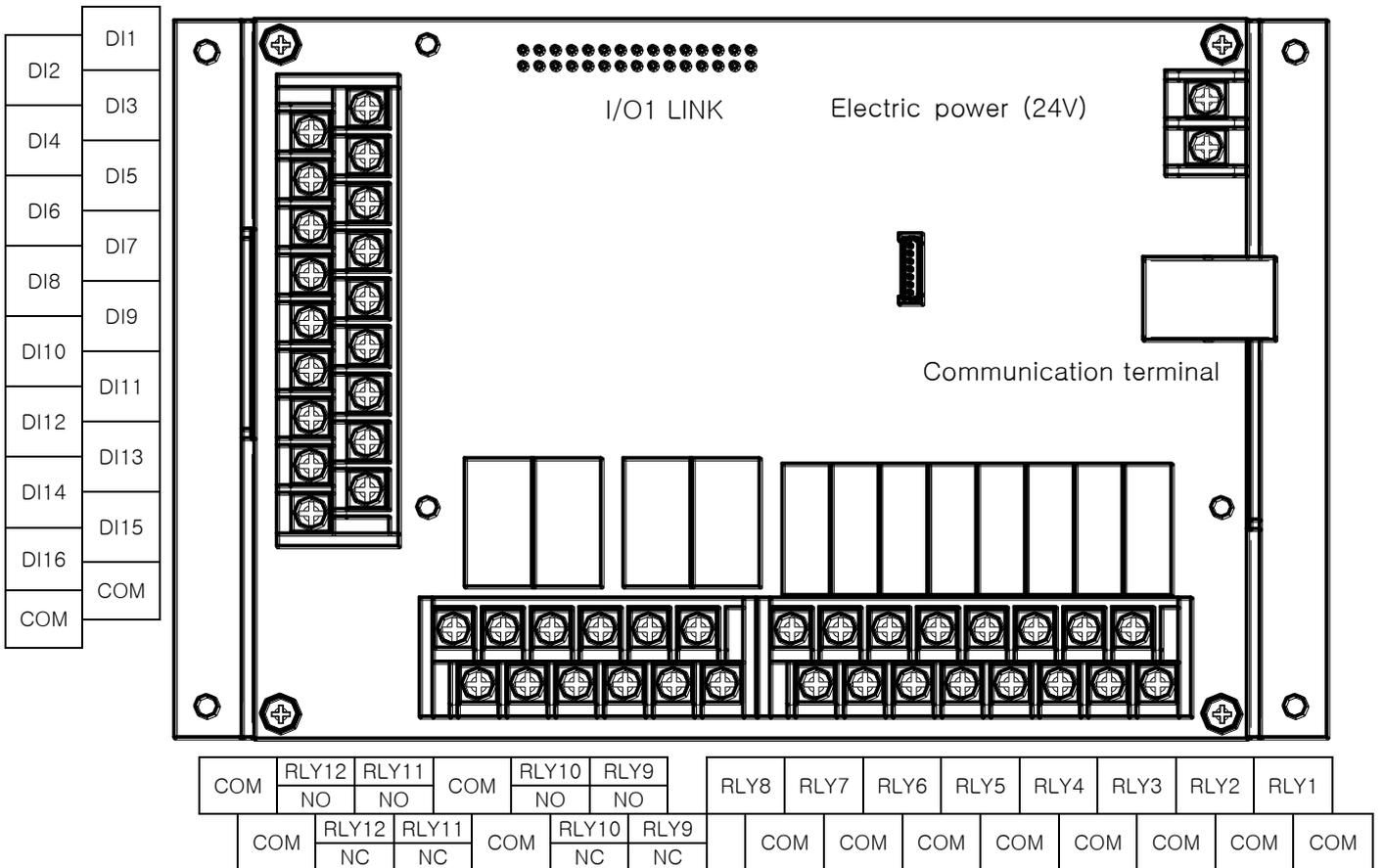


▶ RS232C/485 and Ethernet can not be used at the same time.

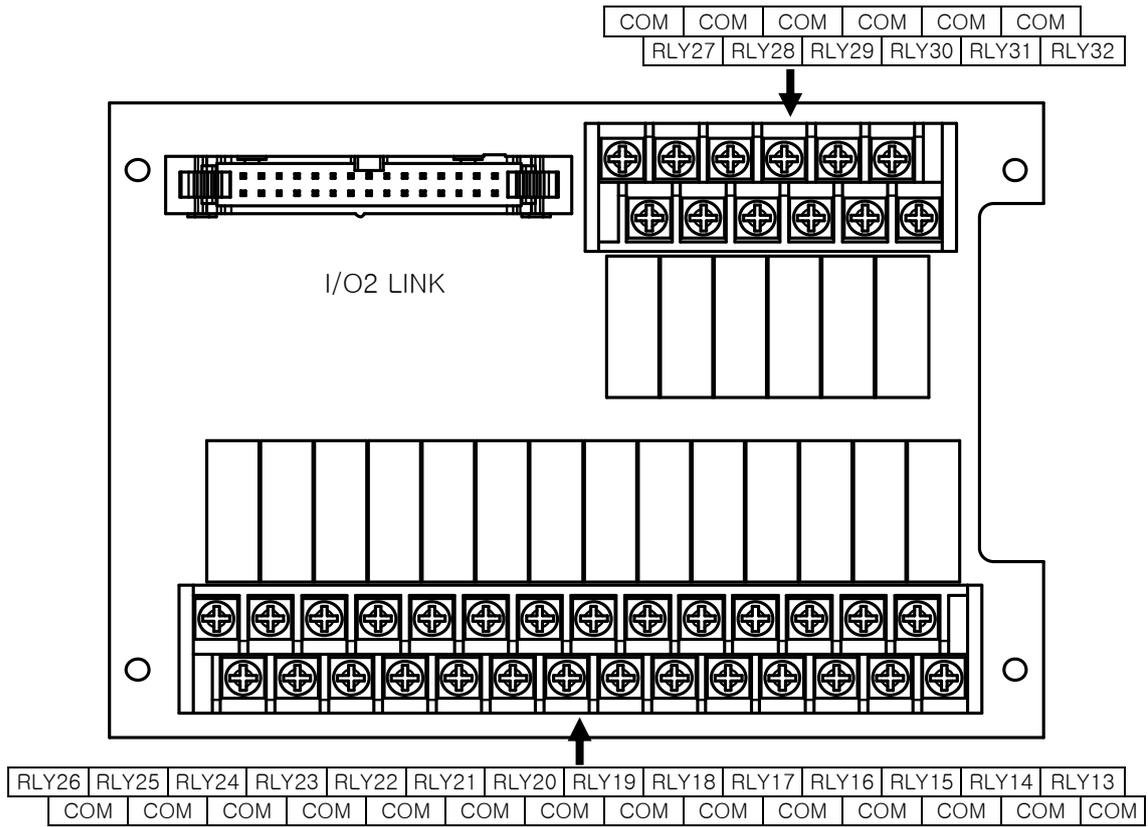
1.3.2.2 Control part terminal



1.3.2.3 I/O1 board terminal

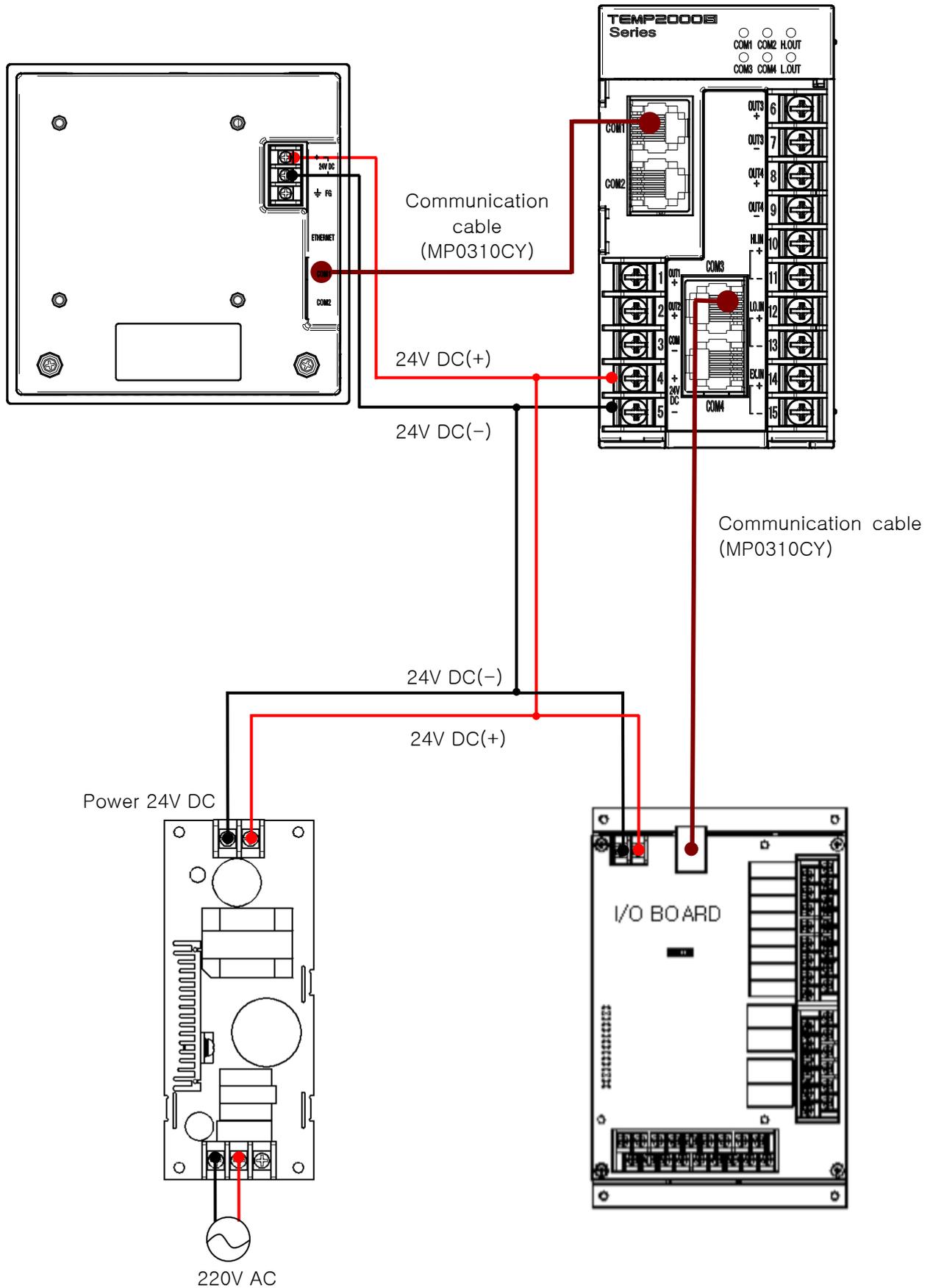


1.3.2.4 I/O2 BOARD terminal

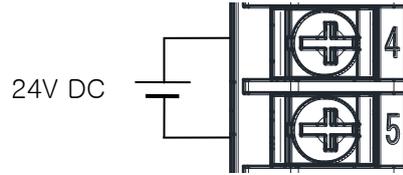


1.3.3 Electric power wiring

- ▶ 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



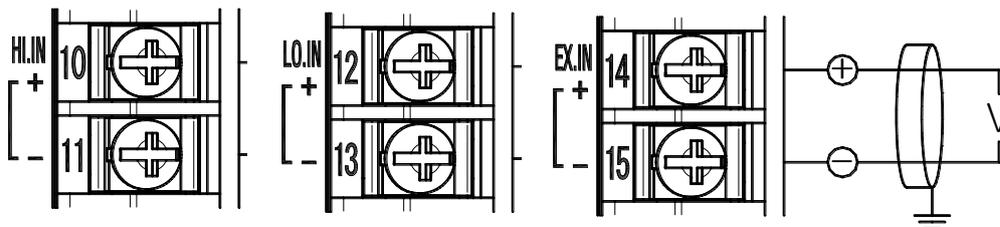
☞ How to connect the electric power for control unit



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

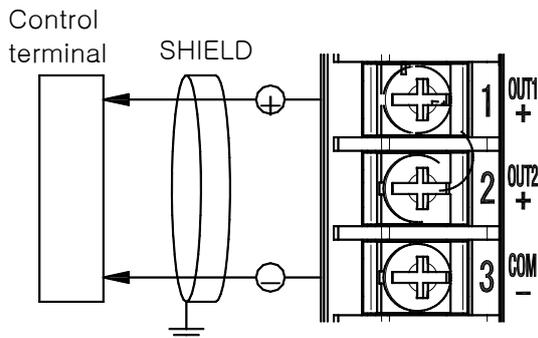


The 3rd class grounding

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)

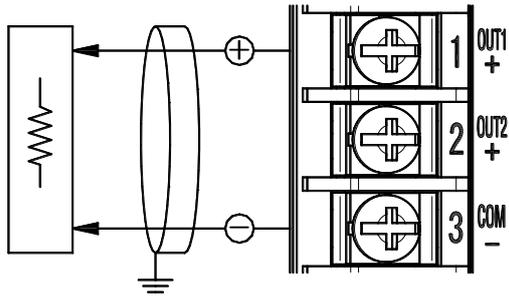


- ▶ Use COM for OUT1, OUT2 output terminal. 24V DC is output voltage checking in unloaded state in case of stop or 0% control power. Check the output voltage after connecting the load (SSR).

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

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

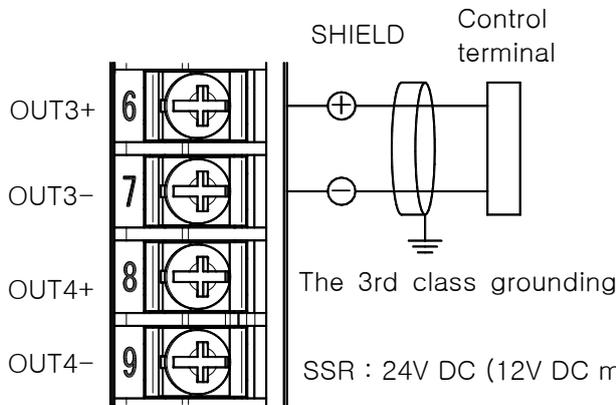
Receiver
(Recorder and etc)



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

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

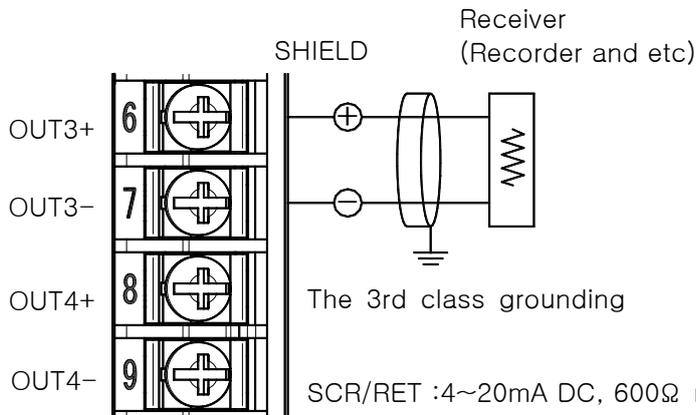
C. OUT3 and OUT4 voltage pulse output (SSR)



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

SSR : 24V DC (12V DC min, 600Ω min)

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

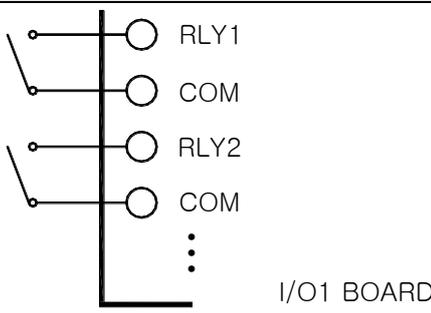
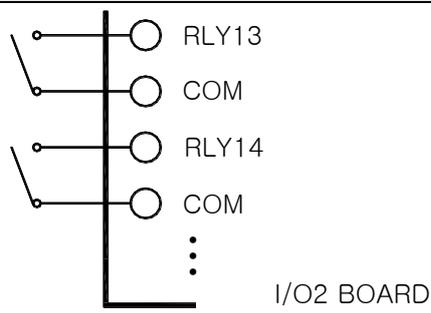
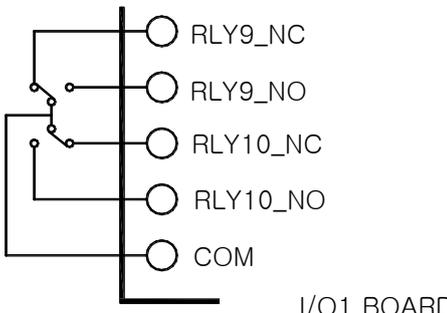
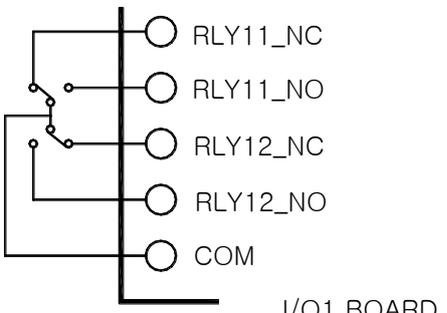


► Use independent COM for OUT3,OUT4 output terminal. Connection method is same.

SCR/RET : 4~20mA DC, 600Ω max

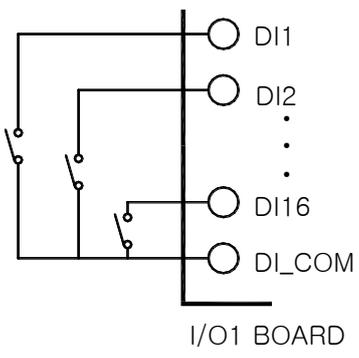
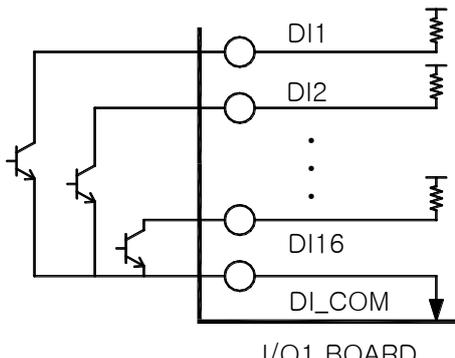
1.3.3.3 Connection for external contact point output

- ▶ 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>
<p>NO (Normal Open): Under 30V DC 1A, 250V AC 1A NO (Normal Close): Under 30V DC 1A, 250V AC 1A</p>	<p>NO (Normal Open): Under 30V DC 1A, 250V AC 1A NO (Normal Close): Under 30V DC 1A, 250V AC 1A</p>
 <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 μ 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>

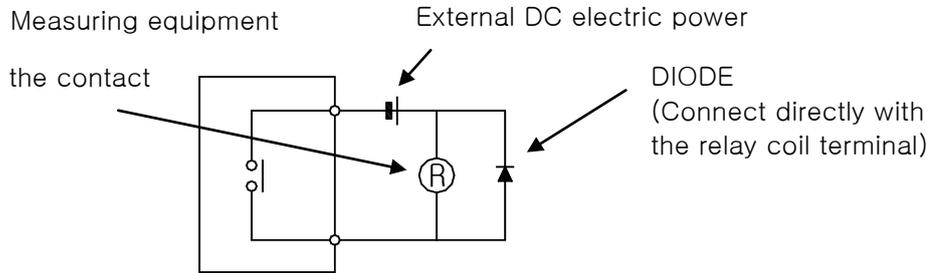
1.3.3.5 Use of sub relay

- ▶ “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 μ +120 Ω)
 - ☞ 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

※ RELAY

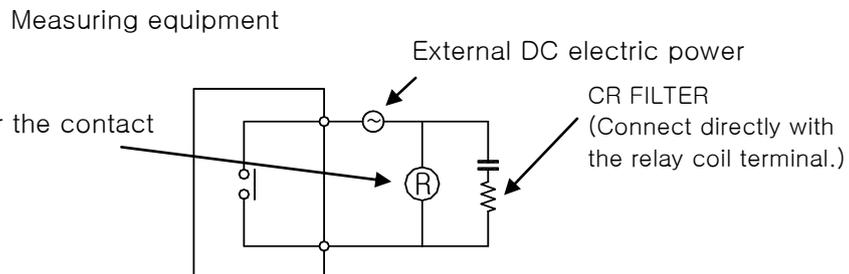
(Use the relay coil under the contact capacity of controller)



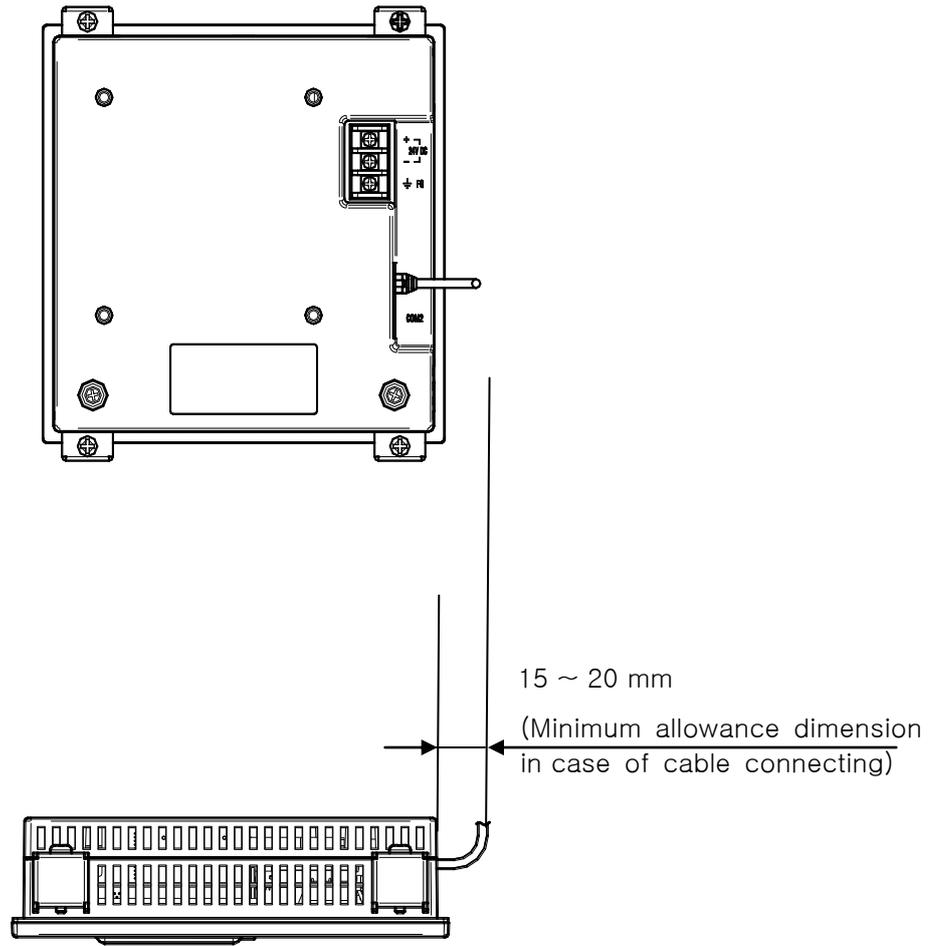
② In case of AC relay

※ RELAY

(Use the relay coil under the contact capacity of controller)

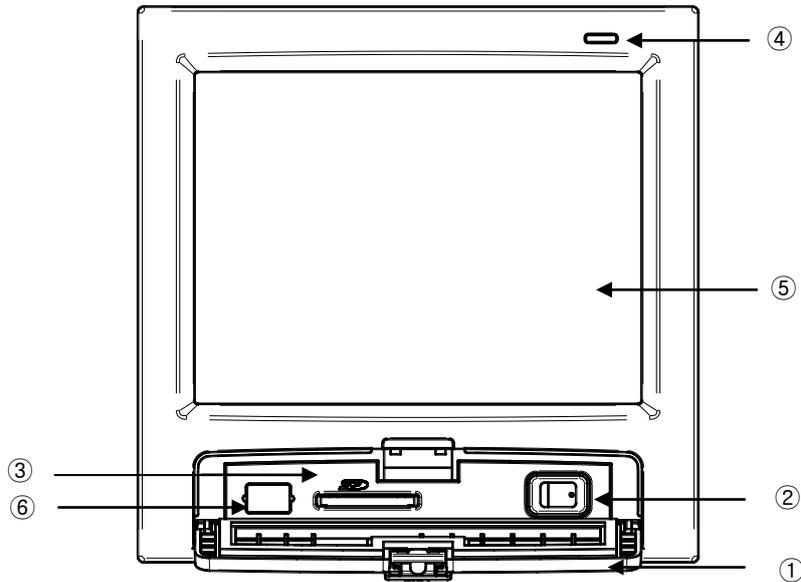


1.3.3.6 How to connect the communication for TEMP2500S/2700S display part



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 (Use for SD card option)
- ④ Lamp (Lighting in "OFF" of backlight/Run : Green, Stop : Red)
- ⑤ Screen display part
- ⑥ Manufacturer service port (Do not use.)

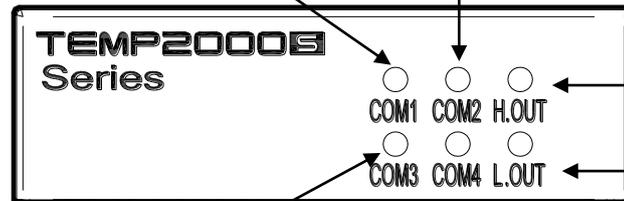
1.5 Control part LED

- ▶ COM1 LED blinks when the communication between display part and control part are connected.
- ▶ COM3 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

COM2 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

COM4 LED unused

2. Operation and setting

- ▶ This product is thermal shock test controller designed with dialogue style touch screen easy-to-use for the users.

2.1 Basic operation flow chart

- ▶ The logo screen and the initial screen are displayed sequentially when the electric power is switched “ON” after installation of the product and it converts to the program stationary screen. It takes about 20 seconds for screen loading.
- ▶ When **MAIN** button is touched at the top of the program stationary screen, it converts to the main screen.
- ▶ Refer to [21. System initial setting] for change in the initial screen.



2.2 Setting button operation

- ▶ The basic setup buttons are like [Table 2-1].

Table 2-1. The basic setup button

Button type	Button operation
	Touch “the Pattern No.” on the freeze-frame of program screen, and use when setup the desired pattern number.
	Use to input the general measure and the name.
	It is used for selection for one out of many types.
	Use to set the operation time of certain section.
	It is used for selection for one out of more than 2 parameter setting. (ON/OFF/Inactive state)
	It is used for selection of Y/N for the corresponding parameter. (ON/OFF/Inactive state)
	It is used for screen conversion.
	It is used for increasing or decreasing of the page within the screen.
	It is used for page conversion by increasing or decreasing of time axis the page on the same screen.
	It moves to the beginning and end of the PV graph page displayed on [6.2 view the saved PV graph]
	Use to move the PV axis for 1 DOT to the top and bottom of PV graph in [6.2 View the saved PV graph] .

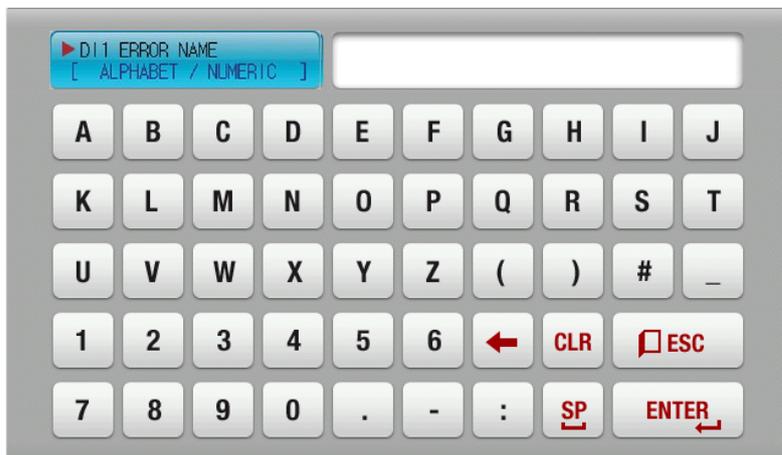
2.3 Parameter setting method

- ▶ On the basic setup button in [Table 2-1] above, select button to see the input key for setup like this and input the desired data.
- ▶ When the data out of the setting range is input, error message ("LIMIT ERROR") is shown on the input data display window with the error sound ("Beep").

① Input key for setting only the numbers.

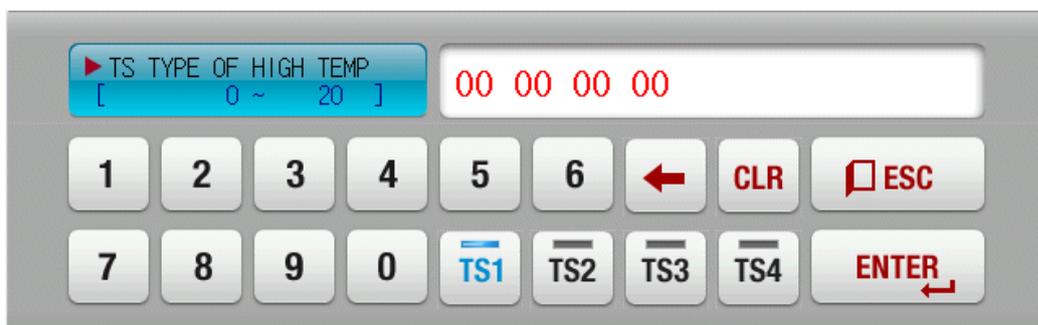


② Input key for setting the pattern experiment name and DI error name.



☞ Refer to [19. DI Function and Motion] for the input key of DI error name.

③ Input key for time signal setting



④ Display when it is out of the setting range



 NOTE	<p>Touch key lock release</p>
	<p>▶ Input OFF (Lock release state) for key block because the set value is not input when “Key block” is “ON.”</p> <p>☞ Refer to [4. Operation state screen setting] for details</p>

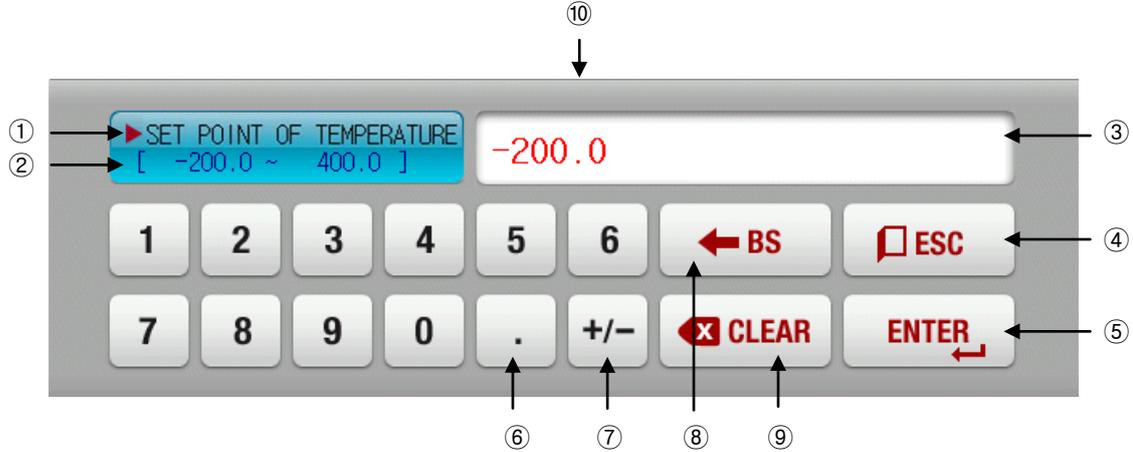
2.3.1 Method for effectiveness of setting button and setting value

- ▶ This product is designed as follows when the setting data input button is touched or to check the effectiveness of the input setting data by sound.
 - ☞ “Beep” : When the basic setting button is touched or the setting data is input normally
 - ☞ “Beep and beep” : When the input data by the setting data input key is out of the input range.

 CAUTION	<p>Precautions on the Operation</p>
	<p>▶ Do not press with sharp thing (Pencil and etc) or excessive force on the input key for basic setting button or setting value. It may cause the malfunction of the device or damage on the touch panel.</p>

2.3.2 Setting data input method

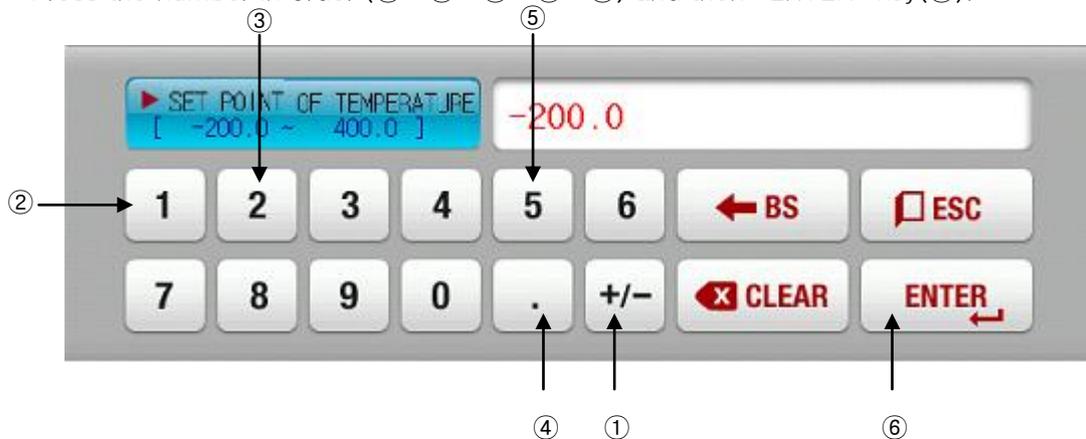
- ▶ Every input data used in this product is set by the set data input key, experiment name input key and time signal input key.
- ▶ The input key of predetermined value is shown if press  button in [Table 2-1], and then input the desired value.
- ▶ Refer to [5-3 Time signal operation] for time signal input.
- ▶ Set the value of the input key features and descriptions



- ① It displays “Parameter.”
- ② It displays “Setting range.”
- ③ It displays “LIMIT ERROR” when it is out of the setting range.
- ④ It is used to return to original screen after stopping the input.
- ⑤ It returns to the original screen by saving the input data.
- ⑥ It is used for input the decimal point.
- ⑦ It is used for input the symbol (+/-).
- ⑧ It is used for erasing the input data by one character.
- ⑨ It is used for erasing all input data.
- ⑩ It displays the already input setting data.

