TEMP2000 SERIES

Operation Manual (Programmable controller)

SAMWON TECH It is a dual/single loop programmable controller which equips with the general control, heating and cooling function by supporting high definition TFT-LCD touch screen and SD card.

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This manual is commonly used for TEMP2000 Series.

Contents

2nd Edition of TEMP2000 Series IM : Sep. 06 2012

01. Cautions (Instructions) for safety

Thank you for your choice of our programmable controller (TEMP2000 series). This manual describes the method of operation of the product.

Cautions in this instruction manual

- Please deliver for the end user to possess always and keep it in the place accessible at any time.
- Use the product after full understanding of this operation manual.
- This operation manual does not warrant any other things because it is a description of the details for the function.
- A part or whole of this manual shall not be edited or copied randomly.
- The descriptions in this manual may be changed randomly without pre notice or warning.
- Even though this manual was made with elaboration, it will be appreciated if you inform to the purchasing point (Dealer shop and etc) or sales team in our company in case of deficiency, mistake or omission in the contents.

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

- Please use this product after full understanding on the safety cautions in this manual for the protection and safety for this product and the system connected to this system.
- Our company is not responsible to the damages occurred by using or handling or unattended using not relying on this operation manual.
- 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.
- The internal modification (Change) and addition to this product are prohibited.
- Do not disassemble, repair and modify of this product because it becomes the reasons for electric shock, fire and malfunction.
- In case of changing the part or the consumables of this product, please contact to the sales department of our company.
- Do not contact to the moisture with this product. It may cause the failure on this product.
- Do not apply the strong impact on this product. It may cause the damage and failure on this product.

With regard to the exemption for the responsibility of this product

- We are not responsible for any warranty on this product besides the defined cases in the quality assurance condition of our company.
- 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

- 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.
- The repair due to the out of order occurred after the warranty period shall be repaired at the actual cost according to the defined condition by our company.
- 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
- 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.

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.

- Product: It is marked on the points to be acknowledged certainly to protect the human body and device.
- 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 earth with the ground in case of product installation and controlling the product.

(C) It means the"supplementary explanation"

- It describes the points to supplement the explanation.

(D) It describes the"references"

- It describes the information and pages of reference to be referred.

Part 01

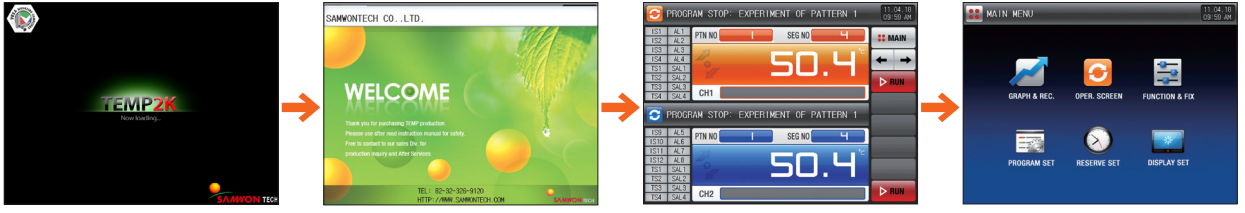
Operation and setting

01. Operation and setting

This product is programmable 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 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 [13. System initial setting] in [Installation manual] for change in the initial screen.



Logo screen | Initial screen | Program stationary screen | Main screen

1-2. Setting button operation

Button type	Button operation
SP SP	The "Set value" is touched in stationary operation/still screen and it is used for setting the set value wanted by the user.
PTN NO PTN NO	The "Pattern No." is touched in program still screen and it is used for setting the pattern number wanted by the user.
	It is used for inputting the general numbers and name.

Button type	Button operation
	It is used for selection for one out of many types.
	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 general screen conversion.
	It is used for increasing or decreasing of the page within the same screen.
	It is used for the page conversion by the decrease and increase in time axis on the same screen.
CH1 CH2	The explanation for the channel corresponds only to **TEMP2*20** (**TEMP2*20** series not support this setting.)

1-3. Parameter setting method

- When [ ] is selected in [1-2 Setting button operation], the input key of the setting value is shown as followings and the necessary data can be input.
- 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").

▲ Input key for setting only the numbers

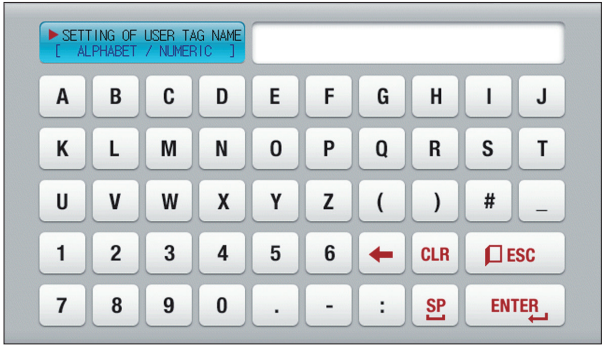
▶ Input key for setting the pattern experiment name and DI error name Refer to [11. DI function and operation setting] in [Operation manual] for DI error name input key.

▲ Input key for time signal setting

▲ Input of SEG alarm setting

▲ Input key for sub output setting
Refer to sub output in [4. Control & Transmitting output] in [Operation manual] for sub output setting.

▲ Display when it is out of the setting range



▲ Input key for user tag name in channel 1 and 2

NOTE

Touch key lock release

- Input OFF (Lock release state) for key lock because the set value is not input when “Key lock” is “ON.”
- Refer to [4. Operation motion setting] for details

(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.
- 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 mal operation of the device or damage on the touch panel.

(2) Setting value input method

- Every input data used in this product is set by the set data input key, test name input key and time signal input key.
- The input key for set data is appeared when [ ] button is touched in [1–2 Setting button operation] and the value to be set can be input.
- Refer to [6–4 Time signal operation] for time signal input.
- Refer to [11. DI function and operation setting] in [Operation manual] for DI error name input key.

▶ Set the value of the input key features and descriptions

Ex) Set data input method
Press the set data input button in the corresponding screen ➡
Press the "ENTER ①" key finally after pressing the corresponding number in sequence (ⓐ→ⓑ→ⓒ→ⓓ→ⓔ)

①	It displays "Parameter."
②	It displays "Setting range."
③	It displays "setting display window." • It displays "LIMIT ERROR" when it is out of the setting range. • It displays "INPUT ERROR" when there is an error in setting unit.
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.

Part 02

Main screen

02. Main screen

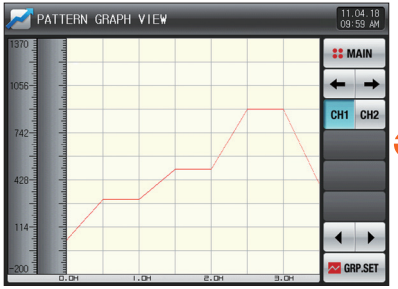
[Fig. 2–1] Main screen

No.	Instruction	Description
①	Graph & Saving	Moving to the screen to set Y/N for using graph display, graph record, SD card recording
②	Operation state screen	Moving to the operation screen
③	Setting operation motion	Moving to the setting screen for additional function and operation method
④	Program setting	Moving to the program setting menu screen
⑤	Programmed operation setting	Moving to the screen for setting current time, programmed operation time.
⑥	Setting screen display	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.

