



TEMP2000S

Thermal Shock Tester Controller

SERIES



Operation Manual

※ This manual is commonly used for TEMP2500S,TEMP2700S

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◆ 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

(가) Please deliver for the end user to possess always and keep it in the place accessible at any time.

(나) Use the product after full understanding of this operation manual.

(다) 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.

(라) A part or whole of this manual shall not be edited or copied for use.

(마) The descriptions in this manual may be changed randomly without pre notice or warning.

(바) 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. Operation and setting

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

1.1 Basic operation flow chart

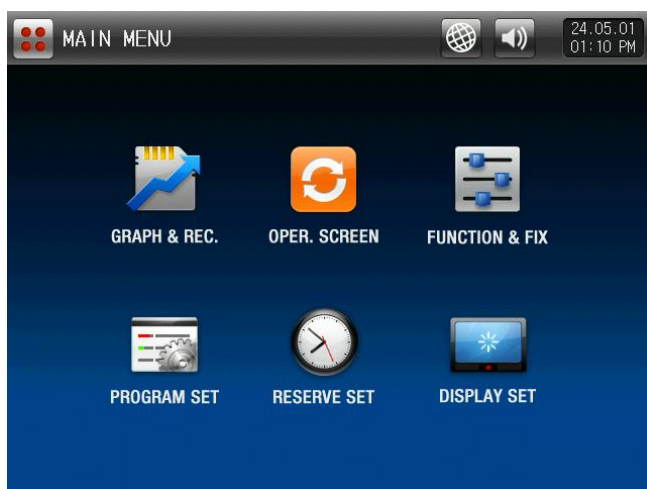
- ▶ The logo screen and the initial screen are displayed sequentially when the electric power is switched “ON” after installation of the product and it converts to the program stationary screen.
 - ☞ It takes about 15 seconds for screen loading.
- ▶ When  button is touched at the top of the program stationary screen, it converts to the main screen.
- ▶ Refer to [14. System initial setting] in [Installation manual] for change in the initial screen.



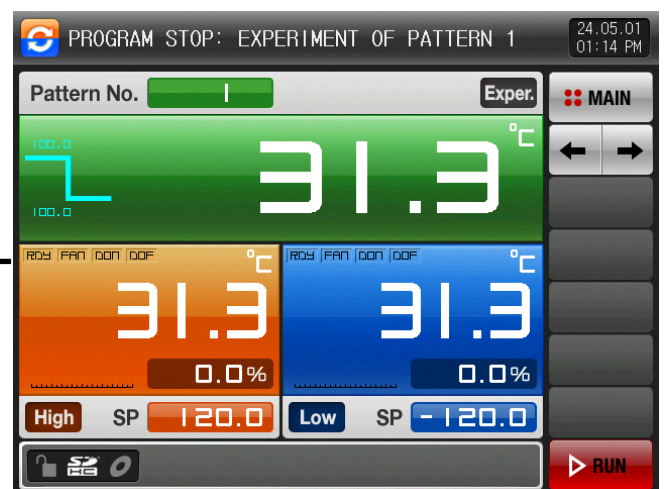
Logo screen



Initial screen



Main screen














Program stopped screen

1.2 Setting button operation

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

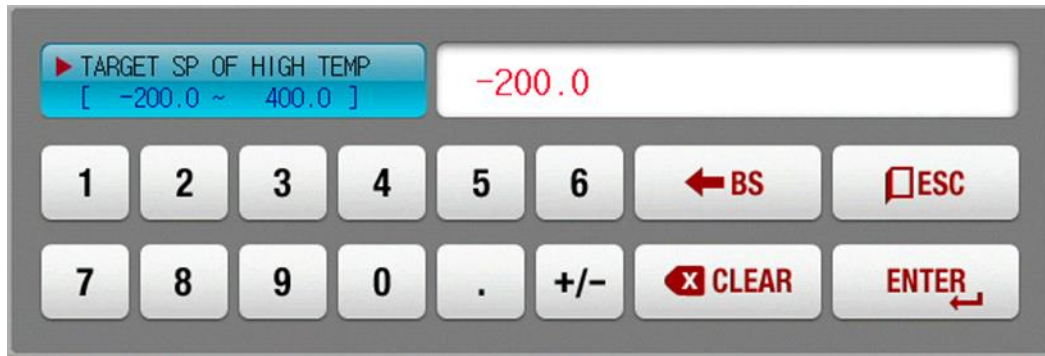
표 1-1. The basic setup button

버튼 종류	버튼 동작
	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 [3.2 view the saved PV graph]
	Use to move the PV axis for 1 DOT to the top and bottom of PV graph in [3.2 View the saved PV graph].

1.3 Parameter setting method

- ▶ On the basic setup button in [Table 1-1] 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.

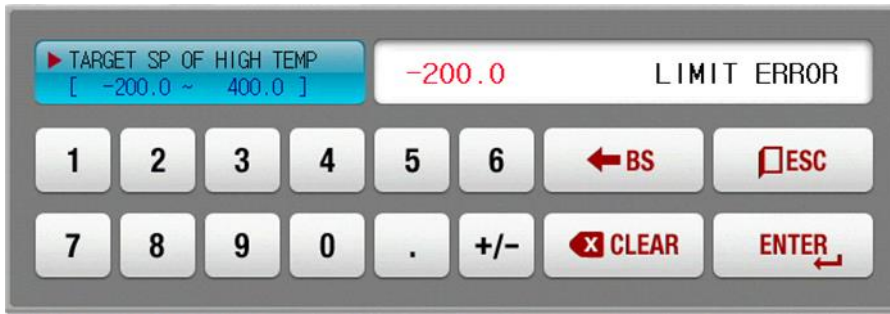



☞ Refer to [12. DI Function and Motion] in [Installation manual] for the input key of DI error name.

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 [5. Operation state screen setting] for details.</p>

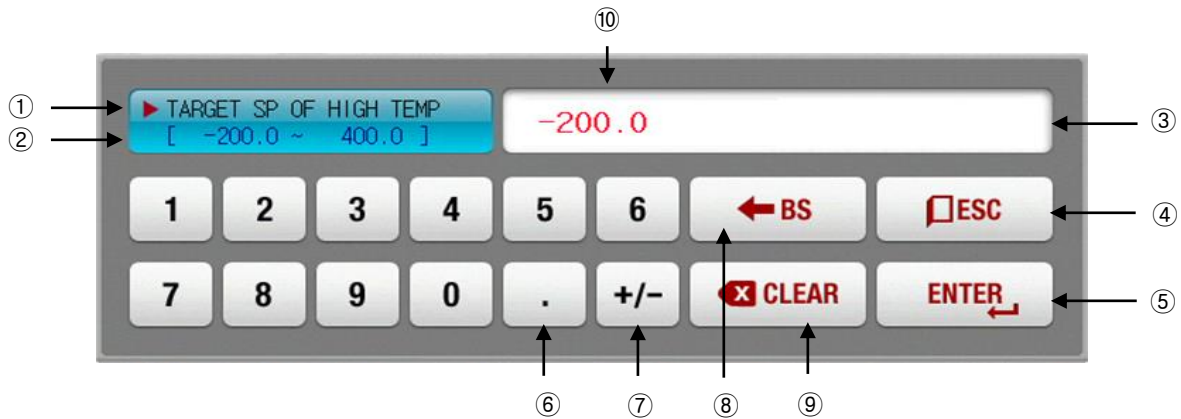
1.3.1 Method for effectiveness of setting button and setting value

- ▶ 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>

1.3.2 Setting data input method

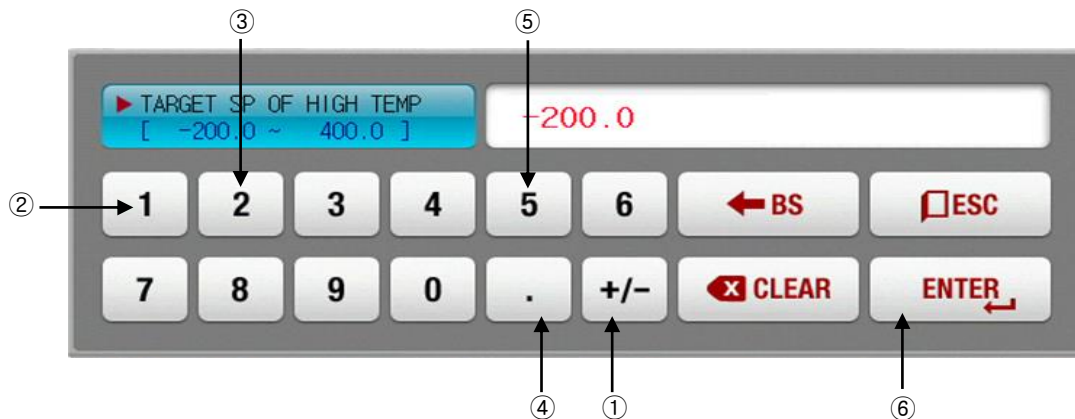
- ▶ Every input data used in this product is set by the set data input key, experiment name input key and time signal input key.
- ▶ The input key of predetermined value is shown if press  button in [Table 1-1], and then input the desired value.
- ▶ Refer to [6-3 Time signal operation] for time signal input.
- ▶ Set the value of the input key features and descriptions



- ① It displays "Parameter."
- ② It displays "Setting range."
- ③ It displays "Setting value display window"
 - ☞ If it is outside the setting range, "LIMIT ERROR" is displayed.
 - ☞ If there is an error in the setting unit, "INPUT ERROR" is displayed.
- 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 -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).



2. Main screen



[Pic 2-1] Main screen

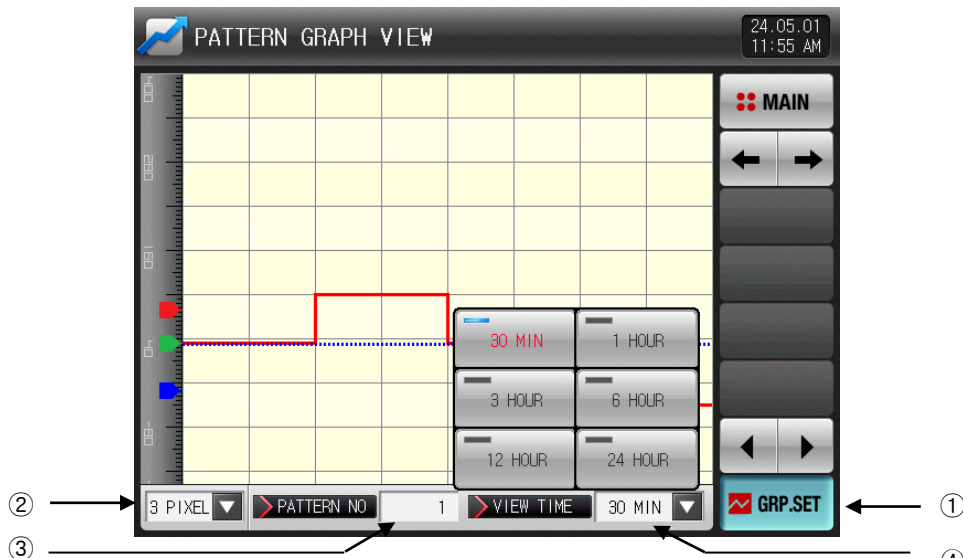
Table 2-1. Main Screen Parameter

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	Move to the screen where user tag, screen switching time, backlight power saving, LCD brightness, and internal memory can be set.
⑦	BUZZER SOUND	It sets Y/N of use buzzer sound. (The buzzer sound generated in DI error is operated when it is set for no use.)
⑧	LANGUAGE SET	Set the language to use. (English, Korean, Simplified, Traditional, Japanese languages available)

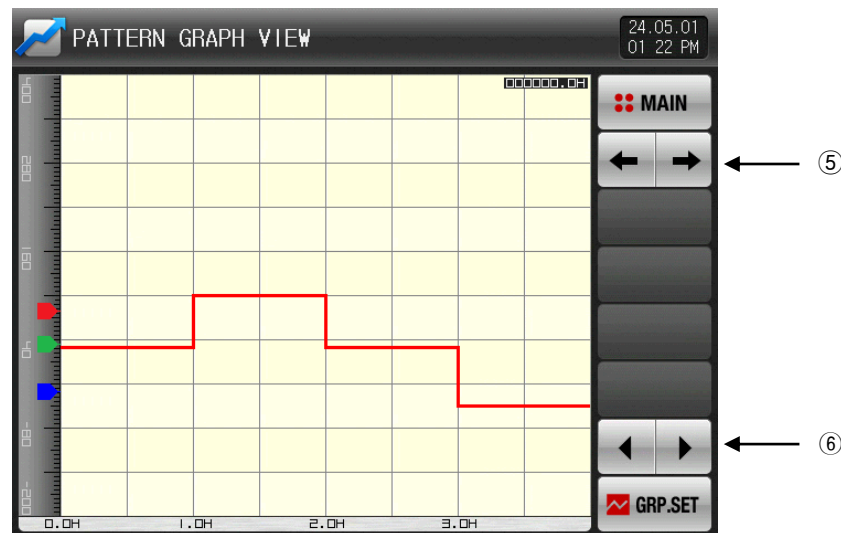
3. Graph display and saving setting

3.1 Pattern graph display

- ▶ This screen displays graph operation pattern and progress in program operation.
- ▶ It converts to [Pic. 3-2 Graph & Save screen 1 (Pattern graph display)] when [Graph & Save] is selected at the left top in [Pic. 2-1 Main screen].
- ▶ It is a screen to display the input pattern in [Pic. 6-2 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).