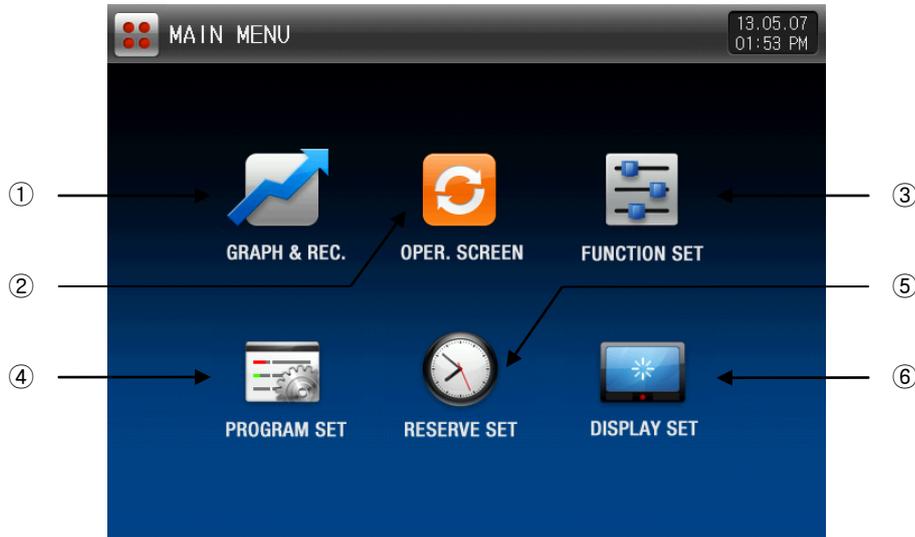
Ex) Set data input method

- ▶ To change the predetermined value 49.4 to -12.5
 - Press the input button for the predetermined value in that screen.
 - Press the number in order (①→②→③→④→⑤) and then “ENTER” key(⑥).



3. The setup for operation status

3.1 Main screen



[Pic 3-1] Main screen

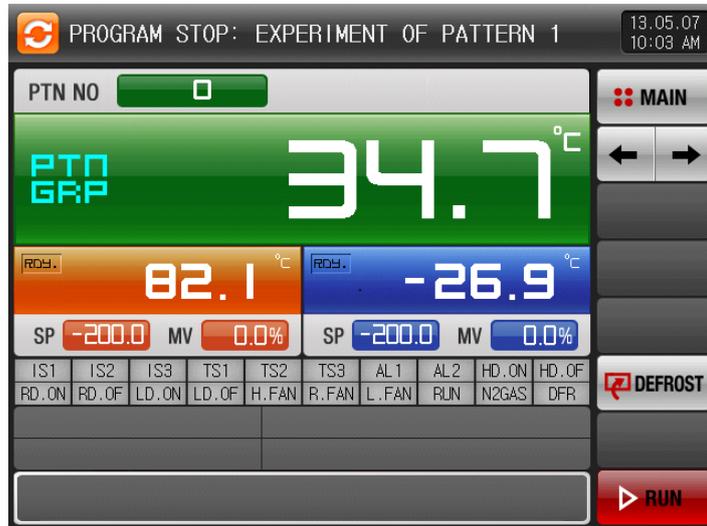
Table 3-1. Main Screen Parameter

No.	Instruction	Description
①	GRAPH & REC	Moving to the screen to set Y/N for using graph display, graph record, SD card recording.
②	OPER.SCREEN	Moving to the operation screen.
③	FUNCTION SET	Moving to the setting screen for additional function and operation method.
④	PROGRAM SET	Moving to the program setting menu screen.
⑤	RESERVE SET	Moving to the screen for setting current time, programmed operation time.
⑥	DISPLAY SET	Moving to the screen for setting the screen brightness,PV font,Y/N for using buzzer sound, electricity saving for backlight and channel conversion time.

3.2 The program operation

3.2.1 The first freeze-frame for program operation

- ▶ In [3.1 Main Screen], select “the operation status screen” to switch to the first freeze-frame for program operation
- ▶ For the pattern setup, refer to [5.1 Program Pattern Setup].
- ▶ In [Pic. 3-2 The first freeze-frame for program operation], press the  (operation) button in the bottom of right to switch to [Pic. 3-5 The first operational screen for program operation].



[Pic. 3-2] The first freeze-frame for program operation

- ▶ For the input of pattern number, press  to activate like [Pic. 3-3 The input screen for pattern number].

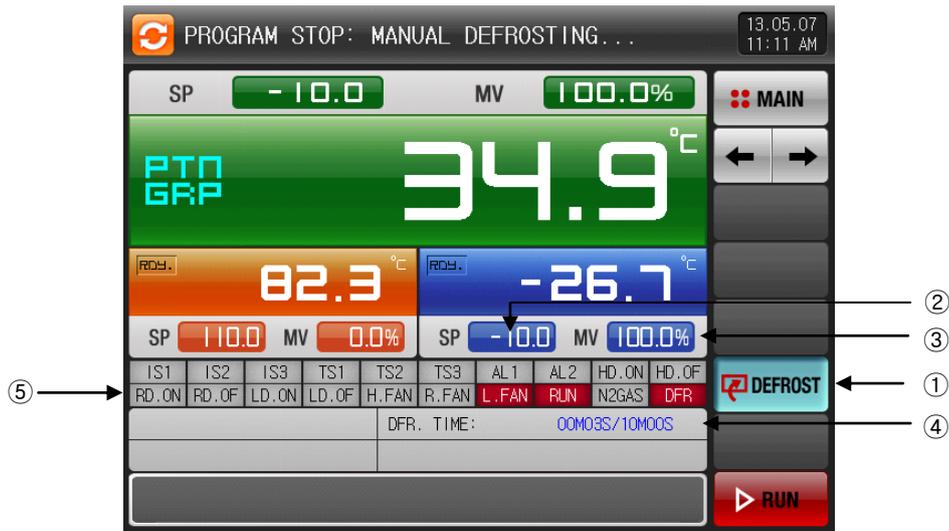


[Pic. 3-3] The input screen for pattern number

Table 3-2. The freeze-frame parameter of program

Parameter	Setting range	Unit	Initial value
PTN NO	0~120	ABS	0

- ▶ This is the setup screen for manual defrosting.
- ▶ The manual defrosting button is not activated during the operation.

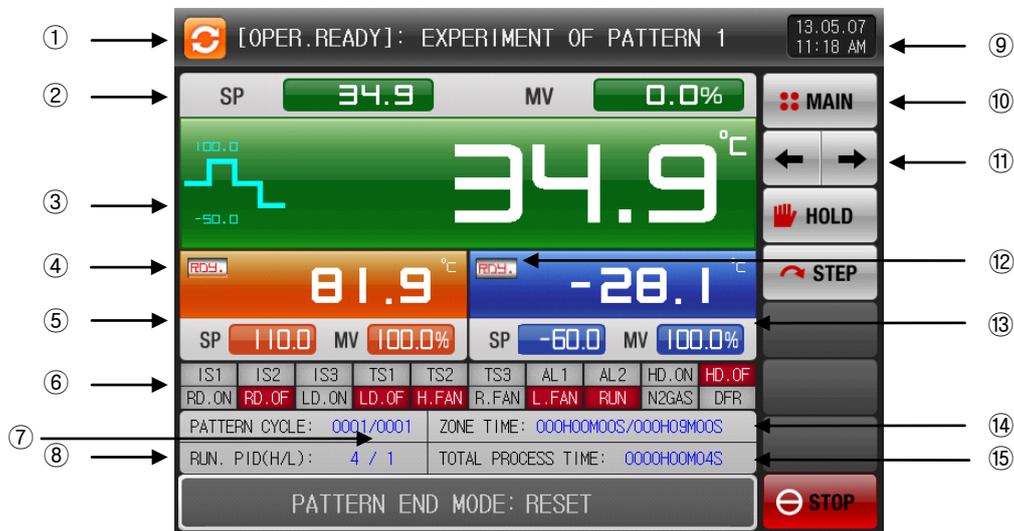


[Pic. 3-4] The manual defrosting

- ① This is the button for manual defrosting.
 - ☞ In [14.1 Equipment Configuration], you can set the button usage.
- ② In the manual defrosting, it displays the predetermined value.
 - ☞ The predetermined values in the low temperature room and the experiment are applied identically.
 - ☞ In [14.1 Equipment Configuration], you can set the defrosting temperature.
- ③ In the manual defrosting, it displays the output quantity.
 - ☞ The output quantity in the low temperature room and the experiment room are applied identically.
- ④ It displays the defrosting time.
 - ☞ In [14.1 Equipment Configuration], you can set the time.
- ⑤ It displays the status lamp.
 - ☞ Please refer to [21.2 The Setup of Status Lamp].

3.2.2 The first operational screen for program operation

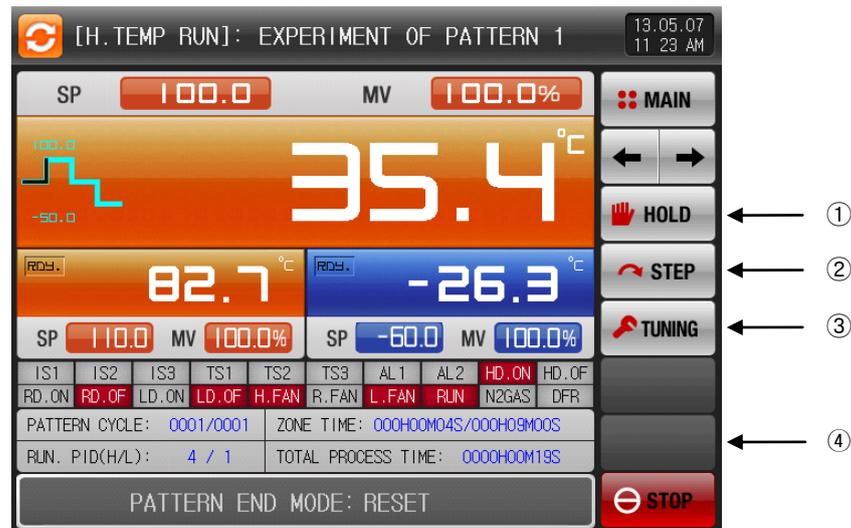
- ▶ This is the screen to display the measured value, predetermined value, control output quantity and operation information.
- ▶ The pattern number is not activated during the operation.
- ▶ In the operation, if touch the “predetermined value”, the input key for the setup of target value is not activated.



[Pic. 3-5] The first operational screen for program operation

- ① It displays the current operation status.
- ② It displays the current predetermined value and the output quantity in the experiment room.
- ③ It displays the current measured value in the experiment room.
- ④ It displays the target temperature in the high temperature room.
- ⑤ It displays the pattern status in the high temperature room.
- ⑥ It displays the pattern status in the room temperature room.
- ⑦ It displays the pattern status in the low temperature room.
- ⑧ It displays the target temperature in the low temperature room.
- ④ In the operation preparation in the high temperature room, RDY lamp is flickered on and off.
- ⑤ It displays the predetermined value, output quantity and measured value in the high temperature room.
- ⑥ It displays the status lamp.
 - ☞ Please refer to [21.2 The Setup of Status Lamp].
- ⑦ It displays the pattern repetition status.
 - ☞ [The number of pattern repetition : 0000/0000] The first number is the number of repetition and the second number is the setup number of repetition.
- ⑧ It displays the current PID section number in the high and low temperature room.
- ⑨ It displays the current date/time, and press here to turn off LCD screen.
 - ☞ In the operation freeze-frame, press the date/time button to turn on the red lamp.
 - ☞ In the operational screen, press the date/time button to turn on the green lamp.
- ⑩ Move to [Pic. 3-1 Main Screen].
 - ☞ When setup the main button control, the key pad for password is displayed.
- ⑪ It is moved from the current screen to the next screen.
- ⑫ In the operation preparation in the low temperature room , RDY lamp is flickered on and off.
- ⑬ For the predetermined value in the low temperature room , the output quantity and the measured value are displayed.
- ⑭ It displays the running time and the setup time of current operation.
 - ☞ [Experiment Time : 000H00M00S/000H00M00S] The first number is the running time of that section and the second number is the setup time in [5.1 The Setup of Program Pattern].
- ⑮ It displays the running time of program operation.

- In the operation preparation, the operation in the high temperature room or the defrosting, the auto-tuning is not activated.

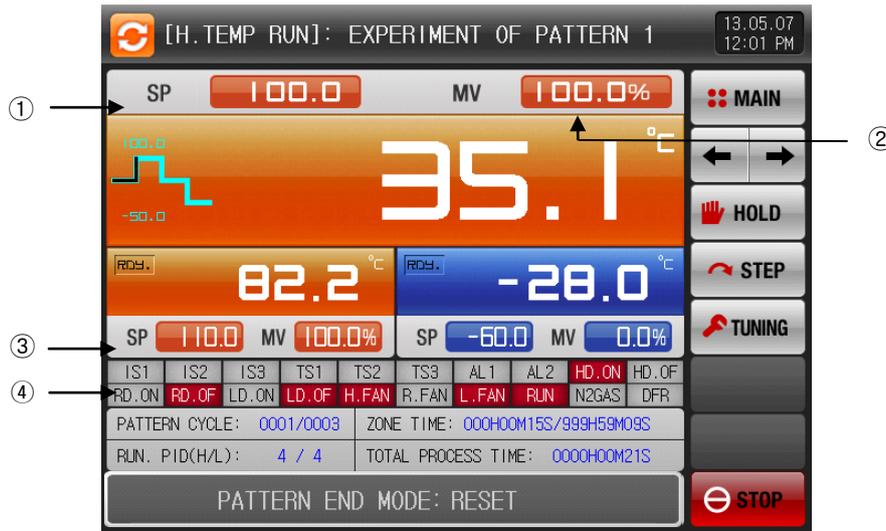


[Pic. 3-6] The first operational screen for program operation

- ① Hold on or hold off the current predetermined value.
- ② Close the current section and force to move to the next section.
- ③ Run or hold off the auto tuning with the current predetermined value.
 - ☞ In [16. PID Group], you can set the display for tuning button.
- ④ It is the button for user.
 - ☞ In [21. System Initial Setup], you can set the usage.
 - ☞ When use the button for user, in [18.DO Relay Setup], you can set the wanted relay.
 Ex) Use for ON/OFF for lamp output in the chamber.
 - ☞ In the freeze-frame/operational screen for program, if press the button for “user”, the wanted relay begins to operate.

※ In the freeze-frame, ① ~ ③ buttons are not displayed.

► This is the operational screen for the high temperature room.

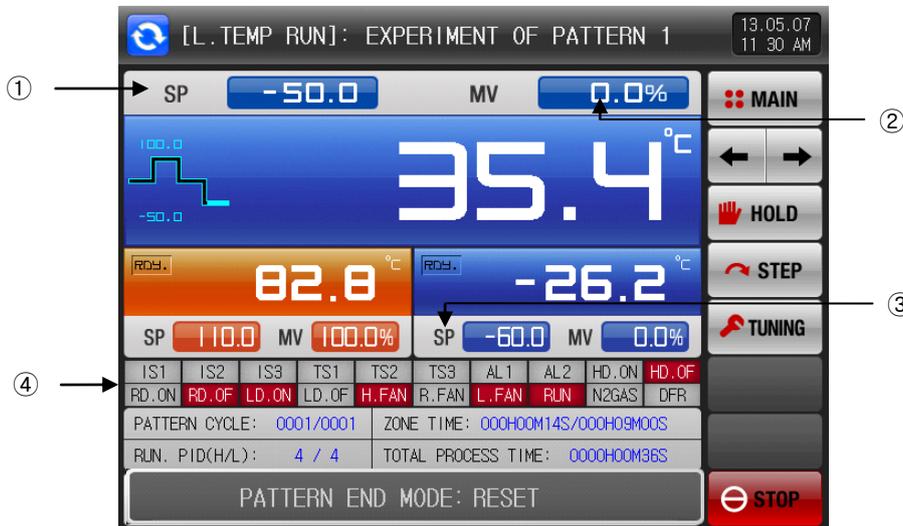


[Pic. 3-7] The first operational screen for program operation (High temperature room)

- ① It displays the target predetermined value in the experiment room.
- ② It displays the current output quantity in the experiment room.
- ③ It displays the preheated predetermined value in the high temperature room.
- ④ It displays the status lamp in the high temperature room.

※ In the operation of high temperature room, the output quantity in the high temperature room and the experiment room is identical.

► This is the operational screen for the low temperature room .

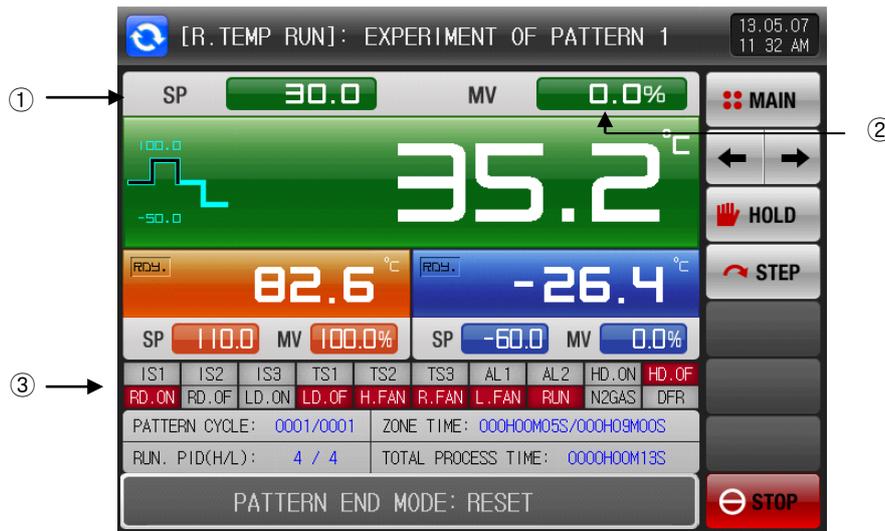


[Pic. 3-8] The first operational screen for program operation (Low temperature room)

- ① It displays the target predetermined value in the experiment room.
- ② It displays the current output quantity in the experiment room.
- ③ It displays the pre-cooled predetermined value in the low temperature room.
- ④ It displays the status lamp in the low temperature room.

※ In the operation of low temperature room , the output quantity in the low temperature room and the experiment room is identical.

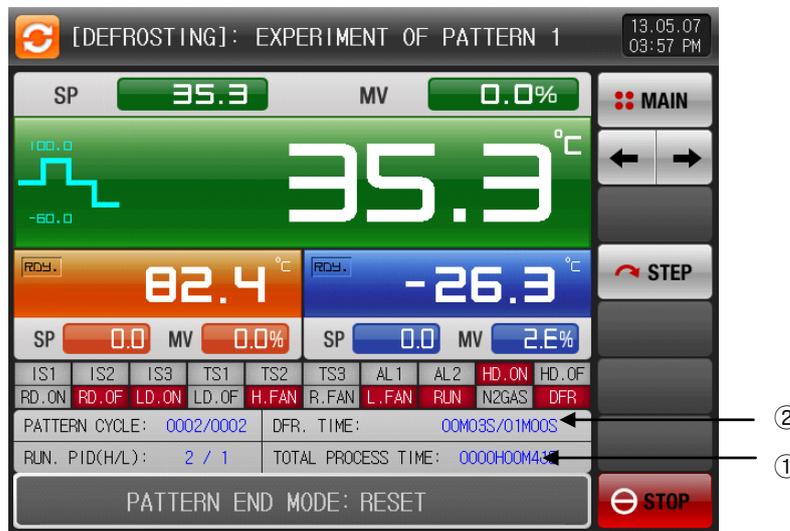
► This is the operational screen for the room temperature room.



[Pic. 3-9] The first operational screen for program operation (Room temperature room)

- ① It displays the target predetermined value in the room temperature room.
- ② It is not controlled in the room temperature room.
- ③ During the operation in the room temperature room, it displays the status lamp.

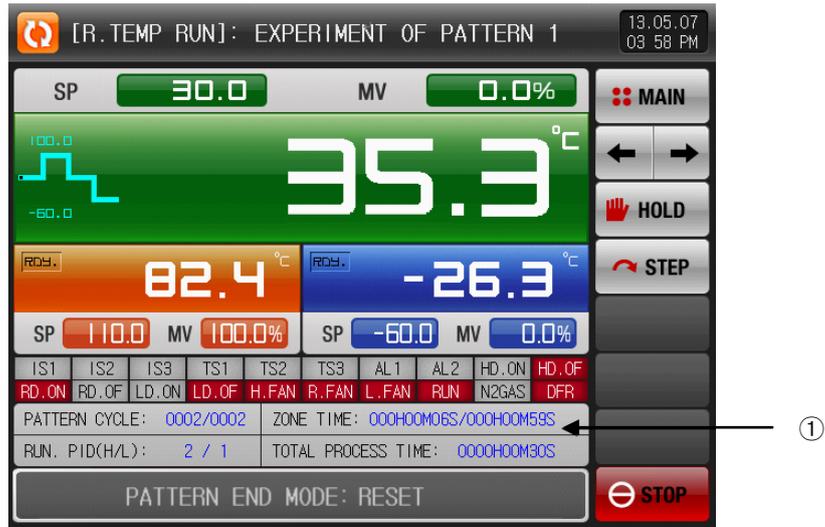
► This is the operational screen for the heater defrosting type.



[Pic. 3-10] The first operational screen for program operation (Heater defrosting type)

- ① It displays the defrosting setup time.
 - ☞ Heater 1 : The defrosting operation during the defrosting setup time.
 - ☞ Heater 2 : Defrosting predetermined value = The defrosting operation during the defrosting setup time from the command of low temperature room .
- ② The defrosting output is “ON” during the defrosting setup time.

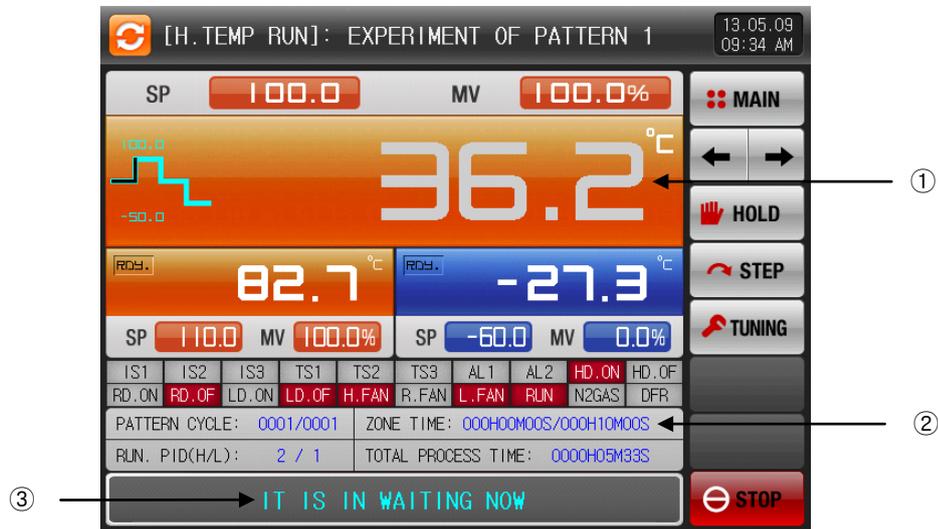
- ▶ This is the operational screen for the defrosting type for hot gas.
- ▶ Without the additional defrosting section, it is used the defrosting type for hot gas.



[Pic. 3-11] The first operational screen for program operation (The defrosting type for hot gas)

① The defrosting output is “ON” during the defrosting setup time.

- ▶ This is the operational screen for the stand-by.

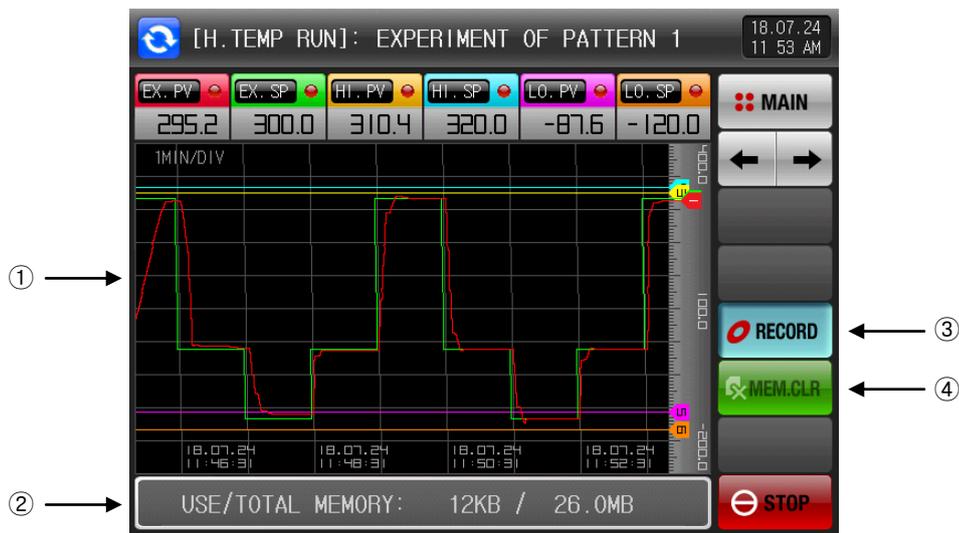


[Pic. 3-12] The first operational screen for program operation (Stand-by)

- ① In the stand-by, the color of PV is changed to gray.
- ② In the stand-by, the experiment time is not running.
- ③ In the stand-by, the message which says “IT IS IN WAITING NOW” is displayed like the picture above.

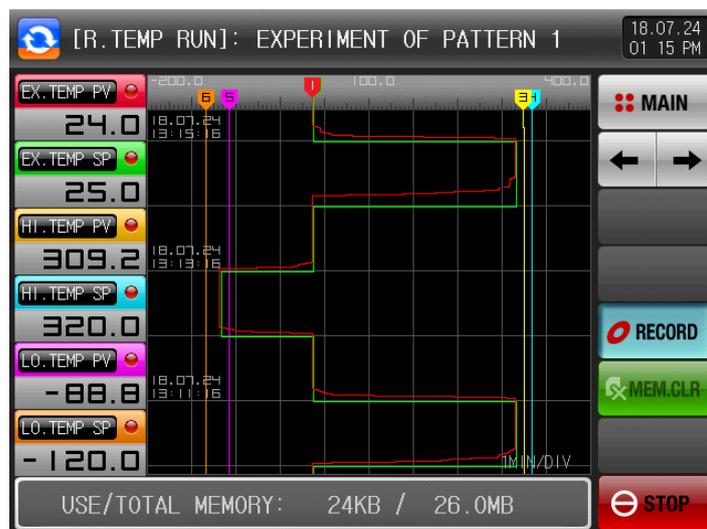
3.2.3 The Second operational screen for program operation

- ▶ In the up of screen, it displays the measured value and the predetermined value in the high, low temperature room, experiment room.
- ▶ check box sets Y/N for data display.
- ▶ Press  at the right middle to save the data of recording.
- ▶ The saved data into the internal memory are erased when the electric power is "OFF".
- ☞ Save the important graph files into the SD card.
- ☞ Please refer to the **[6.2 View the saved PV graph]**
 - ※ When saving the current measured value and the predetermined value in the internal memory, it can not be downloaded in SD card.



[Pic. 3-13] The second operational screen for program operation

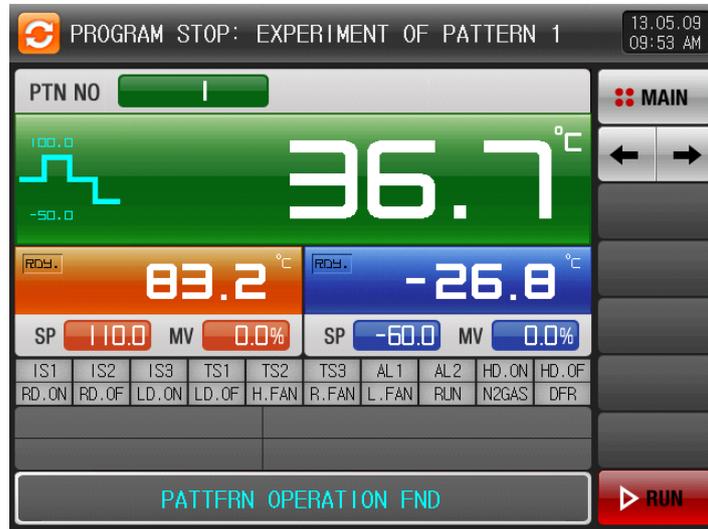
- ① It displays the current measured value and the predetermined value.
- ② It displays the capacity of internal memory.
 - ☞ About 25 days of saving is available when the sampling time is set in 1 second.
- ③ It is the button to save the current measured value and the predetermined value in the internal memory.
- ④ It deletes every file saved in the internal memory.



[Pic. 3-14] The second operational screen for program operation

3.2.4 The freeze-frame for program operation

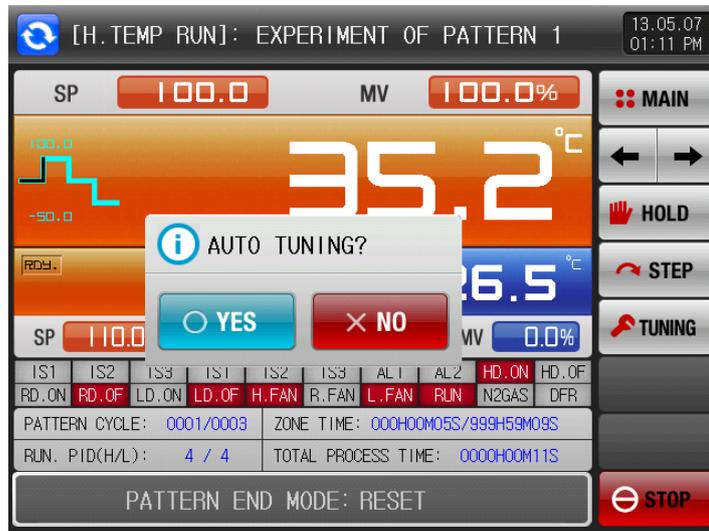
- ▶ When finish the pattern operation of setup section, the message which says “PATTERN OPERATION END” is displayed like the picture below and the program operation is closed.
- ▶ The message is not appeared on the screen when it is forcibly terminated by pressing “Stop” button during operation.
- ▶ The message is disappeared by touching the corresponding part when the operation termination message is display in case of operation termination.



[Pic. 3-15] The freeze-frame for program operation

3.3 Auto Tuning Screen

- ▶ It can be used when the high or low temperature room is operating.
- ☞ It can not be used in the operation preparation or defrosting.
- ▶ In the auto tuning, you can not use the Hold and Step key.



[Pic. 3-16] The setup screen for auto tuning

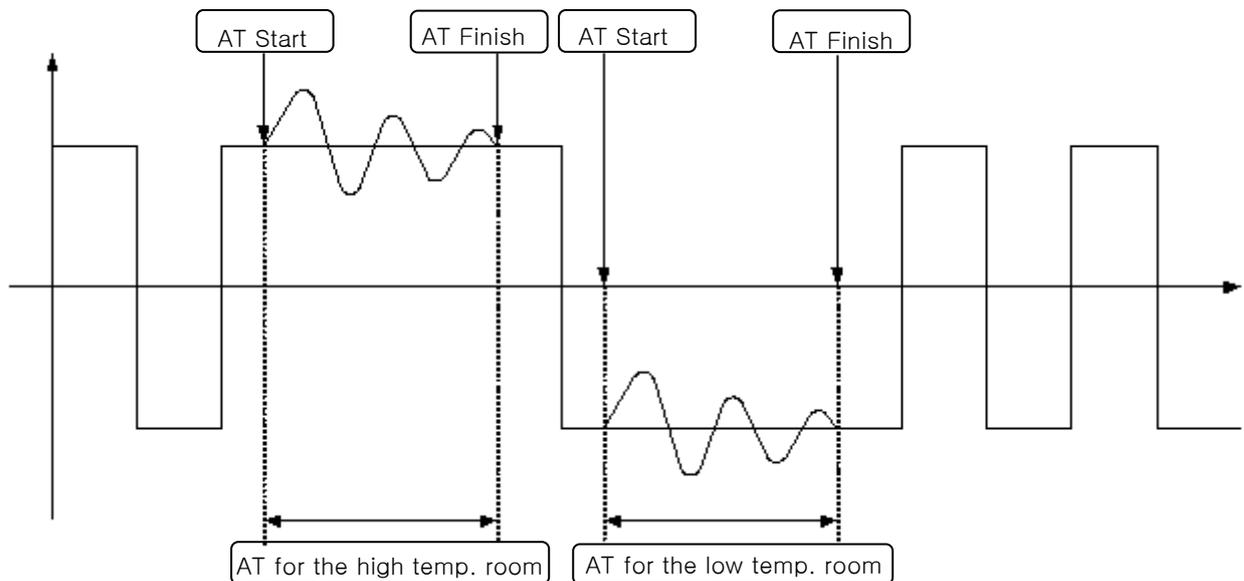
Table 3-3 Auto Tuning Parameter

Parameter	Setting range	Unit	Initial value
AUTO TUNING	OFF, ON	ABS	OFF



AUTO TUNING

- ▶ Auto tuning is a function to set the optimal PID integer automatically by measuring and calculating the object of control with controller.
- ▶ The controller generates the ON/OFF control output during “2.5 periods” during auto tuning and it calculates the P.I.D data automatically based on the period and oscillation magnitude using the limit cycle to the object to be controlled.
- ▶ Auto tuning can be executed only when the thermal shock experiment controller is running and it performs the auto tuning for the experiment room in operation. For example, the auto tuning is executed when the high temperature room is in operation, it performs based on the target temperature of the high temperature room and the auto-calculated P.I.D value will be set automatically when the auto tuning is complete.



[Example of auto tuning]

- ▶ The execution of auto tuning is impossible or will be forced to close under these conditions.
 - When the thermal shock experiment controller stop operating.
 - When the sensor is opened (S.OPN : Sensor Open)
 - When the auto tuning is stopped manually by user before it completes the process.



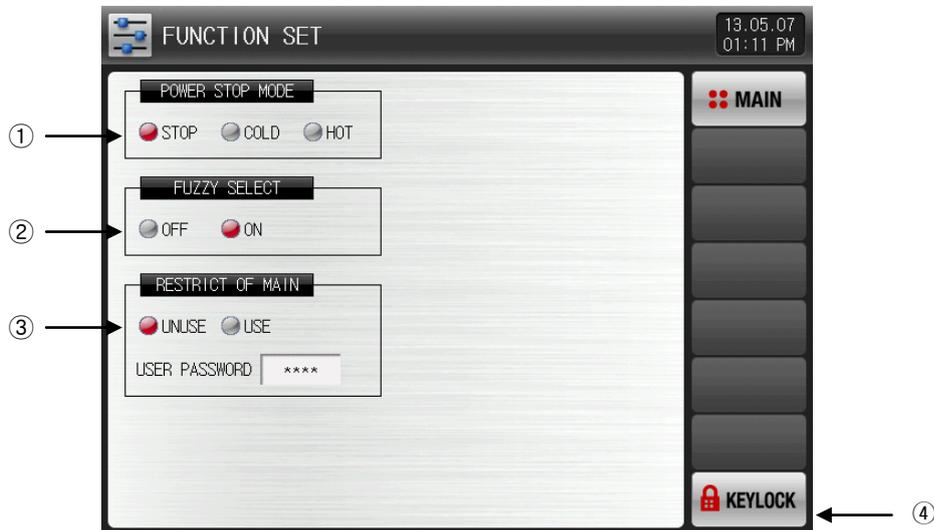
Cautions in AUTO TUNING

- ▶ The manufacturer sets P, I, D parameter for the optimized control of thermal shock experiment controller through the experiment in the manufacturing process. In the auto tuning, the initially set P, I, D parameter can be changed so the control features of thermal shock experiment can be changed. With these reasons, we recommend to consult with the manufacturer when the user want to execute the auto tuning.