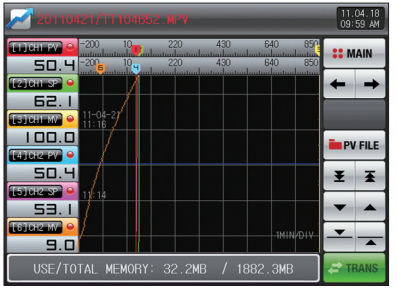
Part 03

Setting graph display and save

Flow chart

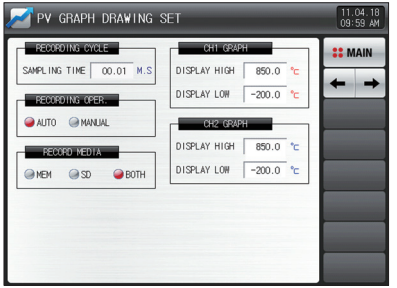


[Fig. 3–2] Graph & Saving screen 1
(Pattern graph display)



[Fig. 3–5 Graph & Saving screen 2
(Graph display selection)

[Fig. 3–9] Graph & Saving screen 4



[Fig. 3–8] Graph & Saving screen 3

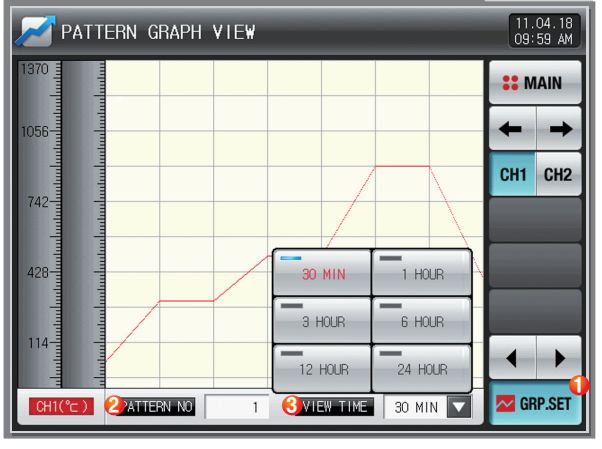
03. Setting graph display and save

Explanation with CH1 CH2 corresponds to TEMP2*20 ONLY (TEMP2*00 series not support this setting)

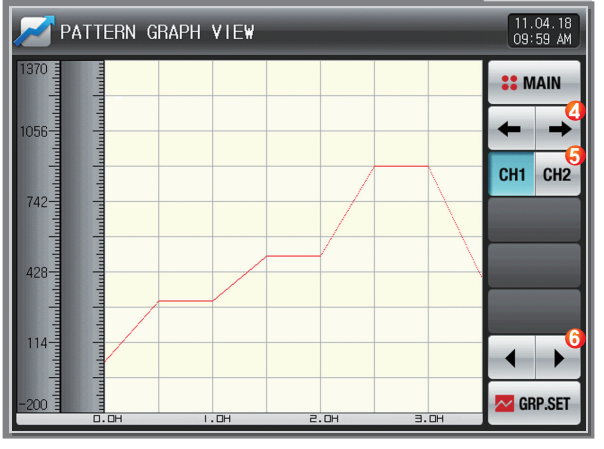
3-1. Pattern graph display

- It converts to [Fig. 3–2 Graph & Save screen 1 (Pattern graph display)] when [Graph & Save] is selected at the left top in [Fig. 2–1 Main screen]
- This screen displays the operation pattern and progress time in program operation.
- The following table is an explanation for channel 1 and channel 2 is same with channel 1.
- It is a screen to display the input pattern in [Fig. 6–2 Pattern editing screen].
- PATTERN NO 1 , VIEW TIME 30 MIN can be changed in pattern graph display.

[Fig. 3–1] Graph & Save screen 1 (Program operation)

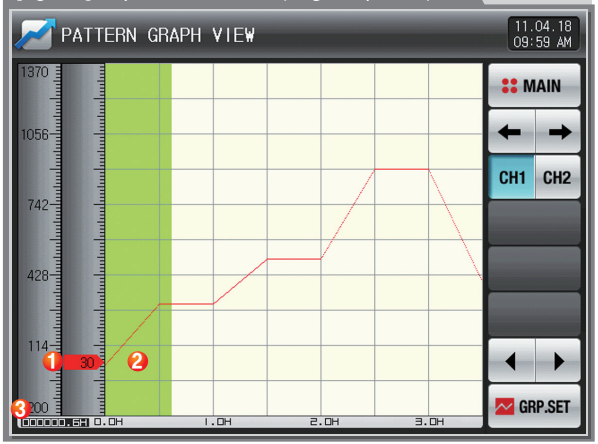


[Fig. 3–2] Graph & Save screen 1 (Pattern graph display)

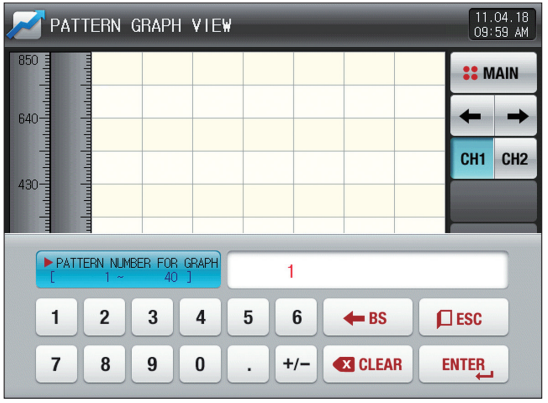


①	Display the graph setting menu • Display the parameters related to the pattern graph operation at the bottom depending on ON/OFF operation on the graph menu button
②	Setting the pattern No. to be displayed • Display the input key to set the pattern No. when [1] (Pattern No.) is touched. • Refer to [Fig. 3–4 Pattern No. input screen]
③	Setting the time on graph X axis • Display of the input key to set the time on X axis when [30 MIN ▼] (Display time) is touched. • The time on X axis can be changed during operation
④	Moving from current screen to next screen
⑤	Moving to channel 1 or 2
⑥	Change into the Previous/Next stage on the time axis when [◀ ▶] is touched on the current page.

[Fig. 3–3] Graph & Save screen 1 (Program operation)



①	Display the current temperature during operation
②	Display in green for the operation ended part
③	Display the processing time for the set pattern in [6–1 Program pattern setting]



[Fig. 3-4] Pattern No. input screen

References

- It is a screen to input the pattern No. to be displayed in graph.
- The pattern No. can be input even during operation.