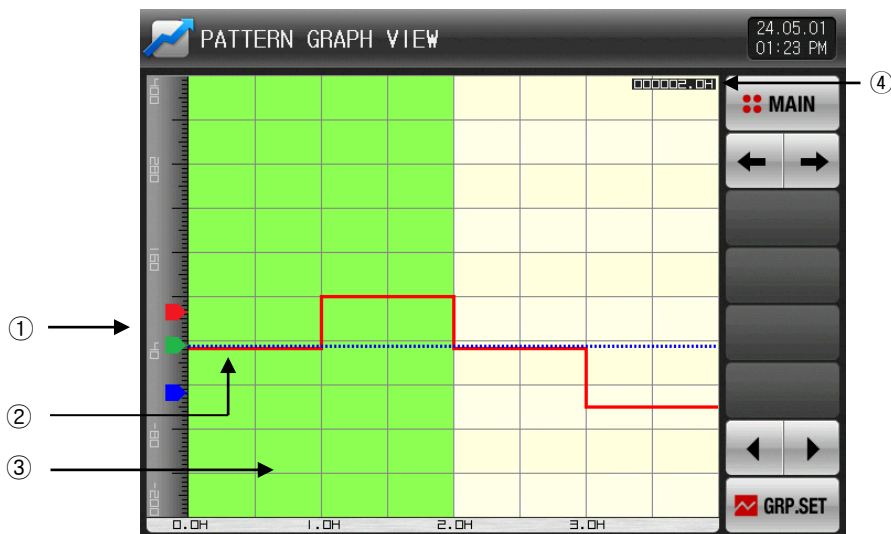
[Pic. 3-1] The first screen for graph & save
(Change the criteria standard of time axis)



[Pic. 3-2] The first screen for graph & save
(Display the pattern graph)

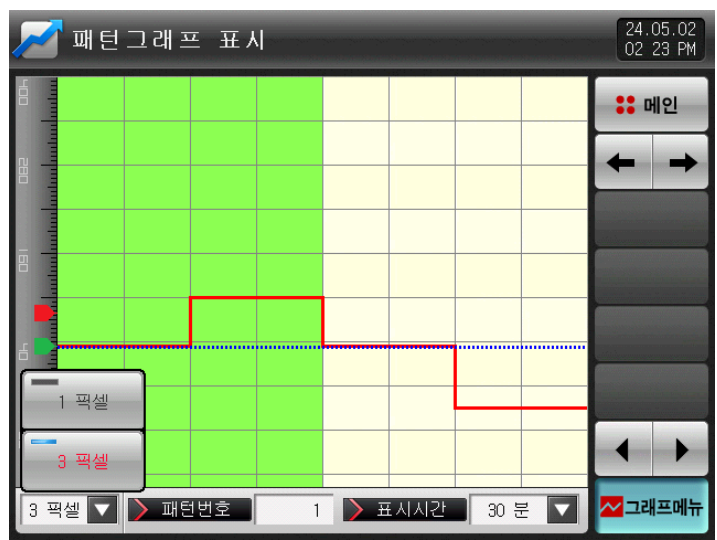
- ① Display the graph setting menu.
 - ☞ Display the parameters related to the pattern graph operation at the bottom depending on ON/OFF operation on the graph menu button.
- ② It set the line thickness of graph.
 - ☞ Press **3 PIXEL** button to display the key for setup the line thickness of graph.
 - ☞ Refer to [Pic. 3-4 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. 3-5 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. 3-1 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.



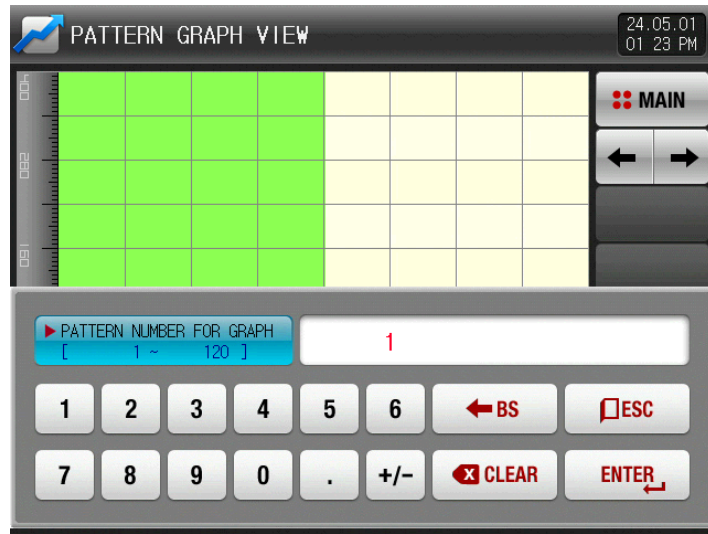
[Pic.3-3] The first screen for graph & save(Pattern operation)

- 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 [6.1 Program pattern setting]
- ▶ It is the screen for setup the line thickness of graph.
 ▶ Line thickness can be changed during the operation.



[Pic.3-4] 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.

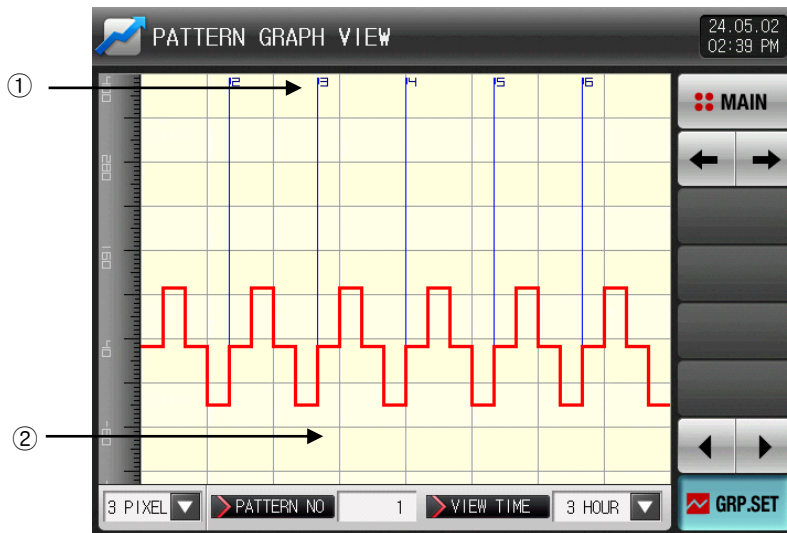


[Pic.3-5] The setup screen for pattern number

Table 3-1. 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.

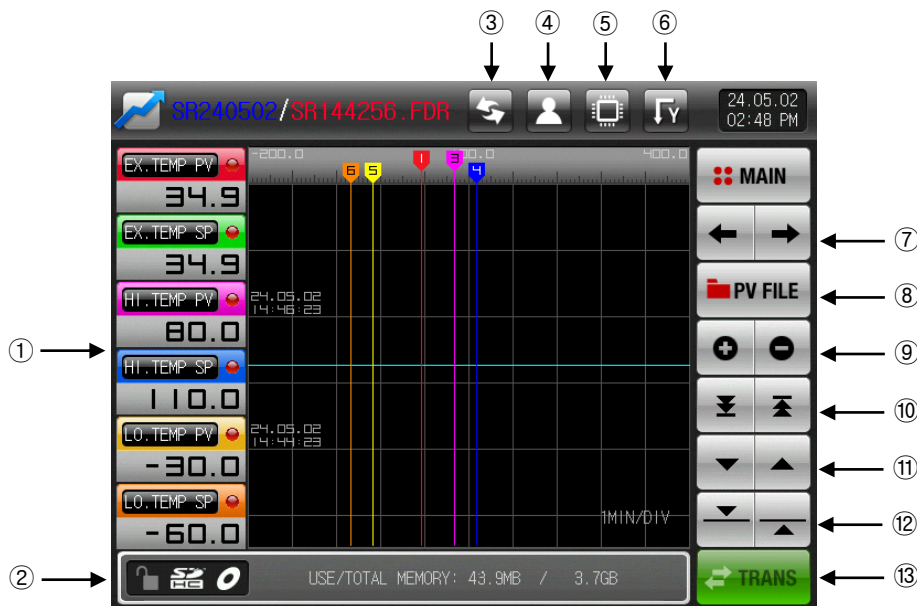


[Pic. 3-6] The display screen for pattern repetition

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

3.2 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.



[Pic. 3-7] The second screen for graph & save (Graph display is

- 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 3-7, Pic 3-8 Graph & Save setting screen2]
- It displays the Key lock / SD card / Storage indicator
- : Display to update the graph screen immediately which is being saved.
- When Setting copy the recorded PV file in the internal memory to an SD card.
 - : Send the selected file.
 - : Send the whole file.
- Set storage media display.
 - : Memory card file.
 - : SD card file
- Set graph display direction.
 - : Vertical (Y-AXIS)
 - : Horizontal (X-AXIS)
- Moving from current screen to next screen.
- When is touched, the files saved into the internal memory is displayed..
 - Moving from current screen to next screen. 현재 열려진 폴더나 파일은 빨간색으로 표시합니다. Currently open folders or files are displayed in red.**
- The time axis is expanded or reduced.
- Moving to the beginning and end of the displayed PV graph page.
- Moving of graph screen by one page.
- Moving the blue line on the graph screen up/down by 1 DOT.
 - When the screen is touched, the indicated values are displayed while the blue line moves.
- Copy the recorded PV files into the internal memory to SD card.



[Pic. 3-8] The second screen for graph & save (not select the graph display)

- ▶ It is a screen when there is not selection item in the set data, measuring data and output volume.
- ▶ It is a screen to display the saved file into the internal memory.
- ▶ Refer to [4.1.3 Program operation 2 operation screen] for saving into internal memory.




[Fig. 3-9] When setting the X-AXIS of Trend direction, Graph Screen







[Fig. 3-10] Graph&Save setting screen 2 (Saved file is displayed)



[Fig. 3-11] Graph&Save setting screen 2 (Saved file is displayed)

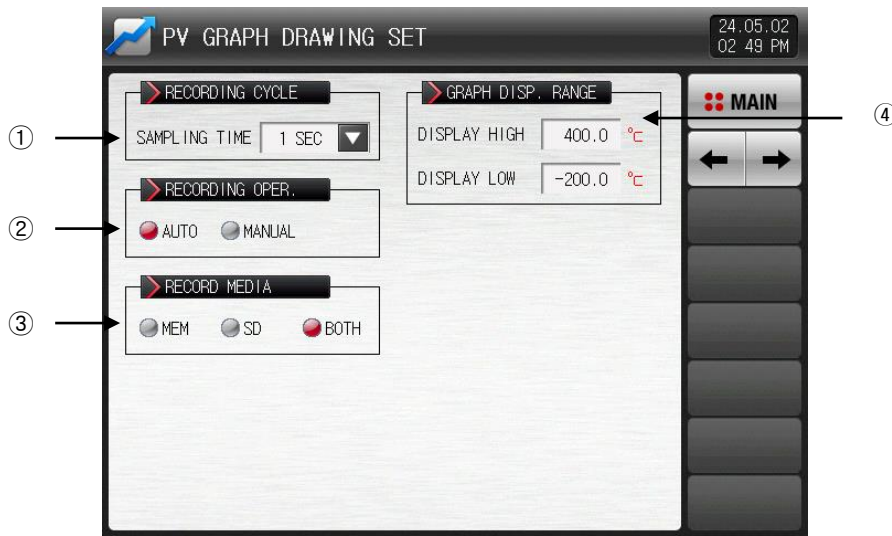
When  is touched, the files saved into the internal memory is displayed.

 While the PV graph is being saved in the driving screen, it is disabled and cannot be transmitted.

- 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.

3.3 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 [4.1.3 The second operational screen for program operation].



[Pic. 3-12] The third screen for graph &

- ① Setting the PV graph saving period.
 - ☞ It is not changeable during PV graph saving.
 - ☞ About 60 days of saving is available when sampling time is set in 1minute in saving into internal memory.
- ② 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: Save to internal memory.
 - ☞ SD card: Save to SD card.
 - ☞ Both: Simultaneous storage in internal memory and SD card
- ④ It sets the lowest and highest value of temperature graph.

Table 3-2. The third screen parameter for graph and save

Parameter	Setting 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
DISPLAY HIGH	EU(0.0 ~ 100.0%) Display Low < Display High	EU	EU(100.0%)
DISPLAY LOW		EU	EU(0.0%)

3.4 SD Memory save setting

► This is the screen to set the required articles for data back-up in SD card



[Pic. 3-13] 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 [6.1 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 3-3. The fourth screen parameter for graph and save

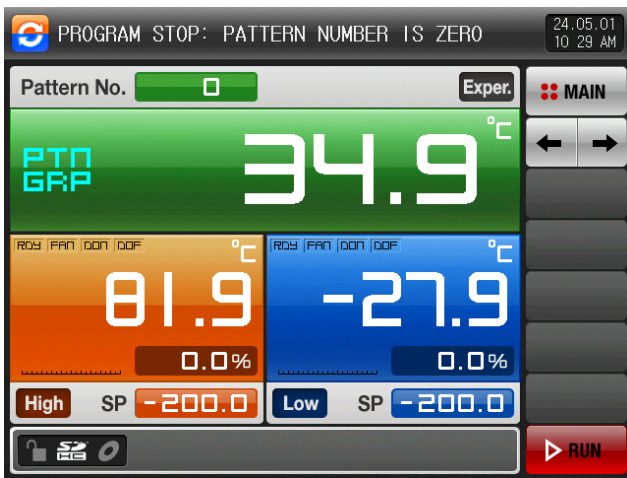
Parameter	Setting range	Unit	Initial value
BACKUP ITEM	PATTERN, PARA., ALL	ABS	PATTERN
DIRECTION	DOWNLOAD, UPLOAD	ABS	DOWNLOAD

4. Operation state screen setting

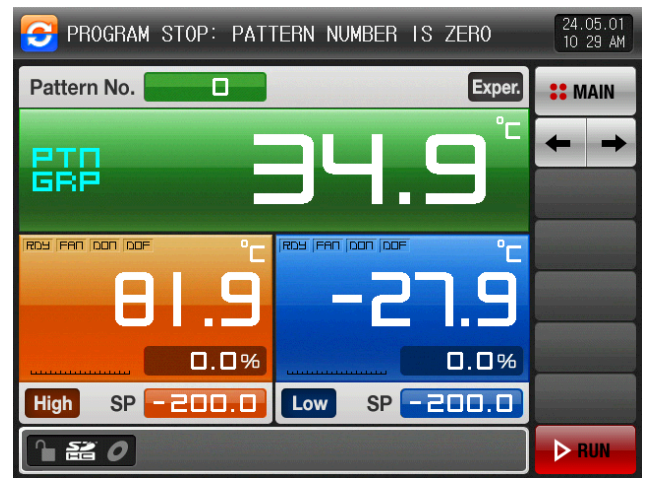
4.1 Program operation

4.1.1 The freeze-frame for program operation

- ▶ In [2. Main Screen], select “the operation status screen” to switch to the first freeze-frame for program operation
- ▶ For the pattern setup, refer to [6.1 Program Pattern Setup].
- ▶ In [Pic. 4-1 The first freeze-frame for program operation], press the  (operation) button in the bottom of right to switch to [Pic. 4-5 The first operational screen for program operation].



[Pic. 4-1] The first freeze-frame for program



[Pic. 4-2] The 2nd freeze-frame for program

- ▶ For the input of pattern number, press  to activate like [Pic. 4-3 The input screen for pattern number].