4. The Setup for operating motions

4.1 Operation method setting

- This is the screen for the additional functions of general equipment.



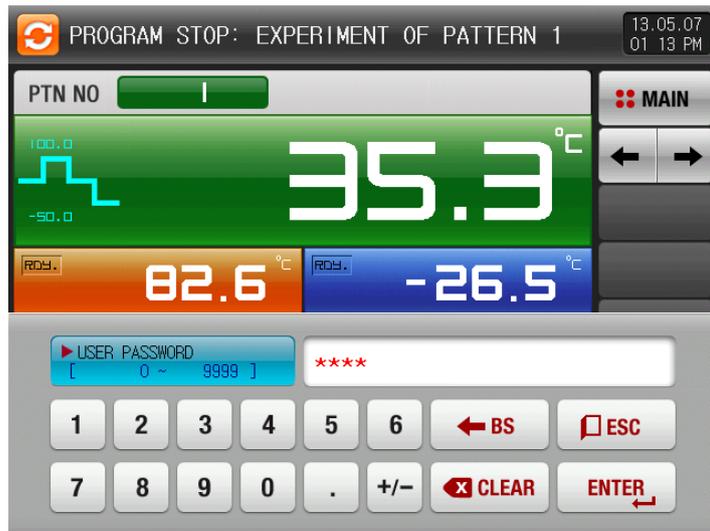
[Pic. 4-1] The setup screen for operation motions

- ① Setting the recovery motion in black out
 - ☞ STOP : A motion to return to the operation stop state after power on from on the black out.
 - ☞ COLD : An operation from the beginning after power on from the black out
 - ☞ HOT : A motion to return to the previous operation state after power on from on the black out.
- ② It stabilizes the control when the disturbance occurs.
 - ☞ OFF : The fuzzy function is not used.
 - ☞ ON : It restrains the overshoot with the fuzzy function.
- ③ The key pad to input the password is displayed when the main button is touched by in the operation screen for setting the main button restriction setting.
 - ☞ Refer to [Fig. 4-2 Screen for main button restriction setting]
- ④ The parameter setting is impossible when  button is touched by
 - ☞ Screen rolling and key block releasing is possible.

Table 4-1. The parameter for operating motions

Parameter	Setting range	Unit	Initial value
POWER STOP MODE	STOP, COLD, HOT	ABS	STOP
FUZZY SELECT	OFF, ON	ABS	OFF
RESTRICT OF MAIN	UNUSE, USE	ABS	UNUSE
KEY LOCK	OFF, ON	ABS	OFF

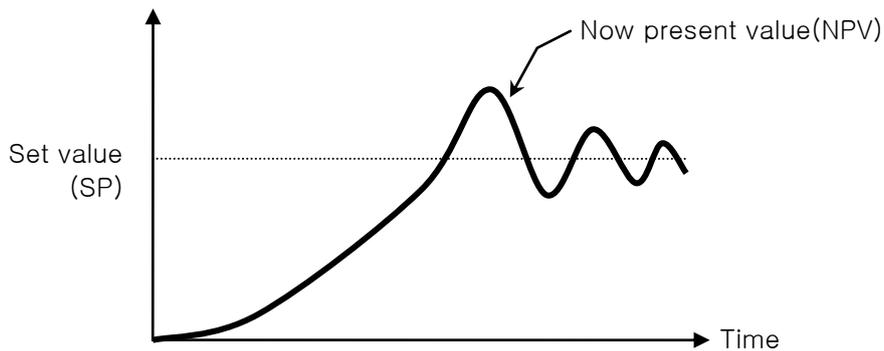
- ▶ The screen below is the control setup screen for main buttons.
- ▶ When press the main button in the operation screen, the key pad for password is displayed.



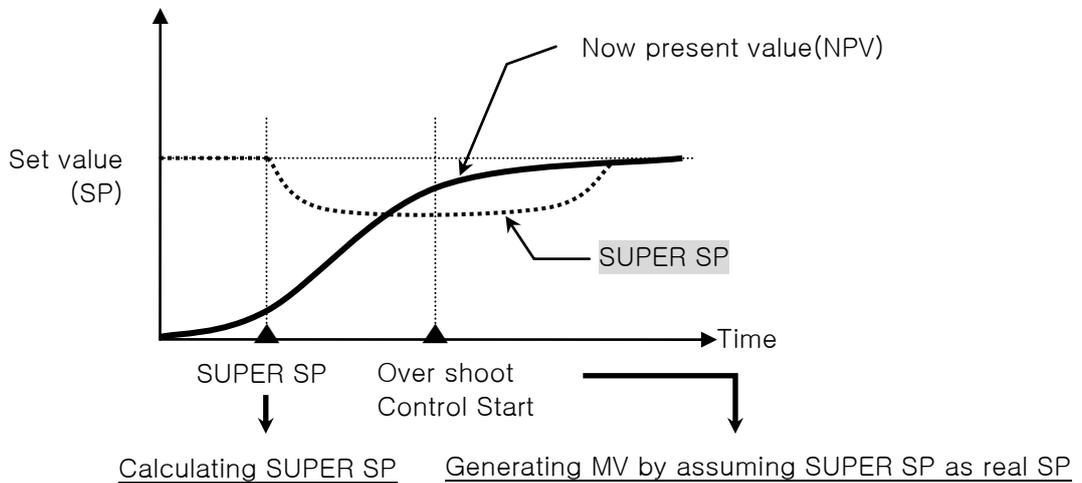
[Pic. 4-2] The control setup screen for main buttons

4.2 Fuzzy operation

- ▶ The overshoot may be taken place in case of severe change in operation or frequent changes in present value (SP). More effective control can be made when the fuzzy function is operated at this time.
 - ▶ Internal operation sequence of fuzzy function
 - ☞ It controls the overshoot by calculating the control output value (MV) with sub target value (Super SP) instead of present value (PV) from the overshoot control start time.
- The control for overshoot (FUZZY) “OFF”

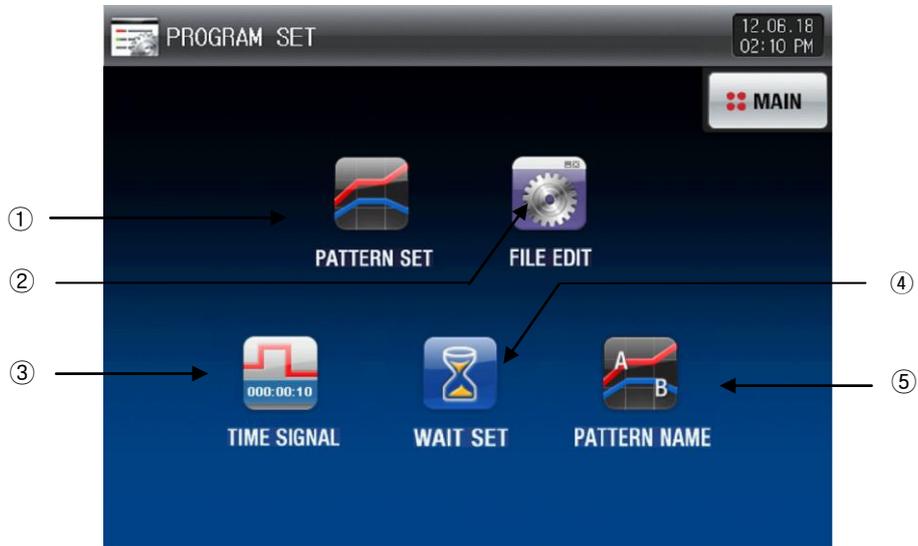


- The control for overshoot (FUZZY) “ON”



5. Program setting

- ▶ It converts to [Pic. 5-1 Program setting screen] when the program setting button is touched by in [3-1 Main screen].
- ▶ It is a screen group to set the parameters related to the program operation.

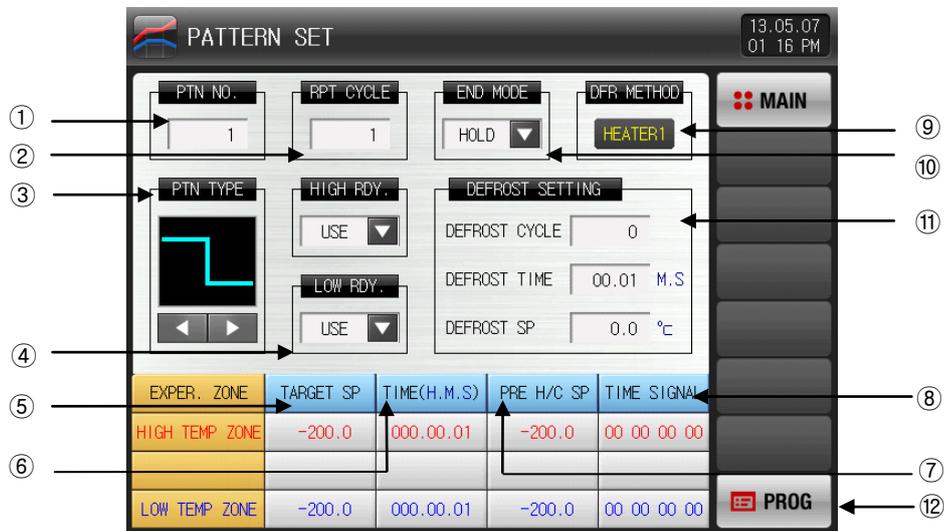


[Pic. 5-1] Program setting screen

No.	Instruction	Description
①	PATTERN SET	It is moved to the screen for the pattern editing.
②	FILE EDIT	It is moved to the screen for the file editing.
③	TIME SIGNAL	It is moved to the screen for the time signal.
④	WAIT SET	It is moved to the screen for the stand-by setup.
⑤	PATTERN NAME	It is moved to the screen for the experiment name setup.

5.1 Program pattern setting

- ▶ This is the setup screen depending on the pattern number.
- ▶ Refer to [5-3 Time signal operation] for time signal setting.
- ▶ It sets the repetition number of pattern.



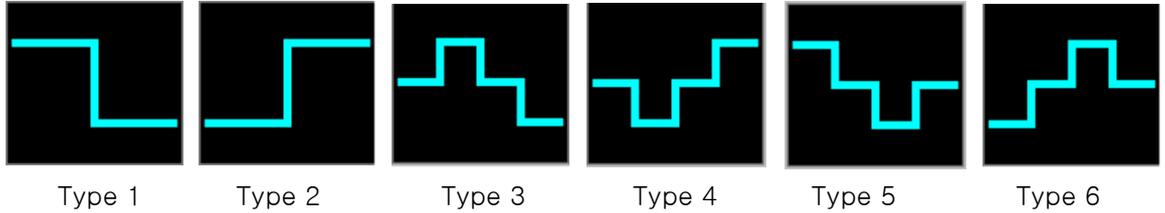
[Pic. 5-2] The screen for pattern editing

- ① It sets the pattern number.
- ② It sets the repetition number of pattern.
- ③ It sets the type of pattern.
 - ☞ Damper : Press ◀▶ button to set one pattern among 6 kinds of patterns.
 - ☞ Elevator : Press ◀▶ button to set one pattern between 2 kinds of patterns.
- ④ It sets the stand-by motion use or unused in the high and low temperature room.
 - ☞ After the heater defrosting, the stand-by motion is applied regardless of setup.
- ⑤ It sets the target temperature of that section.
- ⑥ It sets the running time of that section.
- ⑦ It sets the pre-heated/cooled temperature of that section.
- ⑧ It sets the time signal of that section.
 - ☞ It can set 4 time signals and each can be selected and set among 20 kinds of time signal.
 - ☞ Refer to [5.3 Time signal motions]
- ⑨ It displays the applied defrosting type.
 - ☞ It is only for read so it can not be changed by touch.
 - ☞ In [14.1. The setup for equipment configuration], you can change the defrosting type.
- ⑩ After finish the operation, you can set the motion type.
- ⑪ It sets the defrosting cycle, time and temperature.
- ⑫ Press **PROG** (pattern) button to move to [Pic. 5-1 The screen for program setup].

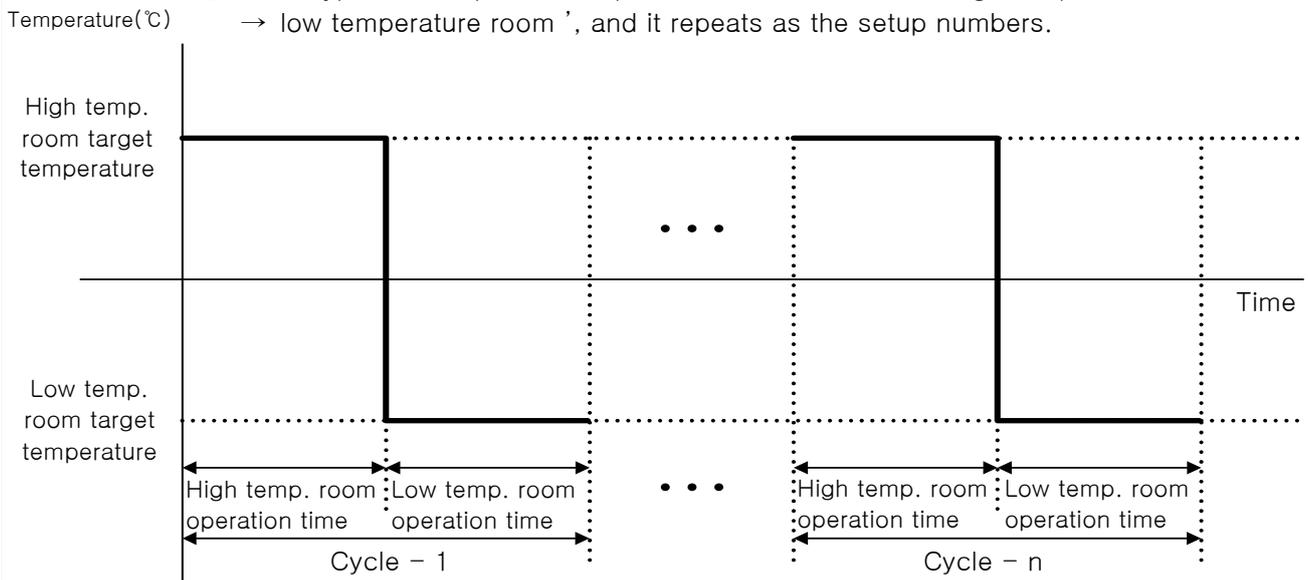


The type of program pattern

- ▶ There are 6 kinds of program pattern in TEMP2000S.
 There are 2 kinds of pattern (Type 1&2) In the elevator type, 6 kinds of patterns.
 (Type 1,2,3,4,5&6) in the damper type.
 When set the program pattern, you can set the type of program pattern using
[Pic. 5-2 The screen for pattern editing]

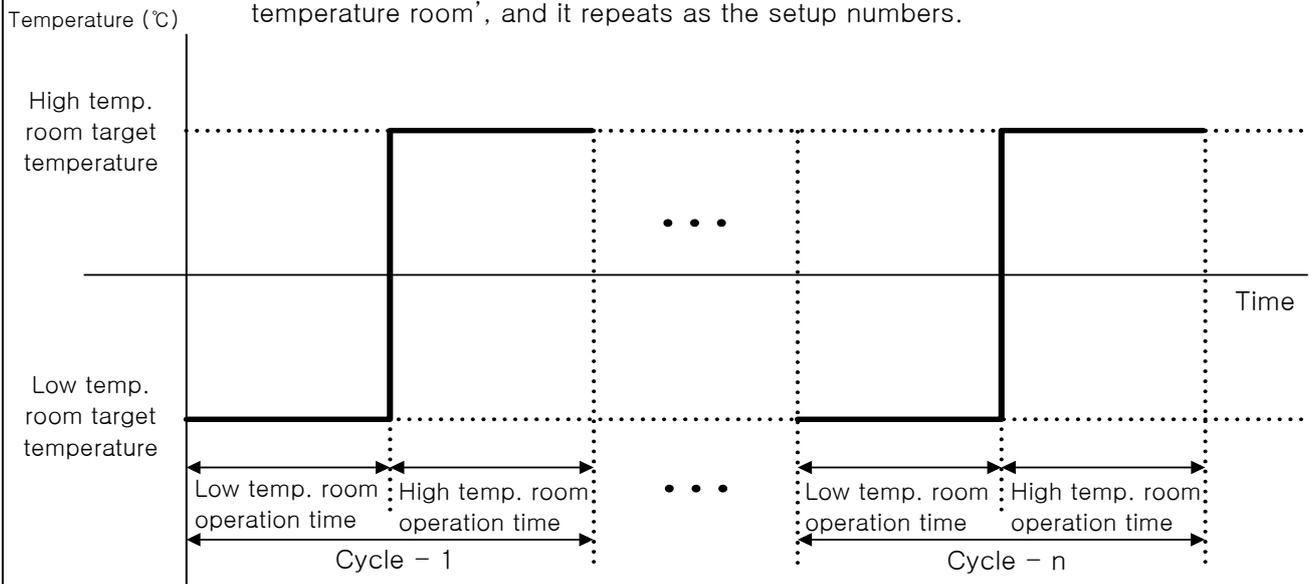


- ① In the type 1, the operation is performed in the order of 'high temperature room → low temperature room', and it repeats as the setup numbers.



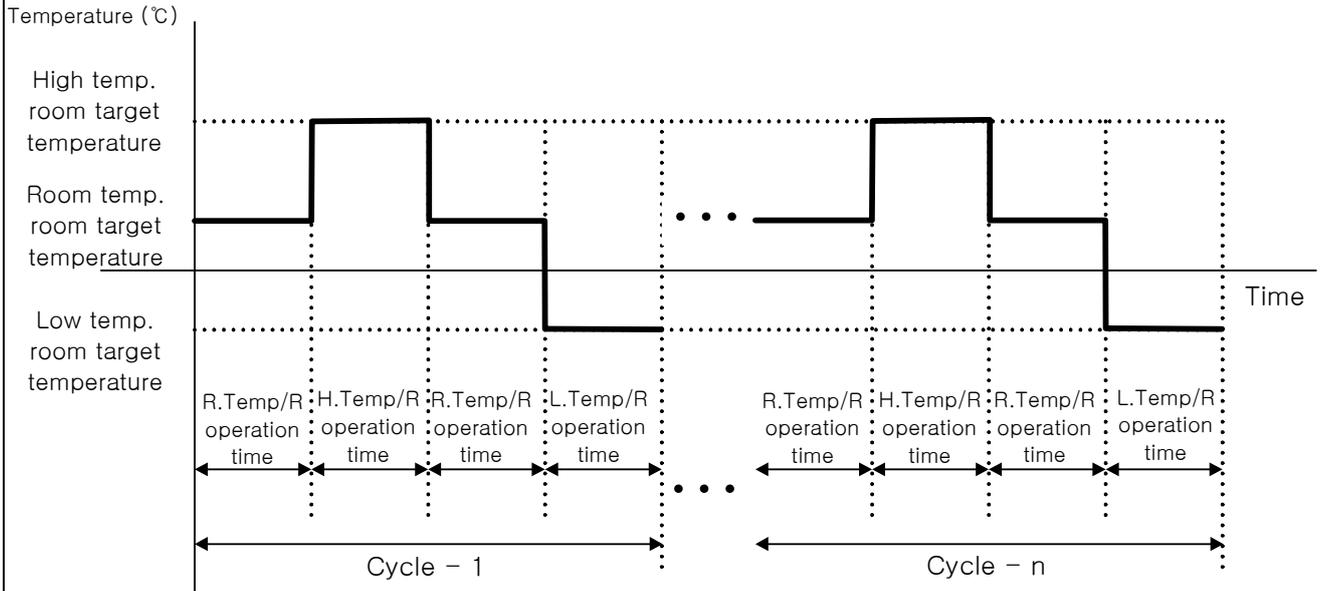
The operation of Type 1

- ② In the type 2, the operation is performed in the order of 'low temperature room → high temperature room', and it repeats as the setup numbers.



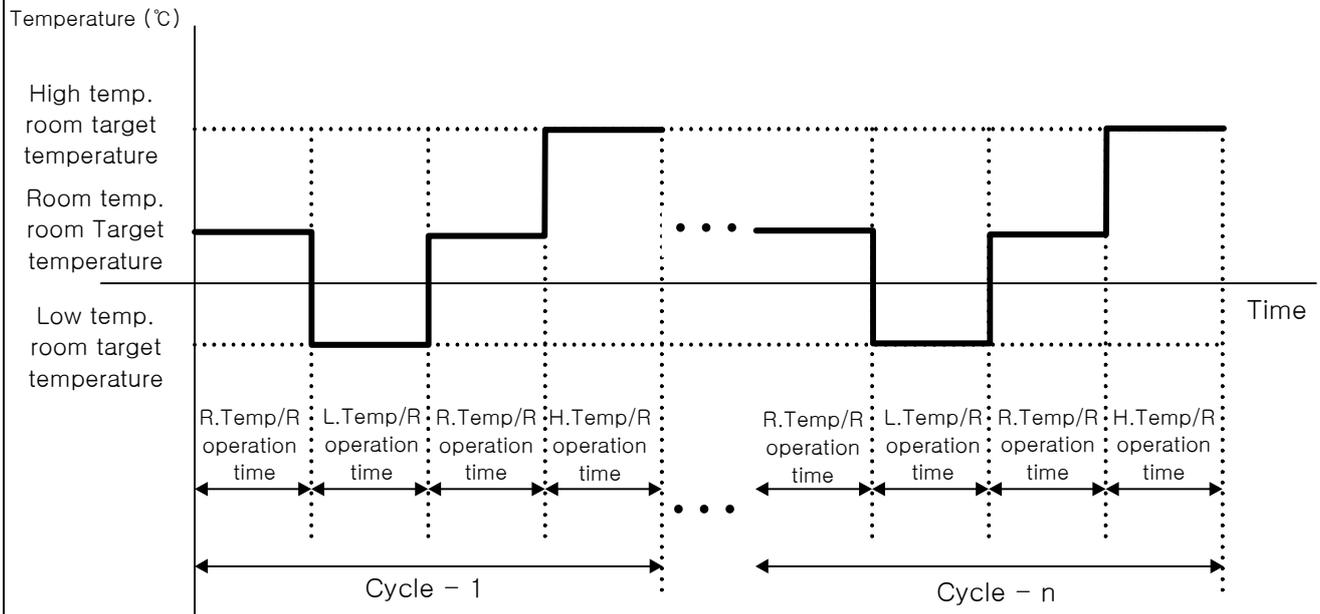
The operation of Type 2

③ In the type 3, the operation is performed in the order of 'room temperature room → high temperature room → room temperature room → low temperature room', and it repeats as the setup numbers.



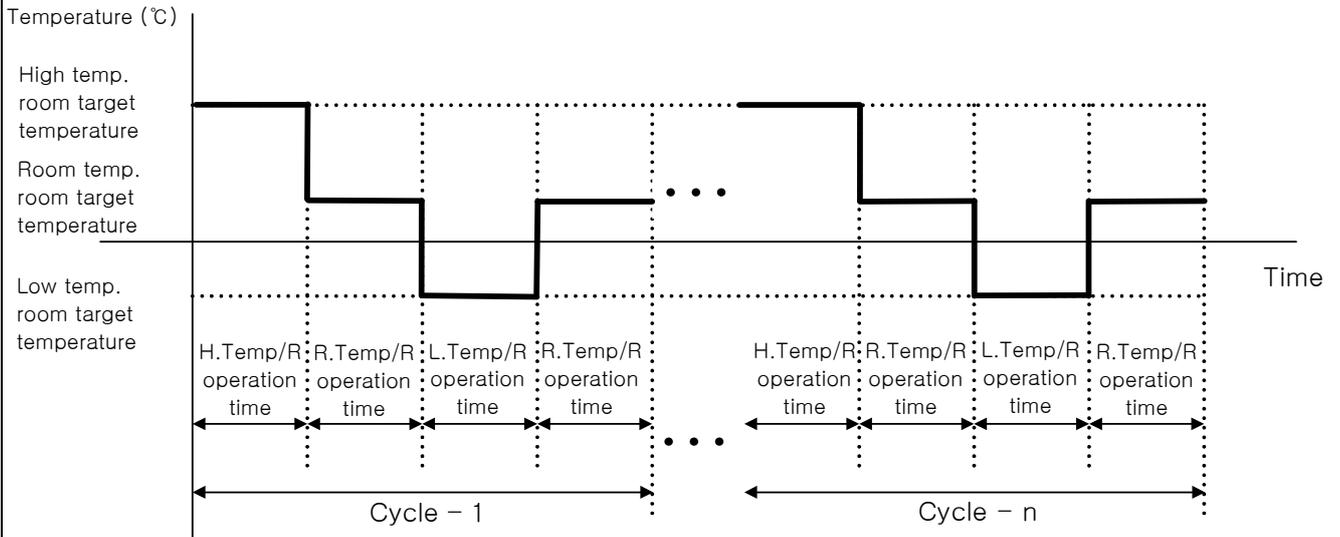
The operation of Type 3

④ In the type 4, the operation is performed in the order of 'room temperature room → low temperature room → room temperature room → high temperature room', and it repeats as the setup numbers.



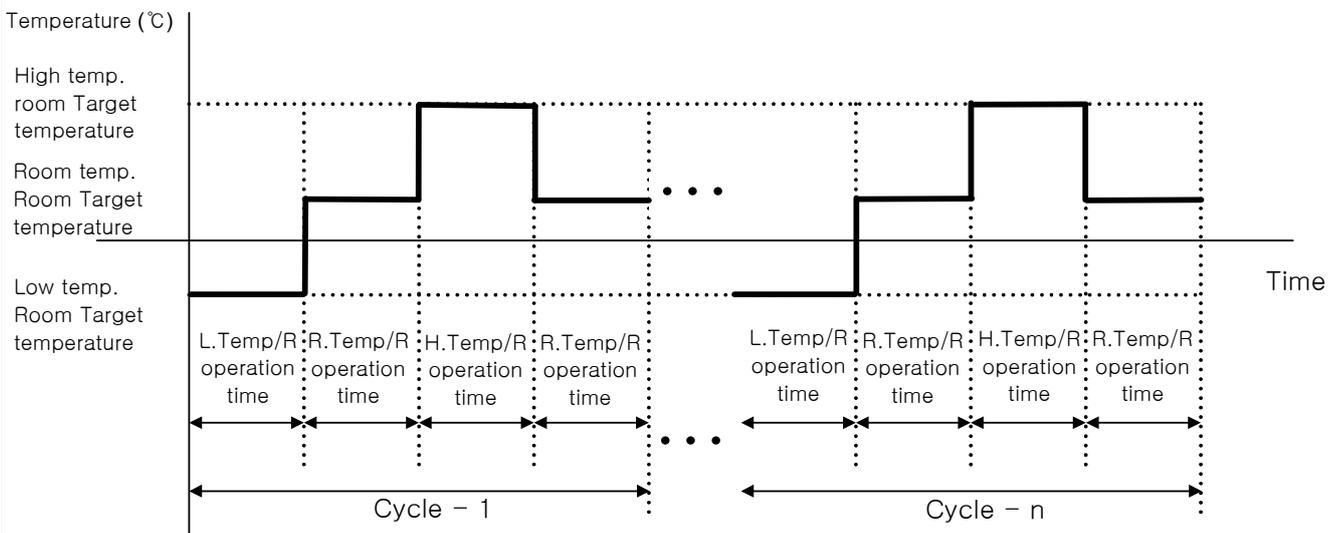
The operation of Type 4

⑤ In the type 5, the operation is performed in the order of 'high temperature room → room temperature room → low temperature room → room temperature room', and it repeats as the setup numbers.



The operation of Type 5

⑥ In the type 6, the operation is performed in the order of 'low temperature room → room temperature room → high temperature room → room temperature room', and it repeats as the setup numbers.



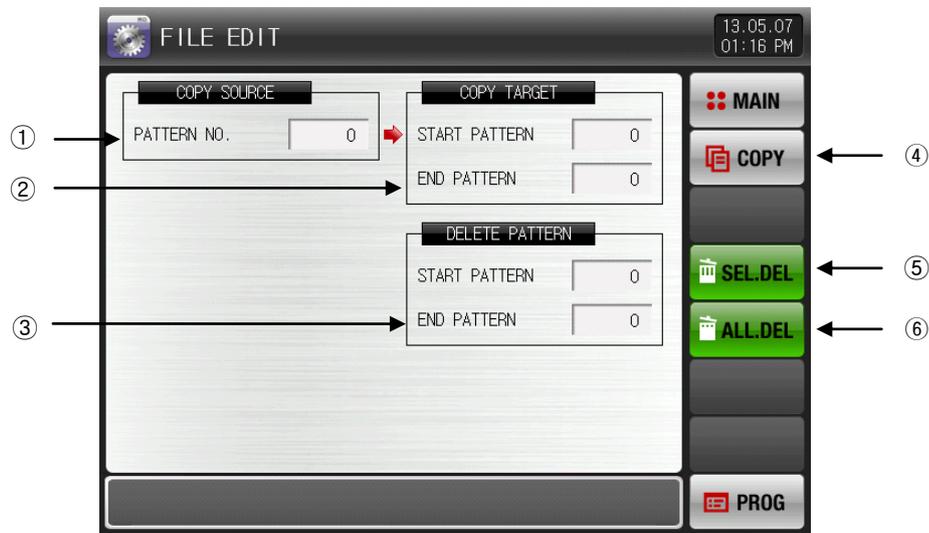
The operation of Type 6

Table 5-1. The parameter for pattern editing

Parameter	Setup Range	Unit	Initial Value
PTN NO.	1~120	ABS	1
PTN TYPE	1(H->L), 2(L->H), 3(R->H->R->L), 4(R->L->R->H) 5(H->R->L->R), 6(L->R->H->R)	ABS	1(H->L)
RPT CYCLE	1~9999	ABS	1
END MODE	Stop, Hold, Defrosting	ABS	Stop
HIGH RDY	Use, Unuse	ABS	Use
LOW RDY	Use, Unuse	ABS	Use
DEFROST CYCLE	0~9999	ABS	0
DEFROST TIME	00.01 ~ 99.59 (Minute, Second)	ABS	00.01
DEFROST SP	Defrosting setup temperature lowest ~ highest	EU	0.0
TARGET SP	EU(0.0 ~ 100.0%)	EU	EU(0.0%)
TIME(High temp.)	000.00.01 ~ 999.59.59	ABS	000.00.01
PRE H/C SP	EU(0.0 ~ 100.0%)	EU	EU(0.0%)
TIME SIGNAL(High temp.)	0 ~ 20	ABS	0
TARGET SP	EU(0.0 ~ 100.0%)	EU	EU(0.0%)
TIME(Room temp.)	000.00.01 ~ 999.59.59	ABS	000.00.01
PRE H/C SP(Room temp.)	EU(0.0 ~ 100.0%)	EU	EU(0.0%)
TIME SIGNAL	0 ~ 20	ABS	0
TARGET SP(Low temp.)	EU(0.0 ~ 100.0%)	EU	EU(0.0%)
TIME(low temp.)	000.00.01 ~ 999.59.59	ABS	000.00.01
PRE H/C SP(Low temp.)	EU(0.0 ~ 100.0%)	EU	EU(0.0%)
TIME SIGNAL(Low temp.)	0 ~ 20	ABS	0

5.2 File editing

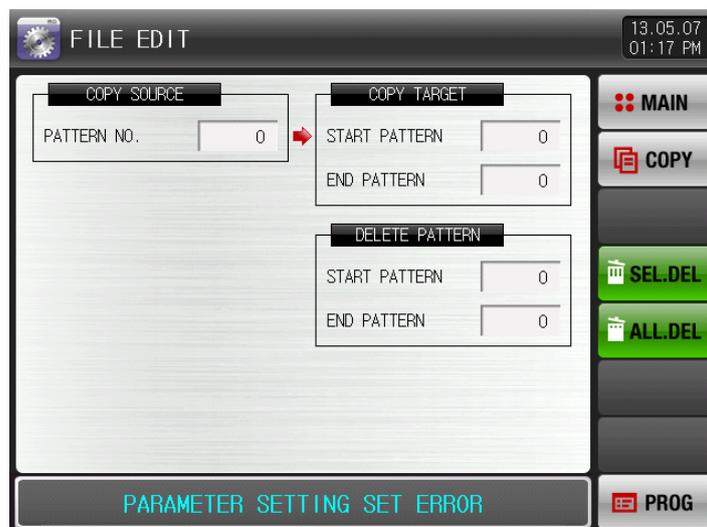
- ▶ In [5.1 The Setup for Program Pattern], you can copy the setup value as other pattern or delete.
- ▶ The pattern number in operation cannot be deleted.
- ▶ The deleted pattern cannot be recover.



[Pic. 5-3] File editing screen-1

- ① It sets the original pattern number to be copied.
- ② It sets the first and last pattern number to be copied.
 - ☞ The first pattern is copied only when the last pattern is “0”.
- ③ It sets the first and last pattern number to be deleted.
 - ☞ The first pattern is deleted only when the last pattern is “0”.
- ④ It copies the set pattern ① to the set pattern ②.
- ⑤ It initializes the set value of the pattern set in ③.
- ⑥ It initializes the set value of every pattern.

- ▶ If copy or delete with wrong pattern number, the message which says “parameter setup set error” is displayed.



[Pic 5-4] File editing screen-2

▶ Please refer to Table 5-2 for the message description.

Table 5-2. Message Description

Message display	Explanation
“There is no saved information in the selected pattern.”	It is displayed in case of copy when there is nothing saved in pattern number.
“The copy is completed in the selected pattern.”	It is displayed in completion of selected pattern copy.
“The deletion is completed in the selected pattern.”	It is displayed in completion of selected pattern deletion.
“The copy is completed in every pattern.”	It is displayed in completion of every pattern deletion.
“The pattern to be copies is being used.”	It is displayed in use of pattern.