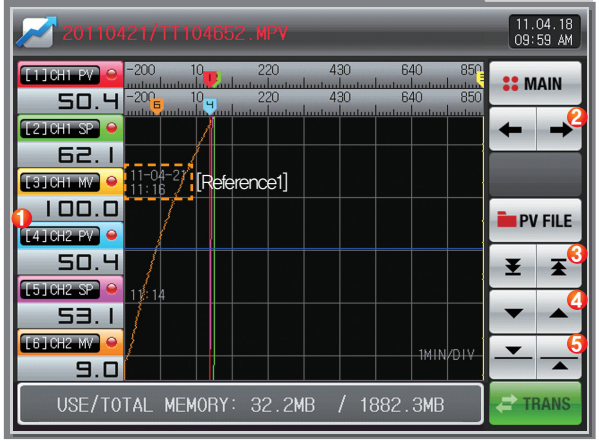
Parameter	Setting range	Unit	Initial value
Channel #n pattern No.	1 ~ 40	ABS	1
Display time	30 minutes, 1 hour, 3 hours, 6 hours, 12 hours, 24 hours	ABS	30 minutes

※ #n : 1 ~ 2

3-2. Presented value (PV) graph view

- It is a screen to display the data recorded in [4–1(4) Stationary operation 3 operation screen] and [4–2(4) Program operation 3 operation screen].
- The date and time saved into the memory are displayed at the top of the screen. [Reference 1]

[Fig. 3–5] Graph&Save setting screen 2 (Graph display is selected)



①	Display the set data, measuring data and output volume • When the checked is touched, it is disappeared on the graph screen and when is touched, it is displayed on the graph screen. • Refer to [Fig. 3–5 and Fig. 3–6 Graph & Save setting screen 2]
②	Moving from current screen to next screen
③	Moving to the beginning and end of the displayed PV graph page
④	Moving of graph screen by one page.
⑤	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.

[Fig. 3-6] Graph&Save setting screen 2
(Graph display is not selected)

References

- 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(4) Stationary operation 3 operation screen] and [4-2(4) Program operation 3 operation screen] for saving into internal memory.

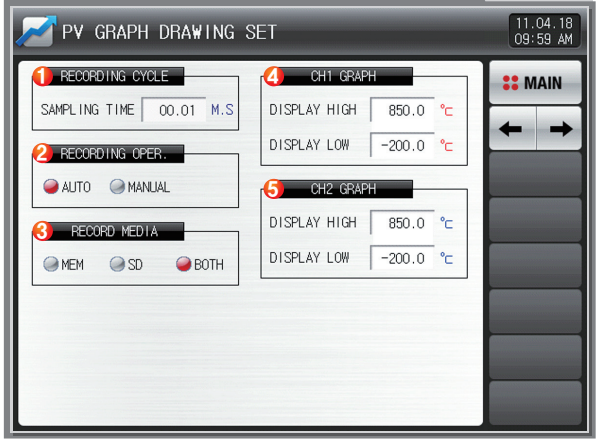
[Fig. 3-7] Graph&Save setting screen 2 (Saved file is displayed)

①	When PV FILE is touched, the files saved into the internal memory is displayed.
②	The saved files into the internal memory are displayed in 8 units.
③	When ▼ ▲ is touched, the saved files are moved in 8 units.
④	Copy the recorded files into the internal memory to SD card. • The transmission is impossible when there is not SD card option or during saving the PV graph in operation screen.

3-3. Presented value (PV) graph save setting

- This screen is to set the display range and sampling time which are necessary for graph recording in [4–1(4) Stationary operation 3 operation screen] and [4–2(4) Program operation 3 operation screen].

[Fig. 3–8] Graph&Save setting screen 3



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	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 2 manually
③	Setting the media for data saving • The saved data into the internal memory is deleted in electricity OFF
④	Setting the display range of channel 1 graph
⑤	Setting the display range of channel 2 graph

Parameter	Setting range	Unit	Initial value
Sampling time	00.01~99.59 (Min, Sec)	ABS	00.01
Saving operation setting	Auto, Manual	ABS	Auto
Saving media	Memory, SD card, Both of them	ABS	Both
Channel 1 graph display upper limit	Channel1.EU (–2.5 ~ 102.5%)	Channel1.EU	Channel1.EU(100.0%)
Channel 1 graph display lower limit	(Channel1 graph display lower limit 〈 Channel 1 graph display upper limit)	Channel1.EU	Channel1.EU(0.0%)
Channel 2 graph display upper limit	Channel1.EU (–2.5 ~ 102.5%)	Channel2.EU	Channel2.EU(100.0%)
Channel 2 graph display lower limit	(Channel1 graph display lower limit 〈 Channel 1 graph display upper limit)	Channel2.EU	Channel2.EU(0.0%)

3-4. Memory save setting

- It is a screen to set the transmitting of pattern and parameter to SD card.
- It is a screen displayed in SD card option only.

[Fig. 3–9] Graph&Save setting screen 4

①	Setting the items and direction of transmitting in SD card and TEMP2000 • PTN : Download or upload the set pattern in [6–1 Program pattern setting] • 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 TEMP2000 to SD card • Upload : Transmitting the selected transmitting items out of the saved data in TEMP2000 to SD card
②	It displays the current capacity of SD card • It displays when the SD card is inserted only
③	When the data is not in recording to SD card, TRANS is activated and download and upload are possible when TRANS is touched by.

Parameter	Setting range	Unit	Initial value
Transmitting item	Pattern, PARA, ALL	ABS	Pattern
Transmitting direction	Download, Upload	ABS	Download

Part 04

Operation state screen setting

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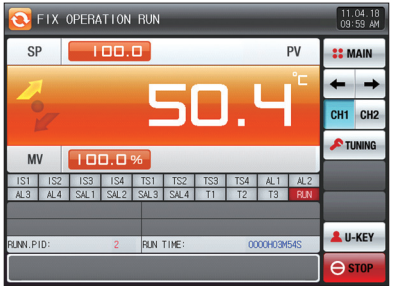
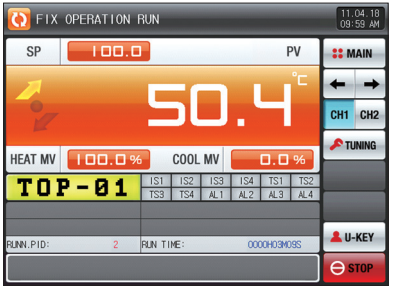
Flow chart

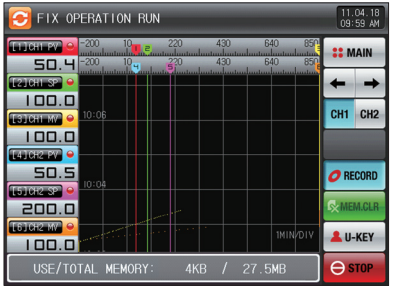
[Fig. 4-1] Stationary operation still screen 1
(General non-synchronized operation)