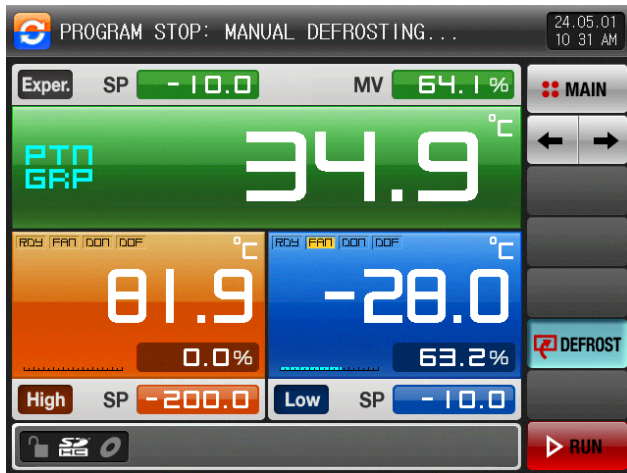


[Pic. 4-3] The input screen for pattern number

Table 4-1. 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. 4-4] The first manual defrosting

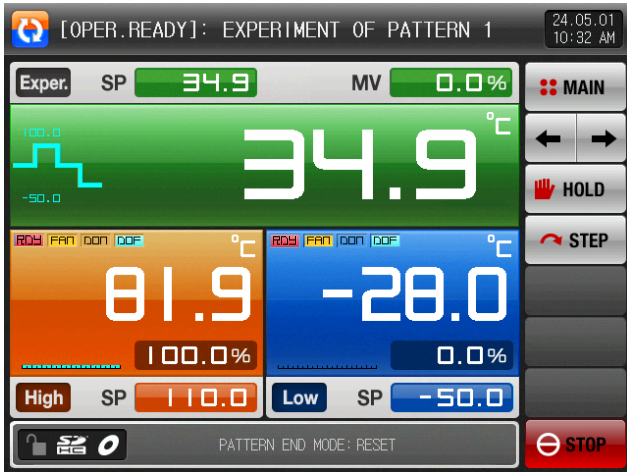


[Pic. 4-5] The 2nd manual defrosting

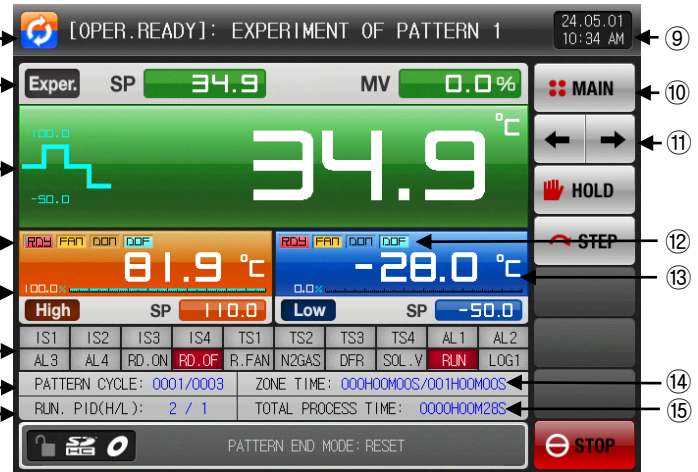
- ① This is the button for manual defrosting.
 - ☞ In [6.1 Equipment Configuration] in [Installation manual], you can set the button usage.
- ② In the manual defrosting, it displays the predetermined value.
 - ☞ The predetermined values in the low temperature room and the experiment are applied identically.
 - ☞ In [6.1 Equipment Configuration] in [Installation manual], 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 [6.1 Equipment Configuration] in [Installation manual], you can set the time.
- ⑤ It displays the status lamp.
 - ☞ Please refer to [21.2 The Setup of Status Lamp] in [Installation manual].

4.1.2 The 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.



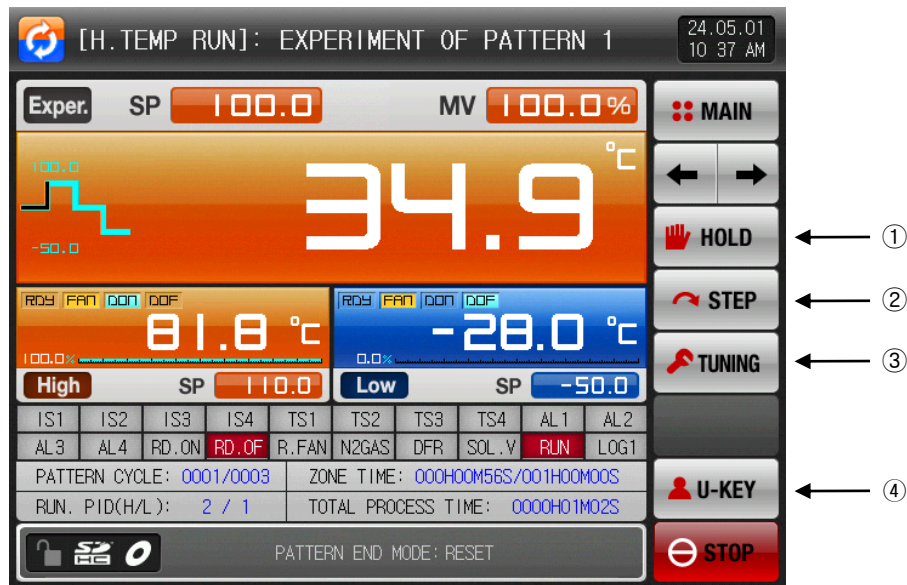
[Pic. 4-6] The first operational screen for program operation



[Pic. 4-7] The 2nd 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. Displays FAN operation and damper ON/OFF in high temperature room.
- 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 [14.2 The Setup of Status Lamp] in [Installation manual].
- 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. 2-1 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. Displays FAN operation and damper ON/OFF in high temperature room.
- 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 [6.1 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.

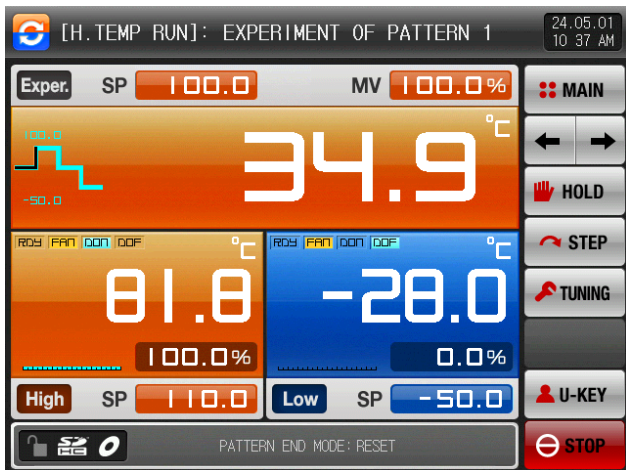


[Pic. 4-8] The 2nd operational screen for program operation

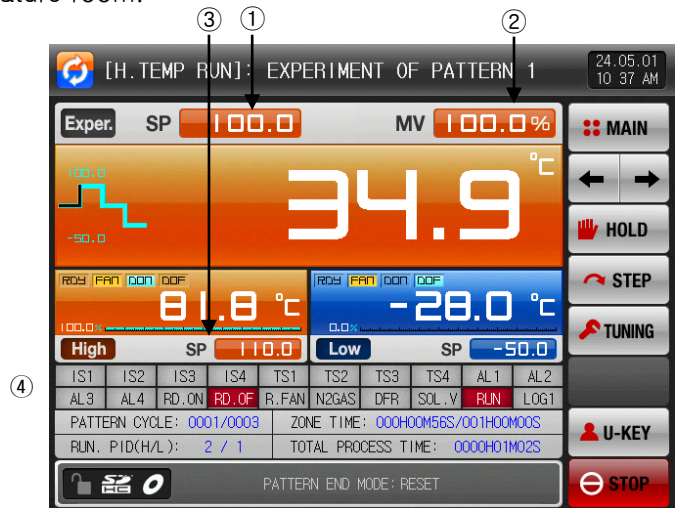
- ① Hold on or hold off the current predetermined value.
 - ② Close the current section and force to move to the next section.
 - ③ Run or hold off the auto tuning with the current predetermined value.
 - ☞ In [9. PID Group] in [Installation manual], you can set the display for tuning button.
 - ④ It is the button for user.
 - ☞ In [14. System Initial Setup] in [Installation manual], you can set the usage.
 - ☞ When use the button for user, in [11.DO Relay Setup] in [Installation manual], 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. 4-9] The first operational screen for program operation (High temperature room)

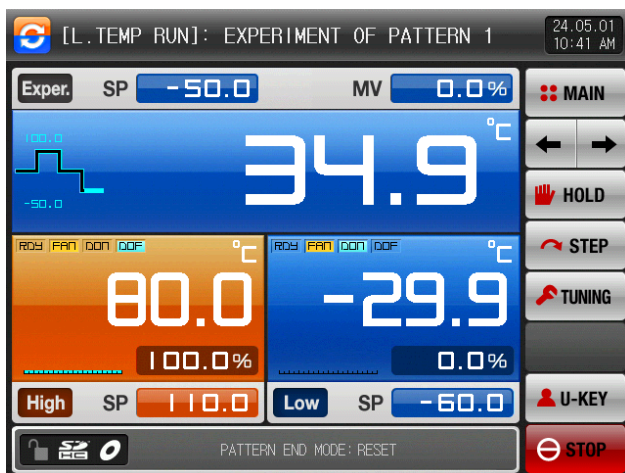


[Pic. 4-10] The 2nd operational screen for program operation (High temperature room)

- 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. 4-11] The first operational screen for program operation (Low temperature room)

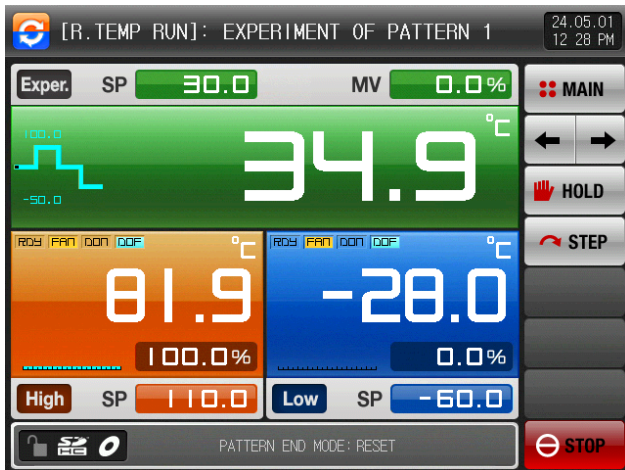


[Pic. 4-12] The 2nd operational screen for program operation (Low temperature room)

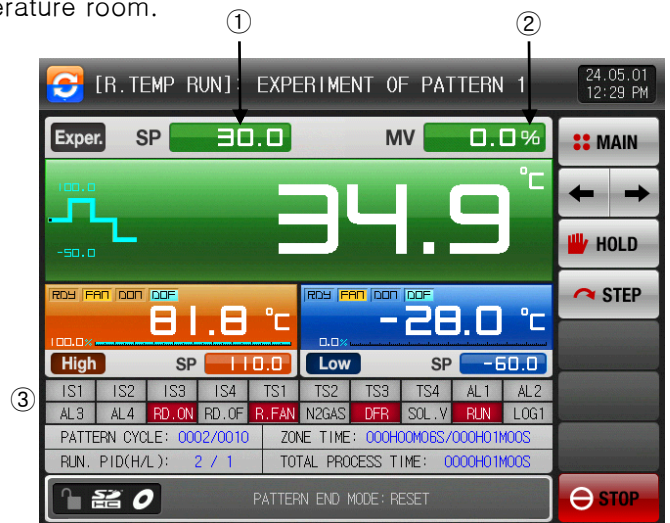
- ① It displays the target predetermined value in the experiment room.
- ② It displays the current output quantity in the experiment room.
- ③ It displays the pre-cooled predetermined value in the low temperature room.
- ④ It displays the status lamp in the low temperature room.

※ 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. 4-13] The first operational screen for program operation (Room temperature room)



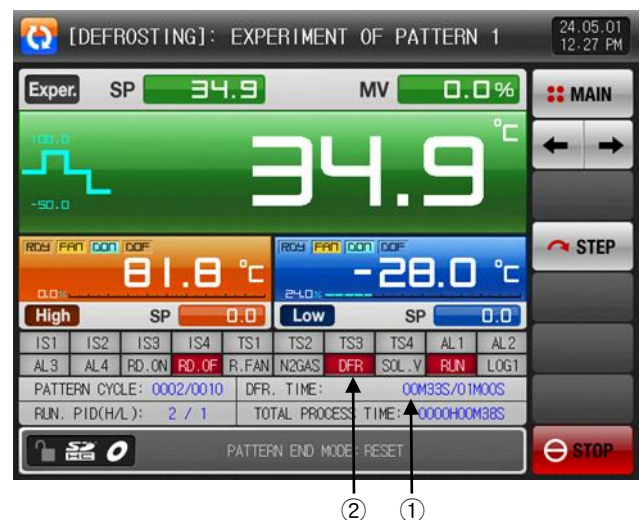
[Pic. 4-14] The 2nd operational screen for program operation (Room temperature room)

- ① Displays the target set value for the room temperature room.
- ② The room temperature room is not controlled.
- ③ Displays the status display lamp applied when operating in a room temperature room.

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



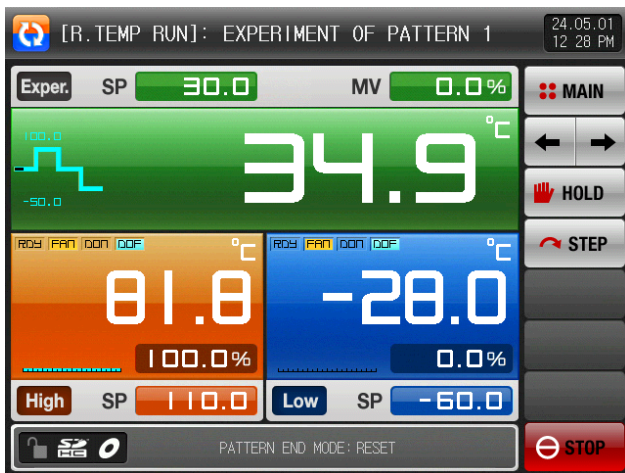
[Pic. 4-15] The first operational screen for program operation (Heater defrosting type)



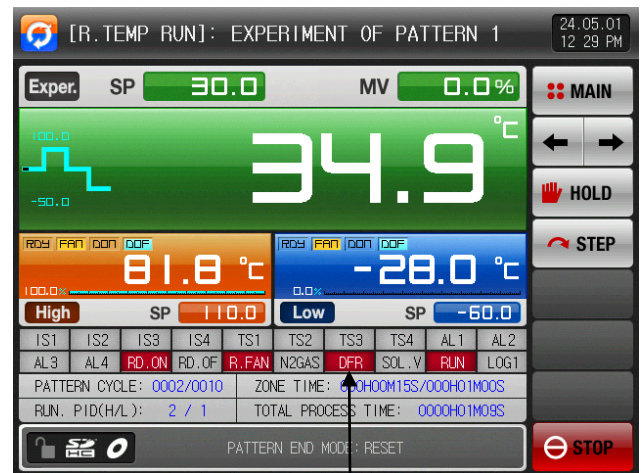
[Pic. 4-16] The 2nd operational screen for program operation (Heater defrosting type)

- 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.