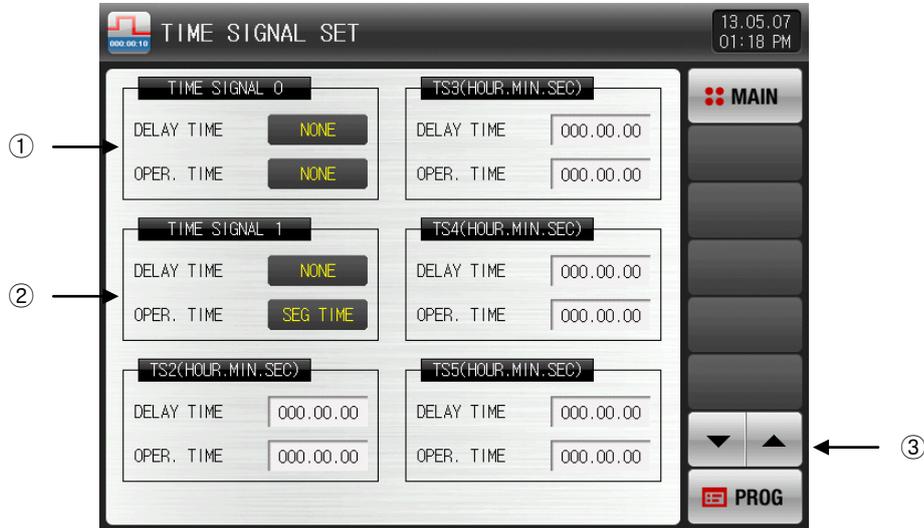
Table 5-3. The parameter for file editing

Parameter	Setup Range	Unit	Initial Value
PATTER NO.	1 ~ 120	ABS	0
START PATTERN(copy)	0 ~ 120	ABS	0
END PATTERN(copy)	0 ~ 120	ABS	0
START PATTERN(delete)	0 ~ 120	ABS	0
END PATTERN(delete)	0 ~ 120	ABS	0
COPY	UNUSE, USE	ABS	UNUSE
SEL.DEL	UNUSE, USE	ABS	UNUSE
ALL.DEL	UNUSE, USE	ABS	UNUSE

5.3 Time signal operation

- ▶ Time signal motion is divided into ON/OFF motion and time setup motion, this time signal is used to set the time signal number in [5.1 The setup for program pattern].

5.3.1 Time signal ON/OFF operation

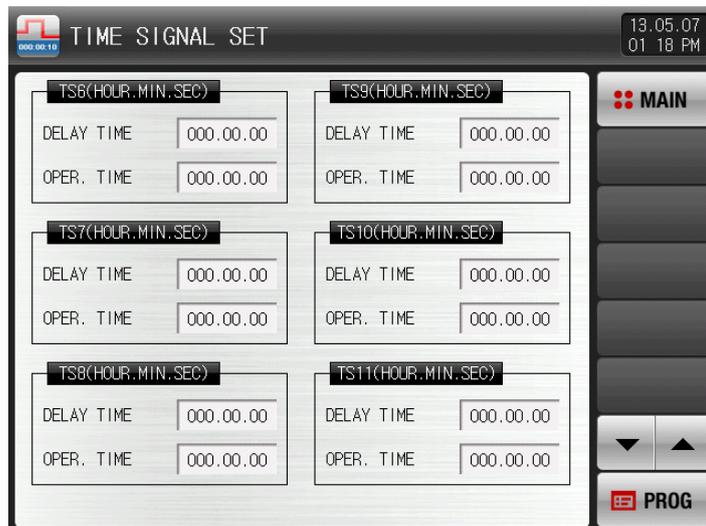


[Pic. 5-5] The first screen for time signal setup

- ① The time signal is OFF during corresponding section operation When '0' is selected
 - ☞ The change is impossible as it is only for reading.
- ② The time signal is ON during corresponding section operation when '1' is selected.
 - ☞ The change is impossible as it is only for reading.
- ③ Moving the screen up/down by 6 time signal units.

5.3.2 Time signal time setting operation

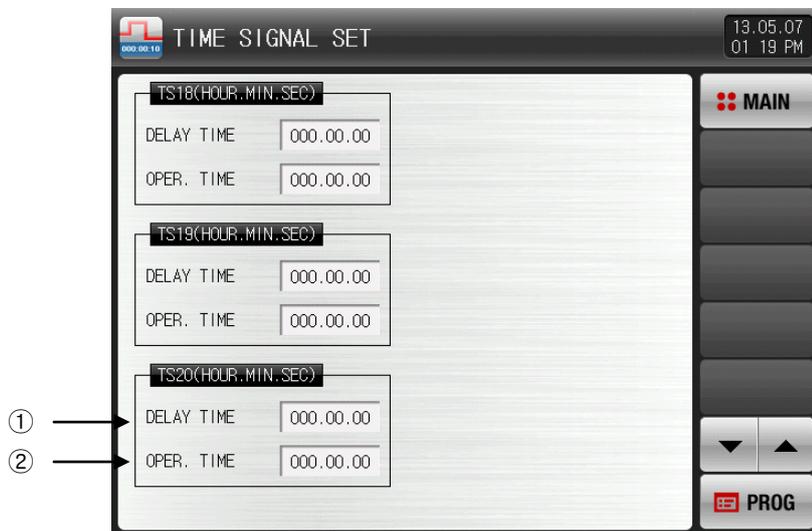
- ▶ The time signal 2~20 (TS2~20) operate depending on delay time and operation time.



[Pic. 5-6] The second screen for time signal setup



[Pic. 5-7] The third screen for time signal setup



[Pic. 5-8] The fourth screen for time signal setup

- ① Time signal is ON after the set time from the start point to delayed time in that section.
 - ☞ But, when the set time is bigger than the delay time in that section, time signal is not turned on.
- ② Time signal which is turned on by delayed time in that section is on only during the set time.
 - ☞ But, when **[delayed time+running time]** is bigger than the set time in that section, time signal is on only during the operation in that section and does not affect on next section.

Table 5-4. Time signal parameter

Parameter	Setting range	Unit	Initial value
DELAY TIME	000.00.00(OFF)~999.59.59 (Hour, Min, Sec)	ABS	000.00.00
OPER. TIME	000.00.00(OFF)~999.59.59 (Hour, Min, Sec)	ABS	000.00.00

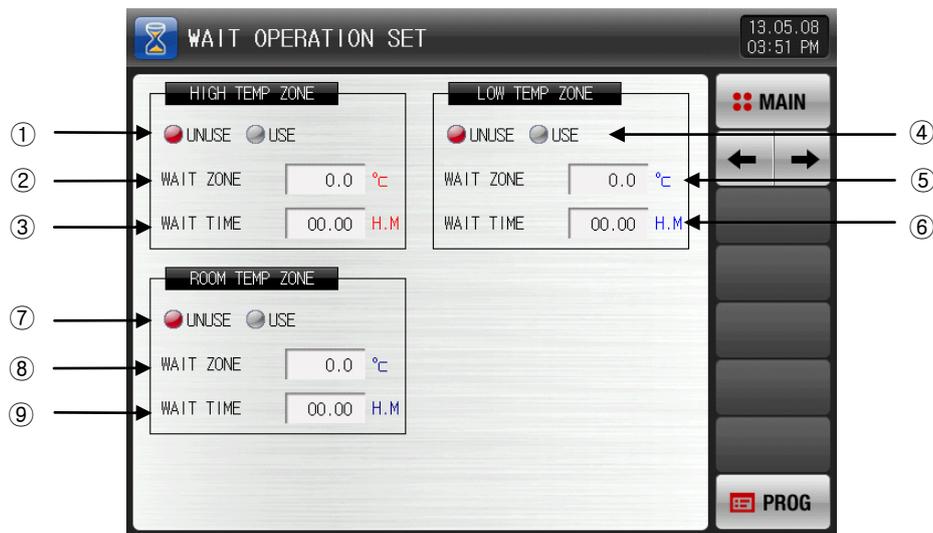
5.3.3 Example of motion when input the time signal

Setting		Time signal operation		
Set time by section \geq Delay time + Operation time	1. Delay time = 000.00.00	ON		
	2. Delay time \neq 000.00.00	ON		
Set time by section $<$ Delay time + Operation time ☞ It does not affect on next section.	3. Delay time = 000.00.00	ON		
	4. Delay time \neq 000.00.00	ON		

5.4 Standby operation

5.4.1 Set the stand-by motion

- ▶ When the measured value is not included into the setup range of stand-by in the operation time of that section.
- ▶ The set standby operation here is applied to [Fig. 5-1 Program pattern setting].
- ▶ Definition of standby operation
 - Conditions for Stand-by Operation Entry: When the measured value is not included into the setup range of stand-by in the operation time of that section.
 - Conditions for Stand-by Operation Release: In case of measurement into the set range for standby operation.
 - The standby time has indefinite value when the standby time is not set.



[Pic. 5-9] The setup screen for stand-by

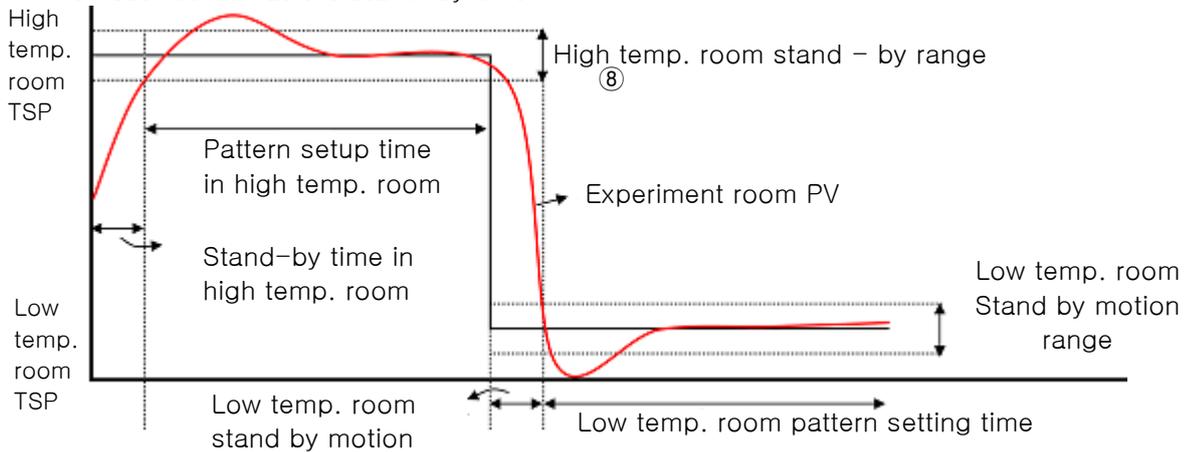
- ① It sets the usage of stand-by in high temperature room.
 - ② It sets the range of stand-by in high temperature room.
 - ③ It set the time of stand-by in high temperature room.
 - ④ It sets the usage of stand-by in low temperature room .
 - ⑤ It sets the range of stand-by in low temperature room .
 - ⑥ It set the time of stand-by in low temperature room .
 - ⑦ It sets the usage of stand-by in room temperature room.
 - ⑧ It sets the range of stand-by in room temperature room.
 - ⑨ It set the time of stand-by in room temperature room.
- ☞ The standby motion is not operated when the range is set in "0.0"
 - ☞ It standby indefinitely for entry to the standby operation range when the standby operation time is set in "00.00".

Table 5-5. The setup parameter for stand-by

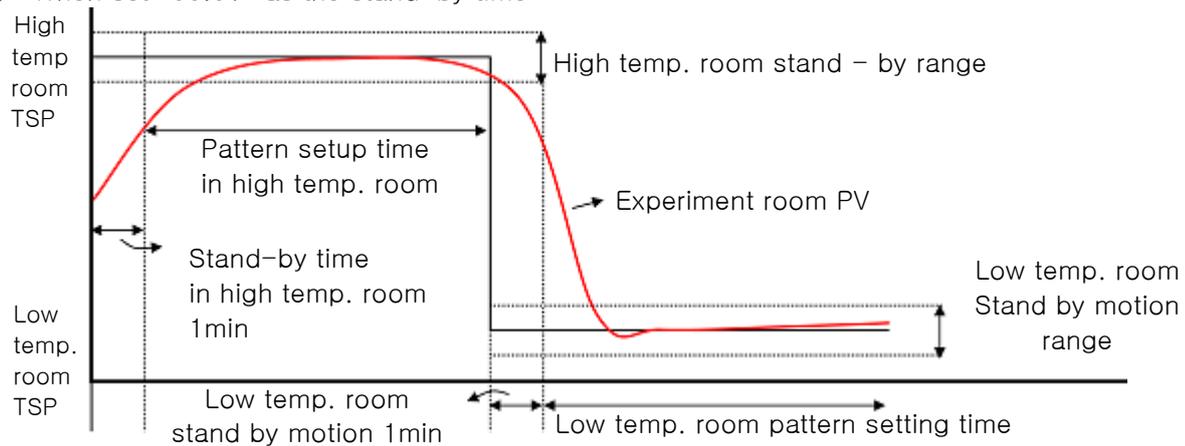
Parameter	Setup Range	Unit	Initial Value
HIGH TEMP ZONE	UNUSE, USE	ABS	UNUSE
WAIT ZONE(High temp.)	EUS(0.0~100.0%)	EUS	EUS(0.0%)
WAIT TIME(High temp.)	0.00 ~ 99.59 (HOUR, MIN)	ABS	0.00
LOW TEMP ZONE	UNUSE, USE	ABS	UNUSE
WAIT ZONE(Low temp.)	EUS(0.0~100.0%)	EUS	EUS(0.0%)
WAIT TIME(Low temp.)	0.00 ~ 99.59 (HOUR, MIN)	ABS	0.00
ROOM TEMP ZONE	UNUSE, USE	ABS	UNUSE
WAIT ZONE(Room temp.)	EUS(0.0~100.0%)	EUS	EUS(0.0%)
WAIT TIME(Room temp.)	0.00 ~ 99.59 (HOUR, MIN)	ABS	0.00

5.4.2 Example of stand-by ⑧

▶ When set "00.00" as the stand-by time

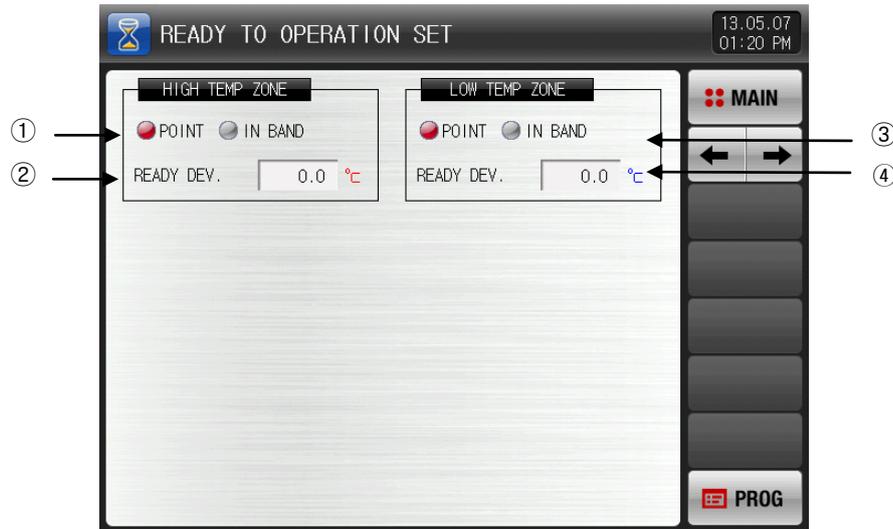


▶ When set "00.01" as the stand-by time



5.4.3 The setup for operation preparation

- ▶ This is the screen for setup the operation preparation type and deviation in high and low temperature room.



[Pic. 5-10] The setup screen for operation preparation

- ① It sets the type of operation preparation in high temperature room.
- ② It set the deviation value for the operation preparation in high temperature room.
- ③ It sets the type of operation preparation in low temperature room.
- ④ It set the deviation value for the operation preparation in low temperature room.

Table 5-6. The setup parameter for operation preparation

Parameter	Setup Range	Unit	Initial Value
HIGH TEMP ZONE	POINT, IN BAND	ABS	POINT
READY DEV.	POINT : EUS(-10.0~10.0%)	EUS	EUS(0.0%)
	IN BAND : EUS(0.0~10.0%)		EUS(0.0%)
LOW TEMP ZONE	POINT, IN BAND	ABS	POINT
READY DEV	POINT : EUS(-10.0~10.0%)	EUS	EUS(0.0%)
	IN BAND : EUS(0.0~10.0%)		EUS(0.0%)



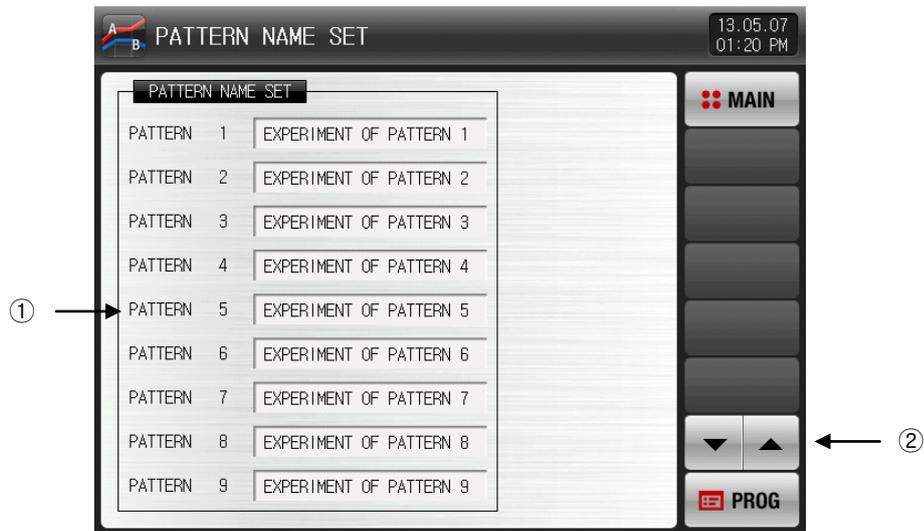
NOTE

The requirement for cancellation of preparation (pre-heated & pre-cooled)

	high temperature room	Low temperature room
POINT	Temperature in high temp. room ≥ Pre-heated setup temperature + Preparation deviation in high temp. room	Temperature in low temp. room ≤ Pre-cooled setup temperature + Preparation deviation in low temp. room
IN BAND	(Pre-heated setup temperature - Preparation deviation in high temp. room) ≤ Temperature in high temp. room ≤ (Pre-heated setup temperature + Preparation deviation in high temp. room)	(Pre-cooled setup temperature - Preparation deviation in low temp. room) ≤ Temperature in low temp. room ≤ (Pre-cooled setup temperature + Preparation deviation in low temp. room)

5.5 Experiment name setting

- ▶ The experiment name can be set for each pattern.
- ▶ Please refer to [3.2.1 The first freeze-frame for program operation].



[Pic. 5-11] The setup screen for experiment name

- ① Input the experiment name of each pattern.
- ② Converting to the next or previous experiment name screen.

- ▶ The input key to set the experiment name is displayed when EXPERIMENT OF PATTERN 1 is touched by.



[Pic. 5-12] Experiment name setting screen

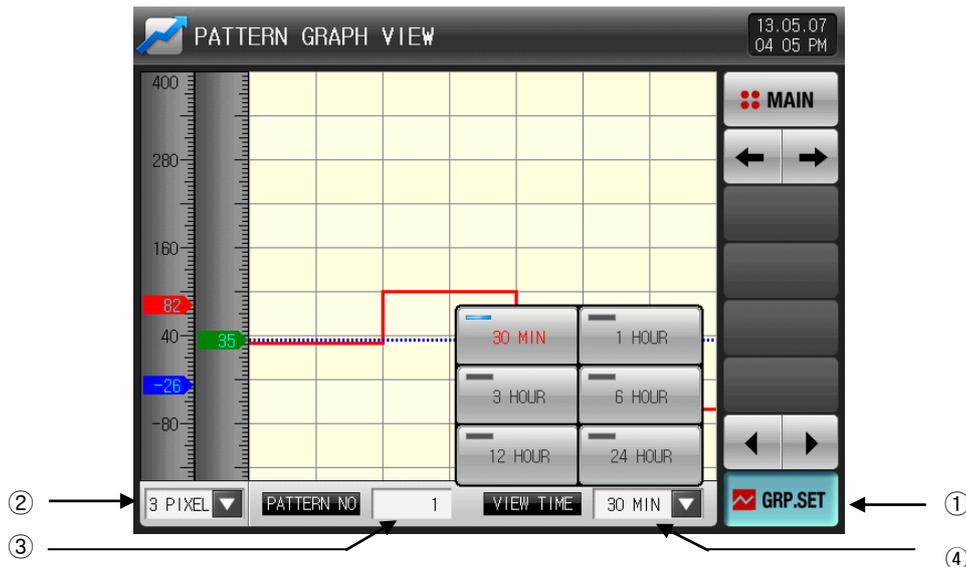
Table 5-7. Experiment name setting parameter

Parameter	Setting range	Unit	Initial value
NAME OF PATTERN 1~120	0~9, A~Z, Special letter (Maximum 24 letters)	ABS	EXPERIMENT OF PATTERN 1~ 120

6. Graph display and saving setting

6.1 Pattern graph display

- ▶ This screen displays graph operation pattern and progress in program operation.
- ▶ It converts to [Pic. 6-2 Graph & Save screen 1 (Pattern graph display)] when [Graph & Save] is selected at the left top in [Pic. 3-1 Main screen].
- ▶ It is a screen to display the input pattern in [Pic. 5-2 Pattern editing screen].
- ▶ During the process of pattern graph, you can change **PATTERN NO** 1 (pattern number), **VIEW TIME** 30 MIN (time), **3 PIXEL** (line thickness).



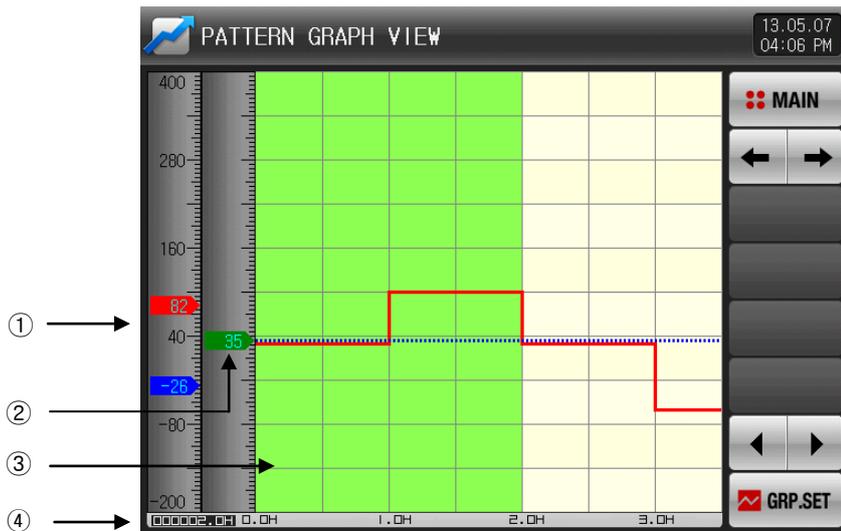
[Pic. 6-1] The first screen for graph & save
(Change the criteria standard of time axis)



[Pic. 6-2] The first screen for graph & save
(Display the pattern graph)

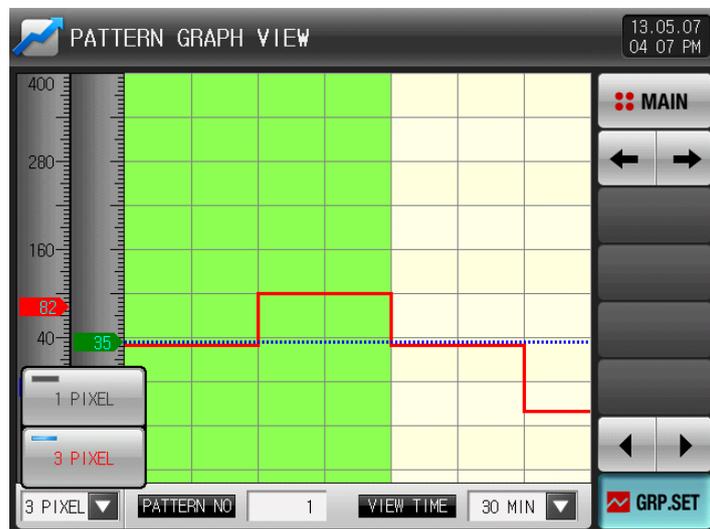
- ① Display the graph setting menu.
 - ☞ Display the parameters related to the pattern graph operation at the bottom depending on ON/OFF operation on the graph menu button.
- ② It set the line thickness of graph.
 - ☞ Press **3 PIXEL** button to display the key for setup the line thickness of graph.
 - ☞ Refer to [Pic. 6-4 The setup screen for the line thickness of graph].

- ③ Setting the pattern No. to be displayed.
 - ☞ Display the input key to set the pattern No. when button is touched again.
 - ☞ Refer to [Pic. 6-5 The input screen for pattern number]
 - ④ Setting the time on graph X axis
 - ☞ Display the input key to set the time on X axis when (Display time) is touched.
 - ☞ The time on X axis can be changed during operation.
 - ☞ Refer to [Pic. 6-1 The first Screen for graph and save (Change the criteria of time axis)]
 - ⑤ Moving from current screen to next screen.
 - ⑥ Change into the Previous/Next stage on the time axis when is touched on the current page.
- ▶ This is the screen for running time of Pattern operation.
 - ▶ The operated part is displayed in green.



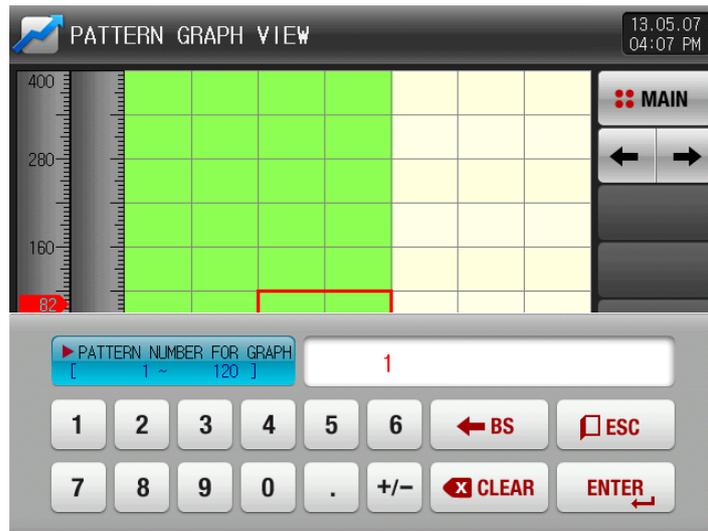
[Pic. 6-3] The first screen for graph & save (Pattern operation)

- ① It displays PV of running high and low temperature room.
 - ② It displays the PV of running experiment room.
 - ③ Display in green for the operation ended part.
 - ④ Display the processing time for the set pattern in [5.1 Program pattern setting]
- ▶ It is the screen for setup the line thickness of graph.
 - ▶ Line thickness can be changed during the operation.



[Pic. 6-4] The setup screen of graph line thickness

- ▶ This is the screen to input the pattern number of graph.
- ▶ You can input the pattern number during the operation.

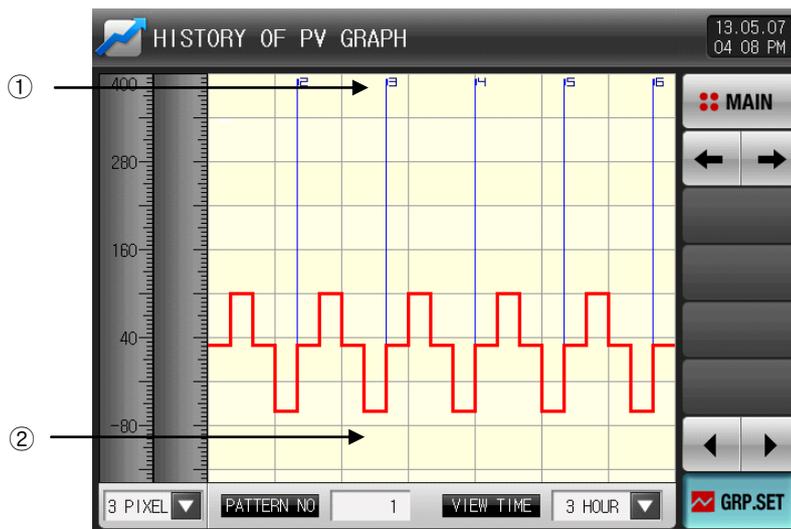


[Pic. 6-5] The setup screen for pattern number

Table 6-1. The first screen parameter for graph and save

Parameter	Setting range	Unit	Initial value
PATTERN NO.	1 ~ 120	ABS	1
DISPLAY TIME	30 minutes, 1 hour, 3 hour, 6 hour, 12 hours, 24 hours	ABS	30 minutes

- ▶ This is the screen to display the repetition cycle of pattern.

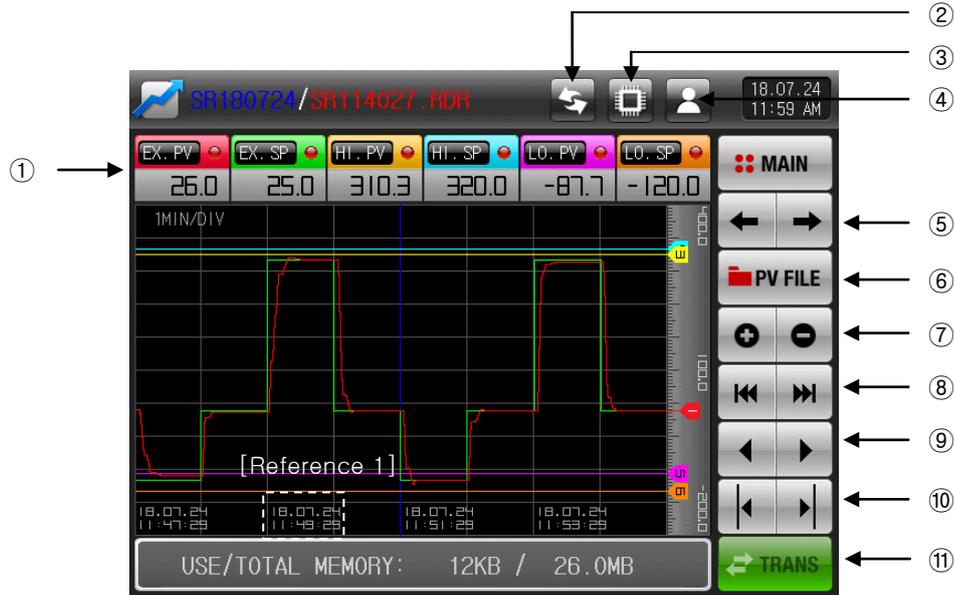


[Pic. 6-6] The display screen for pattern repetition

- ① It displays the repetition cycle of pattern.
- ② You can select the repetition cycle display to touch the screen.

6.2 Saved PV graph view

- ▶ This is the screen to display the graph while open the data file recorded in [3.2.3 The second operational screen for program operation].
- ▶ The date and time saved into the memory are displayed at the top of the screen. [Reference 1]



[Pic. 6-7] The second screen for graph & save (Graph display is selected)

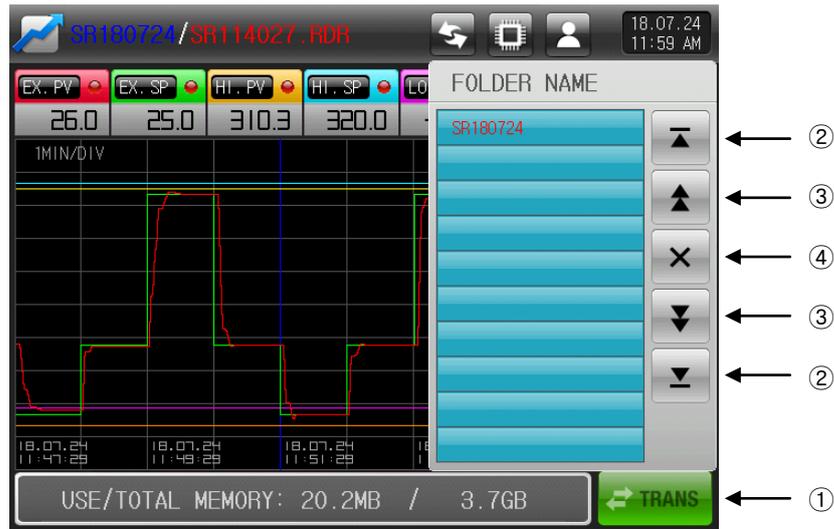
- ① It displays the predetermined value and measured value.
 - ☞ When the checked is touched, it is disappeared on the graph screen. And when is touched again, It is displayed on the graph screen.
 - ☞ Refer to [Pic 6-7, Pic 6-8 Graph & Save setting screen2]
- ② Display to update the graph screen immediately which is being saved.
- ③ When Setting copy the recorded PV file in the internal memory to an SD card
 - ☞ : Send the selected file.
 - ☞ : Send the whole file.
- ④ Set the method to copy the PV file recorded in the internal memory to the SD card.
 - ☞ : Only selected files are transferred.
 - ☞ : Transfer the entire file.
- ⑤ Moving from current screen to next screen
- ⑥ When is touched, the files saved into the internal memory is displayed.
 - ☞ Moving from current screen to next screen
- ⑦ The time axis is expanded or reduced.
- ⑧ Moving to the beginning and end of the displayed PV graph page
- ⑨ Moving of graph screen by one page.
- ⑩ Moving the blue line on the graph screen left/right by 1 DOT
 - ☞ When the screen is touched, the indicated values are displayed while the blue line moves.
- ⑪ Copy the recorded PV files into the internal memory to SD card.

- ▶ This screen is used when there is no optional article in the channel article which is saving.



[Pic. 6-8] The second screen for graph & save (not select the graph display)

- ▶ It is a screen to display the saved file into the internal memory.
- ▶ Refer to [3.2.3 Program operation 2 operation screen] for saving into internal memory.



[Pic. 6-9] Graph&Save setting screen 2 (Saved folder is displayed)

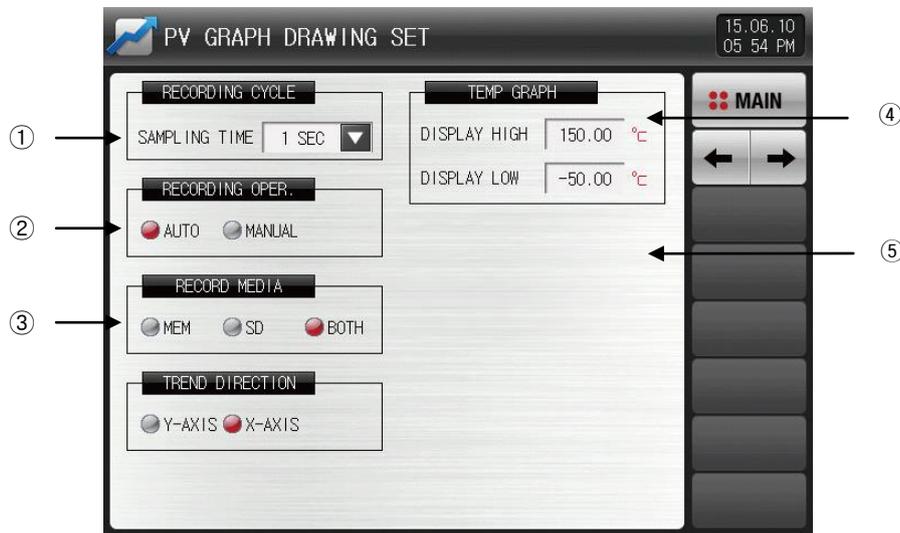


[Pic. 6-9] Graph&Save setting screen 2 (Saved file is displayed)

- ① Copy the recorded PV files into the internal memory to SD card.
- ② Move to the start and end in case of data searching stored in the internal memory
- ③ When search for the saved file in the internal memory, up / down to the end 10 to the units.
- ④ Close the PV file
- ⑤ Move to the folder

6.3 The setup for saving the measured value (PV) graph

- This screen is used to set the display range and sampling time when record the graph in [3.2.3 The second operational screen for program operation].