[Fig. 4-7] Stationary operation still screen 2 (General)



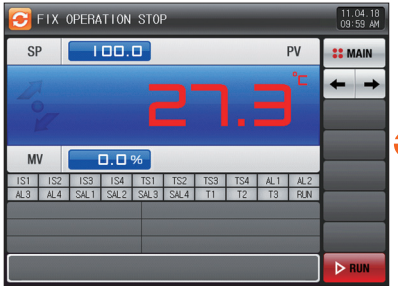
[Fig. 4-8] Stationary operation still screen 2
(Heating · Cooling)



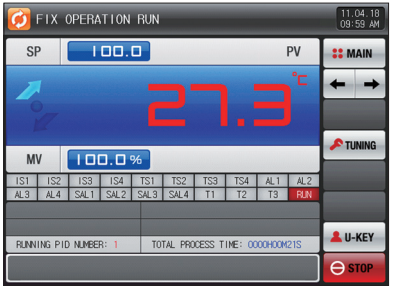
[Fig. 4-9] Stationary operation still screen 3
(Channel 1)

TEMP2000 SERIES

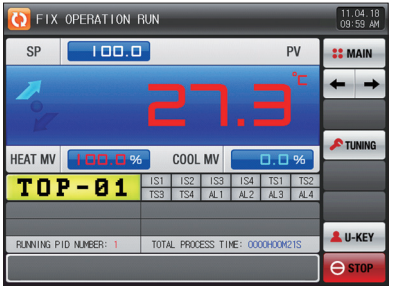
Flow chart



[Fig. 4-30] Stationary operation still screen 1 (General)



[Fig. 4-34] Stationary operation still screen 1 (General)



[Fig. 4-35] Stationary operation still screen 1 (Heating · Cooling)

[Fig. 4-36] Stationary operation still screen 2

04. Operation state screen setting

Explanation with CH1 CH2 corresponds to TEMP2*20 ONLY (TEMP2*00 series not support this setting)

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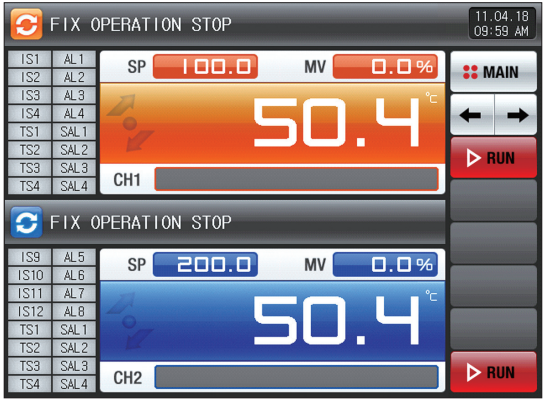
CH1 CH2 is a description of the operation on the screen.

4-1. Stationary operation

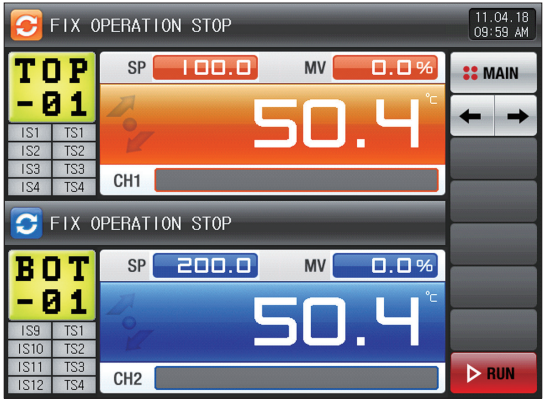
(1) Stationary operation still screen 1

- When the operation state screen is selected in [Fig. 2–1 Main Screen], it is converted to "Stationary operation still screen 1."
- Select the operation method of channel 1 and 2 with "Stationary" in [5. Operation motion setting]
- Synchronized and non–synchronized operation can be selected in [5. Operation motion setting]
- When ▷ RUN at the right bottom of [Fig. 4–1] Stationary operation still screen 1 is touched by, it converts to [Fig. 4–5] Stationary operation still screen 1.



[Fig. 4–1] Stationary operation still screen 1
(General non–synchronized operation)

[Fig. 4–2] Stationary operation still screen 1
(Heating · Cooling synchronized operation)



[Fig. 4–3] Stationary operation still screen 1
(General synchronized operation)

[Fig. 4–4] Screen for input key for setting target data of operation

Parameter	Setting range	Unit	Initial value
Channel1 setting data(SP)	Channel1.EU(0.0~100.0%)	Channel1.EU	Channel1.EU(0.0%)
Channel2 setting data(SP)	Channel2.EU(0.0~100.0%)	Channel2.EU	Channel2.EU(0.0%)

※ Channel1, Channel 2, EU: Range of sensor input data
※ Refer to [Engineering units]

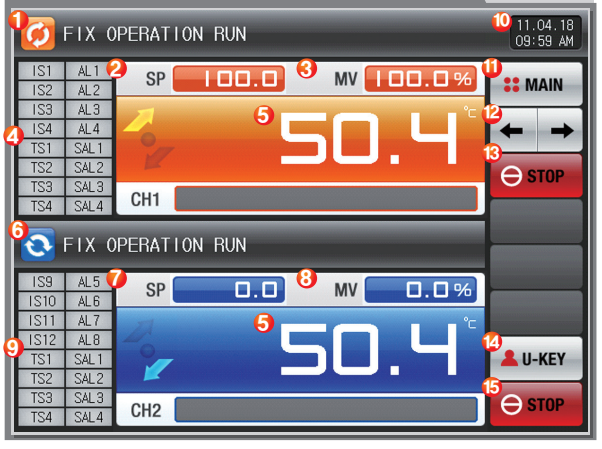
References

- When SP 100.0 and SP 200.0 are touched by for inputting the set data for channel 1 and 2, it is activated as shown in [Fig. 4–4] Screen for input key for setting target data of operation
- When the input of set data of channel 1 and 2 is completed, operate the stationary operation by selecting RUN.

(2) Stationary operation #1 operation screen

- It is a screen to display the state display lamps for measuring data, setting data and output volume.
- When the "Setting data" is touched even in operation, the input key setting for operation is activated.
- When the "Output volume" is touched in Heating · Cooling, output volume, Heating volume and Cooling volume are displayed in turn.
- The user can operate and stop channel for operation because the synchronized operation is classified independently for operation/stop of channel 1 and 2.

[Fig. 4-5] Stationary operation still screen 1 (General/non-synchronized operation)



[Fig. 4-5] Stationary operation still screen 1 (Heating · Cooling/synchronized operation)

References

- ▶ , : Setting data 〉 Measuring data is displayed in temperature increase.
- ▶ , : Setting data = Measuring data is displayed in temperature maintaining
- ▶ , : Setting data 〈 Measuring data is displayed in temperature decrease.