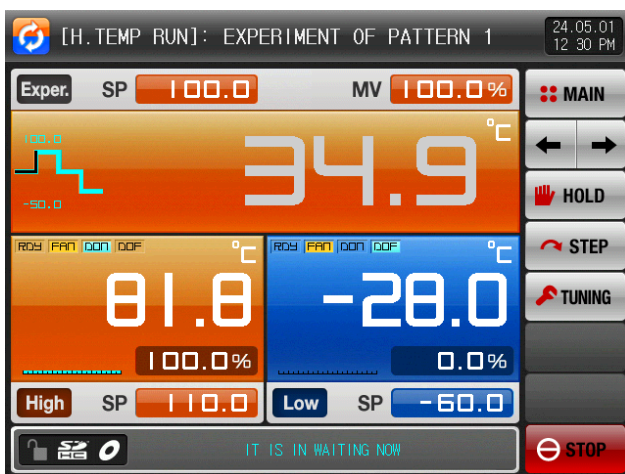
[Pic. 4-17] The first operational screen for program operation (The defrosting type for hot gas)



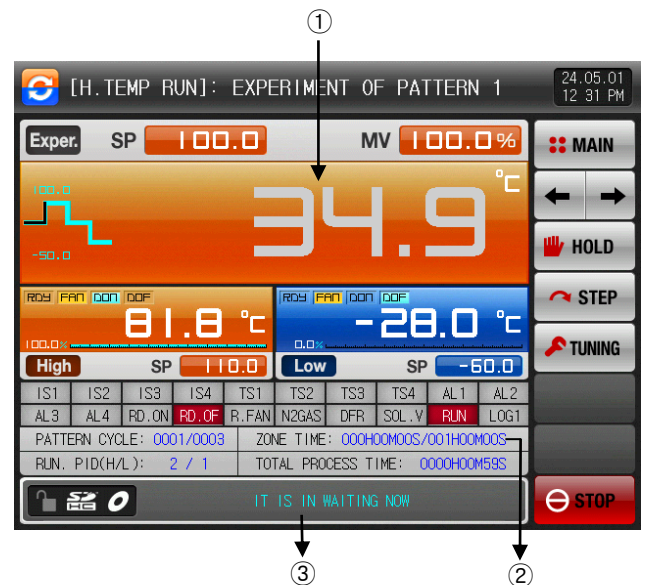
[Pic. 4-18] The 2nd operational screen for program operation (The defrosting type for hot gas)

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

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




[Pic. 4-19] The first operational screen for program operation (Stand-by)



[Pic. 4-20] The 2nd operational screen for program operation (Stand-by)

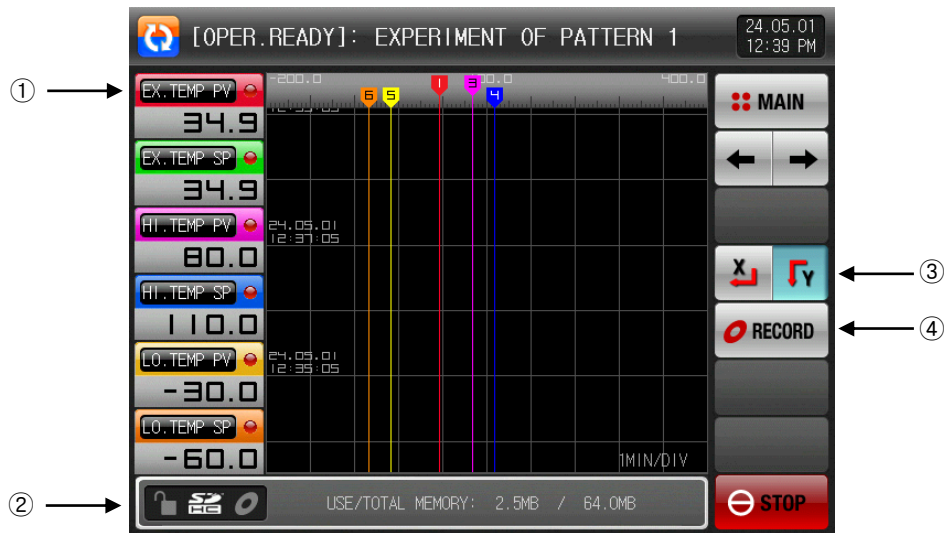
- ① In the stand-by, the color of PV is changed to gray.
- ② In the stand-by, the experiment time is not running.
- ③ In the stand-by, the message which says “IT IS IN WAITING NOW” is displayed like the picture above.

4.1.3 The Third operational screen for program operation



- ▶ In the left side 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.
- ▶ If you set it as default, it will be saved automatically.

☞ [Please refer to the [3.2 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.

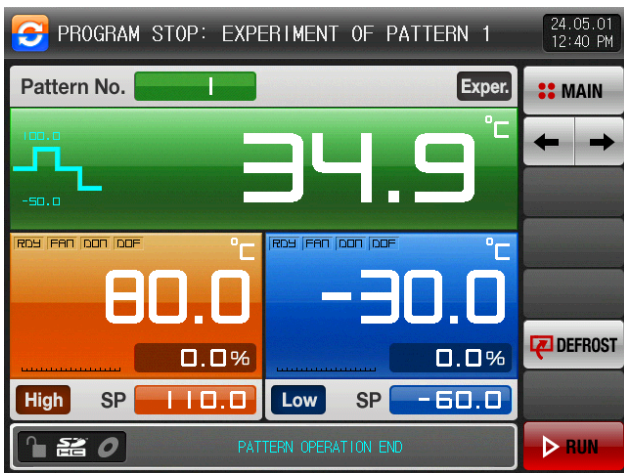


[Pic. 4-21] The Third operational screen for program

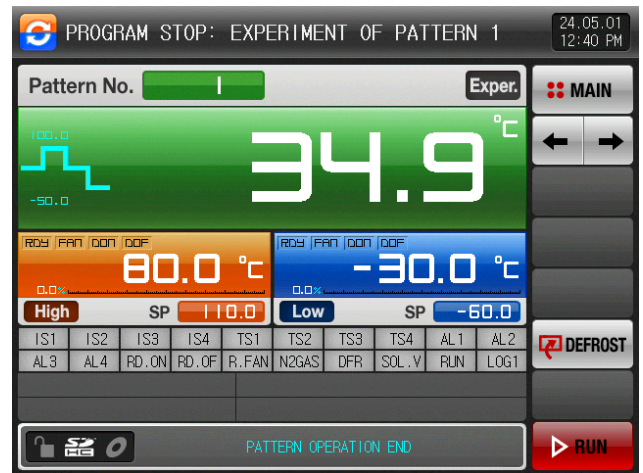
- ① It displays the current measured value and the predetermined value.
- ② It displays the capacity of internal memory.
 - ☞ About 60 days of saving is available when the sampling time is set in 1 second.
 - ☞ Set graph display direction
 -  : Vertical (Y-AXIS)
 -  : Horizontal (X-AXIS)
- ③ It is a button to save the measuring data, setting data of currently recorded into the memory (Internal memory, SD card).

4.1.4 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. 4-22] The first freeze-frame for program operation



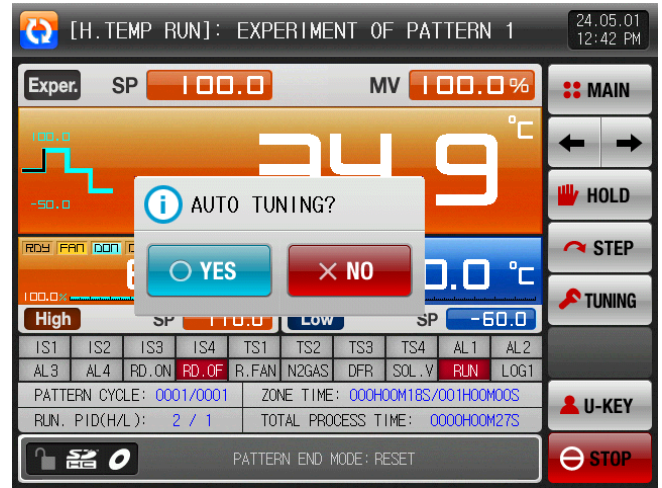
[Pic. 4-23] The 2nd freeze-frame for program operation

4.2 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. 4-24] The first setup screen for auto tuning



[Pic. 4-25] The 2nd setup screen for auto tuning

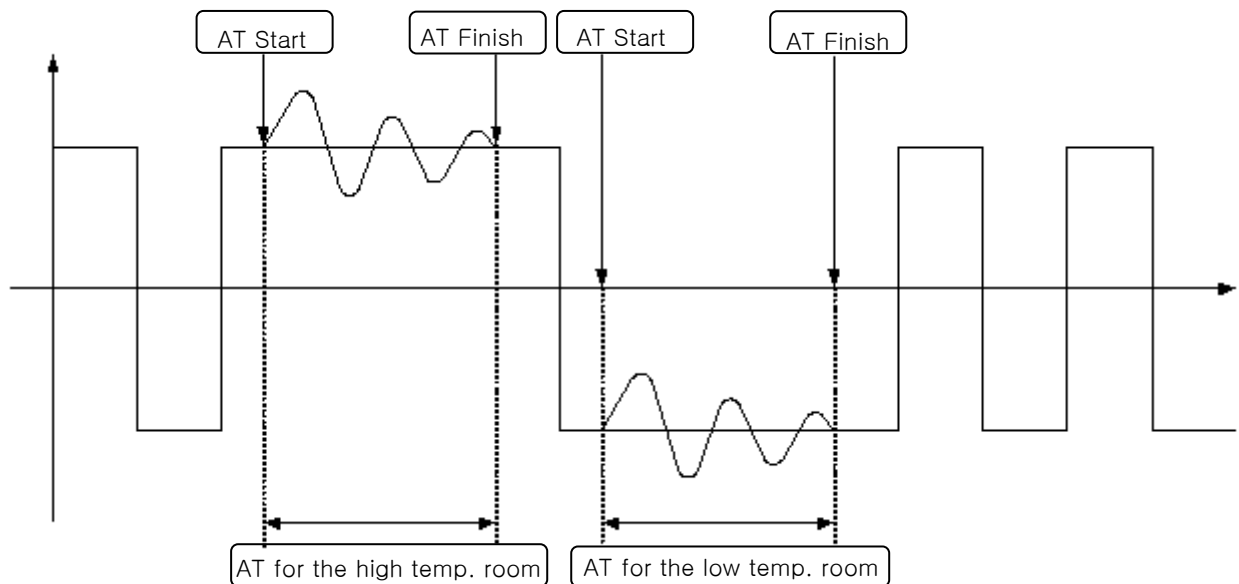
Table 4-2 Auto Tuning Parameter

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.



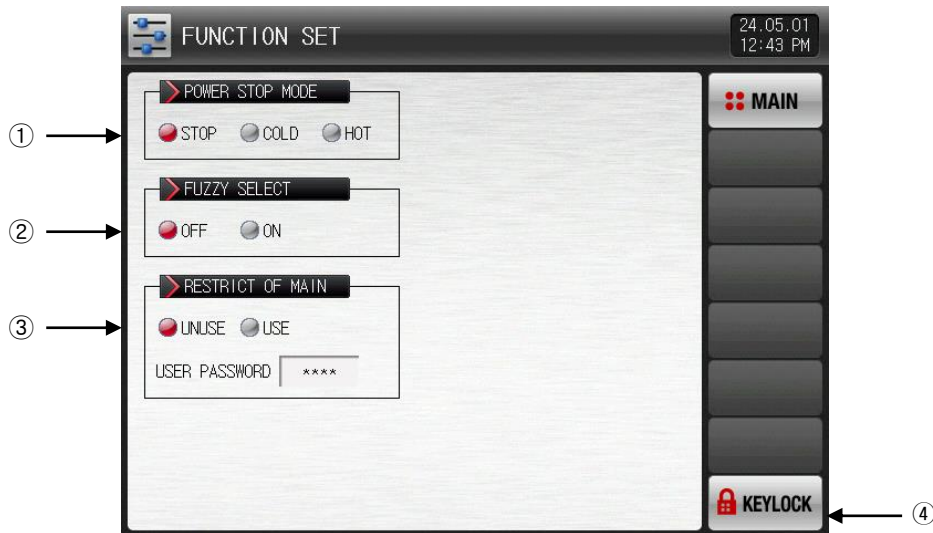
Cautions in AUTO TUNING

- ▶ 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.

5. The Setup for operating motions

5.1 Operation method setting

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



[Pic. 5-1] The setup screen for operation motions

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. 5-2 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 5-1. 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

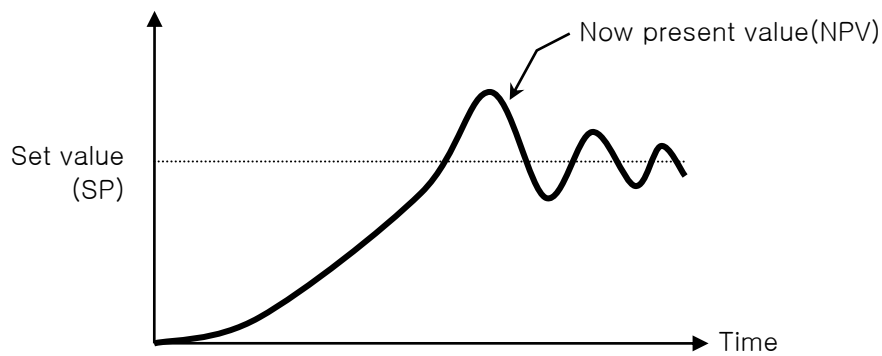
- ▶ The screen below is the control setup screen for main buttons.
- ▶ When press the main button in the operation screen, the key pad for password is displayed.