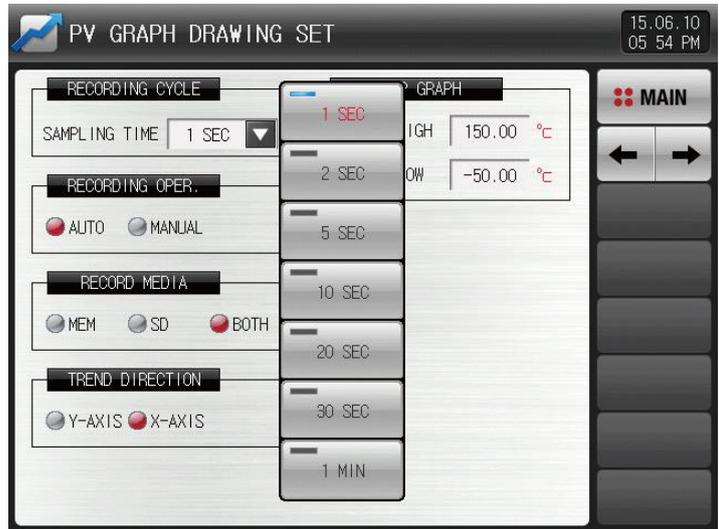


[Pic. 6-11] The third screen for graph & save

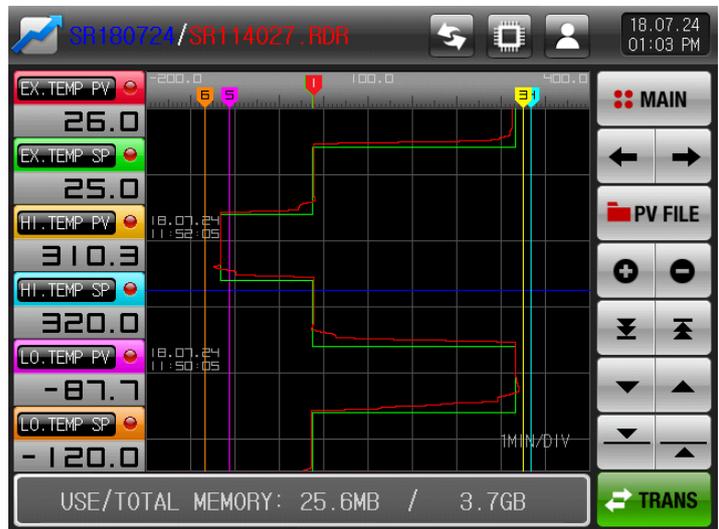
- ① Setting the PV graph saving period
 - ☞ It is not changeable during PV graph saving
 - ☞ Saving about 25 days is possible when sampling time is set in 1 minute in saving into internal memory.
- ② Internal memory and Setting Y/N for saving the data into the SD card
 - ☞ Auto: Saving the data in synchronized with Operation/Stop automatically
 - ☞ Manual: Saving the data by the saving key in the Operation screen 3 manually
- ③ Setting the media for data saving
 - ☞ Memory : stored in the internal memory
 - ☞ SD Card : stored in the SD card
 - ☞ Both : simultaneously stored in the internal memory and SD card
- ④ Setting the Trend display direction
 - ☞ Y-AXIS : Vertical display
 - ☞ X-AXIS : Horizontal display
- ⑤ Setting the display range of Temperature graph

Table 6-2. The third screen parameter for graph and save

Parameter	Setup Range	Unit	Initial Value
RECORDING CYCLE	00.01 ~ 99.59 (Min, Sec)	ABS	00.01
RECORDING OPER.	AUTO, MANUAL	ABS	AUTO
RECORD MEDIA	MEM, SD, BOTH	ABS	BOTH
TREND DIRECTION	Y-AXIS, X-AXIS	ABS	X-AXIS
DISPLAY HIGH	EU(0.0 ~ 100.0%)	EU	EU(100.0%)
DISPLAY LOW	Display Low < Display High	EU	EU(0.0%)



[Pic. 6-12] Sampling time of Recoding cycle setting screen



[Pic. 6-12] When setting the X-AXIS of Trend direction, Graph Screen

6.4 SD Memory save setting

- ▶ This is the screen to set the required articles for data back-up in SD card.
- ☞ It is a screen displayed in SD card option only.



[Pic. 6-14] The fourth screen for graph & save

- ① Setting the items and direction of transmitting in SD card and TEMP2000S.
 - ☞ PATTERN : Download or upload the set pattern in [5.1 Program setting pattern]
 - ☞ PARA. : Download or upload the set parameter.
 - ☞ ALL : Download or upload the pattern and parameter.
 - ☞ Download : Transmitting the selected transmitting items out of the internal data in TEMP2000S to SD card.
 - ☞ Upload : Transmitting the selected transmitting items out of the saved data in TEMP2000S to SD card.
- ② It displays the current capacity of SD card.
 - ☞ It displays when the SD card is inserted only.
- ③  is activated when the program and stationary operation are stopped and download or upload is available when  is pressed.

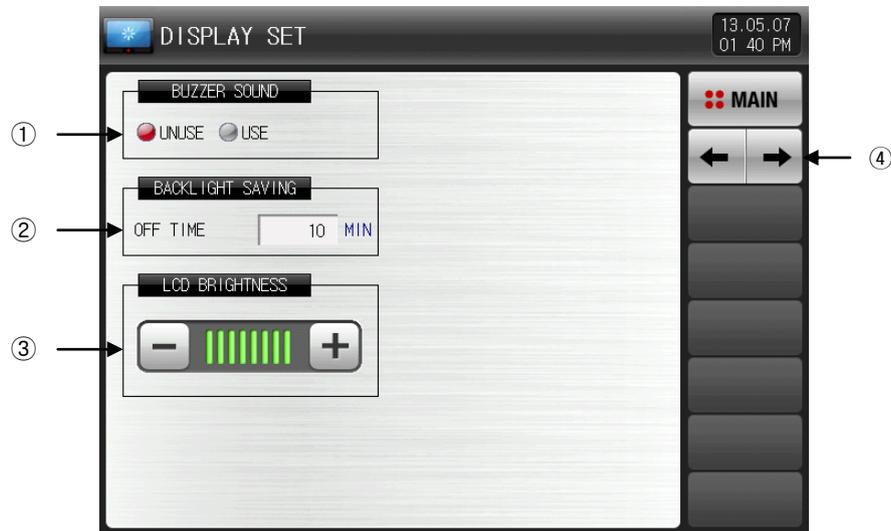
Table 6-3. The fourth screen parameter for graph and save

Parameter	Setting range	Unit	Initial value
BACKUP ITEM	PATTERN, PARA., ALL	ABS	PATTERN
DIRECTION	DOWNLOAD, UPLOAD	ABS	DOWNLOAD

7. Screen display setting

7.1 Screen display setting

► This is the screen to set the font and to adjust the brightness in the operation screen.



[Pic. 7-1] The first screen for display setup

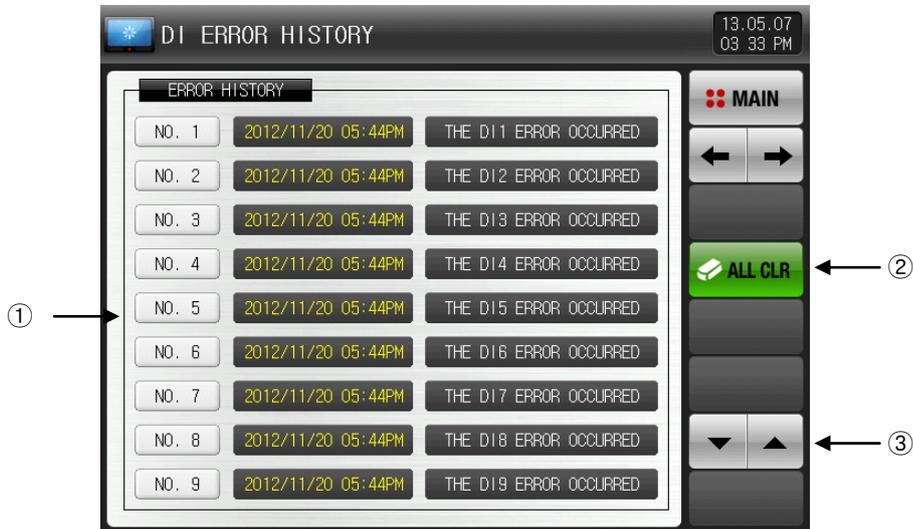
- ① It sets Y/N of use buzzer sound.
 - ☞ The buzzer sound generated in DI error is operated when it is set for no use.
- ② It sets the backlight electricity saving time.
 - ☞ The electricity saving time sets the operation timing of backlight.
- ③ The brightness of LCD is controlled by, button.
 - ☞ The buzzer sound generated in DI error is operated when it is set for no use.
- ④ The screen is moved to next and previous screen.

Table 7-1. The first screen parameter for display setup

Parameter	Setting range	Unit	Initial value
BUZZER SOUND	UNUSE, USE	ABS	USE
OFF TIME	0 ~ 99 MIN	ABS	10
LED BRIGHTNESS	1 ~ 8	ABS	8

7.2 DI error occurrence history view

- ▶ It is a screen to display the type, date and time of error created DI.
- ▶ Error history is displayed up to 30.
 - ☞ If error is occurred more than 30, it will be deleted from the former number among displayed errors and new error is added in the list.



[Pic. 7-2] DI error creation history screen

- ① It displays the history of DI error creation.
 - ☞ It displays the name set in **[19.2 DI Error Name]**.
 - ☞ The change is impossible as it is only for reading.
- ② It deletes the entire DI error creation.
- ③ It checks the previous or next error history.

Table 7-2. The second screen parameter for display setup

Parameter	Setting range	Unit	Initial value
ALL CLR	UNUSE, USE	ABS	UNUSE

- ▶ It is a screen in case of DI error creation.
- ▶ The screen setup for letter and picture can be set in [19. DI Function & Motion Setup].
- ▶ It is converted to the operation screen after escaping from the DI error screen when  is touched by.
- ☞ The same DI error creation is neglected for 1 minute when the screen is changed by pressing  button after DI creation.
- Ex) It neglects even DI1 is created by escaping with “Return” in the state of DI1 creation and the DI error screen is displayed when DI1 has been created even after 1 minute.
 - ※ Here, the neglecting means the DI error screen.
- ▶  button is to block the alarming sound when DI error is created.
- Ex) The description according to the lamp status.
 - ※ In DI error, the corresponding DI lamp is ‘ON’. ( THE D18 ERROR OCCURRED (letter),  8 (picture)
 - ※ After DI error, the corresponding DI lamp is ‘OFF’. ( THE D113 ERROR OCCURRED (letter),  6 (picture)



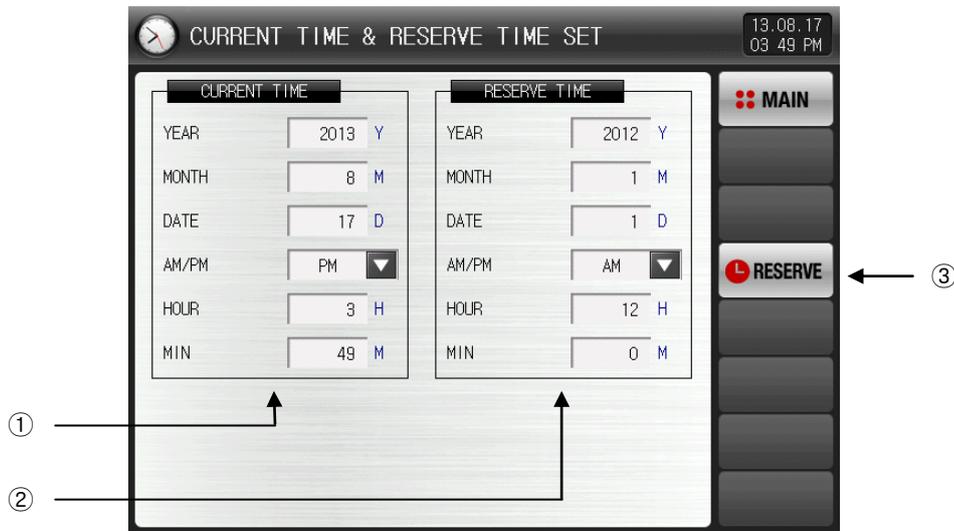
[Pic. 7-3] The screen with letter for DI error display method



[Pic. 7-4] The screen with photo for DI error display method

8. Time Setup

► It is a screen to set the current time and reserve time of operation.



[Pic. 8-1] Time setting screen

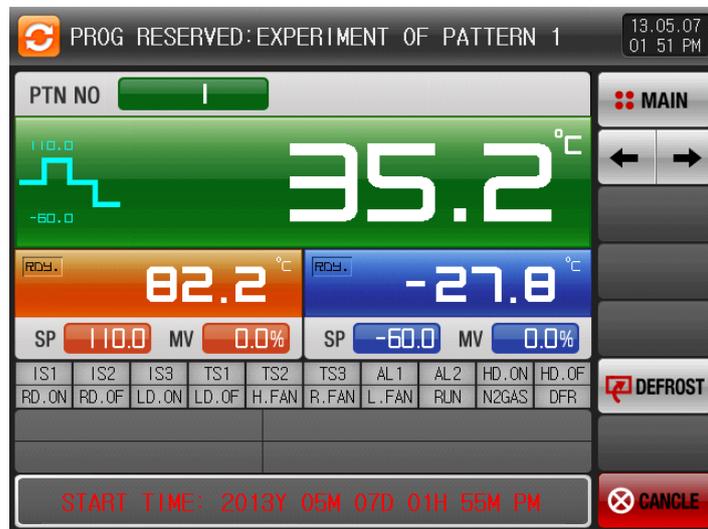
① It sets the year, month, day and hour.

☞ The current time is not changeable during recording the measured data and operating.

② It sets the year, month, day and hour for appointed operation.

③ The operation is possible in the set reserve time when  is touched by.

☞ The reserve time is displayed on the operation screen as shown in [Pic 8-2 Reserve Time of operation setting screen] when  is touched by.



[Pic. 8-2] Reserve time of operation setting

Table 8-1. The setup parameter for reserved operation

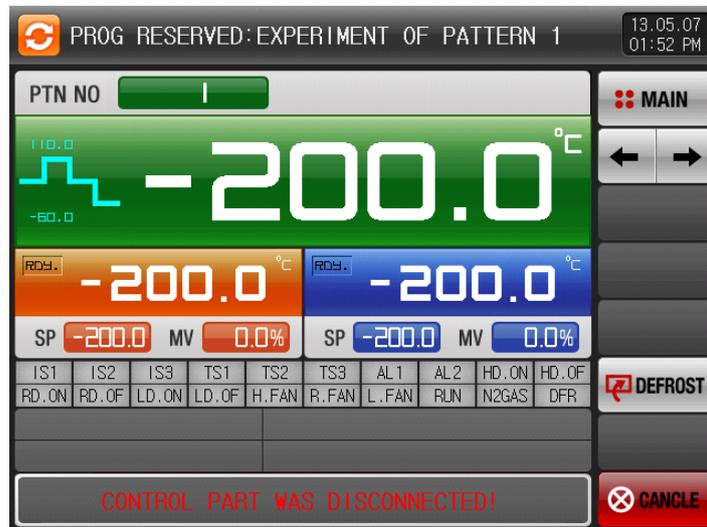
Parameter		Setting range	Unit	Initial value
CURRENT TIME	YEAR	2000~2099	ABS	-
	MONTH	1~12	ABS	-
	DAY	1~31	ABS	-
	AM/PM	AM, PM	ABS	-
	HOUR	1~12	ABS	-
	MINUTE	0~59	ABS	-
RESERVE TIME	YEAR	2000~2099	ABS	2012
	MONTH	1~12	ABS	1
	DAY	1~31	ABS	1
	AM/PM	AM, PM	ABS	AM
	HOUR	1~12	ABS	12
	MINUTE	0~59	ABS	0
RESERVE		Click for appointment		

* AM12:00 : Midnight 00:00

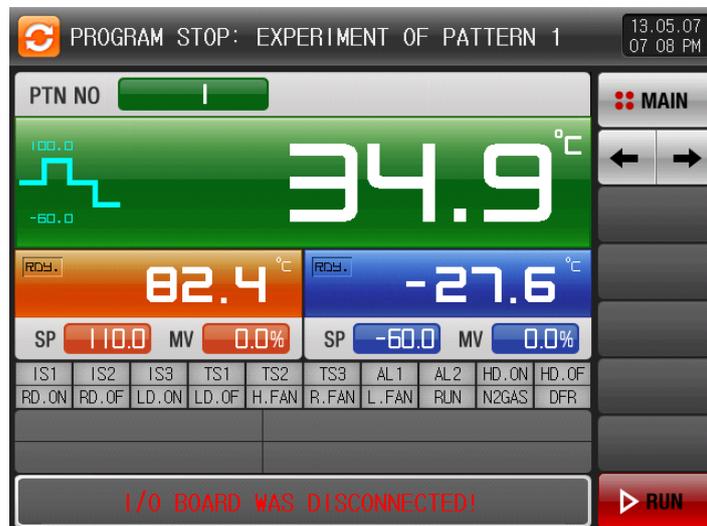
* PM12:00 : Midday 12:00

9. Communication Error

- ▶ In case of the bad communication of display and control unit, the message which says “CONTROL PART WAS DISCONNECTED” is displayed in the bottom of screen like [Pic. 9-1 Communication Error Screen of Control Unit].
- ▶ In case of the bad communication of display and I/O board, the message which says “I/O BOARD WAS DISCONNECTED” is displayed in the bottom of screen like [Pic. 9-2 Communication Error Screen of Board].



[Pic. 9-1] Communication error screen of control unit



[Pic. 9-2] Communication error screen of I/O board

※ Bad communication

- ① Defective communication cable
- ② Bad connection of communication cable

10. System Setup

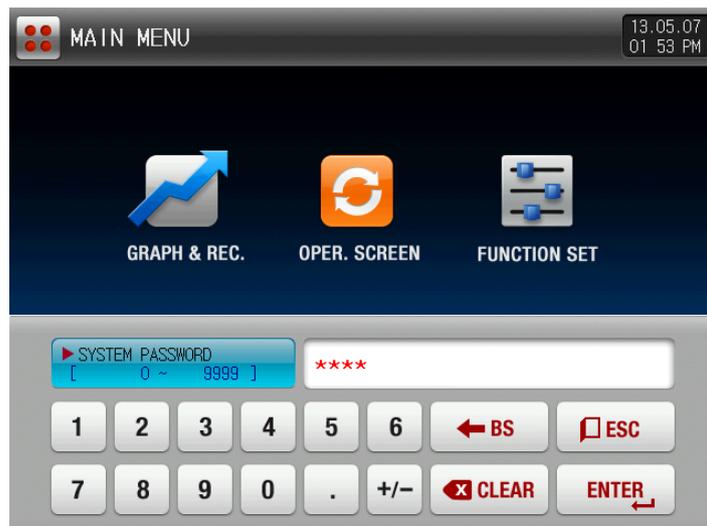
10.1 Main Screen

- ▶ The basic screen is like below.



[Pic. 10-1] Main screen

- ▶ Press ① and ② in [Pic. 10-1 Main Screen] in sequence, [Pic. 10-2 Password Input Screen] is displayed.
- ▶ When the password is input in [Fig. 10-2 password input screen], it is converted to [Fig. 10-3 system parameter setting screen].
 - ☞ The password is set in '0' when it is outgoing from factory.
 - ☞ Set the password in [21. Basic screen display setting] certainly at the necessity of blocking the access of the general user.



[Pic. 10-2] Password input screen

► The setup screen for system parameter is like below.



[Pic. 10-3] 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	
	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 BMP 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.
- ☞ User screen setting : It is activated with SD card option and inactivated without option.

10.2 System parameter setting sequence

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

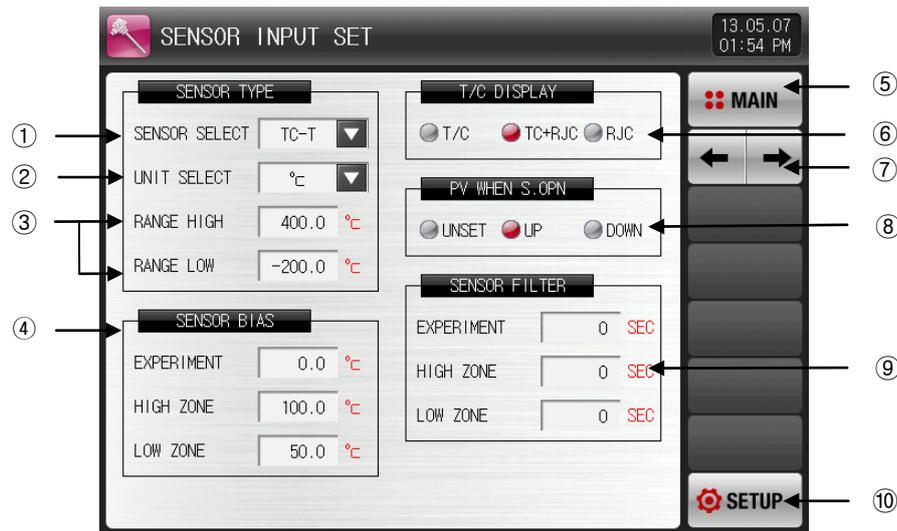
Setting order	SYMBOL	Item	Function	Note
1		INPUT SET	① Sensor type setting ② Setting of range of sensor using ③ Other parameter setting	PAGE 76
2		OUTPUT SET	① Output type setting ② Output direction setting ③ Other parameter setting	PAGE 83
3		DO CONFIG	DO configuration parameter setting	PAGE 109
4		COMMUNICATION	Parameter setting	PAGE 106

11. Sensor input

11.1 Sensor input setting

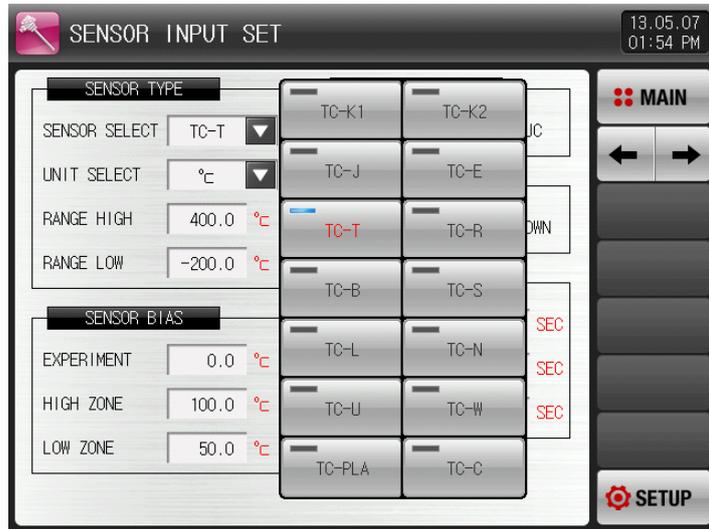
11.1.1 Sensor input screen 1

- ▶ 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.

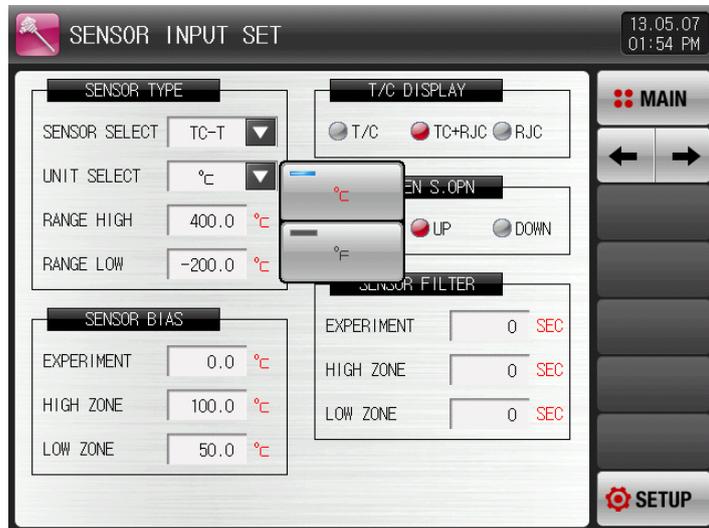


[Pic. 11-1] The first setup screen for sensor input

- ① Setting of the input sensor type.
 - ☞ The setting screen is displayed as shown in [Pic. 11-2 Sensor type setting screen(T/C setting case)].
 - ☞ Refer to [Table 11-1. The first setup screen for sensor input]
- ② Set the display unit.
 - ☞ The setting screen is displayed as shown in [Pic. 11-3 Display unit setting screen(T/C setting case)].
 - ☞ Refer to [Table 11-1. 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 11-1. 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 11-1. The first setup screen for sensor input]
- ⑤ Move to [Pic. 10-1 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 11-1. 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 lowtemperature room.
 - ☞ Setting of the sensor filter time when high frequency noise is included into the input signal.
- ⑩ Move to [Pic. 10-3 System parameter setting screen].



[Pic. 11-2] In case of sensor setting screen



[Pic. 11-3] Display unit setting screen

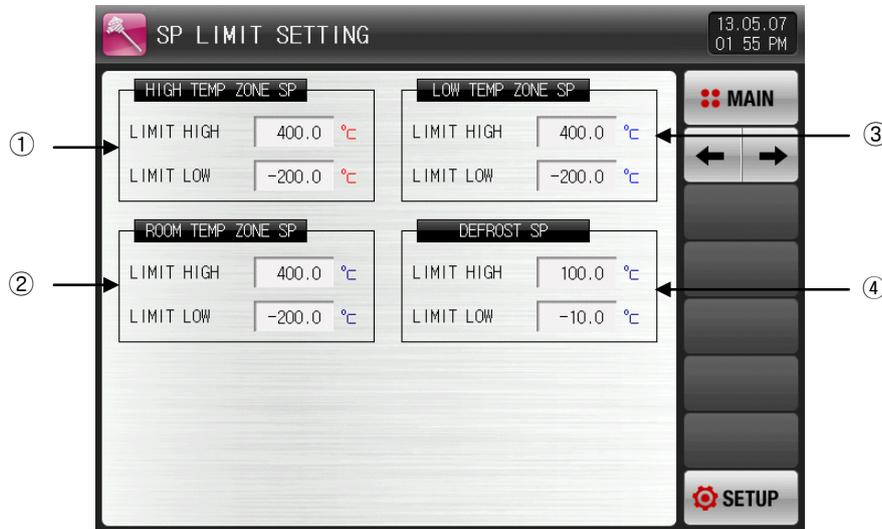
Table 11-1. The first screen parameter for sensor input setup

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

11.2 Temperature Limit Setup

11.2.1 The second screen for sensor input

- ▶ The temperature setup range cannot be changed during the operation.



[Pic. 11-4] The modification screen for sensor input by section

- 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 11-2. The second setup screen parameter for sensor input].
- ② It sets the range of temperature setup in room temperature room.
 - ☞ Refer to [Table 11-2. The second setup screen parameter for sensor input].
- ③ It sets the range of temperature setup in low temperature room .
 - ☞ Refer to [Table 11-2. The second setup screen parameter for sensor input].
- ④ It sets the range of temperature setup for defrosting.
 - ☞ Refer to [Table 11-2. The second setup screen parameter for sensor input].

Table 11-2. modification screen parameter for sensor input by section

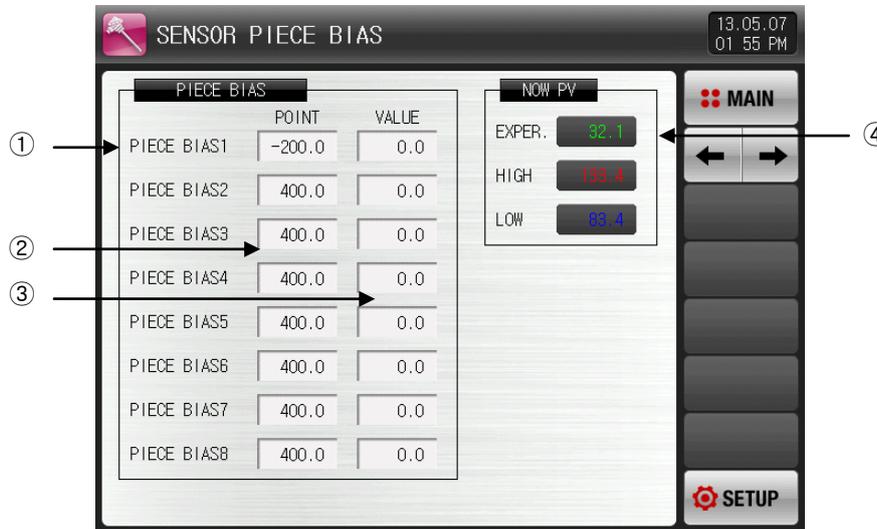
Parameter	Setup Range	Unit	Initial Value
LIMIT HIGH(HIGH)	EU(0.0 ~ 100.0%) Limit Low < Limit High	EU	EU(100.0%)
LIMIT LOW(HIGH)		EU	EU(0.0%)
LIMIT HIGH(ROOM)	EU(0.0 ~ 100.0%) Limit Low < Limit High	EU	EU(100.0%)
LIMIT LOW(ROOM)		EU	EU(0.0%)
LIMIT HIGH(LOW)	EU(0.0 ~ 100.0%) Limit Low < Limit High	EU	EU(100.0%)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

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

11.3 Sectional sensor input calibration

11.3.1 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. 11-5] Screen for sensor input calibration for each range

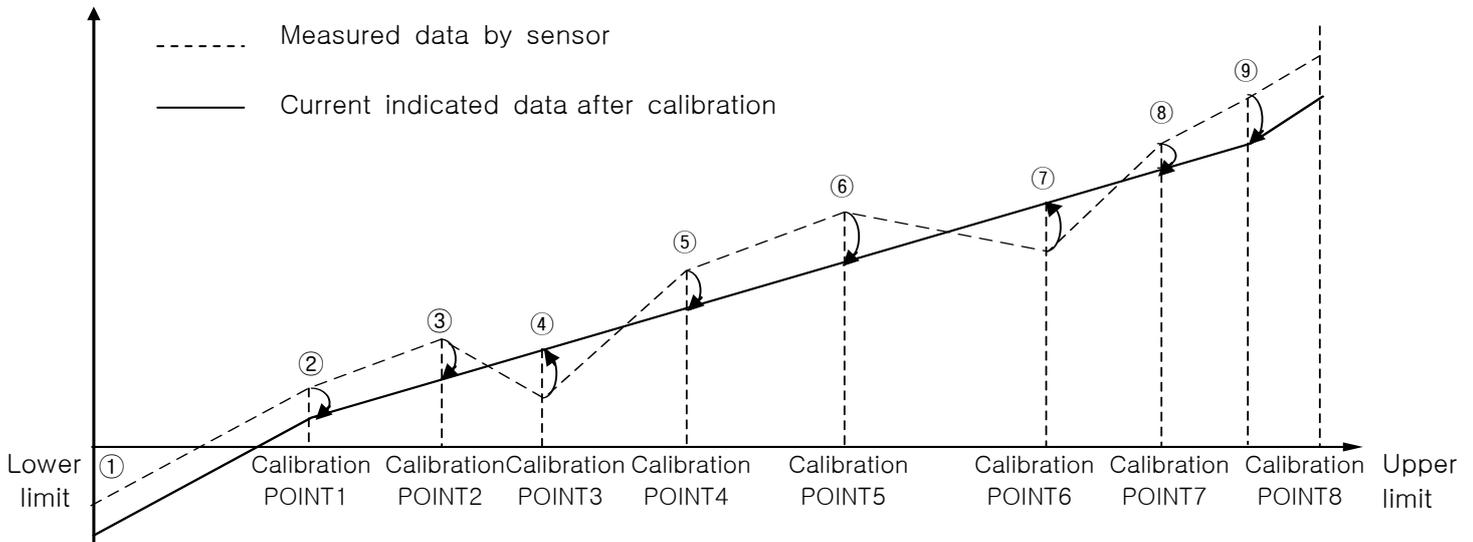
- ① Setting of the calibration for temperature.
 - ② Setting of the temperature in each standard point requiring the temperature setting.
 - ③ Setting the calibration temperature in each standard temperature.
 - ④ Display of the temperature with input calibration.
- ☞ Impossible to change by touching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

Table 11-3. 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%)

11.4 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

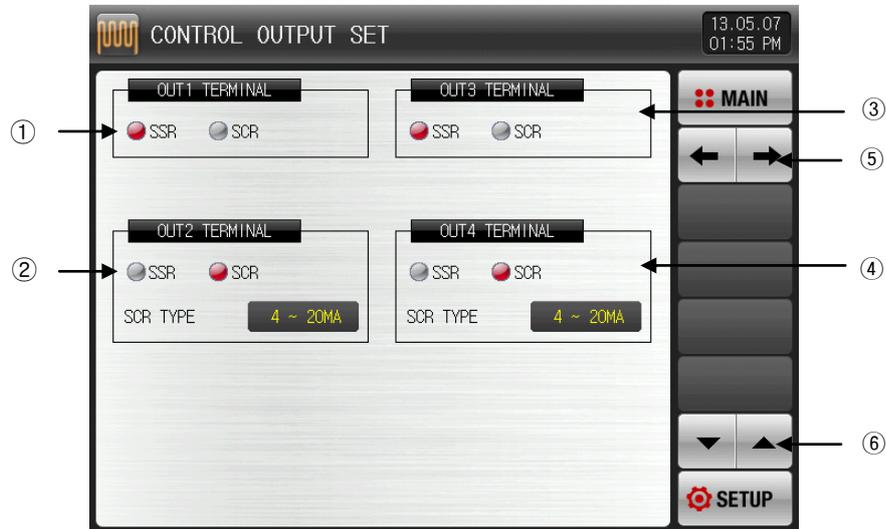
$$= \text{Measured data by sensor} + (\text{Measured data by sensor} - \text{calibration 8 point})$$

12. Control & Transmitting output

12.1 General control output setup

12.1.1 The first screen for output setup

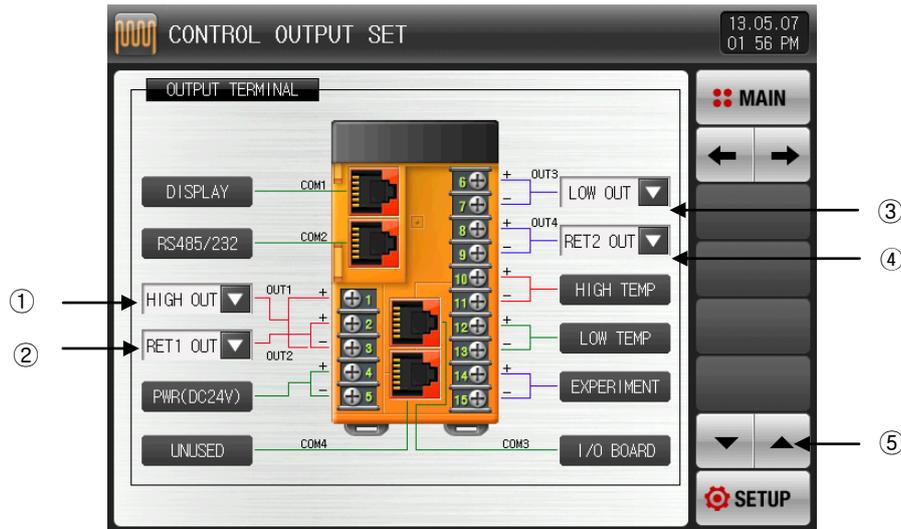
- ▶ It sets the type of output for temperature control.