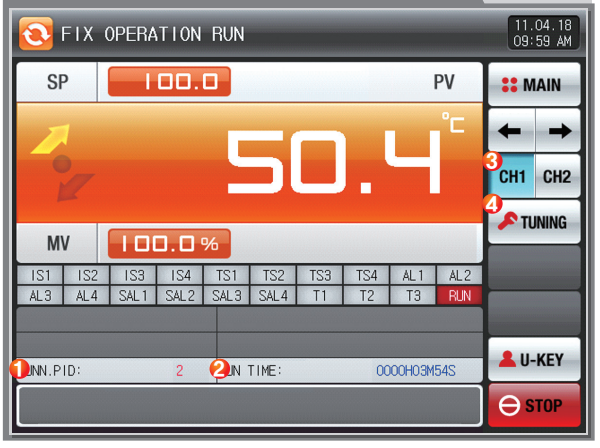
①	It displays the current operation status. • The arrow rotates to the clockwisely during operation
②	It displays the setting data (SP) to be controlled in channel 1.
③	It displays the control output volume (MV) in channel 1. When the output volume part is touched in controlling the Heating · Cooling, output volume (MV), Heating volume (H.MV) and Cooling volume (C.MV) is displayed in turn.
④	It displays the control output volume (MV) in channel 1. The "ON" state is displayed in red and "OFF" state is displayed in dark grey. • Setting the state lamp in [13. System initial setting] in [Operation manual] • Setting up to 20 for each state lamp channel in [13. System initial setting] The state lamps displayed in [Stationary operation #1 operation screen] are limited to 16. • The state lamps are displayed up to 8 units when the user tag is used. • 20 set state lamps are displayed in [Stationary operation #2 operation screen]
⑤	It displays the present value (PV)
⑥	It displays the current operation status. • The arrow rotates to the clockwisely during operation
⑦	It displays the setting data (SP) to be controlled in channel 1.
⑧	It displays the control output volume (MV) in channel 1. When the output volume part is touched in controlling the Heating · Cooling, output volume (MV), Heating volume (H.MV) and Cooling volume (C.MV) is displayed in turn.
⑨	It displays the control output volume (MV) in channel 2. The "ON" state is displayed in red and "OFF" state is displayed in dark grey.

⑨	• Setting the state lamp in [13. System initial setting] in [Operation manual] • Setting up to 20 for each state lamp channel in [13. System initial setting] The state lamps displayed in [Stationary operation #1 operation screen] are limited to 16. • The state lamps are displayed up to 8 units when the user tag is used. • 20 set state lamps are displayed in [Stationary operation #2 operation screen]
⑩	It displays the current date/time and LCD backlight is off when it is touched. • Red LED lamp at the right top is ON when the backlight is OFF in still state. • Green LED lamp at the right top is ON when the backlight is OFF in operation of any channel.
⑪	Moving to [Fig. 2–1 Main screen] • It displays the key pad to input the password when main button restriction is set. • Refer to [Fig. 5–2 Screen in restriction setting of main button]
⑫	Moving from current screen to next screen
⑬	Operation/stop button in channel 1 (Independently available for Operation/Stop)
⑭	User button • Y/N for use in [13. System initial setting] in [Operation manual] • User uses the wanted relay in [10. DO relay setting] in [Operation manual] when the user button is used. Ex) It is used for light the chamber. • The set relay is operated when the "User" button is touched by in the stationary and program operation/stop screen.
⑮	Operation/stop button in channel 2 (Independently available for Operation/Stop)
⑯	It displays the user tag for channel 1 and 2 • The setting for use of user tag and name can be made in [8–1 Screen display setting]

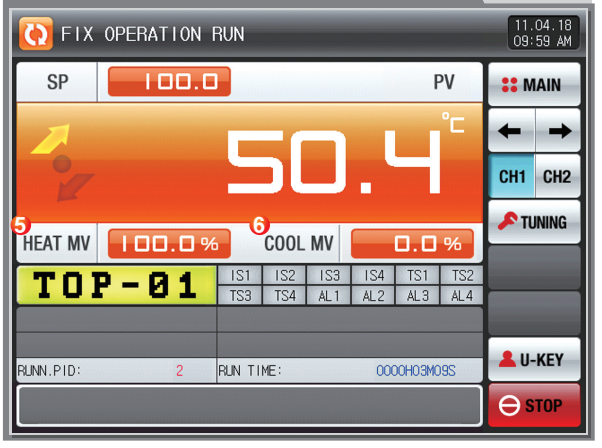
(3) Stationary operation #2 operation screen

- It is a screen to display the display lamps for measuring data, setting data and output volume.
- Channel 1 and 2 is stopped or operated when the stop or operation button is touched by during synchronized operation.
- The following screen is an explanation for channel 1 and screen of channel 2 is same with that of channel 1.

[Fig. 4-7] Stationary operation #2 operation screen (General)



[Fig. 4-8] Stationary operation #2 operation screen (Heating · Cooling)



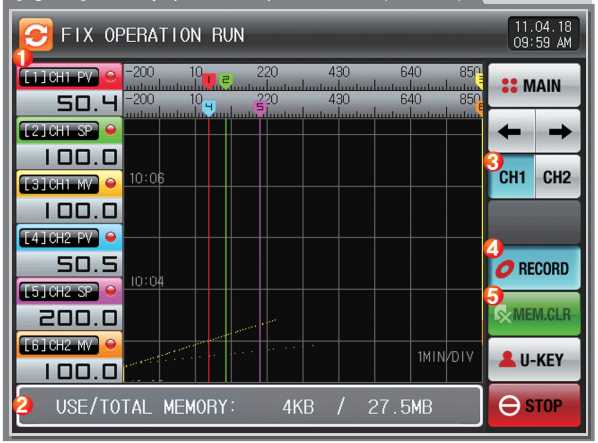
①	It displays the currently applied PID group number. • The applied PID group can be checked in [8. PID group] in [Operation manual]
②	It displays the total process time of stationary operation.
③	Moving to channel 1 or 2

④	Execution or releasing the auto tuning with set value (SP). • Y/N of the tuning button display is set in [8. PID group] in [Operation manual]
⑤	It displays the Heating output volume.
⑥	It displays the Cooling output volume.