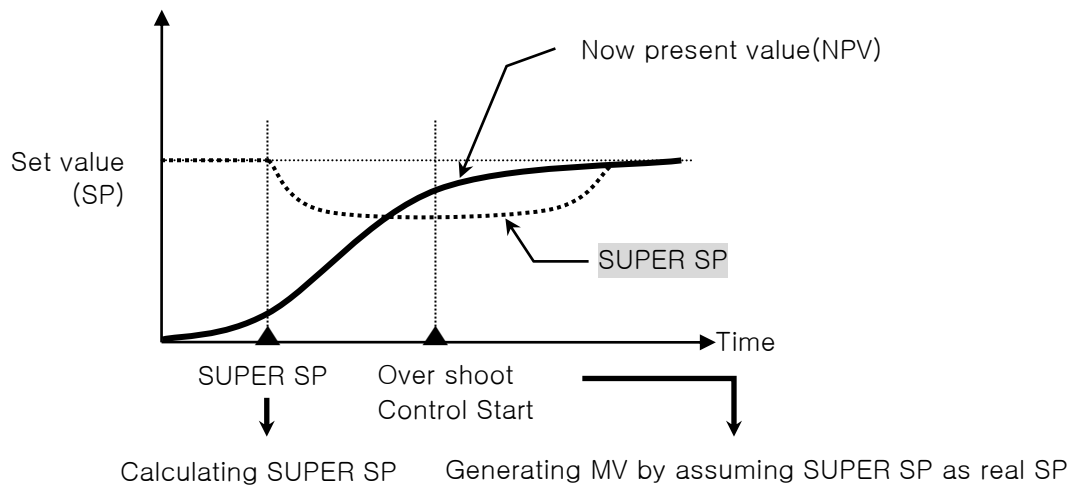
[Pic. 5-2] The control setup screen for main buttons

5.2 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”

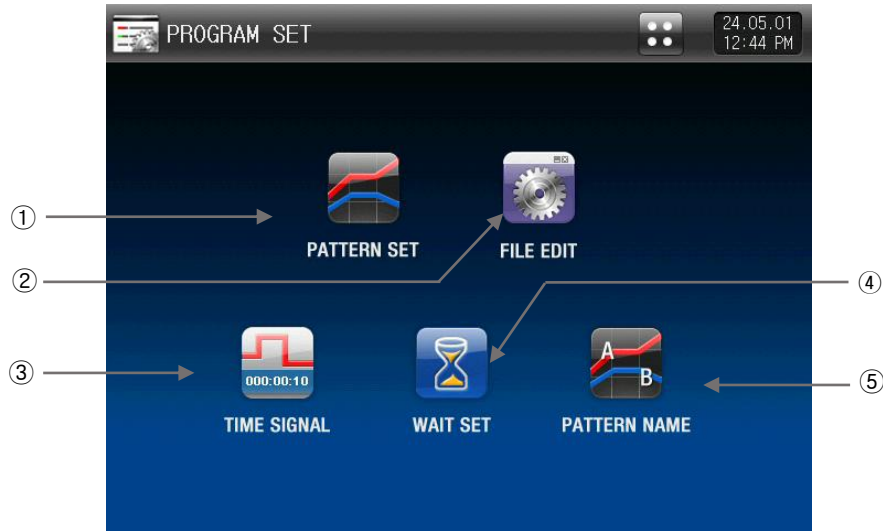


- The control for overshoot (FUZZY) “ON”



6. Program setting

- ▶ It converts to [Pic. 6-1 Program setting screen] when the program setting button is touched by in [2. Main screen].
- ▶ It is a screen group to set the parameters related to the program operation.

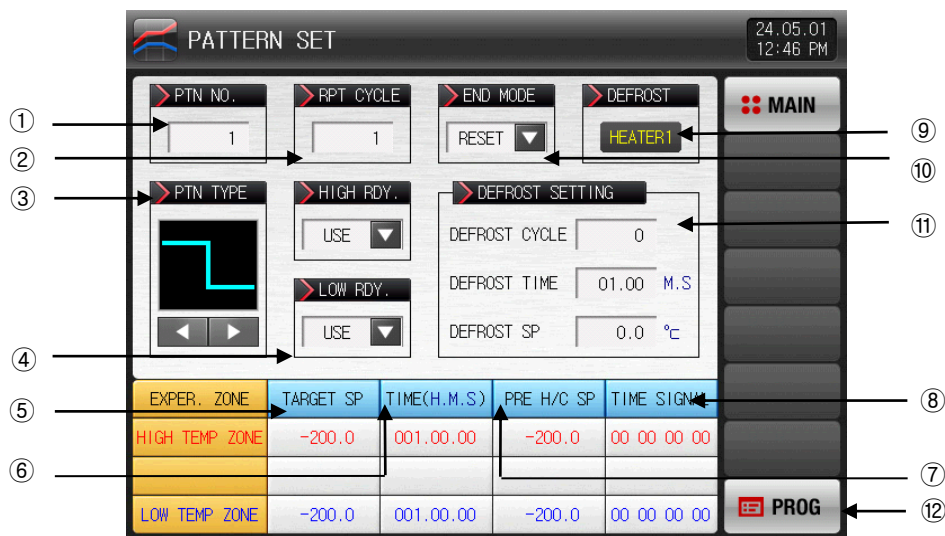


[Pic. 6-1] Program setting screen

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.

6.1 Program pattern setting

- ▶ This is the setup screen depending on the pattern number.
- ▶ Refer to [6-3 Time signal operation] for time signal setting.



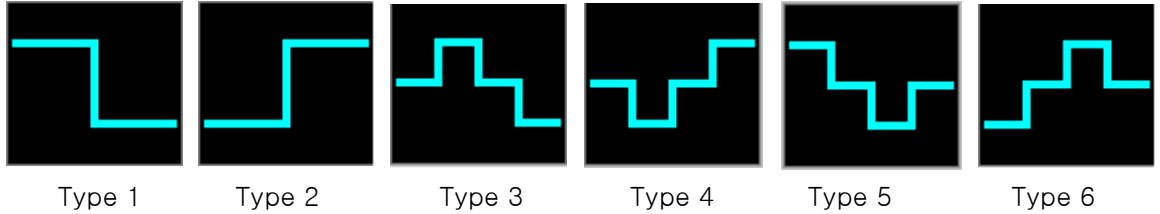
[Pic. 6-2] The screen for pattern editing

- 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 [6.3 Time signal motions]
- ⑨ It displays the applied defrosting type.
 - ☞ It is only for read so it can not be changed by touch.
 - ☞ In [6.1. The setup for equipment configuration] in [Installation manual], 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. 6-1 The screen for program setup].

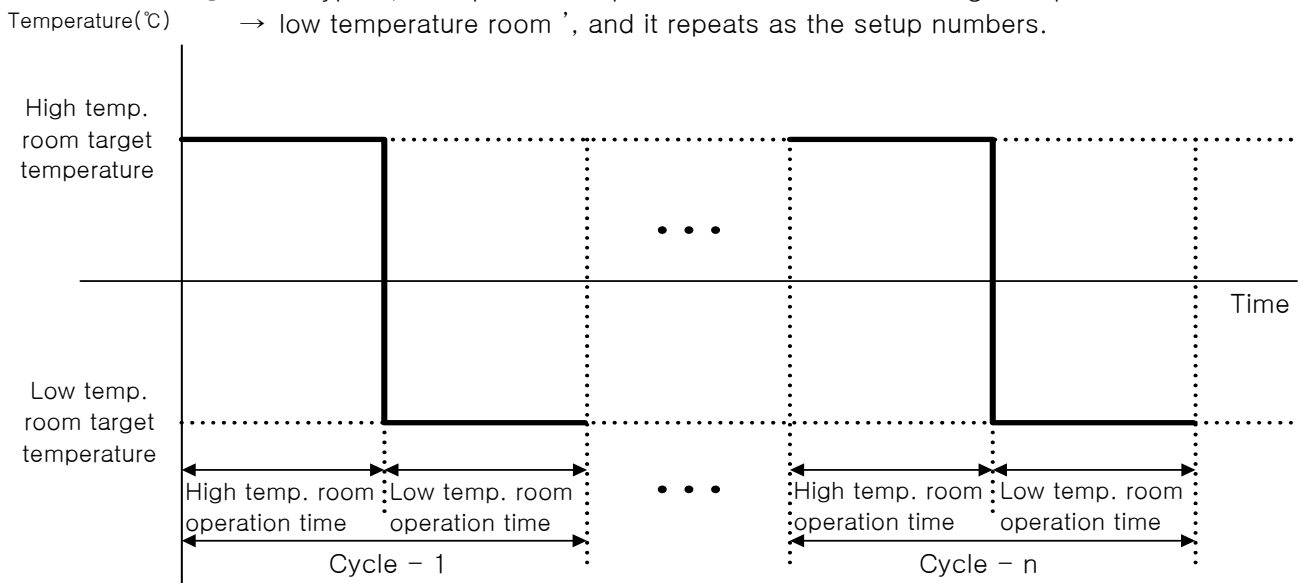


The type of program pattern

- ▶ 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]

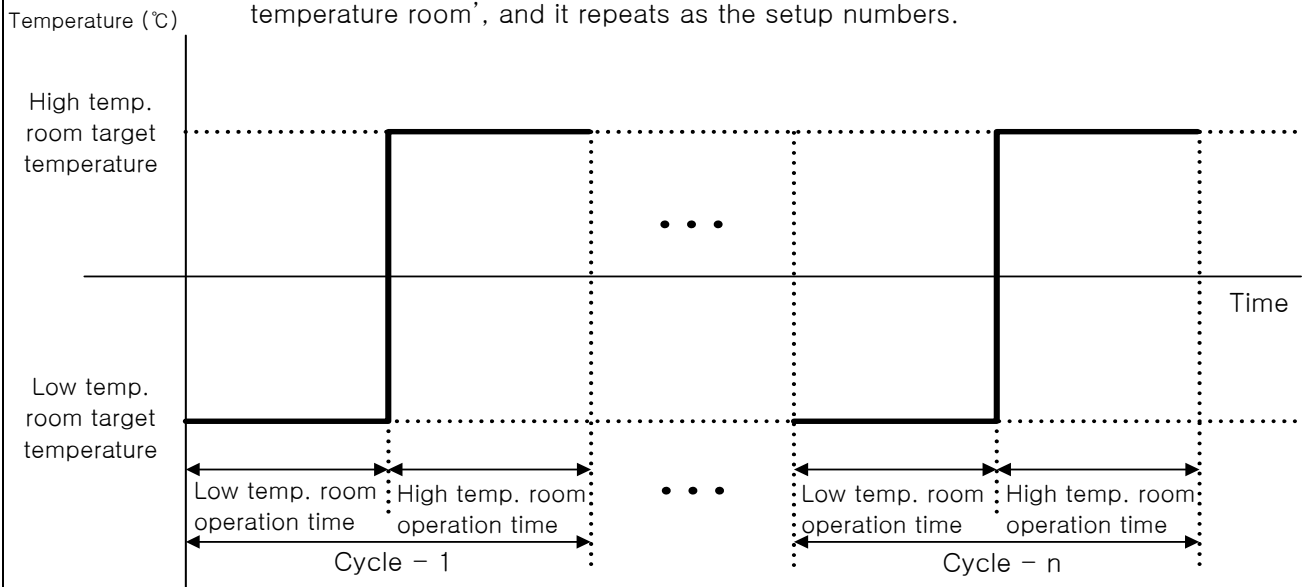


- ① In the type 1, the operation is performed in the order of 'high temperature room → low temperature room', and it repeats as the setup numbers.



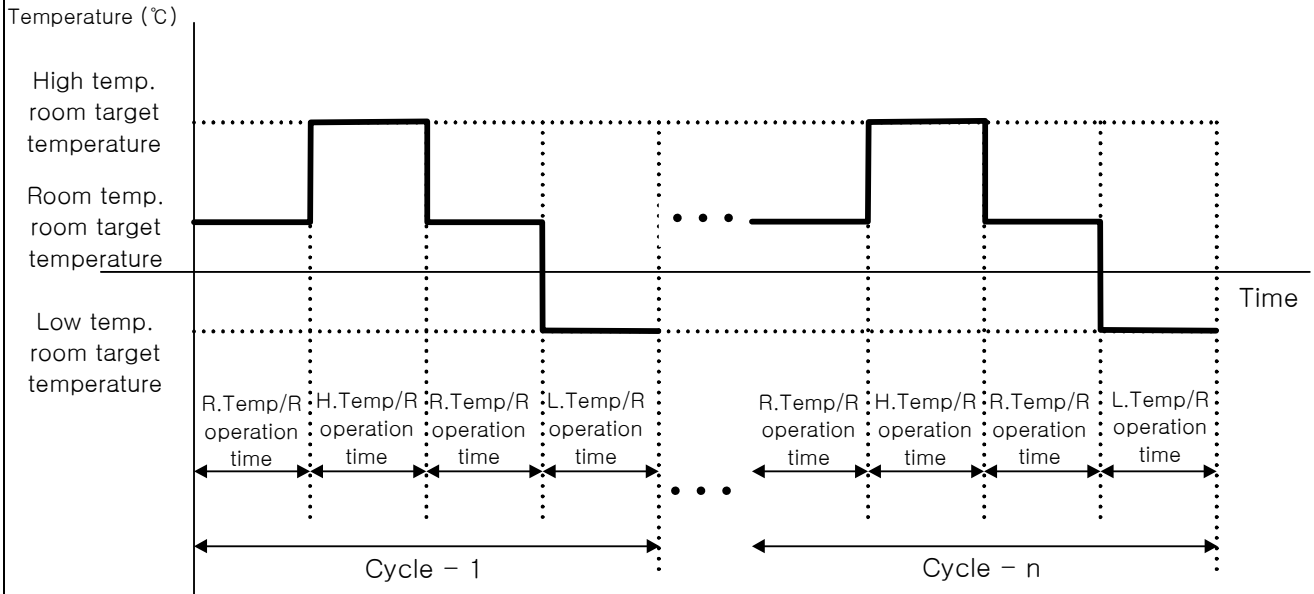
The operation of Type 1

- 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.