[Pic. 12-1] The first screen for control output setup

- ① It sets the type of output of OUT1 output terminal.
 - ☞ For SSR, it displays like [Pic. 12-3 The setup screen for SSR output terminal].
 - ☞ For SCR, it displays like [Pic. 12-4 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. 12-3 The setup screen for SSR output terminal].
 - ☞ For SCR, it displays like [Pic. 12-4 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. 12-5 The setup screen for SSR output terminal].
 - ☞ For SCR, it displays like [Pic. 12-6 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. 12-5 The setup screen for SSR output terminal].
 - ☞ For SCR, it displays like [Pic. 12-6 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.

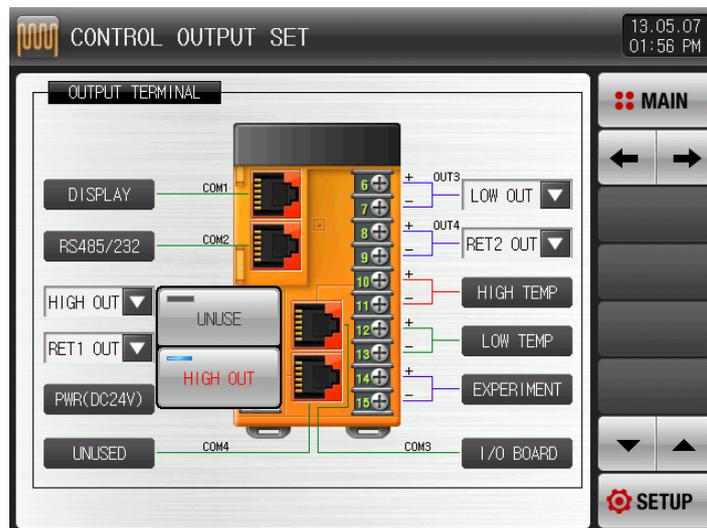
► The following figure is a screen to check/set the setting on the product with graphic.



[Pic. 12-2] The setup screen for output terminal

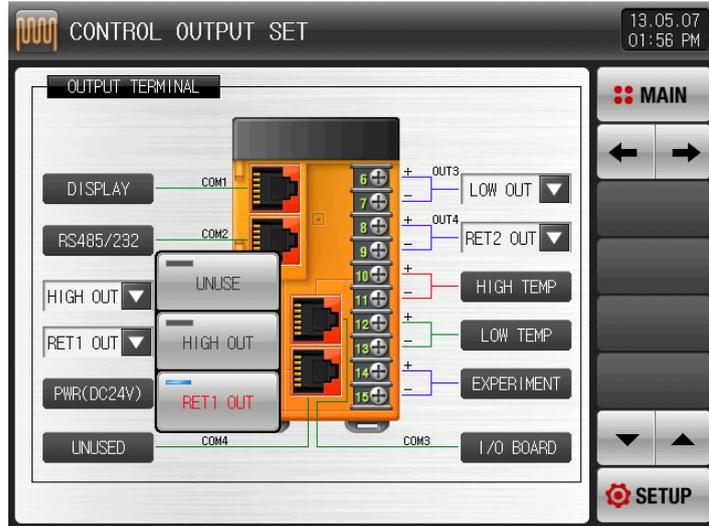
- ① When set OUT1 as SSR in [Pic. 12-1 The first screen for output terminal]
 - ☞ The setup screen is displayed like [Pic. 12-3 The setup screen for SSR output terminal].
- ② When OUT2 as SCR in [Pic. 12-1 The first screen for output terminal]
 - ☞ The setup screen is displayed like [Pic. 12-4 SCR The setup screen for SCR output terminal and transmission output terminal].
- ③ When OUT3 as SSR in [Pic. 12-1 The first screen for output terminal]
 - ☞ The setup screen is displayed like [Pic. 12-5 The setup screen for SSR output terminal].
- ④ When OUT4 as SCR in [Pic. 12-1 The first screen for output terminal]
 - ☞ The setup screen is displayed like [Pic. 12-6 The setup screen for SCR output terminal and transmission output terminal].
- ⑤ The screen is moved to next or previous screen.

► When set SSR in OUT1 output terminal, the setup screen for high temperature output and unused is displayed like this.



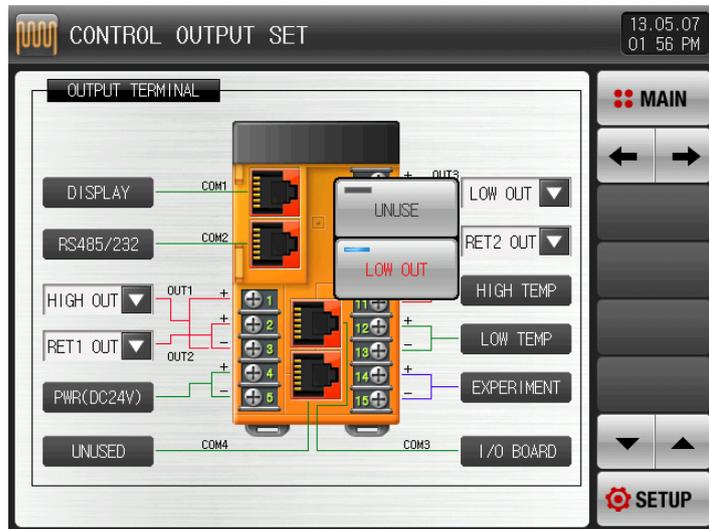
[Pic 12-3] SSR Output terminal setting Display

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



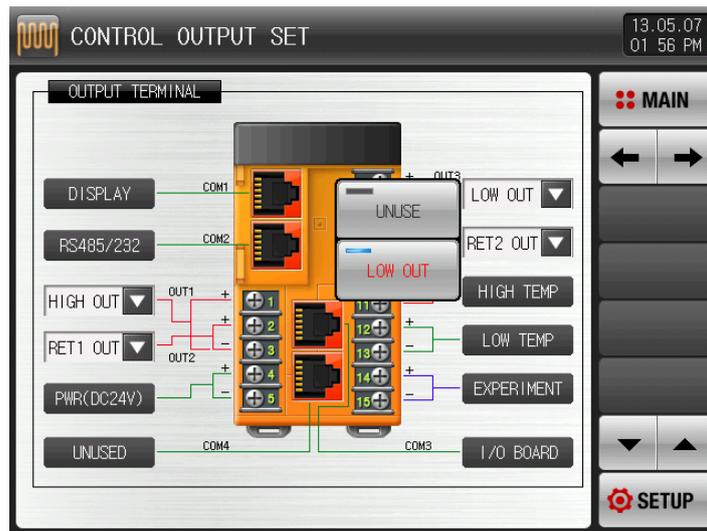
[Pic. 12-4] The setup screen for SCR output terminal and transmission output terminal

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



[Pic. 12-5] SSR Output terminal setting display

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



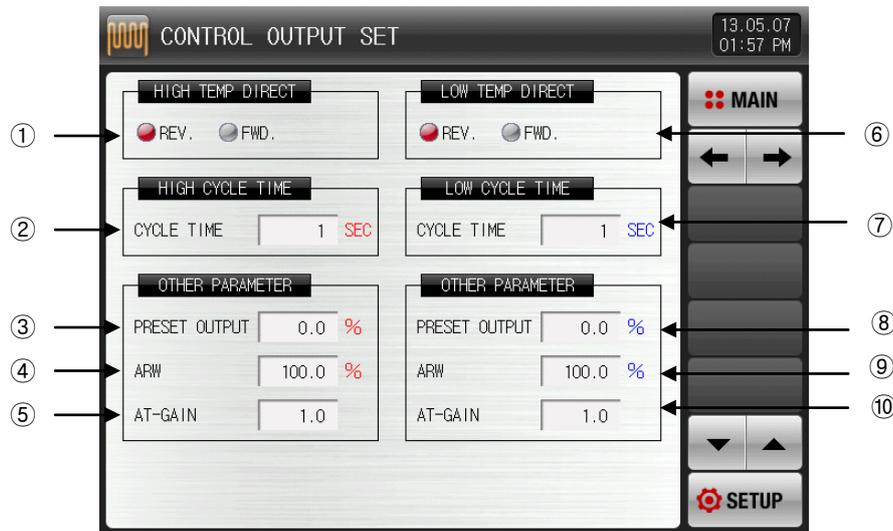
[Pic. 12-6] The setup screen for SCR output terminal and transmission output terminal

Table 12-1. 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		TRANSMISSION 1
OUT2	SSR	HIGH OUT, UNUSE	ABS	HIGH OUT
	SCR	HIGH OUT, TRANSMISSION 1, UNUSE		TRANSMISSION 1
OUT3	SSR	LOW OUT, UNUSE	ABS	LOW OUT
	SCR	LOW OUT, TRANSMISSION 2, UNUSE		TRANSMISSION 2
OUT4	SSR	LOW OUT, UNUSE	ABS	LOW OUT
	SCR	LOW OUT, TRANSMISSION 2, UNUSE		TRANSMISSION 2

12.1.2 The second screen for output setup

► It sets the control related parameter.



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

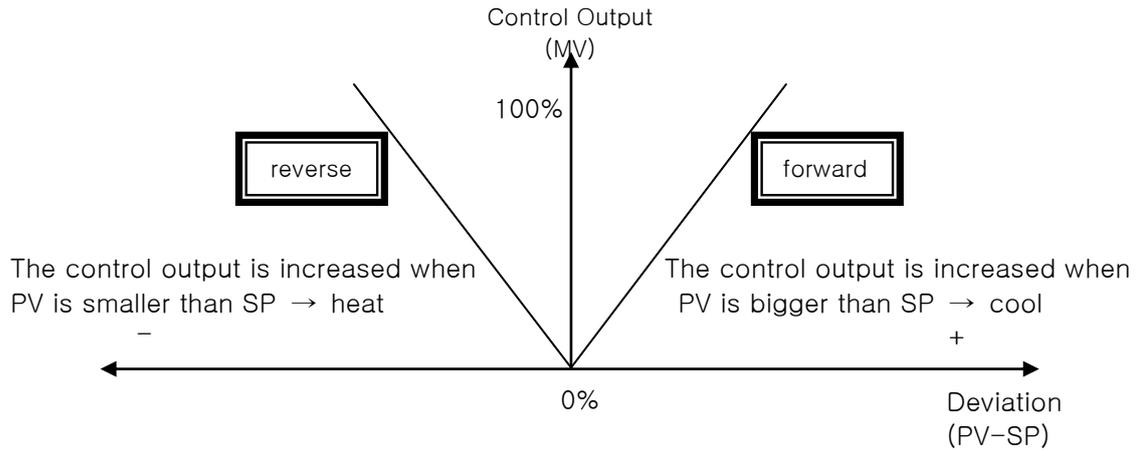
- ① It sets the motion type of PID control in high temperature room.
 ▶ Refer to [12.1.2.1 Operation direction]
- ② When the control output in high temperature room is “SSR(SOLID STATE RELAY)”, it sets the cycle for control output motion.
- ③ When the operation is stopped(STOP) and the sensor is open (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 [12.1.2.3 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 [12.1.2.4 Control time constant]
- ⑥ It sets the motion type of PID control in high 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) and 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 12-2. 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

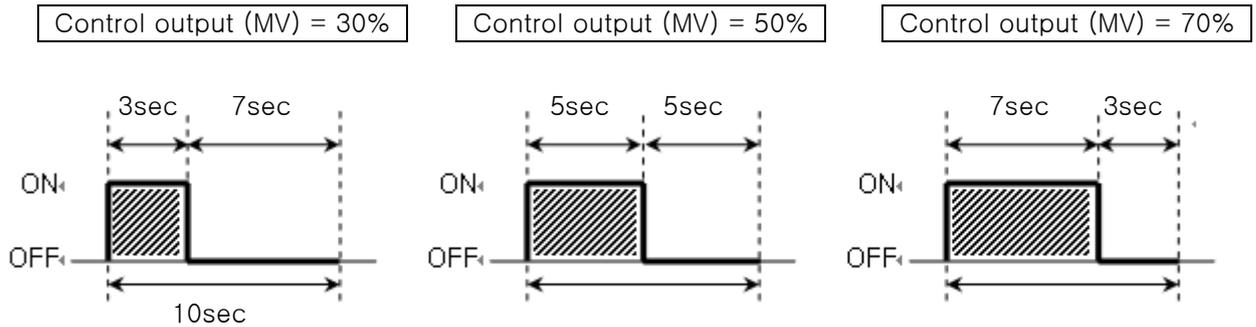
LOW TEMP. ROOM DIRECT	REVERSE, FORWARD	ABS	REVERSE
LOW TEMP. ROOM CYCLE TIME	1~300 SEC	ABS	1
LOW TEMP. ROOM PRESET OUTPUT	-5.0~105.0%	%	0.0
LOW TEMP. ROOM ARW	0.0(AUTO) ~ 200.0%	%	100.0
LOW TEMP. ROOM AT-GAIN	0.1~10.0	ABS	1.0

12.1.2.1 Motion Direction



12.1.2.2 Output cycle

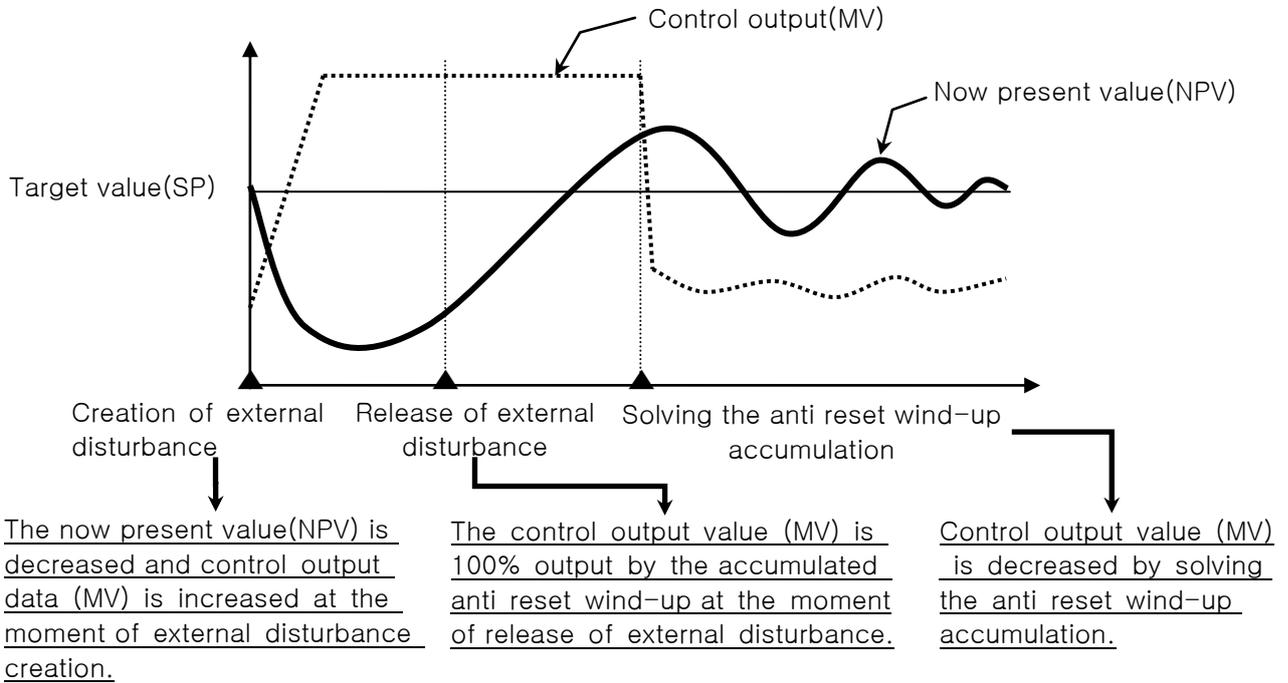
- ▶ It is applied when the control output type is "SSR (Solid State Relay)".
- ▶ It means the time of 1 cycle of "ON/OFF" in the set time.
- ▶ "SSR" when output period is 10seconds



12.1.2.3 Anti reset wind-up

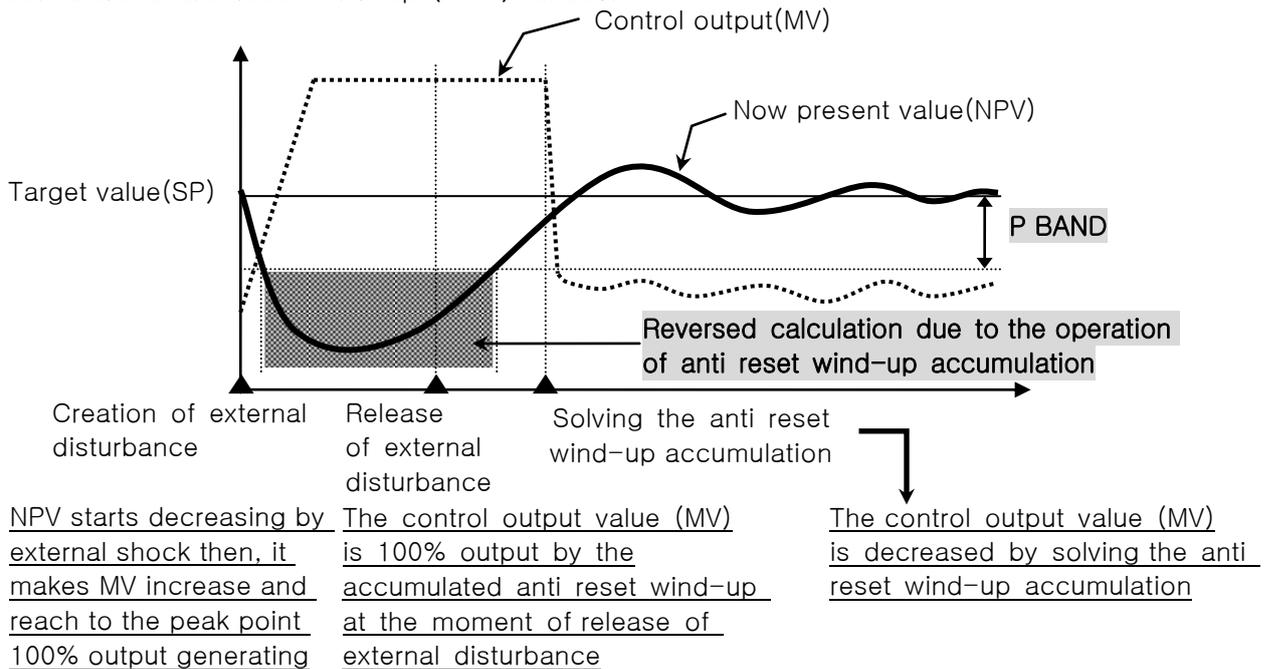
- ▶ It is one of the methods for effective control in case of external disturbance.
 - ☞ It is a function to inhibit the over shoot by anti reset wind-up when the control output reached to the maximum point.
- ▶ When I = 0, it is not operated in the PID setting data.

☞ 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)

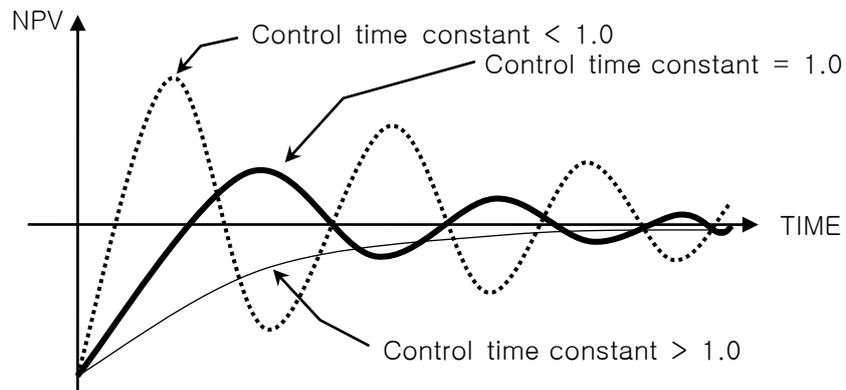
what is the P Band for input upper limit (RH) = 100.0°C, Input lower limit (RL) = -100.0°C, Proportional band (P) = 10.0%, anti reset wind-up (ARW) = 200%?

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

12.1.2.4 Control time constant

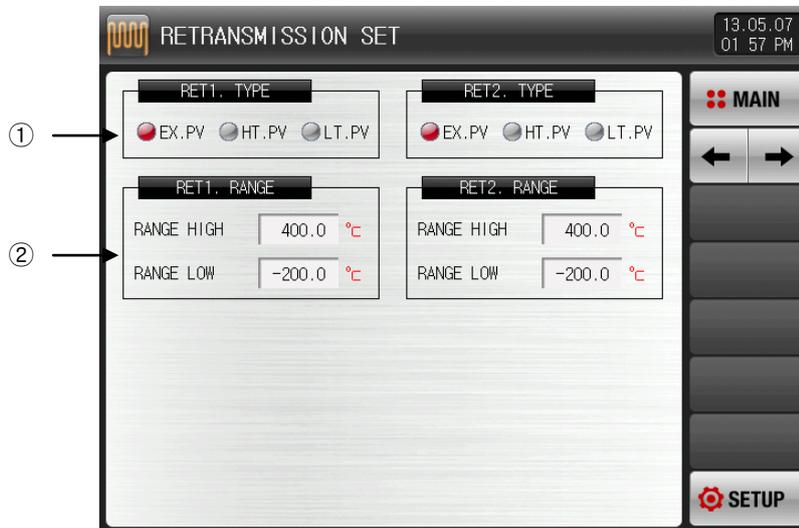
- ▶ It is used to change the control characteristics based on the set PID value after auto tuning.
- ▶ It can control the control time constant depending on the object of control and characteristics.
 - ☞ Control time constant < 1.0
The response speed is fast, but the hunting is severe.
 - ☞ Control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



12.2 Transmission Output Setup

12.2.1 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. 12-8] 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.

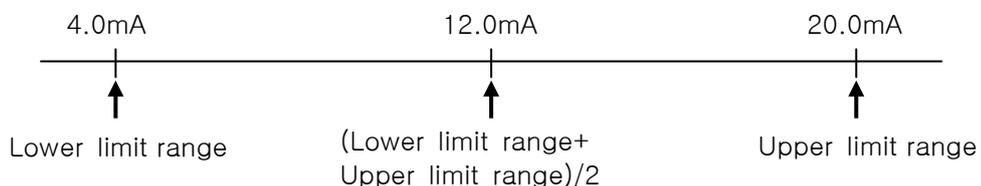
Table 12-3. The third screen parameter for output setup

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%)	EU	EU(100.0%)
RET. RANGE LOW	RET. Range Low < RET. Range High	EU	EU(0.0%)

12.2.2 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.

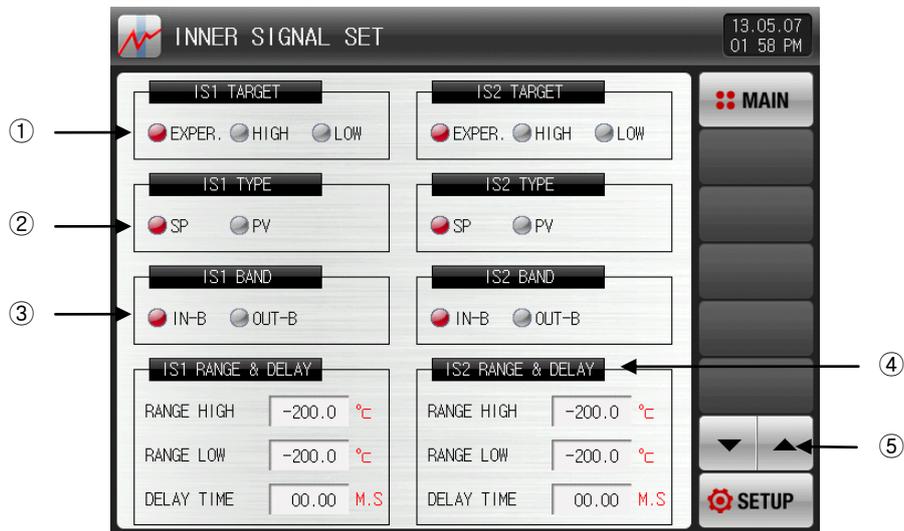
☞ When the type of transmission output is one of experiment PV, high temp. PV and low temp. PV,



13. Inner signal

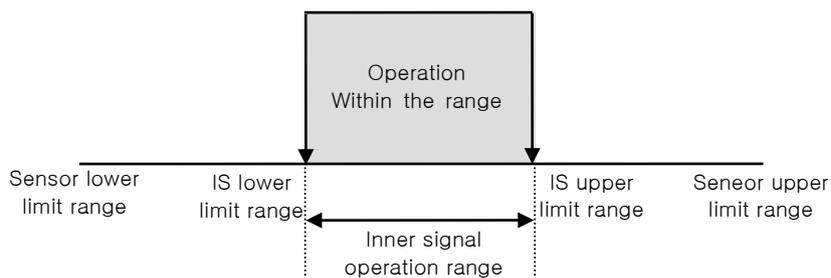
13.1 Inner signal setup

- ▶ It is a screen to set the object of application, type and operation of each inner signal.
- ▶ Setting of 8 (IS1~IS8) inner signal operations is available.
- ▶ The operation range and delay time of inner signal can be set in [Fig. 13-1 The first setup screen for inner signal]

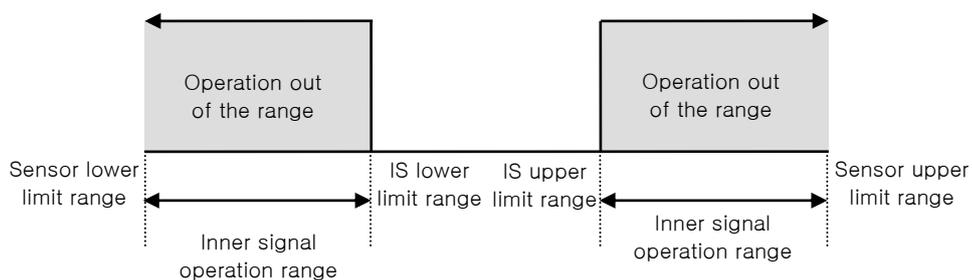


[Pic. 13-1] The first setup screen for inner signal

- 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.



- ☞ OUT-BAND : The operation of inner signal is "ON" when the selected application from application type of inner signal (SP, PV and TSP) 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.
- ⑤ The screen is moved up/down with 2 inner signal units.

Table 13-1. 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	EU(0.0%)
	RANGE LOW		EU	EU(0.0%)

* It can be set #n = 1 ~ 8

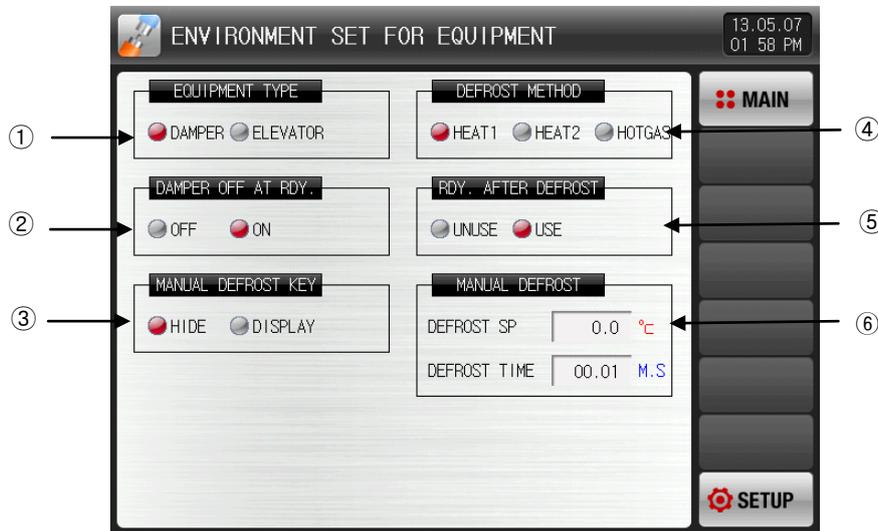
13.2 Inner signal operation

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

14. Configuration Setup for Equipment

14.1 Configuration Setup for Equipment

14.1.1 The first screen for configuration setup



[Pic. 14-1] The setup screen for configuration

- ① It sets the type of equipment.
- ② It sets the usage of damper OFF output motion in the operation preparation.
- 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. 14-1. The parameter for configuration setup

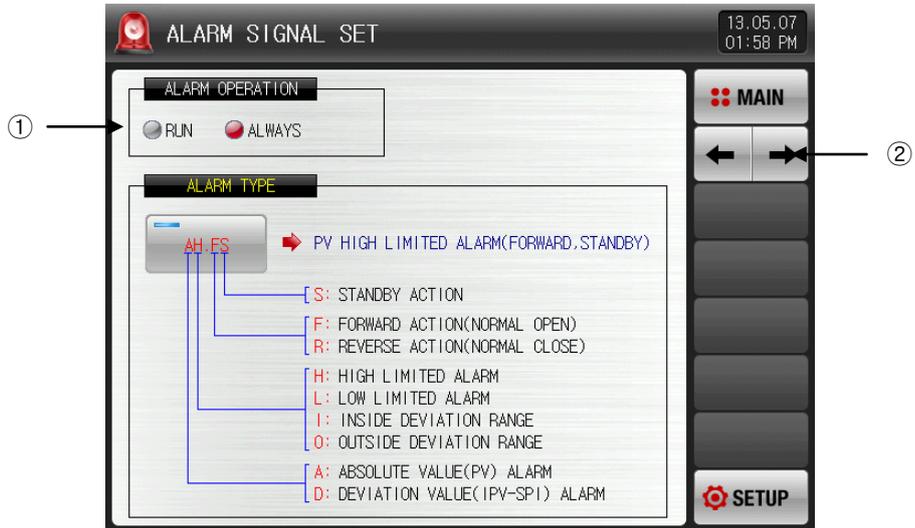
Parameter	Setup Range	Unit	Initial Value
EQUIPMENT TYPE	DAMPER, ELEVATOR	ABS	DAMPER
DAMPER OFF AT RDY.	OFF, ON	ABS	ON
MANUAL DEFROST KEY	HIDE, DISPLAY	ABS	HIDE
DEFROST METHOD	HEAT1, HEAT2, HOTGAS	ABS	HEAT1
RDY AFTER DEFROST	UNUSE, USE	ABS	USE
DEFROST SP	Limit low defrost ~ Limit high defrost	EU	0.0
DEFROST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

15. Alarm signal

15.1 Alarm signal setting

15.1.1. The first screen for alarm signal setup

► This is the screen to set the alarm signal.



[Pic. 15-1] 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.

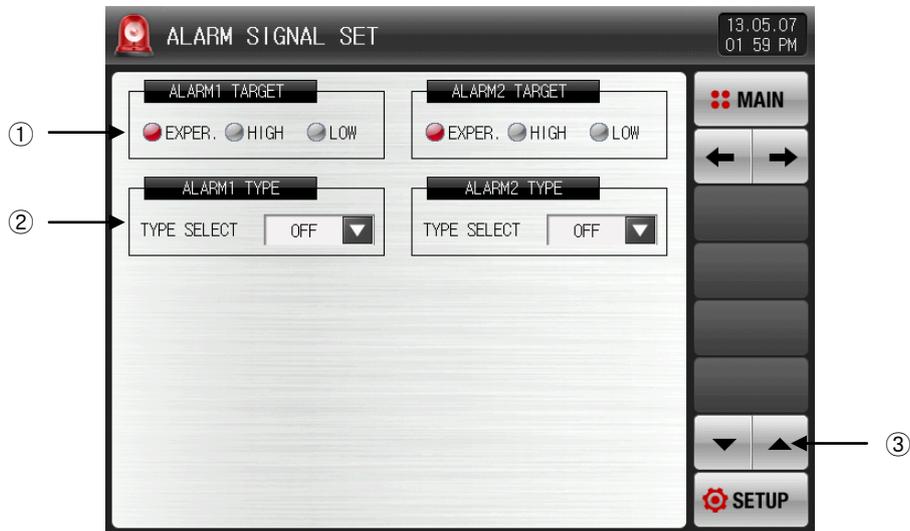
② Moving from current screen to next screen

Table 15-1. The first screen parameter for alarm signal setup

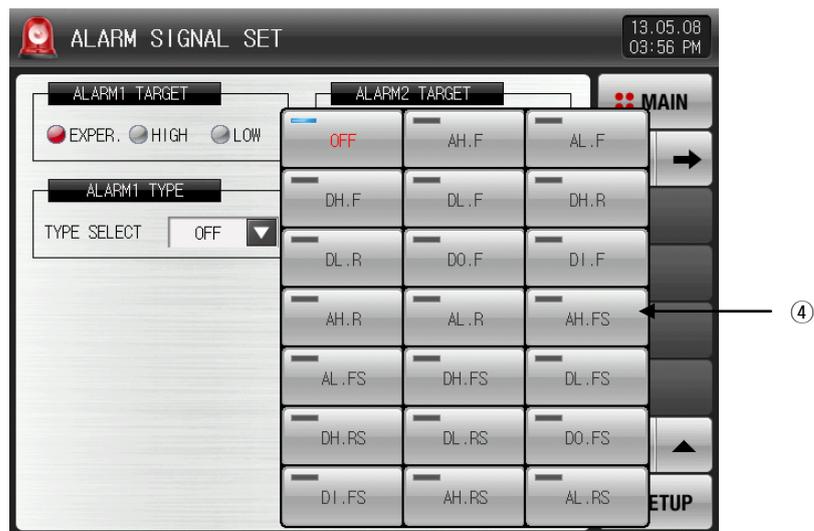
Parameter	Setup Range	Unit	Initial Value
ALARM OPERATION	RUN, ALWAYS	ABS	ALWAYS

15.1.2 The second screen for alarm signal setup

- ▶ This is the screen to set the alarm signal.
- ▶ It can set 4 signals.
- ▶ The alarm signal is activated by the setup in the alarm type, and there are 20 kinds of alarms.