(4) Stationary operation #3 operation screen

- The following screen is an explanation for channel 1 and screen of channel 2 is same with that of channel 1.
- The left of the screen is to display the measuring data, setting data and output volume of channel 1 and 2.
- ( ) check box sets Y/N for data display.
- Press RECORD 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.
- Refer to [3-2 Present value (PV) graph view]

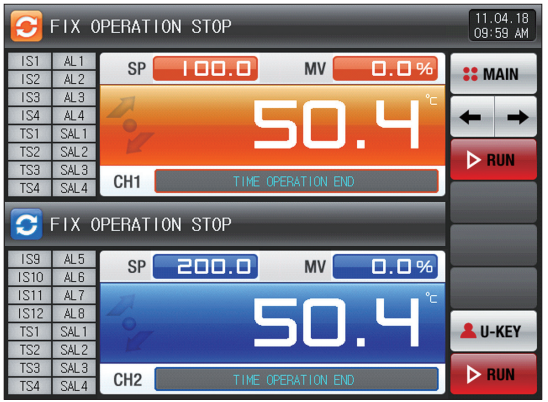
[Fig. 4-9] Stationary operation #3 operation screen (Channel 1)



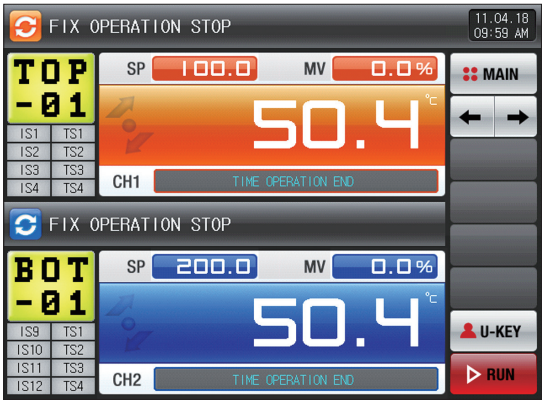
①	It displays the measuring data, setting data and output volume of currently operated channel 1 and 2.
②	It displays the capacity of internal memory. • About 25 days of saving is available when the sampling time is set in 1 second.
③	Moving to channel 1 or 2
④	It is a button to save the measuring data, setting data and output volume of currently recorded channel 1 and 2 into the memory (Internal memory, SD card).
⑤	It deletes every file saved in the internal memory.

(5) Termination screen for operation of stationary time setting

- The stationary operation is terminated while it shows the message, “The time setting operation is terminated.” when the operation is terminated by the elapse of setting time in channel 1 and 2 in [5. Operation motion setting]
- The “Time setting operation” can be set in same time because channel 1 and 2 operate independently, but the terminating timing can be differed.
- 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. (It is same with the program operation termination.)



[Fig. 4–10] Termination screen for operation of stationary time setting (Non synchronized operation)



[Fig. 4–11] Termination screen for operation of stationary time setting (Synchronized operation)

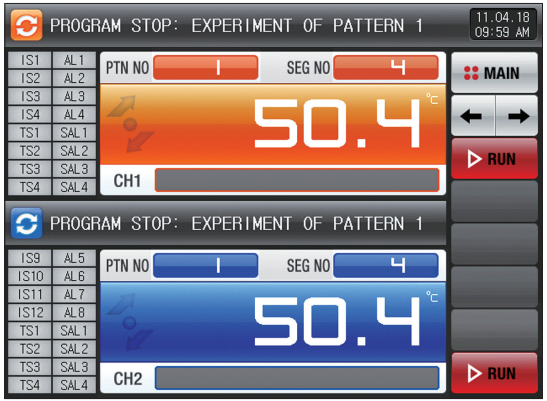
References

- It is a screen of termination for time setting operation in channel 1 and 2.
- The timing of termination of channel 1 and 2 can be differed depending on the time setting operation.

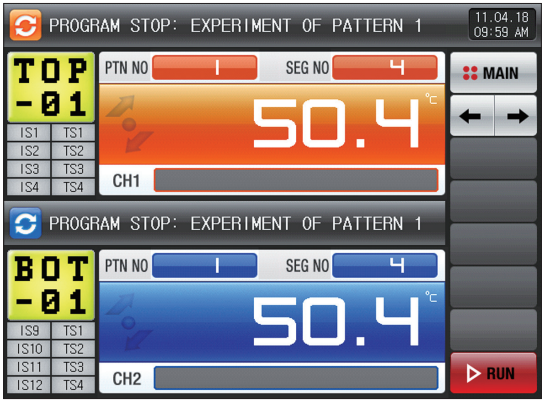
4-2. Program operation

(1) Program operation still screen 1

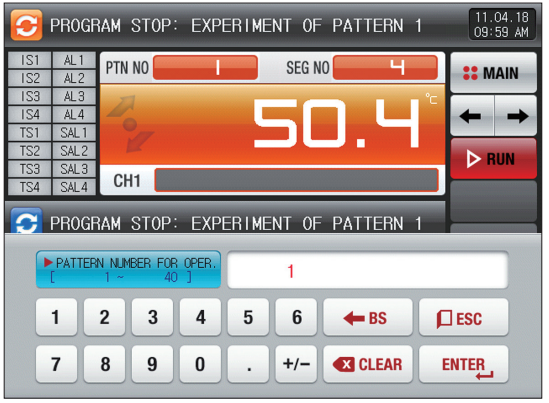
- It converts to “Program operation still screen 1” when the operation state screen is selected in [Fig. 2.1 Main screen].
- Select the operation method in channel 1 and 2 with “Pattern” in [5. Operation motion setting].
- The synchronized and non-synchronized operation can be selected in [5. Operation motion setting].
- Refer to [6-1 Program pattern setting] for pattern setting method.
- It converts to [Fig. 4-15 Program operation #1 operation screen] when RUN is touched by on the right bottom in [Fig. 4-12 Program operation #1 still screen]



[Fig. 4-12] Program operation #1 still screen
(Non-synchronized operation)



[Fig. 4-12] Program operation #1 still screen
(Synchronized operation)



[Fig. 4–14] Screen for pattern number setting input key to be operated

References

- When the button PTN NO 1 and PTN NO 1 are touched by for inputting the pattern number setting to be operated, it is activated as shown in [Fig. 4–14] Screen for pattern number setting input key to be operated.
- Execute the program by selecting RUN button when the input for the pattern number setting to be operated is completed.