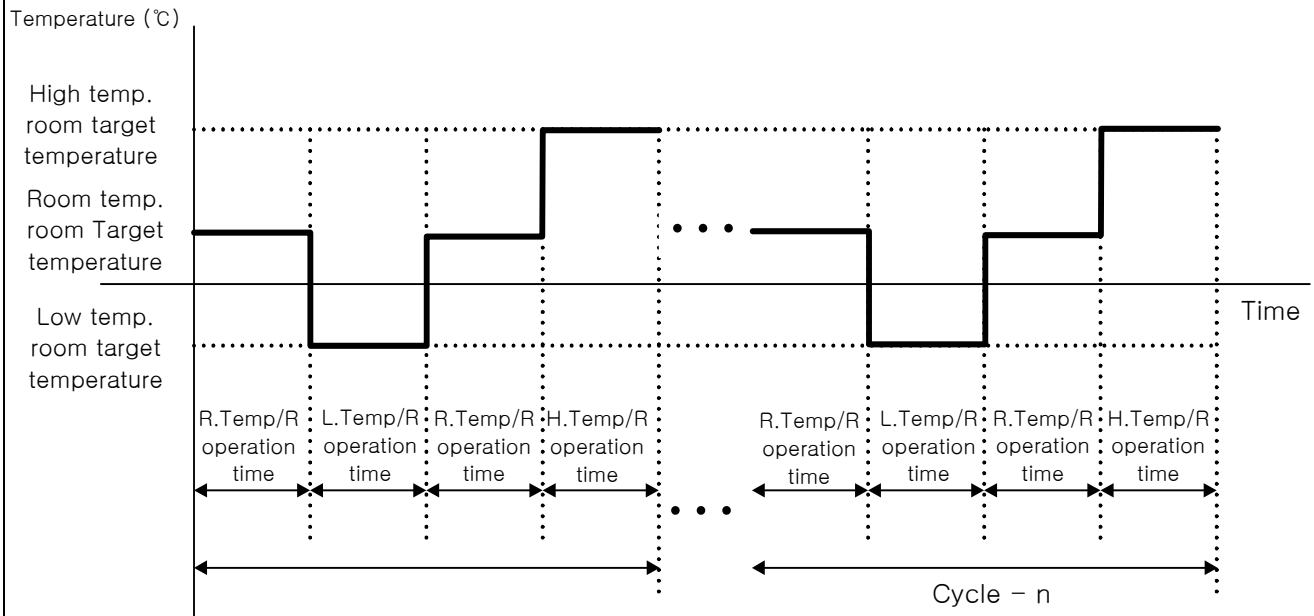
The operation of Type 2

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.



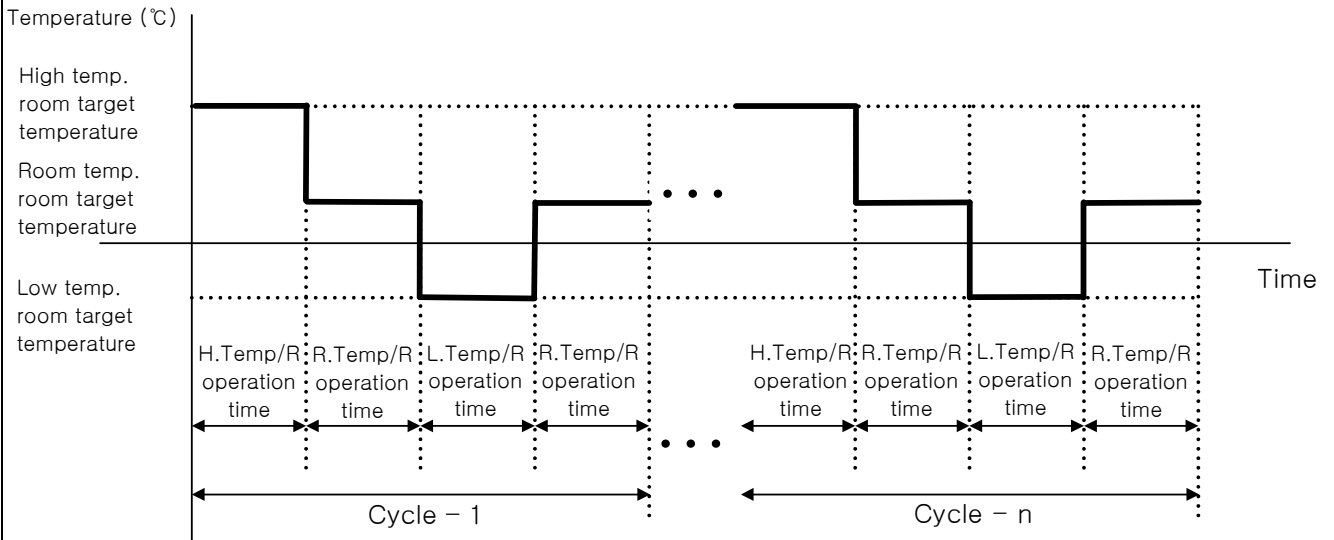
The operation of Type 3

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.



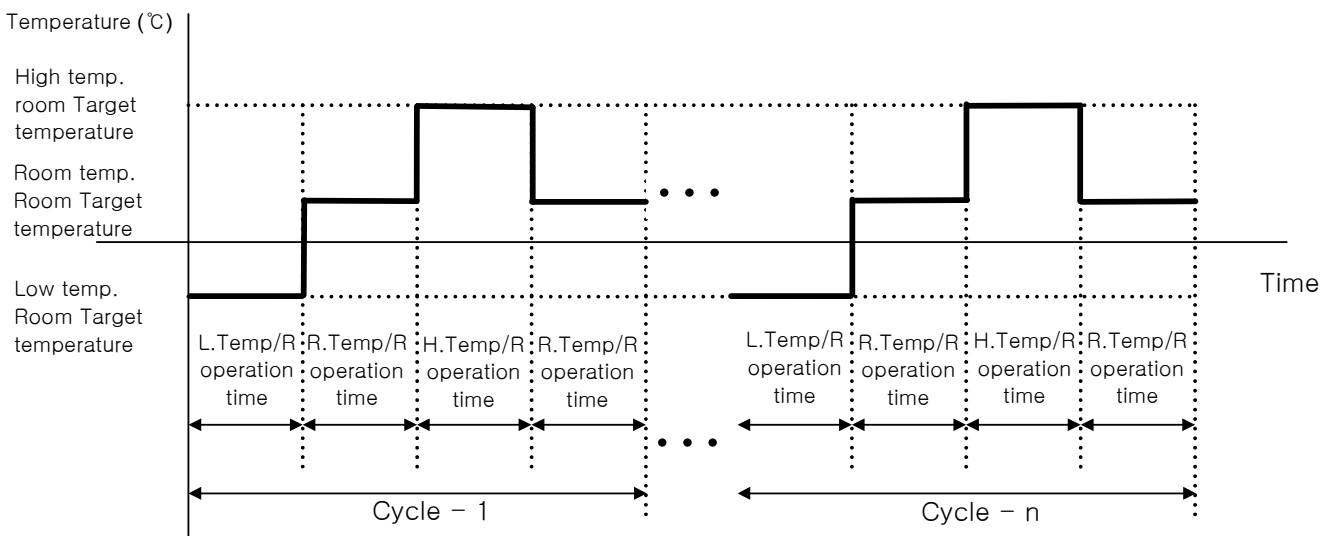
The operation of Type 4

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.



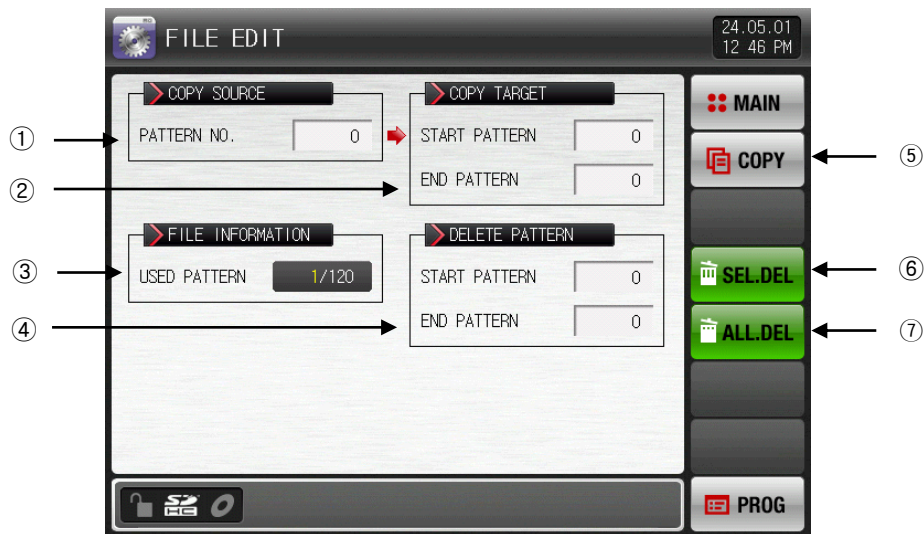
The operation of Type 6

Table 6-1. 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

6.2 File editing

- ▶ In [6.1 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. 6-3] File editing screen

- 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 displays the total patterns set in [Pic. 6-1] Program setting screen].
 - ☞ The change is impossible as it is only for reading
- ④ IT sets the first and last pattern number to be deleted.
 - ☞ The first pattern is deleted only when the last pattern is “0”.
- ⑤ It copies the set pattern ① to the set pattern ②.
- ⑥ It initializes the set value of the pattern set in ④.
- ⑦ 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 6-4] File editing screen (Parameter setting set error)

▶ Please refer to Table 6-2 for the message description.

Table 6-2. 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.

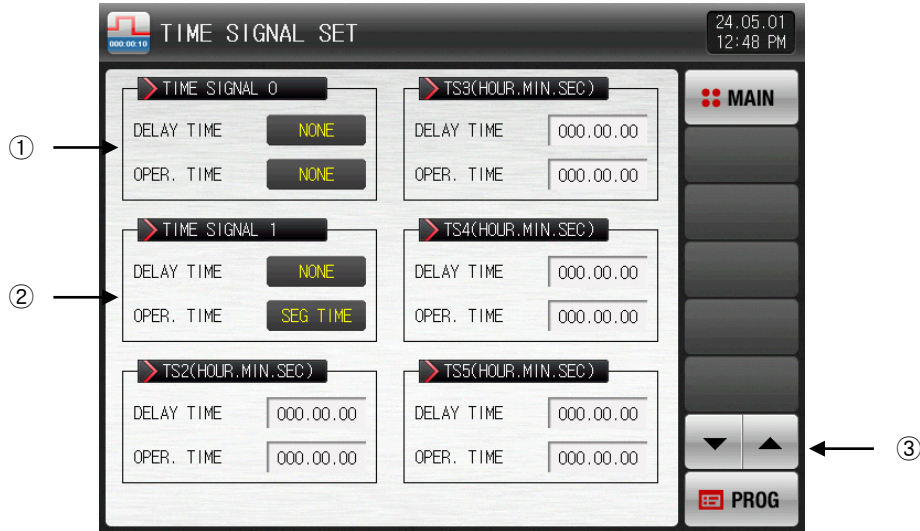
Table 6-3. The parameter for file editing

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

6.3 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 [6.1 The setup for program pattern].

6.3.1 Time signal ON/OFF operation

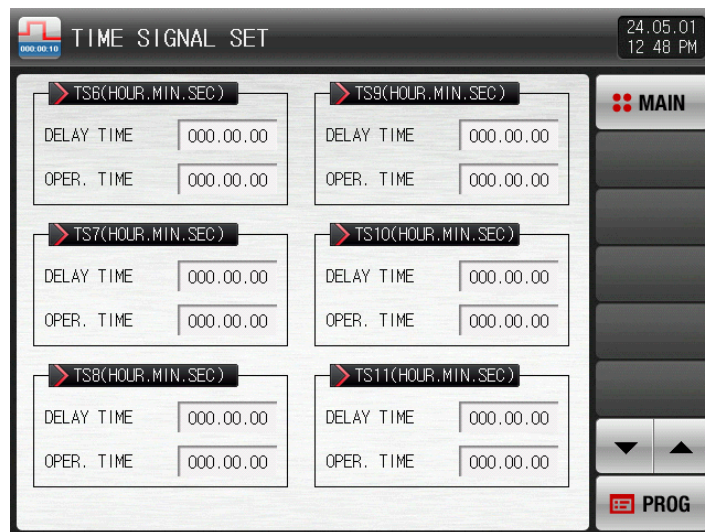


[Pic. 6-5] The first screen for time signal setup

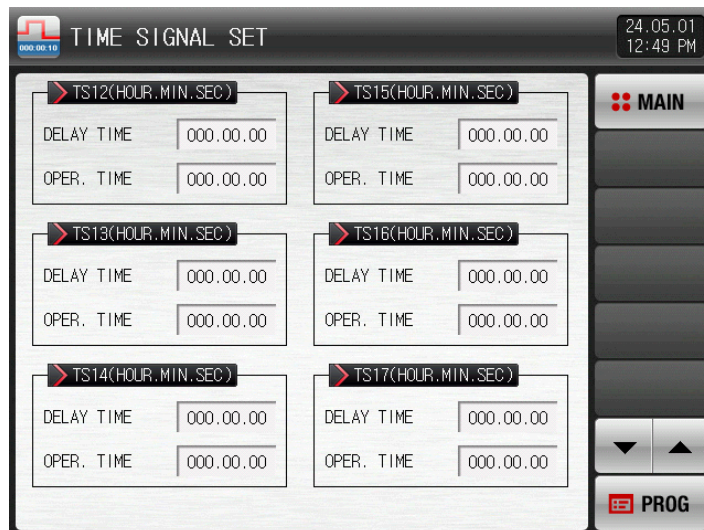
- ① The time signal is OFF during corresponding section operation When '0' is selected
 - ☞ The change is impossible as it is only for reading.
- ② The time signal is ON during corresponding section operation when '1' is selected.
 - ☞ The change is impossible as it is only for reading.
- ③ Moving the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

6.3.2 Time signal time setting operation

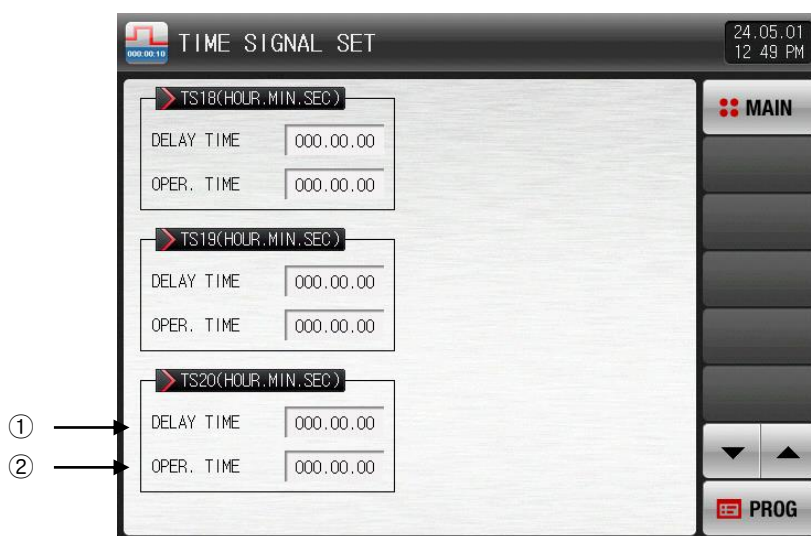
- ▶ The time signal 2~20 (TS2~20) operate depending on delay time and operation time.