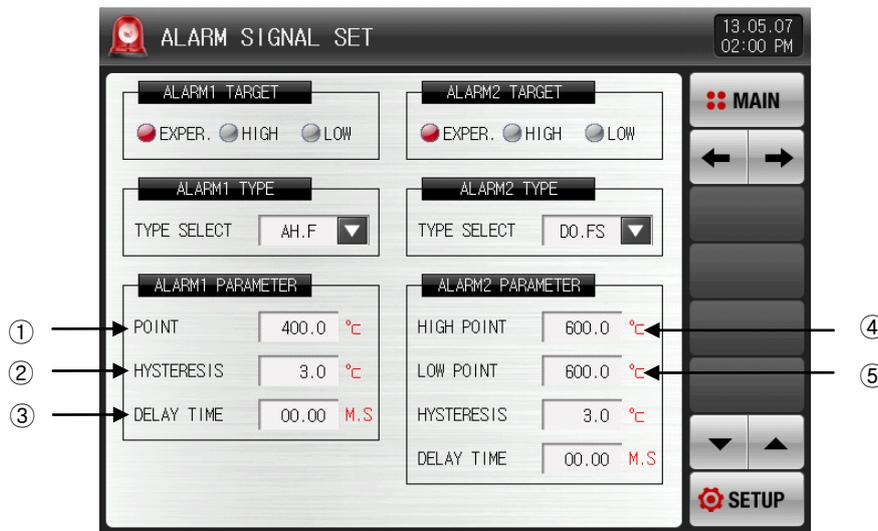
[Pic. 15-2] The second screen for alarm signal setup-1



[Pic. 15-3] 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 15-3 The Alarm Type].

- ▶ When the alarm type was set in AH.F and DO.F in [Pic. 15-3 The second screen for alarm signal setup-2], the following screen is displayed.



[Pic. 15-4] 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 15-2. The second screen for alarm signal setup

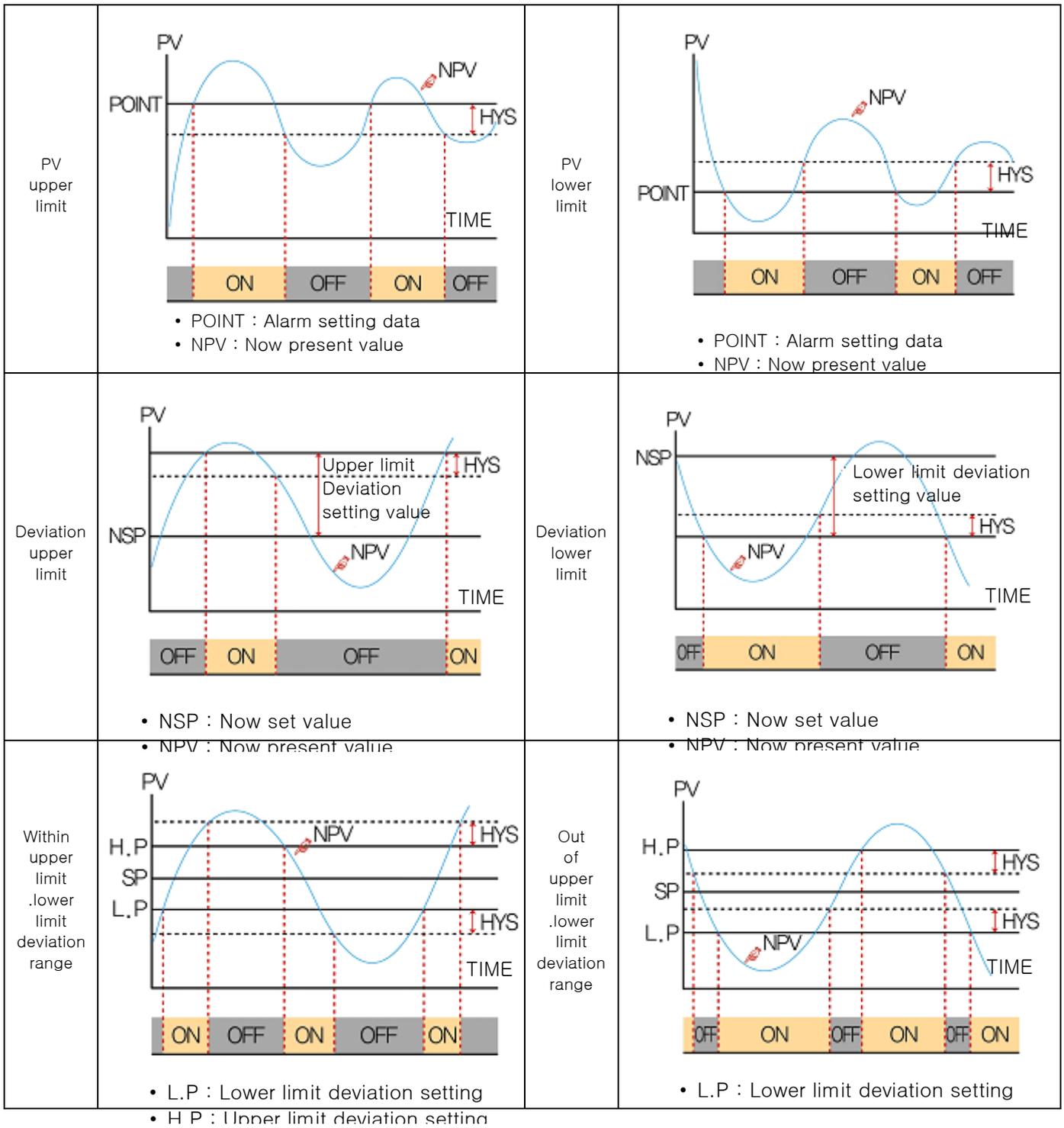
Parameter	Setup Range	Unit	Initial Value
ALARM#n TARGET	Experiment room High temperature room Low temperature room	ABS	Experiment room
ALARM#n TYPE	No use, AH.F, AL.F, DH.F DL.F, DH.R, DL.R DO.F, DI.F, AH.R AL.R, AH.FS, AL.FS DH.FS, DL.FS, DH.RS DL.RS, DO.FS, DI.FS AH.RS, AL.RS	ABS	No use
ALARM#n PARAMETER	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 ~ 4

Table 15-3. 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			■		■

15.2 Alarm signal operation

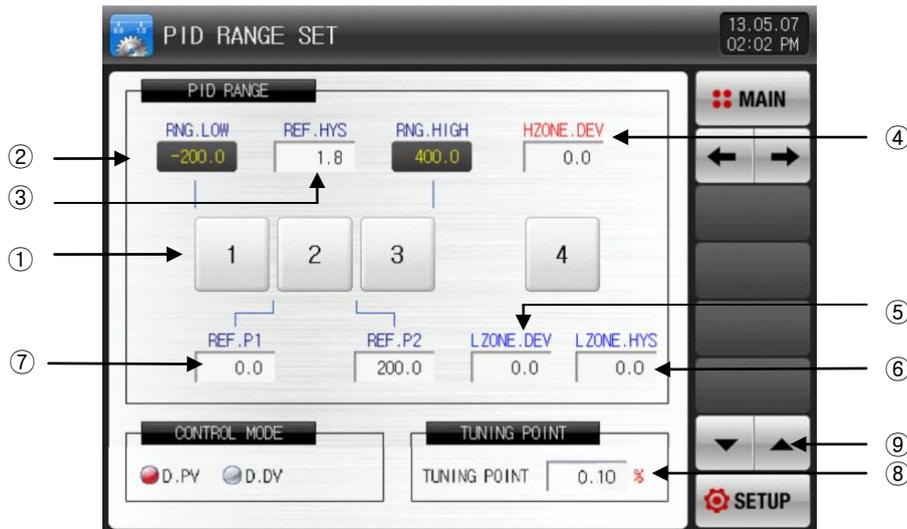


16. PID group

16.1 PID application scope setup

16.1.1 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. 16-1] The first screen for PID application range setup

- 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 16-1. 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"> ► 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. ► It is good if it is applied to the equipment reacting sensitively to the control output data(MV) changing rate.
D.PV control	Explanation
	<ul style="list-style-type: none"> ► 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 ► It is good if it is applied to the equipment reacting sensitively to the control output data(MV) changing rate.

16.1.2 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. 16-2] The second screen for PID application range setup

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

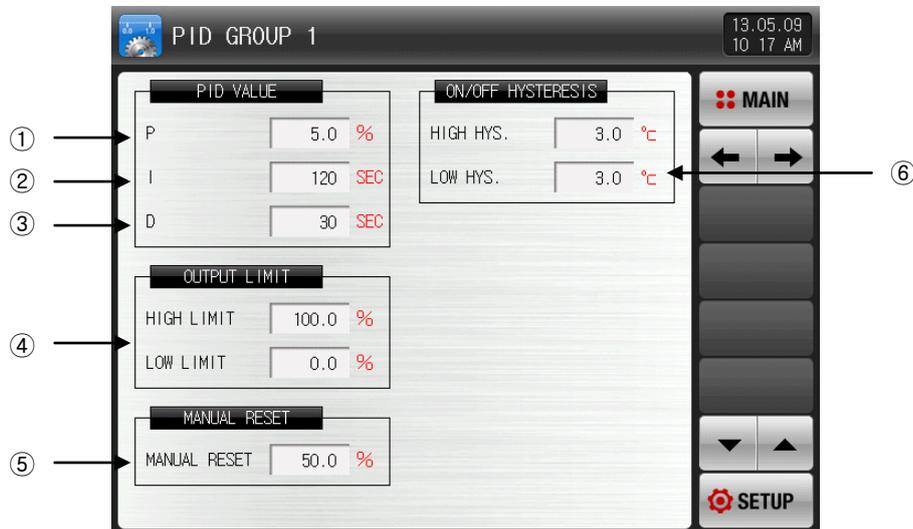
Table 16-2 The second screen parameter for PID group setup

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

16.2 PID Group Setup

16.2.1 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 16-3] 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). 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 operation.
 - ☞ 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 speedier 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.
 - ⑥ When control ON/OFF, HYS parameter is displayed only in ON/OFF control(P:0.0).
- ▶ Output limit parameter is displayed only when PID control (P ≠ 0).
 - ▶ When ON / OFF control, HYS parameter is displayed only when ON / OFF control (P = 0).

Table 16-3. 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%)

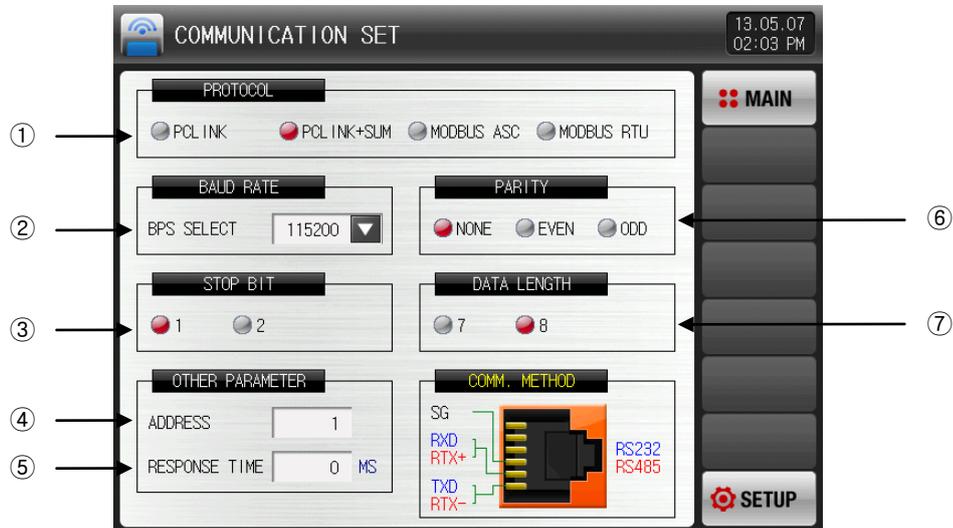
* #n : 1 ~ 4

* 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".

17. Communication

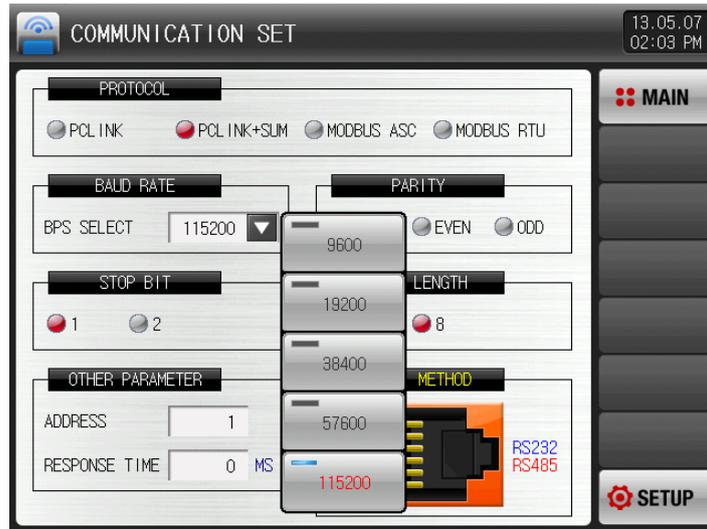
17.1 The communication Environment Setup (RS232C / RS485)

- ▶ It sets the communication protocol and condition.



[Pic. 17-1] The setup screen for communication environment (RS232C / RS485)-1

- ① It sets the communication protocol.
- ② It sets the communication speed.
 - ☞ Refer to [Pic. 17-2 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.



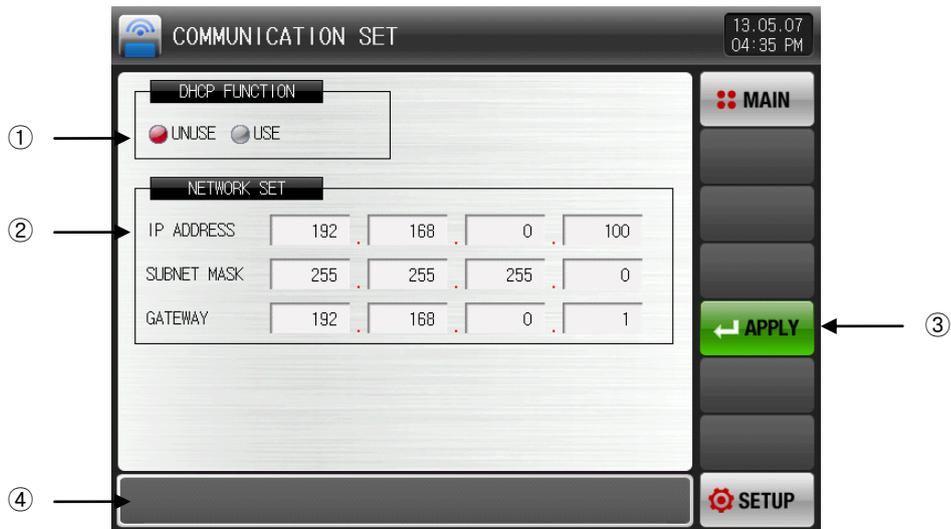
[Pic. 17-2] The setup screen for communication environment (RS232C / RS485)-2

Table 17-1. 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

17.2 The communication Environment Setup (Ethernet)

- ▶ It sets the communication condition of Ethernet.



[Pic. 17-3] 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 If applied after set IP address, subnet mask and gateway, Ethernet communication is available.
- ④ It displays the communication status of Ethernet.
 - ☞ ETHERNET APPLY : In case of  operation
 - ☞ ETHERNET READY : Ethernet normal operation
 - ☞ CONNECTION ERROR : No connection of Ethernet cable or in failure
 - ☞ ETHERNET APPLY - RESP.ERR : Ethernet communication failure.

Table 17-2. 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



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

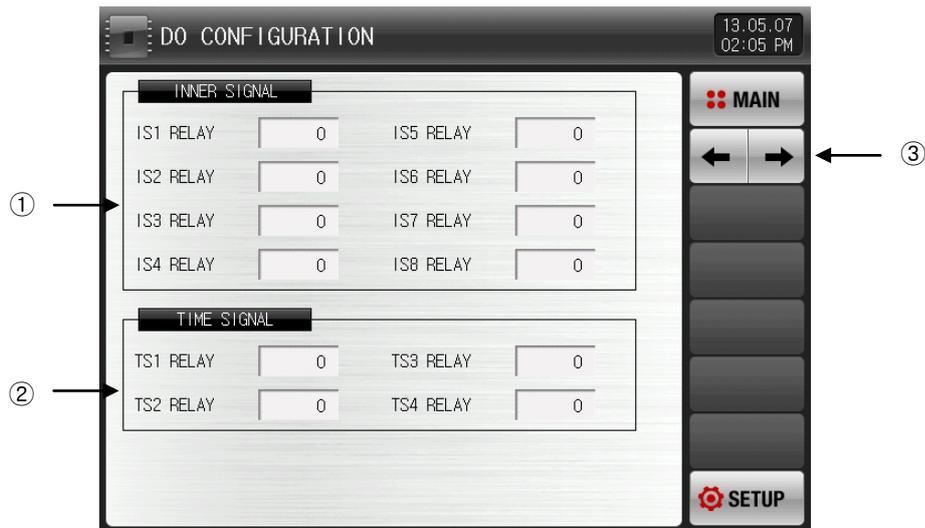
18. DO relay output

18.1 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.
- ▶ Relay number 13~32 can be used when I/O2 board option is added.

18.1.1 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. 18-1] The setup screen for inner signal/time signal relay

- ① Setting the relay number of inner signal. (IS1~IS8)
- ② Setting the relay number of time signal. (TS1~TS4)
- ③ Moving from current screen to the next screen.

Table 18-1. The setup screen parameter for inner signal/time signal relay

Parameter	Setting range	Unit	Initial data
IS1 ~ IS8 RELAY	0~32	ABS	0
TS1 ~ TS4 RELAY	0~32	ABS	0

18.1.2 The setup screen of alarm signal/ experiment room signal/ fan signal relay



[Pic. 18-2] The setup screen of alarm signal/experiment signal/fan signal relay

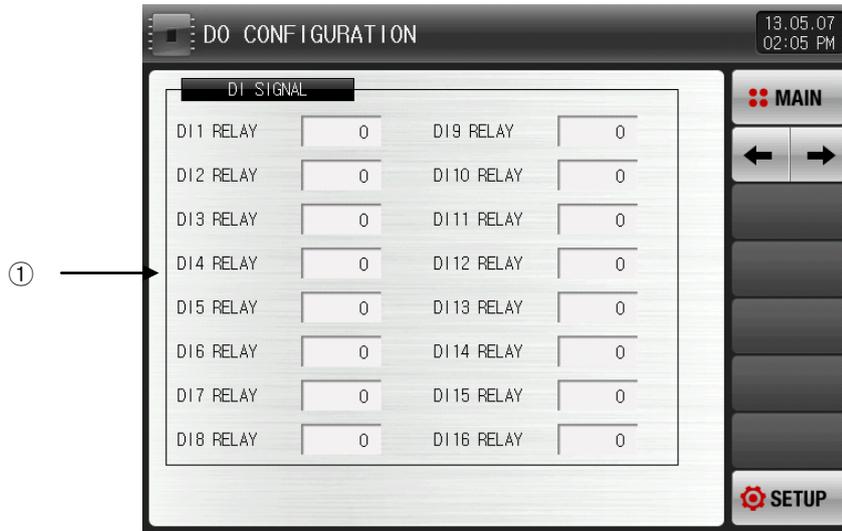
- ① It sets the alarm signal relay. (AL1 ~AL4)
- ② It sets the experiment room signal relay. (High temp. room , Low temp. room , Room temp. room)
 - ☞ The set relay is “ON” depending on the application of experiment room operation.
- ③ It sets the fan signal relay.(High temp. room , Low temp. room , Room temp. room)
 - ☞ The fan relay in high temp. room and low temp. room is always “ON” based on the setup, the fan relay in room temp. room is “ON” only during the operation based on the setup.

Table 18-2. 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
FAN SIGNAL (High temp. room, Low temp. room, Room temp. room)	0~32	ABS	0

18.1.3 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. 18-3] DI signal relay setting screen

- ① It sets the DI signal relay.(DI1~DI16)
 - ☞ Only when the motion is set as “error” in [19.1.1 DI The first screen for function and motion setup] and [19.1.2 The second screen for DI function and motion setup], DI signal is activated.

Table 18-3. The setup screen parameter for DI signal relay

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

18.1.4 The setup screen for manual signal/logical signal relay

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



[Pic. 18-4] 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.
- ③ The page is moved up/down at this screen.

Table 18-4. The setup screen parameter for manual signal

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

- ▶ It is a screen to set the Logical relay signal.
- ▶ The Logical signal can be set up to 3.



[Pic. 18-5] The setup screen for logical signal

- ① It sets the output of logical signal.
- ② It sets the number of relay 1 for calculation.
- ③ It sets the number of relay 2 for calculation.
- ④ The output is “ON” to the relay which is set at the logic output relay cell, while calculating the logic relay 1 and 2 with AND, OR, NAND, NOR and XOR.
- ⑤ The page is moved up/down at this screen.

Table 18-5 The setup screen parameter for manual signal

Parameter	Setting range	Unit	Initial value
LOGICAL SIGNAL1 OUTPUT RELAY	0~32	ABS	0
LOGICAL SIGNAL2 OUTPUT RELAY	0~32	ABS	0
LOGICAL SIGNAL3 OUTPUT RELAY	0~32	ABS	0
OPERAND	AND, OR, NAND, NOR, XOR	ABS	AND

Table 18-6 Operator motion

• AND

Logical relay1	Logical relay2	Logical output relay
OFF	OFF	OFF
OFF	ON	OFF
ON	OFF	OFF
ON	ON	ON

• OR

Logical relay1	Logical relay2	Logical output relay
OFF	OFF	OFF
OFF	ON	ON
ON	OFF	ON
ON	ON	ON

• NAND

Logical relay1	Logical relay2	Logical output relay
OFF	OFF	ON
OFF	ON	ON
ON	OFF	ON
ON	ON	OFF

• NOR

Logic relay 1	Logical relay2	Logic output relay
OFF	OFF	ON
OFF	ON	OFF
ON	OFF	OFF
ON	ON	OFF

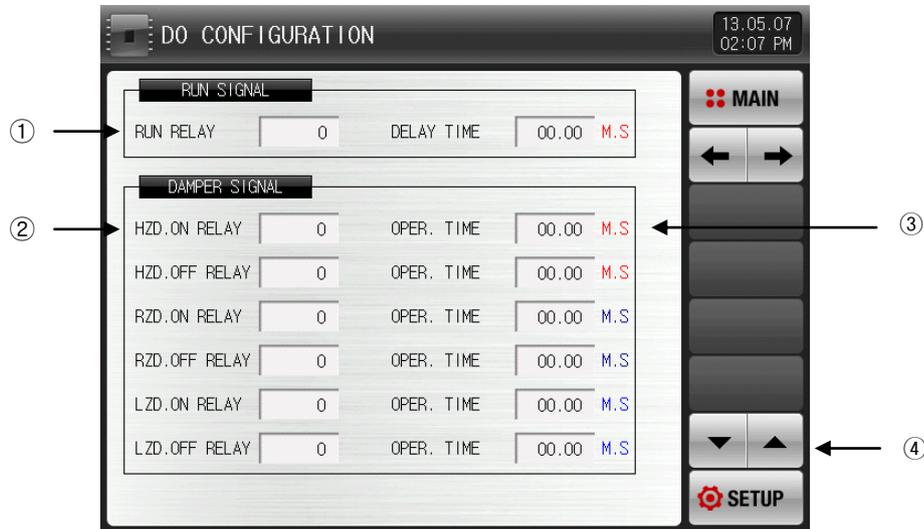
• XOR

Logical relay1	Logical relay2	Logical output relay
OFF	OFF	OFF
OFF	ON	ON
ON	OFF	ON
ON	ON	OFF

18.2 Other Signal Relay Setup

18.2.1 The first screen for other signal relay setup

- ▶ This is the screen to set the run signal and damper signal.



[Pic. 18-7] 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 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”.
- ③ It sets the damper signal motion time.
 - ☞ OPERATION TIME : If the corresponding relay maintains “ON”, set delay becomes “OFF” after set time.
- ④ The page is moved up/down at this screen.

Table 18-7. 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
HZD. ON RELAY	0~32	ABS	0
OPER.TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
HZD. OFF RELAY	0~32	ABS	0
OPER.TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
RZD. ON RELAY	0~32	ABS	0
OPER.TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
RZD. OFF RELAY	0~32	ABS	0
OPER.TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
LZD. ON RELAY	0~32	ABS	0
OPER.TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
LZD. OFF RELAY	0~32	ABS	0
OPER.TIME	00.00~99.59 (MIN.SEC)	ABS	00.00

- This is the second screen for other signal relay setup.



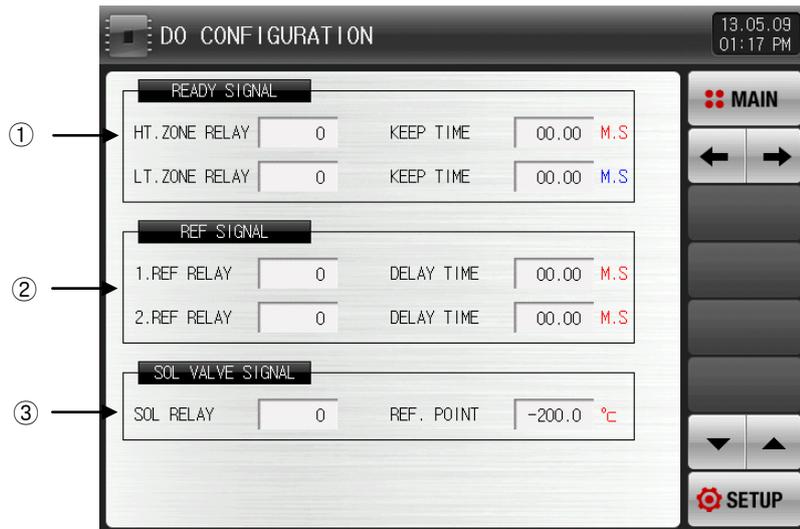
[Pic. 18-8] The second screen for other signal relay setup

- ① It sets the sensor open signal relay and keep time.
 - ☞ HT. ZONE RELAY : It 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.
- 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.
- 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.

Table 18-8. The second screen parameter for other signal relay setup

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

► This is the third screen for other signal relay setup.



[Pic. 18-9] The third screen for other signal relay setup

① 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.

② 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.

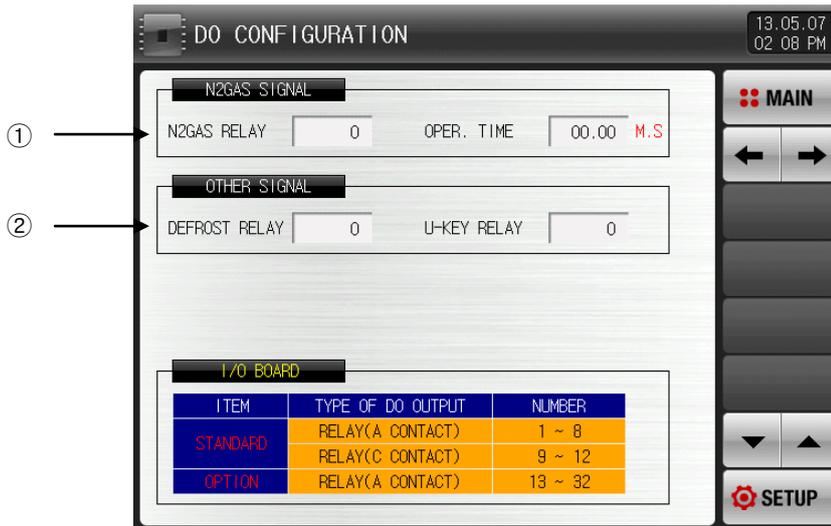
③ It set the sol valve signal relay and standard motion value.

- ☞ SOL RELAY: When the current command in low temperature room is smaller than the predetermined value of standard motion value, set relay is “ON”.
- ☞ REF. POINT: It sets the sol valve signal motion temperature.

Table 18-9. The third screen parameter for other signal relay setup

Parameter	Setup Range	Unit	Initial Value
HT.ZONE RELAY	0~32	ABS	0
KEEP TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
LT.ZONE RELAY	0~32	ABS	0
KEEP TIME	00.00~99.59 (MIN.SEC)	ABS	00.00
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
SOL RELAY	0~32	ABS	0
REF. POINT	EU(0.0 ~ 100.0%)	EU	EU(0.0%)

► This is the fourth screen for other signal relay setup.



[Pic. 18-10] The fourth 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.

② It set other signal relay.

- ☞ DEFROST RELAY : The set relay is “ON” during the defrosting operation.
- ☞ 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 18-10. The fourth 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
DEFROST RELAY	0~32	ABS	0
U-KEY RELAY	0~32	ABS	0

Table 18-11. The description of relay motion time for each signal

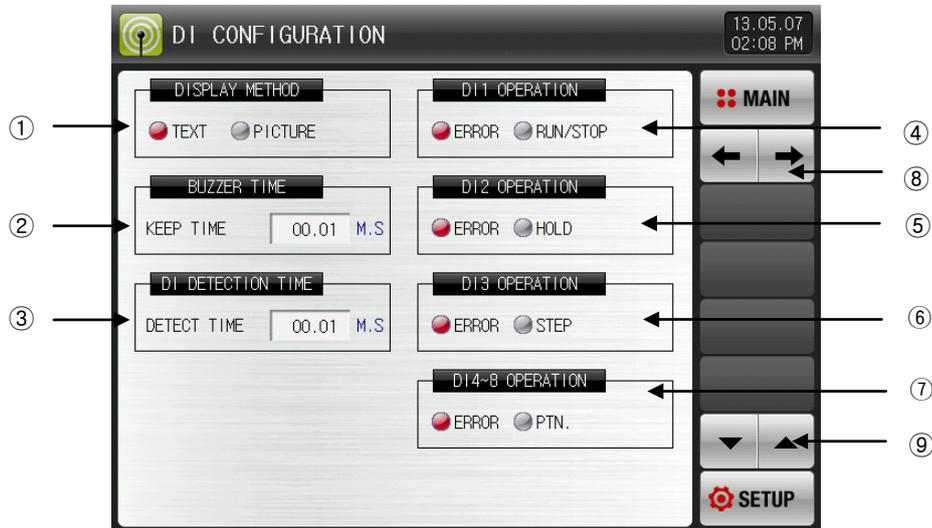
	Requirement	Relay ON time
Close signal	When touch the screen to delete the message after the relay motion time set from occurrence	Until the set relay motion time
	When touch the screen to delete the message during the relay motion time set from occurrence	Until the screen touch
Error signal Sensor open signal Wait signal	When recover after the relay motion time set from occurrence	Until the recovery
	When recover during the relay motion time set from occurrence	Until the set relay motion time

19. DI function and Operation

19.1 DI Operation setup

19.1.1 The first screen for DI function and operation setup

► DI function and Operation setting



[Pic. 19-1] The first screen for DI function and operation setup

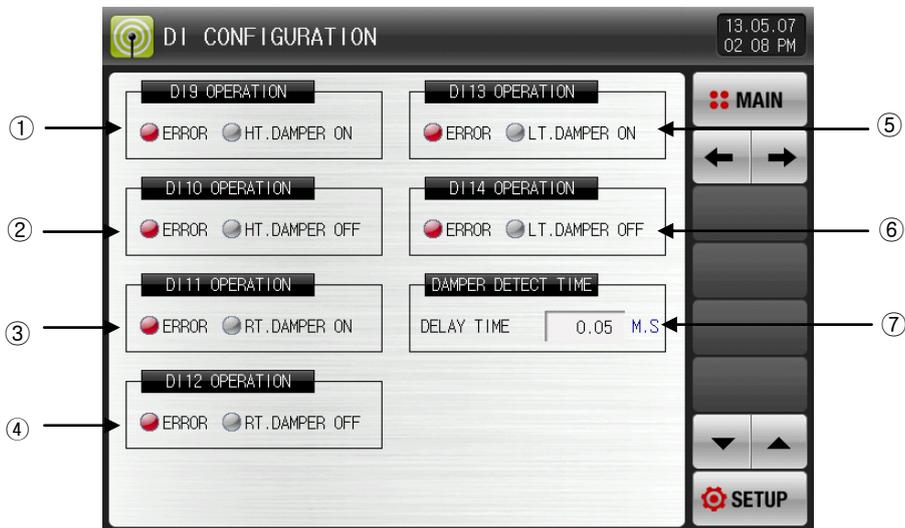
- ① Setting the error display method in DI error creation.
 - ☞ TEXT : Refer to [Pic. 19-12 The screen with letter signal for DI error]
 - ☞ PICTURE : Refer to [Pic. 19-13 The screen with picture signal for DI error]
 - The uploaded photo file into the internal memory is displayed into the DI error and basic photo is displayed when it is not uploaded.
- ② Setting the buzzer ringing time in DI error creation.
 - ☞ The buzzer ringing is made in DI error creation in spite of setting into "0".
 - ☞ Buzzer does not ring when set DI 1~ 8 motions as non-error.
- ③ Setting the DI sensing delay time.
 - ☞ In case of physical DI contact, it operates with DI input when it is "ON" during the contact point setting time.
- ④ Setting the DI1 operation method.
 - ☞ ERROR : Use the DI1 operation for error detection.
 - ☞ RUN/STOP : Run/Stop: DI1 motion is used to run/stop.
- ⑤ Setting the DI2 operation method.
 - ☞ ERROR : Use the DI2 operation for error detection.
 - ☞ HOLD : Hold: DI2 motion is used to Hold ON/OFF at the operational screen.
- ⑥ Setting the DI3 operation method.
 - ☞ ERROR : Use the DI3 operation for error detection.
 - ☞ STEP: DI3 motion is used to Step ON/OFF at the operational screen.
- ⑦ Setting the DI4~8 operation method.
 - ☞ ERROR : Use the DI4~8 operation for error detection.
 - ☞ PTN: DI4~8 motions are used to select the pattern by DI.
 - Refer to [Table 19-4 The pattern selection by DI]
- ⑧ The screen is moved to next or previous screen.
- ⑨ The page is moved up/down at this screen.

Table 19-1. The first screen parameter for DI function and motion setup.

Parameter	Setting range	Unit	Initial data
DISPLAY METHOD	TEXT, PICTURE	ABS	TEXT
KEEP TIME	0.00 ~ 99.59 (MIN.SEC)	ABS	00.01
DI DETECTION TIME	0.00 ~ 99.59 (MIN.SEC)	ABS	00.01
D11 OPERATION	ERROR, RUN/STOP	ABS	ERROR
D12 OPERATION	ERROR, HOLD	ABS	ERROR
D13 OPERATION	ERROR, STEP	ABS	ERROR
D14~8 OPERATION	ERROR, PTN	ABS	ERROR

19.1.2 The second screen for DI function and operation setup

- It sets the DI function and operation.