Parameter	Setting range	Unit	Initial value
Channel #n pattern number	1~40	ABS	1

※ #n : 1 ~ 2

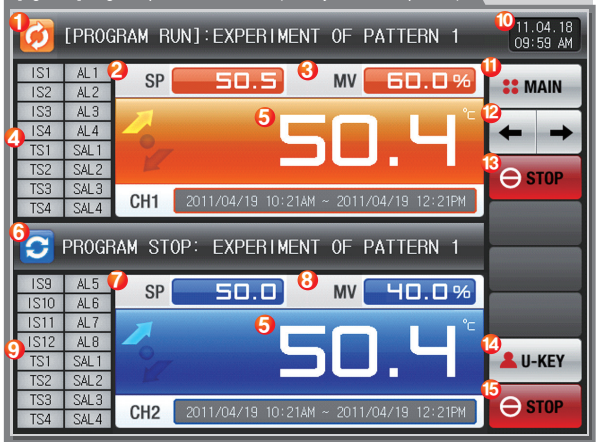
CAUTION Cautions in operation

- It is not operated when the program is not input into the pattern number on the screen.
- Refer to [6–1 Program pattern setting]

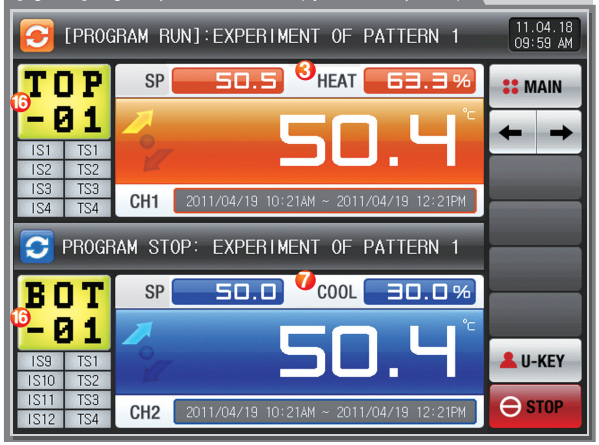
(2) Program operation #1 operation screen

- It is a screen to display the state display lamps for measuring data, setting data and output volume.
- The pattern number cannot be set during operation.
- When the "Output volume" is touched in Heating · Cooling, output volume, Heating volume and Cooling volume are displayed in turn.
- The user can operate and stop channel for operation because the non-synchronized operation is classified independently for operation/stop of channel 1 and 2.

[Fig. 4-15] Program operation still screen 1 (Non-synchronized operation)



[Fig. 4-16] Program operation still screen 1 (Synchronized operation)



References

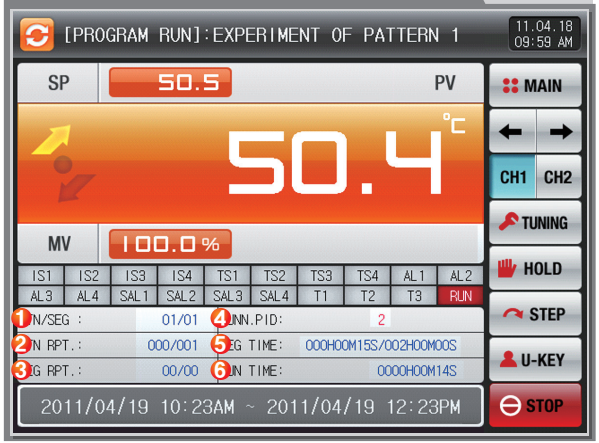
- It displays the direction of current pattern processing.
- , : Setting data)Measuring data is displayed in temperature increase.
- , : Setting data=Measuring data is displayed in temperature maintaining
- , : Setting data(Measuring data is displayed in temperature decrease.

①	It displays the current operation status. • The arrow rotates to the clockwisely during operation
②	It displays the setting data (SP) to be controlled in channel 1.
③	It displays the control output volume (MV) in channel 1. When the output volume part is touched in controlling the Heating · Cooling, output volume (MV), Heating volume (H.MV) and Cooling volume (C.MV) is displayed in turn.
④	It displays the control output volume (MV) in channel 1. The "ON" state is displayed in red and "OFF" state is displayed in dark grey. • Setting the state lamp in [13. System initial setting] in [Operation manual] • Setting up to 20 for each state lamp channel in [13. System initial setting] The state lamps displayed in [Program operation #1 operation screen] are limited to 16. • The state lamps are displayed up to 8 units when the user tag is used. • 20 set state lamps are displayed in [Program operation #2 operation screen]
⑤	It displays the present value (PV).
⑥	It displays the current operation status. • The arrow rotates to the clockwisely during operation
⑦	It displays the setting data (SP) to be controlled in channel 1.
⑧	It displays the control output volume (MV) in channel 1. When the output volume part is touched in controlling the Heating · Cooling, output volume (MV), Heating volume (H.MV) and Cooling volume (C.MV) is displayed in turn.
⑨	It displays the control output volume (MV) in channel 2. The "ON" state is displayed in red and "OFF" state is displayed in dark grey. • Setting the state lamp in [13. System initial setting] in [Operation manual] • Setting up to 20 for each state lamp channel in [13. System initial setting] The state lamps displayed in [Program operation #1 operation screen] are limited to 16. • The state lamps are displayed up to 8 units when the user tag is used. • 20 set state lamps are displayed in [Program operation #2 operation screen]
⑩	It displays the current date/time and LCD backlight is off when it is touched. • Red LED lamp at the right top is ON when the backlight is OFF in still state. • Green LED lamp at the right top is ON when the backlight is OFF in operation of any channel.
⑪	Moving to [Fig. 2–1 Main screen] • It displays the key pad to input the password when main button restriction is set. • Refer to [Fig. 5–2 Screen in restriction setting of main button]
⑫	Moving from current screen to next screen
⑬	Operation/stop button in channel 1 (Independently available for Operation/Stop)
⑭	User button • Y/N for use in [13. System initial setting] in [Operation manual] • User uses the wanted relay in [10. DO relay setting] in [Operation manual] when the user button is used. Ex) It is used for light the chamber. • The set relay is operated when the "User" button is touched by₩ in the stationary and program operation/stop screen.
⑮	Operation/stop button in channel 2 (Independently available for Operation/Stop)
⑯	It displays the user tag for channel 1 and 2 • The setting for use of user tag and name can be made in [8–1 Screen display setting]

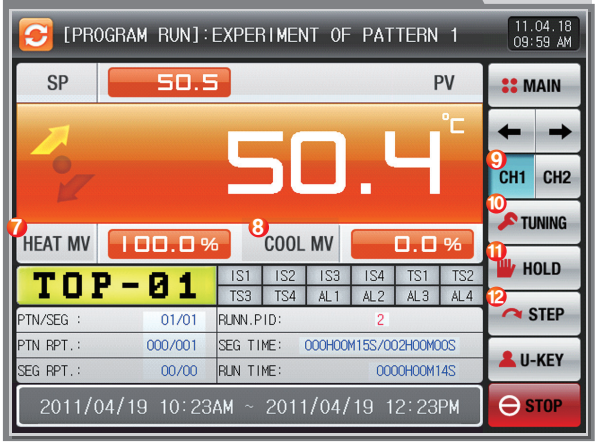
(3) Program operation #2 operation screen

- It is a screen to display the display lamps for measuring data, setting data and output volume.
- Channel 1 and 2 is stopped or operated when the stop or operation button is touched by during synchronized operation.
- The following screen is an explanation for channel 1 and screen of channel 2 is same with that of channel 1.