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



[Pic. 6-7] The third screen for time



[Pic. 6-8] The fourth screen for time signal

- 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 6-4. 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

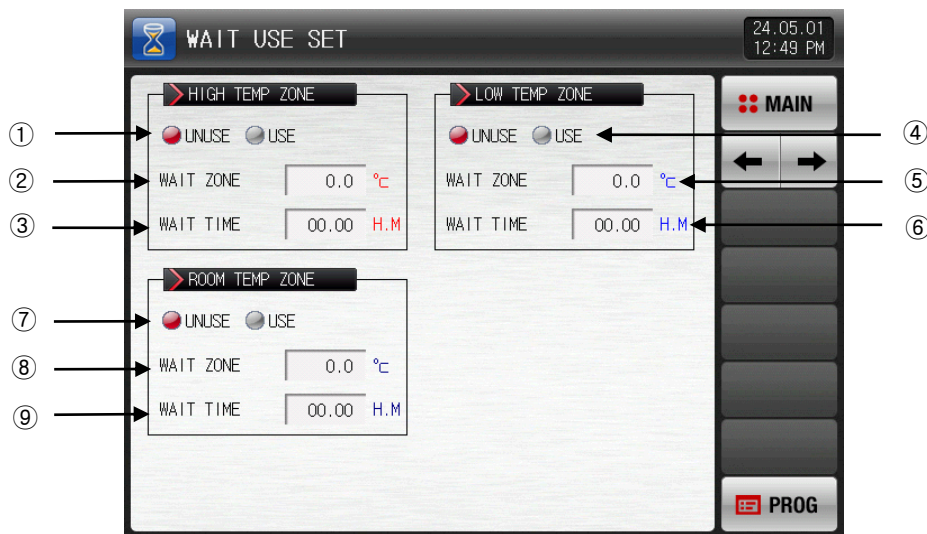
5.3.3 Example of motion when input the time signal

Setting		Time signal operation		
Set time by section ≥ Delay time + Operation time	1. Delay time = 000.00.00	ON		
	2. Delay time ≠ 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 ≠ 000.00.00	ON		

6.4 Standby operation

6.4.1 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.
- ▶ 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. 6-9] The setup screen for stand-by

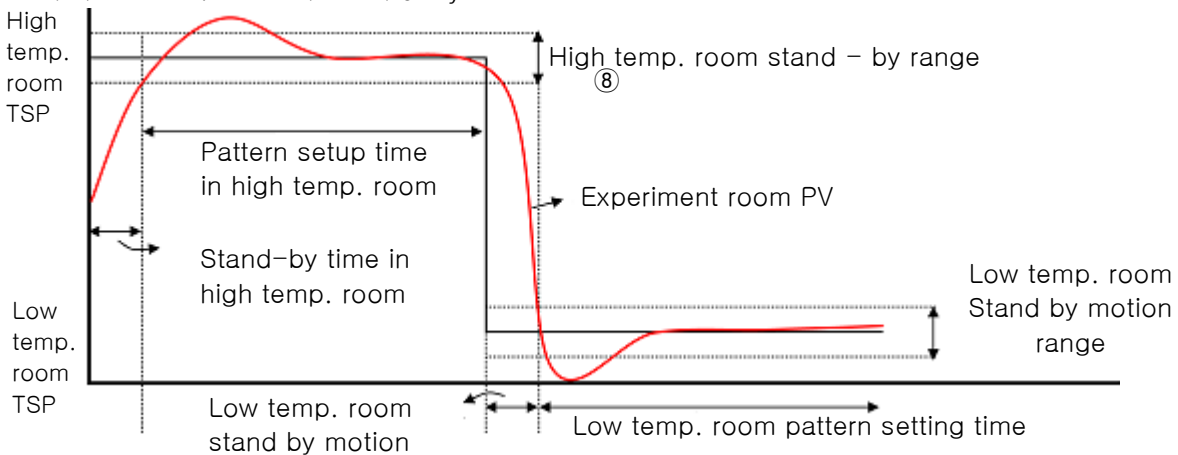
- ① It sets the usage of stand-by in high temperature room.
 - ② It sets the range of stand-by in high temperature room.
 - ③ It set the time of stand-by in high temperature room.
 - ④ It sets the usage of stand-by in low temperature room .
 - ⑤ It sets the range of stand-by in low temperature room .
 - 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 6-5. The setup parameter for stand-by

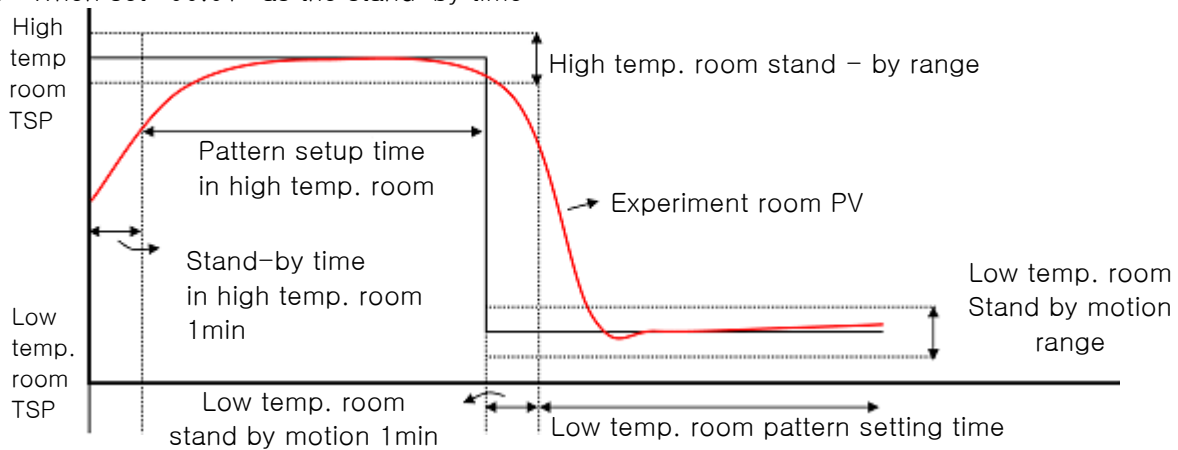
Parameter	Setup Range	Unit	Initial Value
HIGH TEMP ZONE	UNUSE, USE	ABS	UNUSE
WAIT ZONE(High temp.)	EUS(0.0~100.0%)	EUS	EUS(0.0%)
WAIT TIME(High temp.)	0.00 ~ 99.59 (HOUR, MIN)	ABS	0.00
LOW TEMP ZONE	UNUSE, USE	ABS	UNUSE
WAIT ZONE(Low temp.)	EUS(0.0~100.0%)	EUS	EUS(0.0%)
WAIT TIME(Low temp.)	0.00 ~ 99.59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

6.4.2 Example of stand-by

► When set “00.00” as the stand-by time

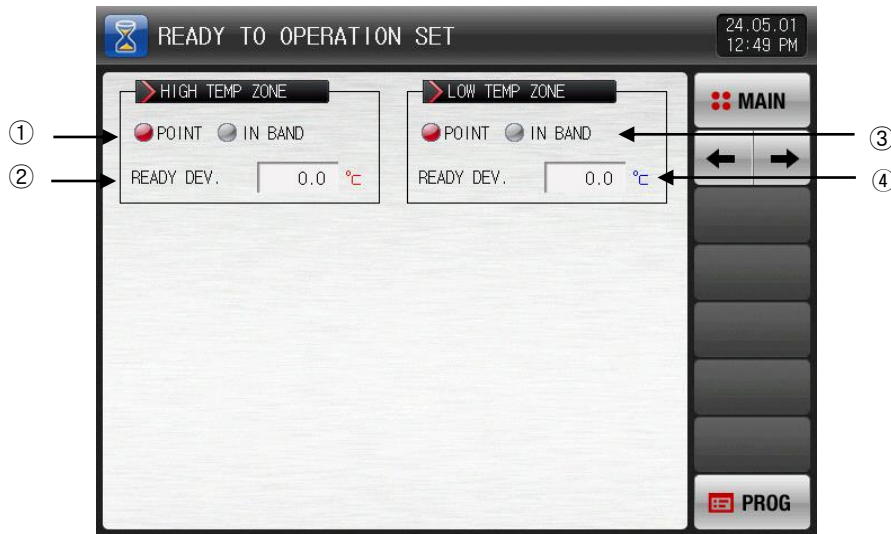


► When set “00.01” as the stand-by time



6.4.3 The setup for operation preparation

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



[Pic. 6-10] 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 6-6. 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%)

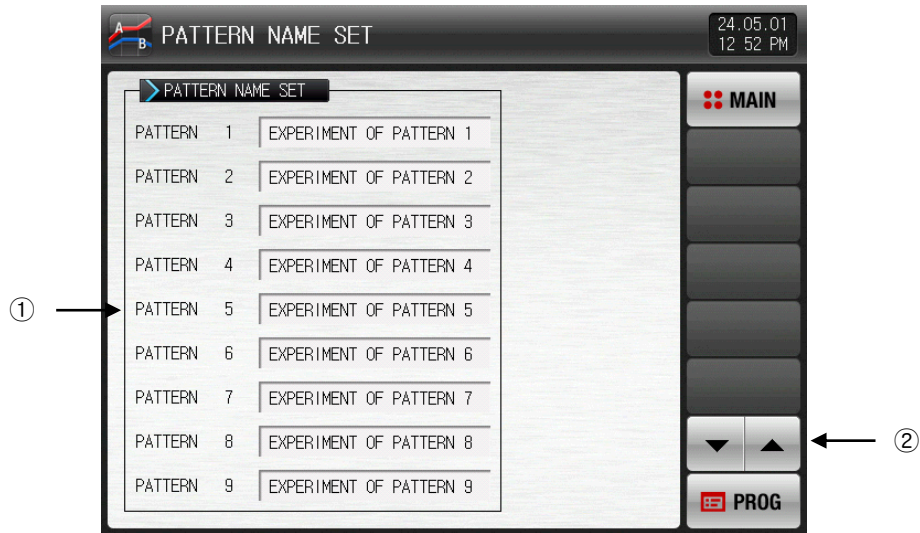


The requirement for cancellation of preparation (pre-heated & pre-cooled)

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

6.5 Experiment name setting

- ▶ The experiment name can be set for each pattern.
- ▶ Please refer to [4.1.1 The freeze-frame for program operation].



[Pic. 6-11] 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.



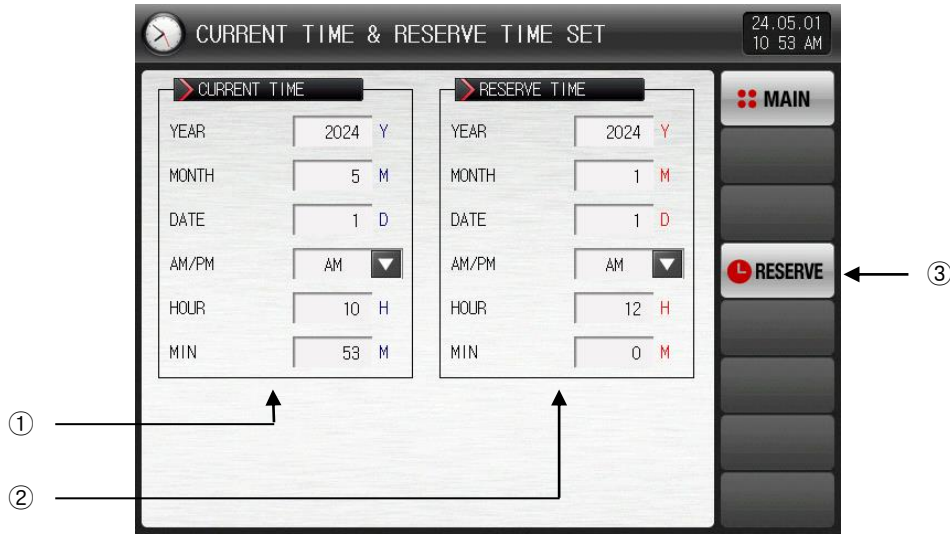
[Pic. 6-12] Experiment name setting screen

Table 6-7. 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

7. Time Setup

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





[Pic. 7-1] Time setting screen

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

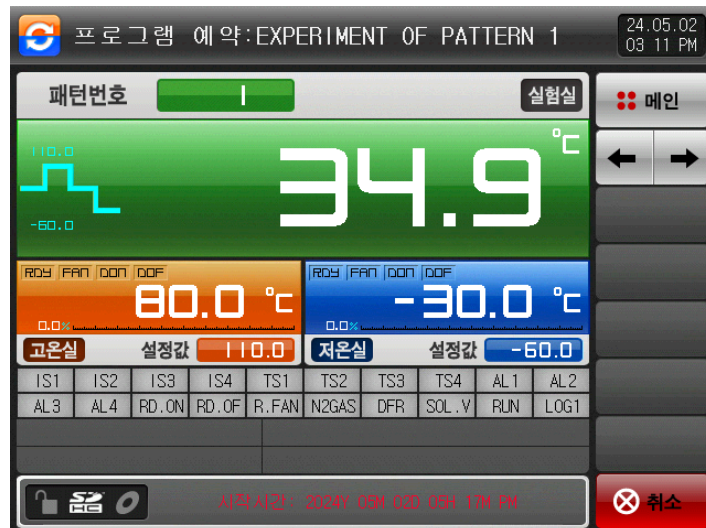
☞ The current time is not changeable during recording the measured data and operating.

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 7-2 Reserve Time of operation setting screen] when  is touched by.

☞  You can cancel your reservation by pressing the (Reservation) button again.



[Pic. 7-2] Reserve time of operation

Table 7-1. 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	2024
	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		

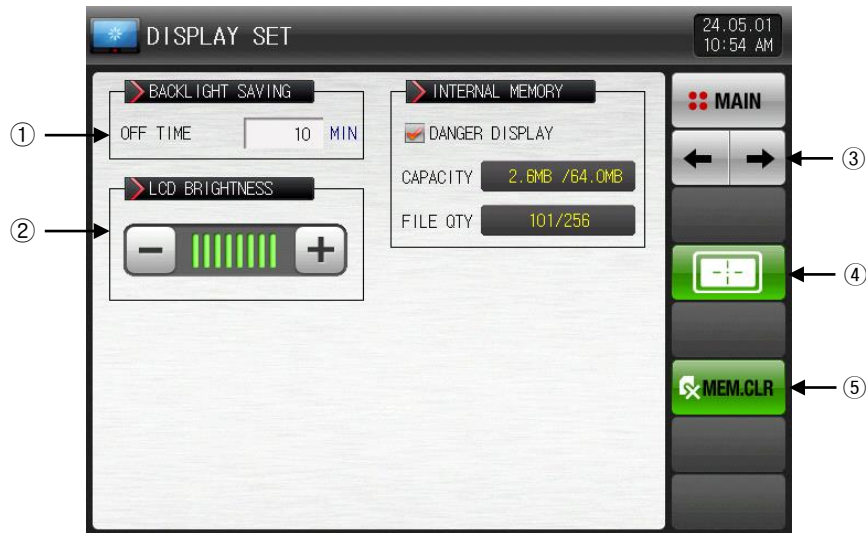
* AM12:00 : Midnight 00:00

* PM12:00 : Midday 12:00

8. Screen display setting

8.1 Screen display setting

► This is the screen to adjust the brightness in the operation screen.