[Pic. 19-2] The second screen for DI function and operation

- ① Setting the D19 operation method.
 - ☞ ERROR : Use the D19 operation for error detection.
 - ☞ HT.DAMPER ON: DI9 motion is used to detect error with high temperature room damper ON.
- ② Setting the D10 operation method.
 - ☞ ERROR : Use the D10 operation for error detection.
 - ☞ HT.DAMPER OFF: DI10 motion is used to detect error with high temperature room damper OFF.
- ③ Setting the D11 operation method.
 - ☞ ERROR : Use the D11 operation for error detection.
 - ☞ RT.DAMPEER ON: DI11 motion is used to detect error with room temperature damper ON.
- ④ Setting the D12 operation method.
 - ☞ ERROR : Use the D12 operation for error detection.
 - ☞ RT.DAMPER OFF: DI12 motion is used to detect error with room temperature damper OFF.
- ⑤ Setting the D13 operation method.
 - ☞ ERROR : Use the D13 operation for error detection.
 - ☞ LT.DAMPER ON : DI13 motion is used to detect error with room temperature damper ON.
- ⑥ Setting the D14 operation method.
 - ☞ ERROR : Use the D14 operation for error detection.
 - ☞ LT.DAMPER OFF: DI14 motion is used to detect error with room temperature damper OFF.
- ⑦ It sets the damper detection delayed time.
 - ☞ DELAY TIME: It detects damper ON/OFF error after the delayed time set in that section.

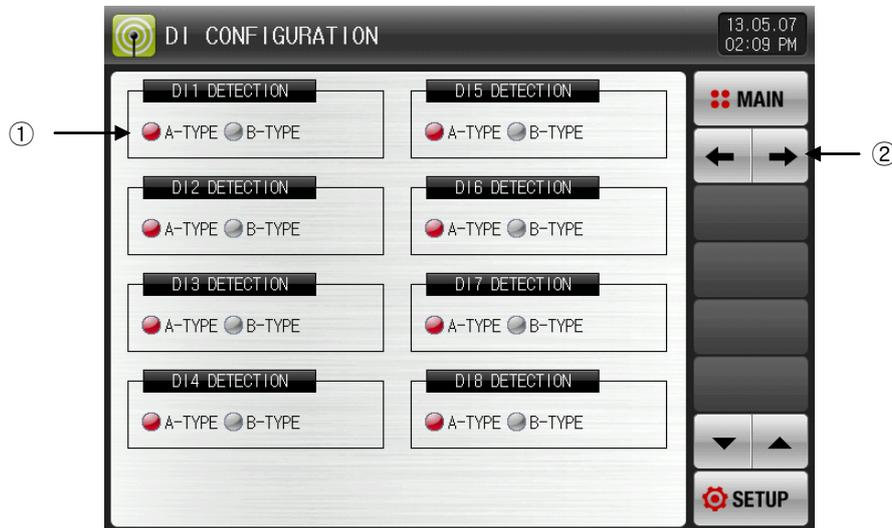
Table 19–2. The error detection motion for DI 9~14 damper

Parameter	High temperature room	Room temperature room	Low temperature room
DI9 HT.DAMPER ON	ON	OFF	OFF
DI10 HT.DAMPER OFF	OFF	ON	ON
D11 RT.DAMPEER ON	OFF	ON	OFF
RT.DAMPEER OFF	ON	OFF	ON
LT.DAMPER ON	OFF	OFF	ON
LT.DAMPER OFF	ON	ON	OFF

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

19.1.3 The third screen for DI function and operation setup

► It sets DI detection type.



[Pic. 19–3] 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 Move the screen to next or previous page.

Table 19–3. The third screen parameter for DI function and motion setup

Parameter	Setting range	Unit	Initial value
DI#n	A- TYPE, B- TYPE	ABS	A- TYPE

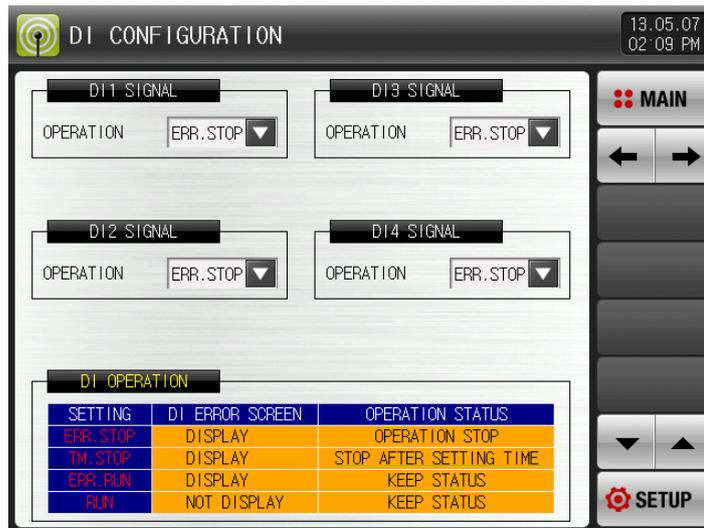
*#n = 1 ~ 16

Table 19-4. The pattern selection by DI

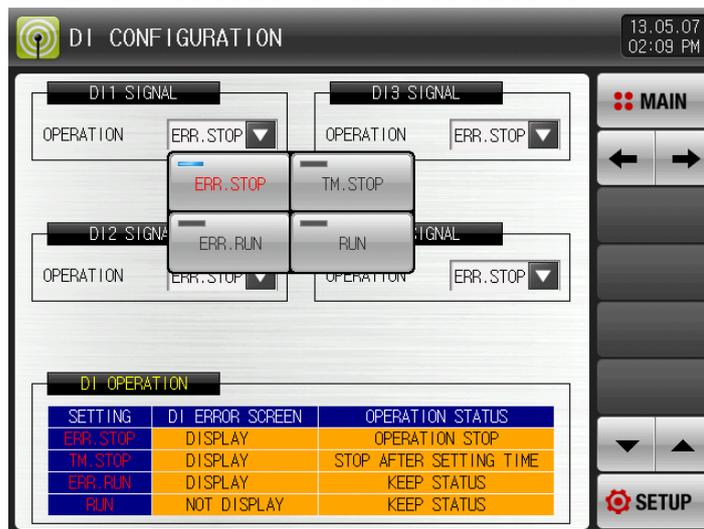
Pattern number	DI8	DI7	DI6	DI5	DI4
Manual	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	ON	ON
4	OFF	OFF	ON	OFF	OFF
5	OFF	OFF	ON	OFF	ON
6	OFF	OFF	ON	ON	OFF
7	OFF	OFF	ON	ON	ON
8	OFF	ON	OFF	OFF	OFF
9	OFF	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON	OFF
11	OFF	ON	OFF	ON	ON
12	OFF	ON	ON	OFF	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

19.1.4 The fifth Screen for DI function and operation setup

► It can set the operation of each DI signal.



[Pic. 19-4] The fifth screen for DI function and operation setup-1



[Pic. 19-5] The fifth screen for DI function and operation setup -2

► DI motion type

- ☞ ERR. STOP : It displays DI error screen in case of DI error creation and stops operation.
 - ☞ 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 19-5. The fifth screen parameter for DI function and operation setup

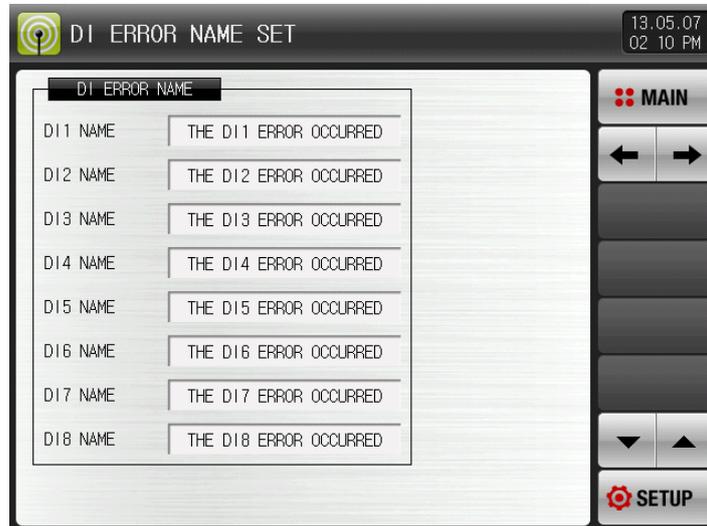
Parameter	Setting range	Unit	Initial value
DI #n SIGNAL	ERR. STOP, TM. STOP, ERR. RUN, RUN	ABS	ERR.STOP

* #n = 1 ~ 16

19.2 DI error name

19.2.1 The setup screen for DI error name

- ▶ The setting is available when the display method is “Letter”.
- ▶ The screen to set the name to use for DI occurrence
- ▶ The DI error name can be put in 24 letters in maximum.



[Pic. 19–6] The setup screen parameter for DI error name



[Pic. 19–7] The setup screen parameter for display name in occurrence DI

Table 19–6. DI The setup screen parameter for DI error name

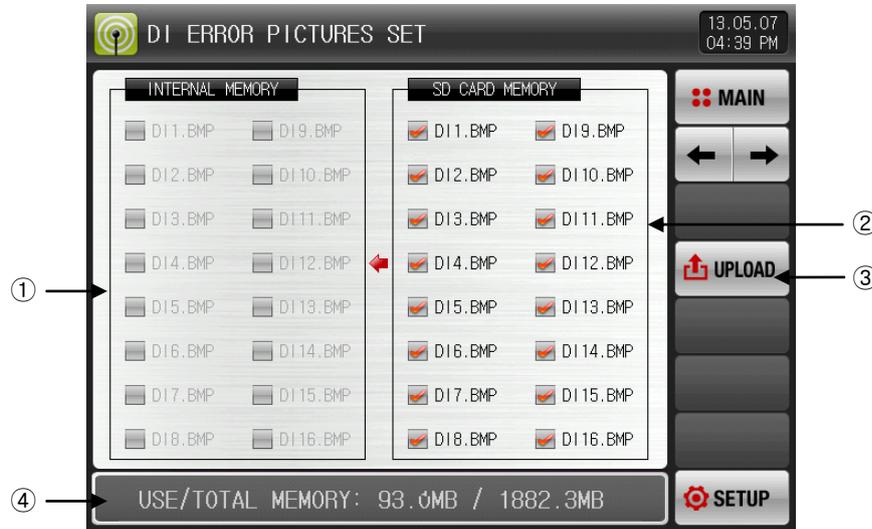
Parameter	Setting range	Unit	Initial value
DI #n NAME	0 ~ 9, A ~ Z, special letters (24 letters in maximum)	ABS	THE DI#n ERROR OCCURRED
DI #m NAME	0 ~ 9, A ~ Z, special letters (24 letters in maximum)	ABS	THE DI#m ERROR OCCURRED

* #n = 1 ~ 8

* #m = 9 ~ 16

19.2.2 DI error creation photo setup

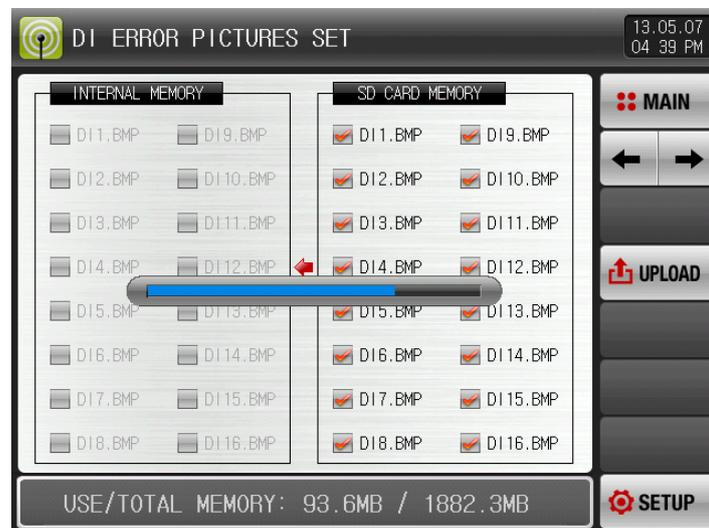
- ▶ The setting is available when the display method is “Photo”.
- ▶ The uploaded photo file (BMP) into the internal memory is displayed in DI error and basic photo is displayed when it is not uploaded.
- ▶ The photo can be uploaded when there is a SD card option and refer to 20. User screen



[Pic. 19-8] The setup screen for picture of DI error-1

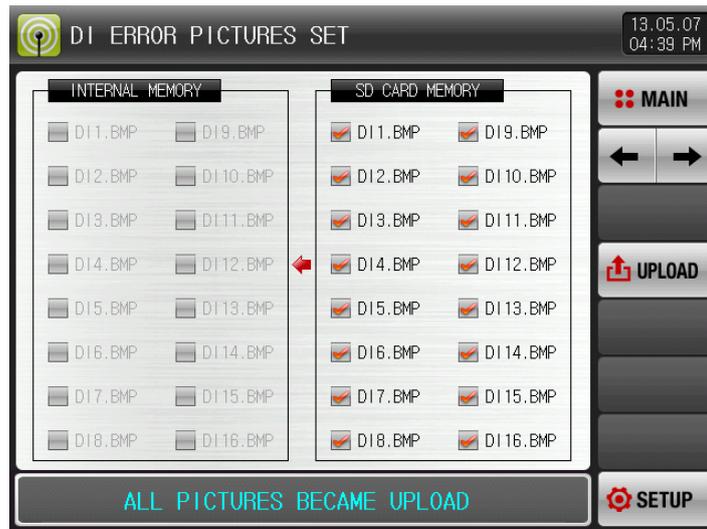
- ① The photo file corresponding of its name to DI out of the saved photo files (BMP) into the memory is displayed and it is inactive (☐) when there is not corresponding file.
- ② The photo file corresponding of its name to DI out of the saved photo files (BMP) into the SD card is displayed.
 - ☞ The file selected is uploaded into the internal memory.
- ③ The photo files (BMP) 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** (upload) button in [Pic. 19-8 The setup screen for picture of DI error-1] to upload (☑) only selected picture file in SD card memory to the internal memory.
- ▶ During the upload, you can check the progress through the progress bar in the middle of screen.



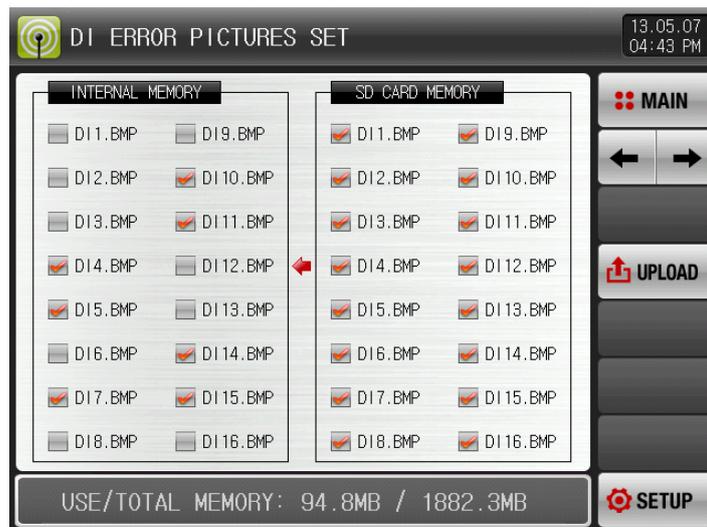
[Pic. 19-9] The setup screen for picture of DI error-2

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



[Pic. 19-10] 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. 19-11] The setup screen for picture of DI error-4

19.3 The screen of DI error occurrence

- ▶ It is a screen in case of DI error creation.
- ▶ When  is pressed, it is converted to the operation screen by escaping from DI error screen
- ▶ 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 'Revert' in creation of D11, neglect it for 1 minute in spite of D11 creation. It displays DI error screen when D11 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
 - ※ When DI error is occurred, related DI lamp is 'ON'. ( THE D16 ERROR OCCURRED (letter),  (picture))
 - ※ After DI error is occurred, related DI lamp is 'OFF'. ( THE D11 ERROR OCCURRED (letter),  (picture))



[Pic. 19-12] The screen with letter for DI error display method



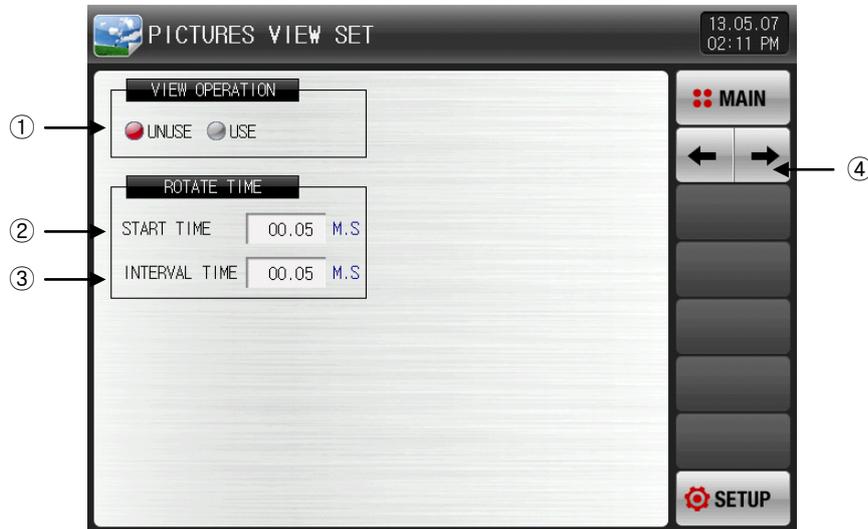
[Pic. 19-13] The screen with photo for DI error display method

20. User screen

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

20.1 User screen setup

20.1.1 The first screen for user screen setup



[Pic. 20-1] The first screen for user's screen setup

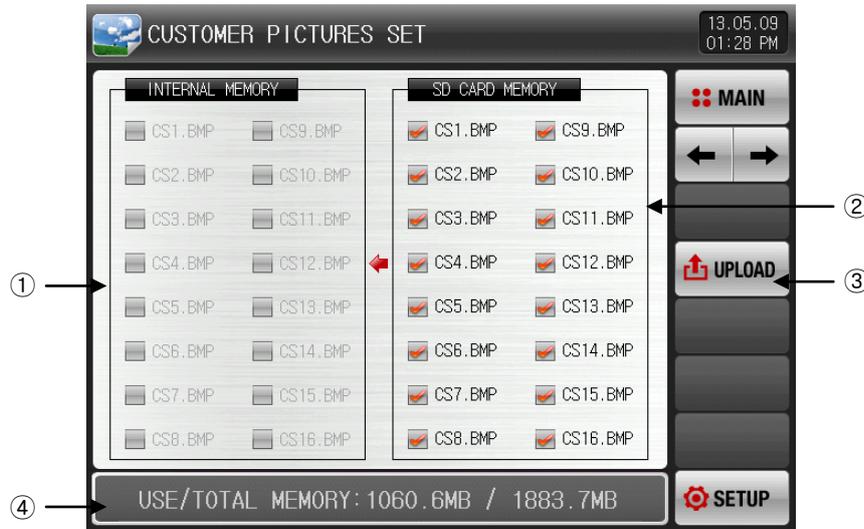
- ① Setting Y/N for using the user screen.
 - ☞ User screen operation is "ON" when more than one selected.
- ② Setting the user screen operation time.
 - ☞ The operation is started when there is no key input during set time.
- ③ Setting the user screen conversion time.
 - ☞ The saved pictures are switched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

Table 20-1. The first screen parameter for user's screen setup

Parameter		Settin range	Unit	Initial vakue
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

20.1.2 The second screen for user screen setup

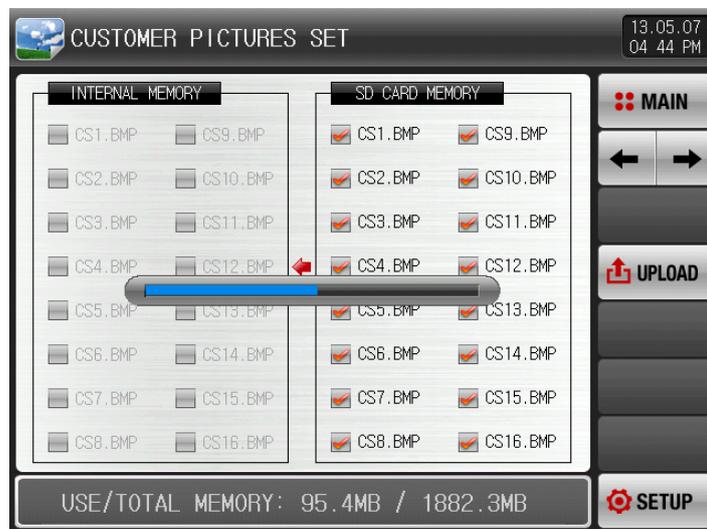
- ▶ It is a screen to display the photo file (BMP) saved into SD card.
- ▶ When there are no files in SD card, the selection and upload are not available as they are inactive.



[Pic. 20-2] The second screen for user screen setup-1

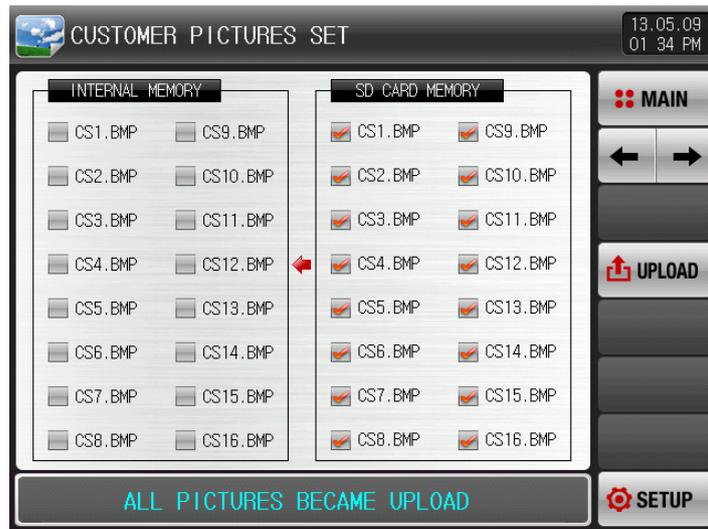
- ① The photo file corresponding of its name to CS out of the saved hoto files (BMP) into the Memory is displayed and it is inactive (☐) when there is no corresponding file.
- ② The photo file corresponding of its name to CS out of the saved photo files (BMP) into the SD card is displayed.
 - ☞ The file selected with (☑) is uploaded into the internal memory.
- ③ The photo files (BMP) 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. 20-2 The second screen for user’s screen setup-1] to upload (☑) only selected picture file in SD card memory to the internal memory.
- ▶ During the upload, you can check the progress through the progress bar in the middle of screen.



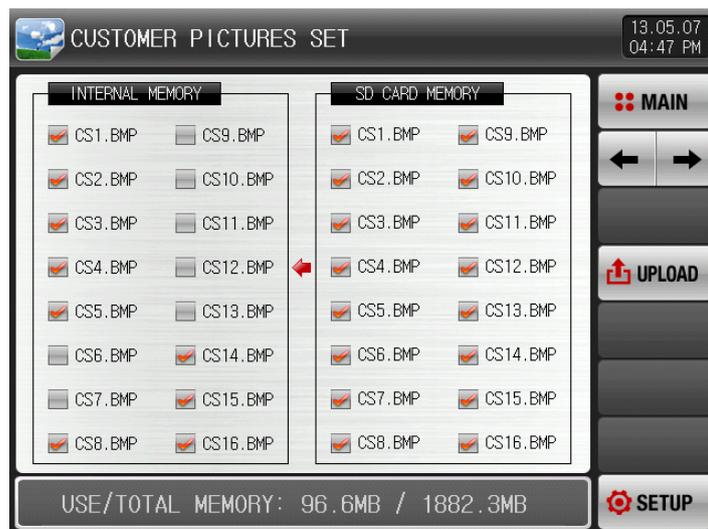
[Pic. 20-3] The second screen for user screen setup-2

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



[Pic. 20-4] The second screen for user screen setup-3

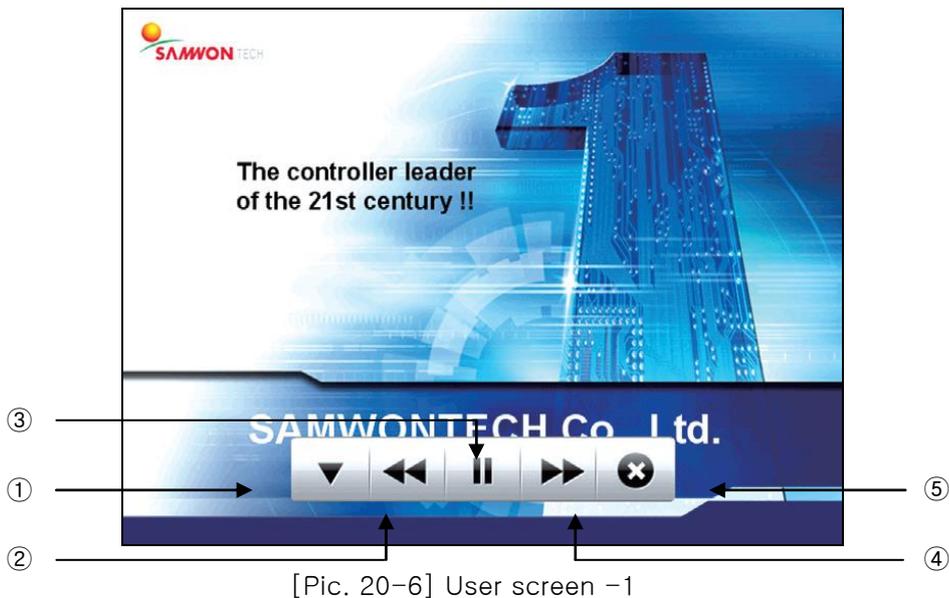
- ▶ When the files (☑) needed from the internal memory is selected, it can be used for user screen in operation of user screen.



[Pic. 20-5] The second screen for user screen setup-4

20.2 User screen operation

- ▶ Refer to [Pic.20.1.1 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.



- ①  : Terminate the user's screen, and the screen will return to operation.
 - When the time has elapsed, user screen will work again.
- 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  :  is disappeared in the user screen.



20.3 How to creat BMP file

- ▶ When create BMP file, you must use **[Photoshop Program]**.
 - ☞ "[Picture Plat]" used generally in the computer cannot be used because the bit map cannot be set in 16BIT.
- ▶ BMP file configuration
 - ☞ 16BIT(X1 R5 G5 B5) BMP
 - ☞ 16BIT(R5 G6 B5) BMP : When the image has lots of gradation
- ▶ Resolution
 - ☞ User's screen: 640 X 480 Pixel
 - ☞ Initial screen: 640 X 480 Pixel
 - ☞ DI error screen: 520 X 414 Pixel
- ▶ File name
 - ☞ User's screen : CS1.BMP, CS2.BMP, CS3.BMP ~ CS14.BMP, CS15.BMP, CS16.BMP (Total 16)
 - ☞ Initial screen : INIT.BMP
 - ☞ DI error screen : DI1.BMP, DI2.BMP, DI3.BMP ~ DI14.BMP, DI15.BMP, DI16.BMP (Total 16)
 - If save other file name, not the file name designated at user's screen, initial screen and DI error screen, you cannot user that file.
 - Use the extension with ".BMP" when the file is saved in [Photoshop program].
 - ☞ The folder name in SD card is designated as 'BMP'.

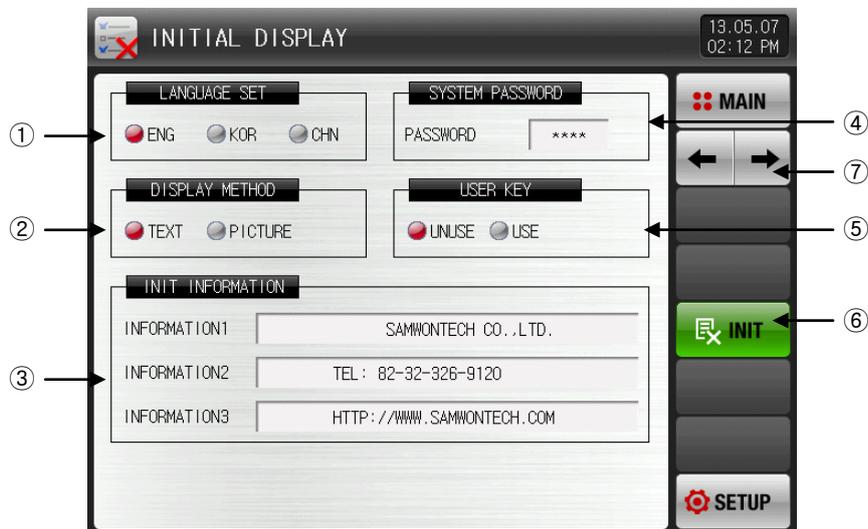
※ With regards to the BMP instruction manual, download from the homepage of our company

21. System initial setup

21.1 Basic screen display setup

21.1.1 Basic screen display setup

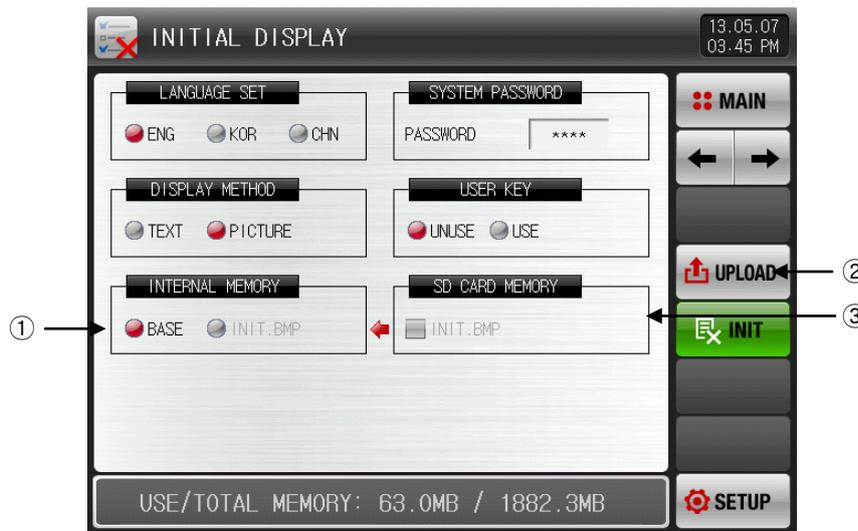
- ▶ It sets the language and system initialization related motions.



[Pic. 21-1] The first screen for system initial setup-1

- ① Setting the language.
- ② Setting the display on the initial screen with electric power ON.
- 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 It sets the usage of user's button at the operational screen.
- 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. 21-2] The first screen for system initial setup-2

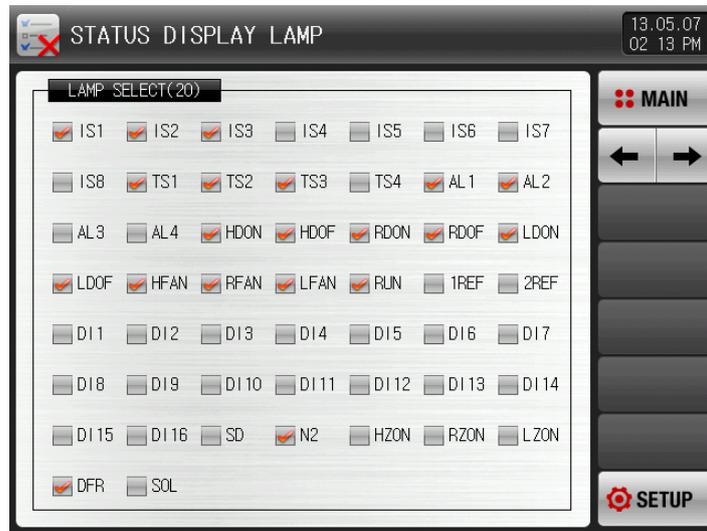
- ① Selection of the photo displayed on the initial screen in electric power ON.
- ② Upload the INIT.BMP file inside the SD card into the internal memory.
 ☞ refer to **20.3 BMP file making method**
- ③ Display of Y/N for the INIT.BMP file saved in SD card.
 The photo file corresponding of its name to INIT.BMP out of the saved photo files (BMP) into the memory is displayed and it is inactive (☐) when there is not corresponding file.

Table 21-1. 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		

21.2 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. 21-3] The second screen for system initial setup

21.3 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. 21-4] Initial screen-1

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

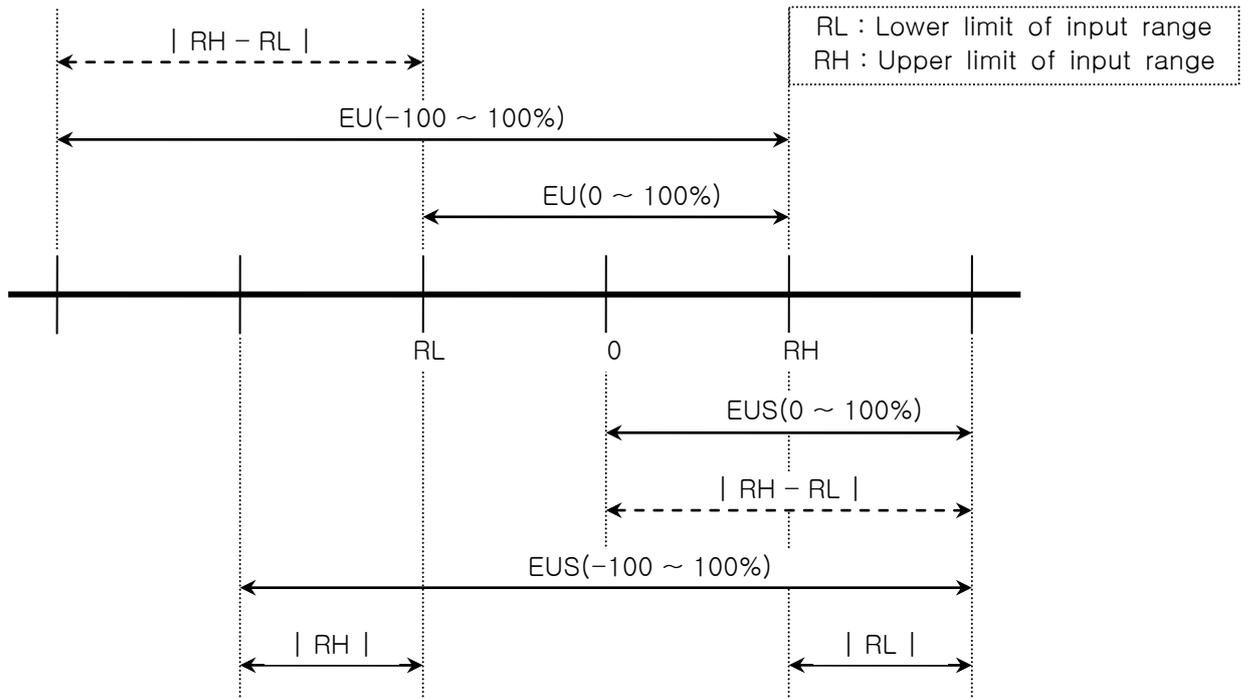


[Pic. 21-5] Initial screen-2

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.



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