[Pic. 6-2] The first screen for display setup

① It sets the backlight electricity saving time.

☞ The electricity saving time sets the operation timing of backlight..

② The brightness of LCD is controlled by, **- +** button.

③ The screen is moved to next and previous screen.



④ Touch screen calibration.

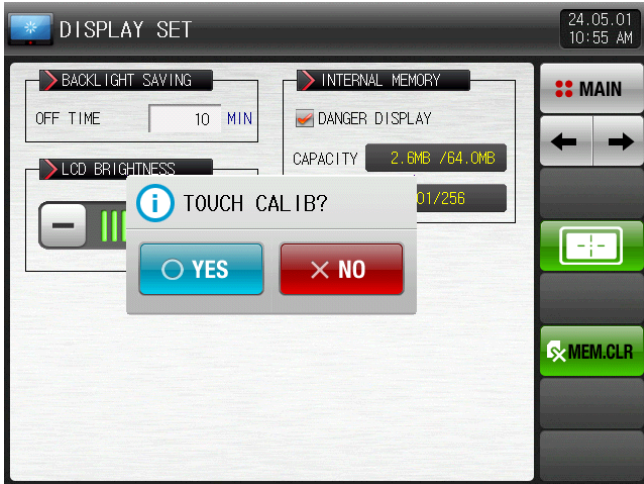
⑤ It deletes every file saved in the internal memory.

Table 8-1. The first screen parameter for display setup

Parameter	Setting range	Unit	Initial value
OFF TIME	0 ~ 99 MIN	ABS	10
LCD BRIGHTNESS	1 ~ 8	ABS	8
TOUCH SCREEN CALIBRATION	When you calibrate the touch screen, click.		

8.2 Touch screen calibration Setting

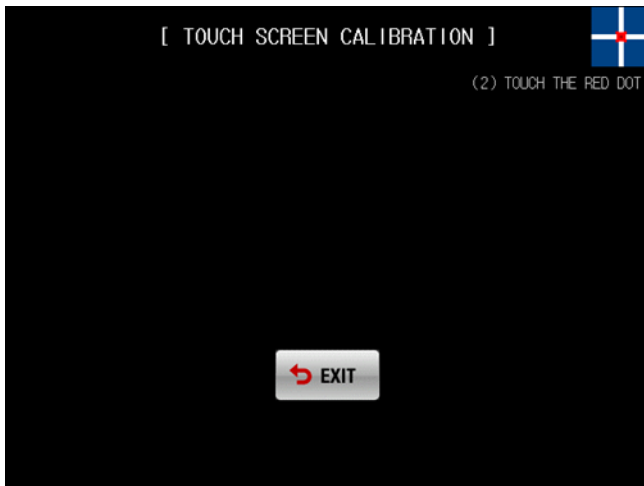
- ▶ Press  the red dot at the left / right upper, left / right bottom and center of the touch screen calibration screen, you can calibrate the touch screen.
- ▶ Press  on the touch screen calibration screen is not touch screen calibration is stored and stops will move to [Figure 8-1 Screen display setting screen]



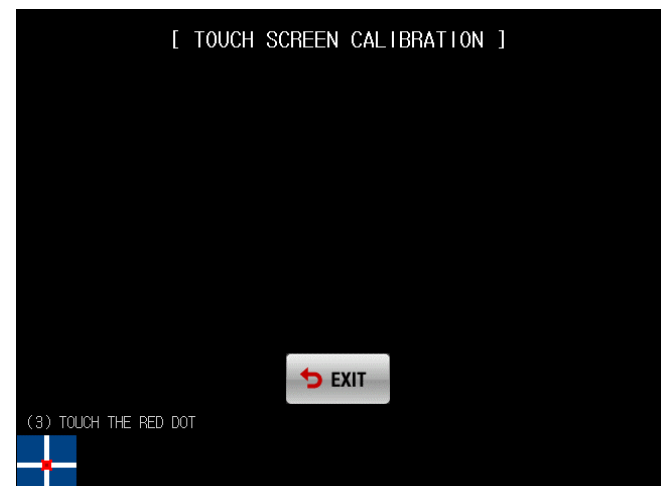
[Pic .8-2] Touch screen calibration -1



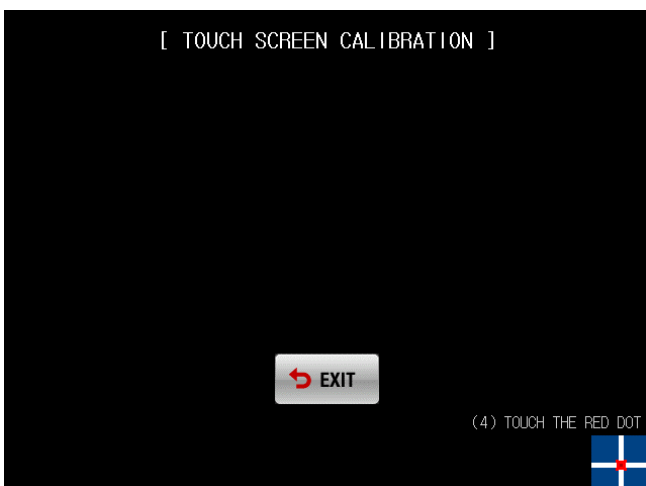
[Pic .8-3] Touch screen calibration -2



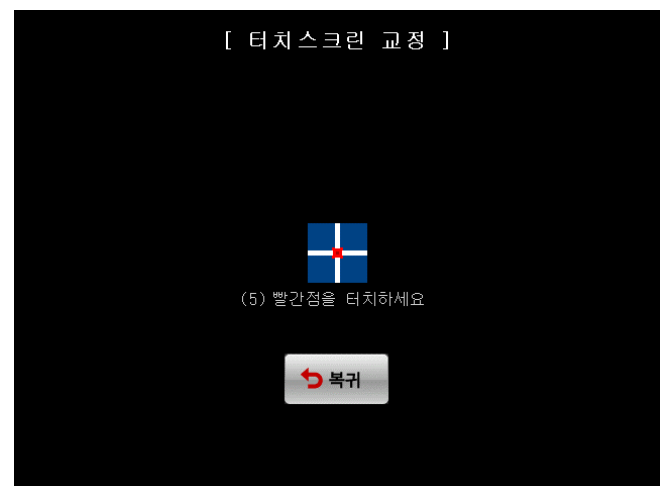
[Pic .8-4] Touch screen calibration -3



[Pic .8-5] Touch screen calibration -4



[Pic .8-6] Touch screen calibration -5



[Pic .8-7] Touch screen calibration -6

8.3 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.












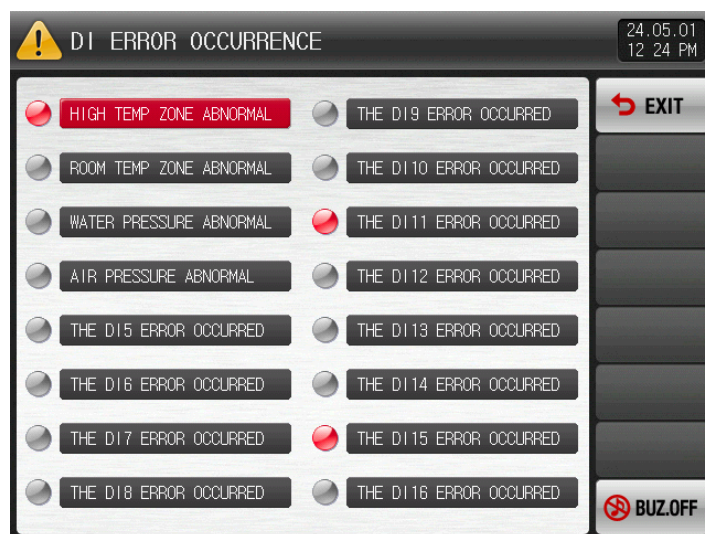
[Pic. 8–8] DI error creation history screen

- ① It displays the history of DI error creation.
 - ☞ It displays the name set in [12.2 DI Error Name] in [Installation manual].
 - ☞ 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 8–2. 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 [12. DI Function & Motion Setup] in [Installation manual].
- ▶ 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.
 - ※ No DI error occurred (“OFF” state). ( THE D11 ERROR OCCURRED writing,  picture)
 - ※ DI error occurs (“ON” state) ( THE D11 ERROR OCCURRED writing,  picture)
 - ※ Released after DI error occurs (“ON” then “OFF” state) ( THE D11 ERROR OCCURRED writing,  picture)



[Pic. 8–9] The screen with letter for DI error display method

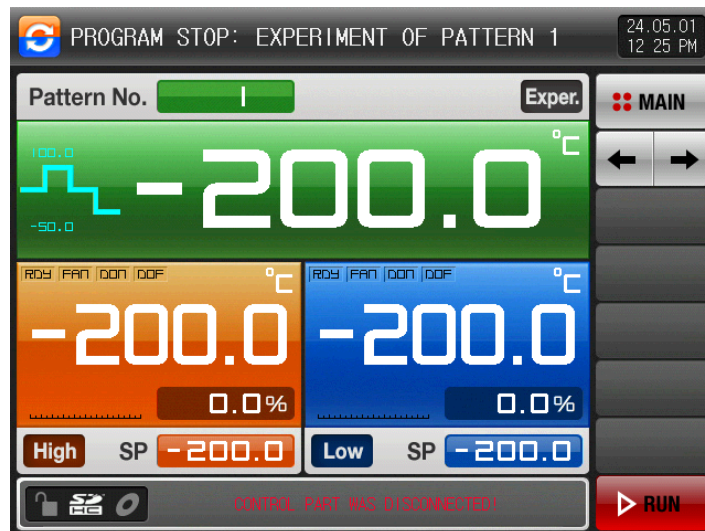


[Pic. 8–10] The screen with photo for DI error display method

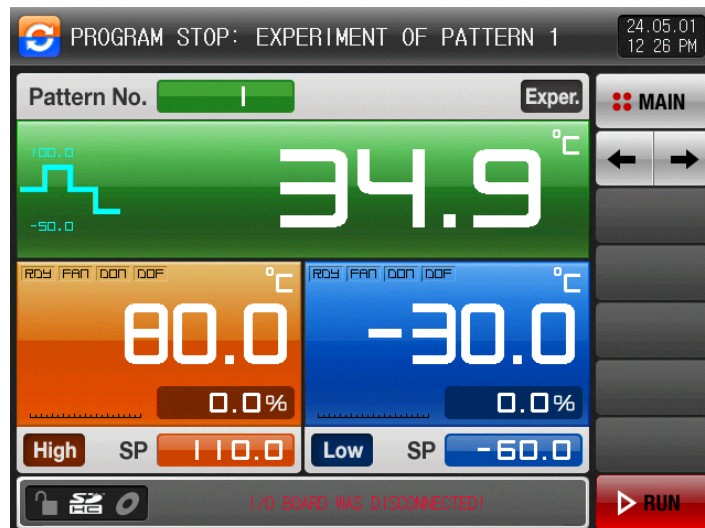
※ DI and DO can be used up to 58 points for DI and up to 56 points for DO when selecting the TIO option.

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

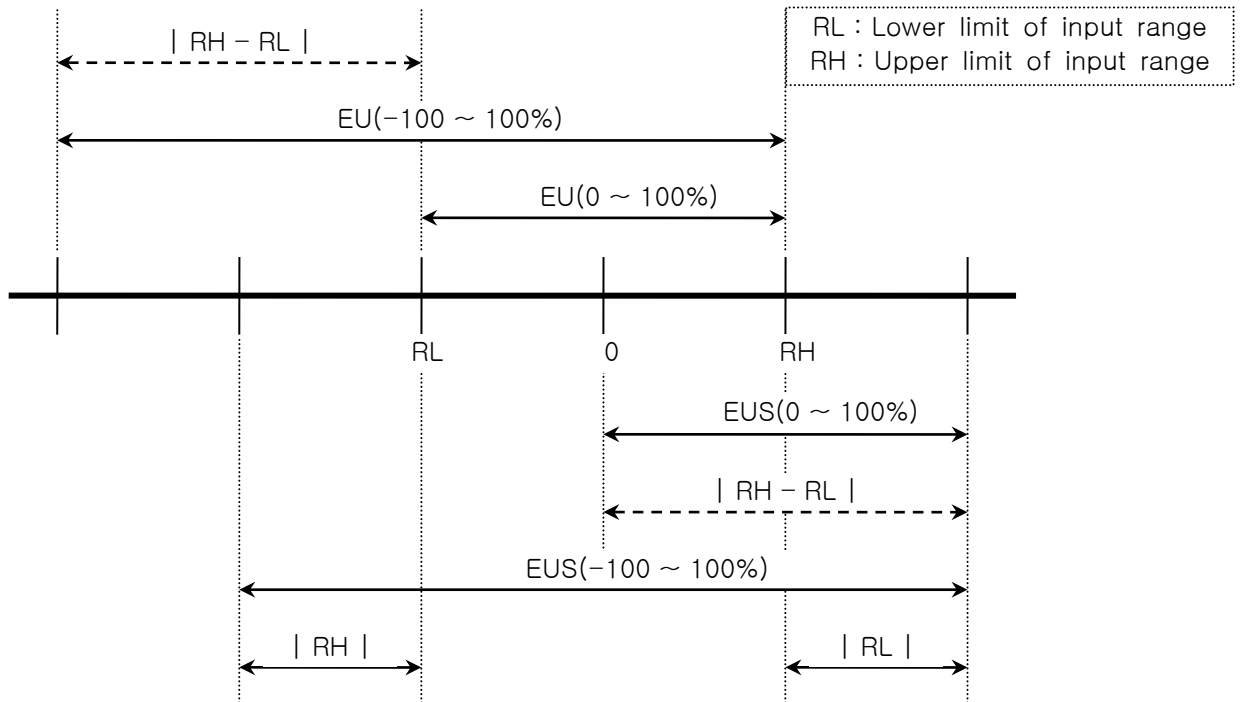
- ① Defective communication cable
- ② Bad connection of communication cable

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 \sim 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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