[Fig. 4-17] Program operation #2 operation screen (General)



[Fig. 4-8] Program operation #2 operation screen (Heating · Cooling)



①	It displays the currently operated program pattern number and segment number.
②	It displays the pattern repetition state. • The figure in the front in PTN RPT.: 000/001 shows the frequency of repetition and the figure at the end shows the set repetition frequency.
③	It displays the partial repetition state. • The figure in the front of SEG RPT.: 00/00 shows the frequency of repetition and the figure at the end shows the set repetition frequency.
④	It displays the currently applied PID ground number. • The applied PID group can be checked in [8. PID group] in [Operation manual].
⑤	It displays the segment process time and setting time of currently processing segment. • The time in the front of SEG TIME: 000H00M15S/002H00M00S shows the segment processing time and the time at the end shows the set time in [6-1 Program pattern setting]
⑥	It displays the total process time of program operation.
⑦	It displays the Heating output volume.
⑧	It displays the Cooling output volume.
⑨	Moving to channel 1 or 2
⑩	Execution or releasing the auto tuning with set value (SP). • Y/N of the tuning button display is set in [8. PID group] in [Operation manual]
⑪	Maintaining (Hold On) or Release (Hold Off) the currently operating temperature set value.
⑫	Terminating the currently processing segment and forced moving to the next segment.

(4) Program operation #3 operation screen

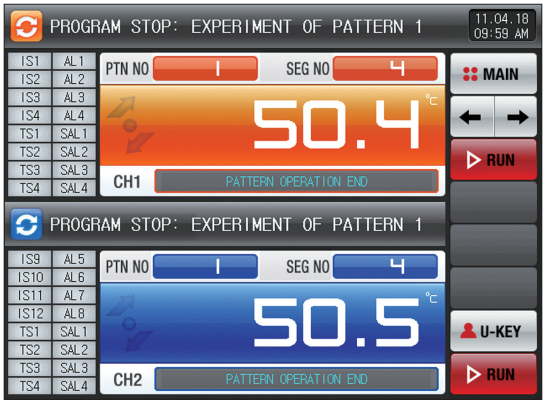
- The following screen is an explanation for channel 1 and screen of channel 2 is same with that of channel 1.
- The left of the screen is to display the measuring data, setting data and output volume of channel 1 and 2.
- ( ) check box sets Y/N for data display.
- Press RECORD at the right middle to 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.
- Refer to [3-2 Present value (PV) graph view]

[Fig. 4-9] Program operation #3 operation screen (Channel 1)

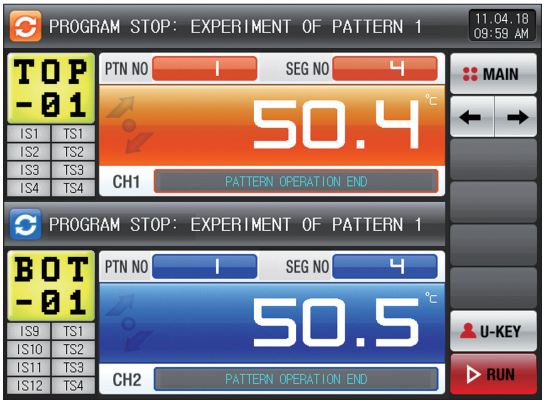
①	It displays the measuring data, setting data and output volume of currently operated channel 1 and 2.
②	It displays the capacity of internal memory. • About 25 days of saving is available when the sampling time is set in 1 second.
③	Moving to channel 1 or 2
④	It is a button to save the measuring data, setting data and output volume of currently recorded channel 1 and 2 into the memory (Internal memory, SD card).
⑤	It deletes every file saved in the internal memory.

(5) Termination screen for operation of program

- The program operation is terminated while it shows the message, “The program operation is terminated.” when the operation for segment setting range saved into the pattern is terminated in channel 1 and 2 in.
- The “Program pattern operation” can be set in same time because channel 1 and 2 operate independently, but the terminating timing can be differed.
- 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. (It is same with the stationary operation termination.)



[Fig. 4–20] Termination screen for operation of program (Non synchronized operation)



[Fig. 4–11] Termination screen for operation of program (Synchronized operation)

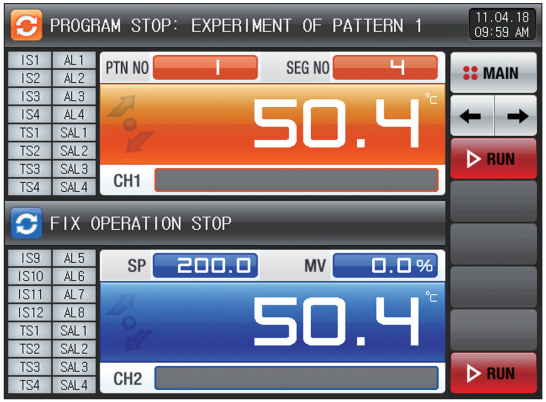
References

- It is a screen of termination for time setting operation in channel 1 and 2.
- The timing of termination of channel 1 and 2 can be differed depending on the time setting operation.

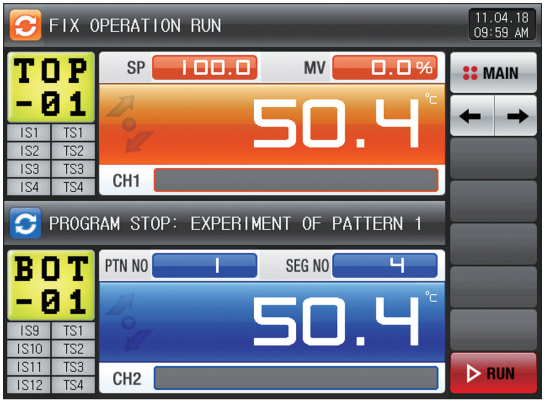
4-3. Stationary and Program operation

(1) Stationary and Program operation still screen 1

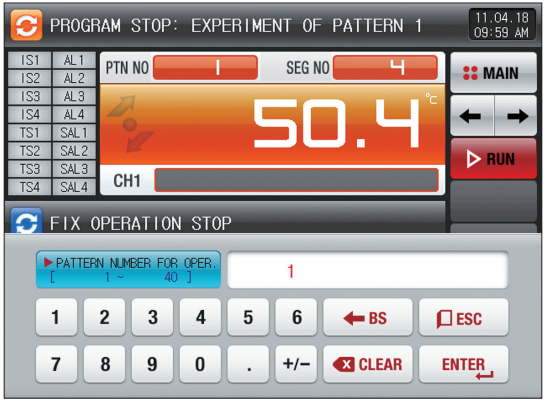
- Select the operation method in channel 1 and 2 with “Stationary” or “Pattern” in [5. Operation motion setting].
- The synchronized and non-synchronized operation can be selected in [5. Operation motion setting].
- Refer to [6-1 Program pattern setting] for pattern setting method.
- It converts to [Fig. 4-28 Program/Stationary operation #1 operation screen] when ▷ RUN is touched by on the right bottom in [Fig. 4-12 Program operation #1 still screen]



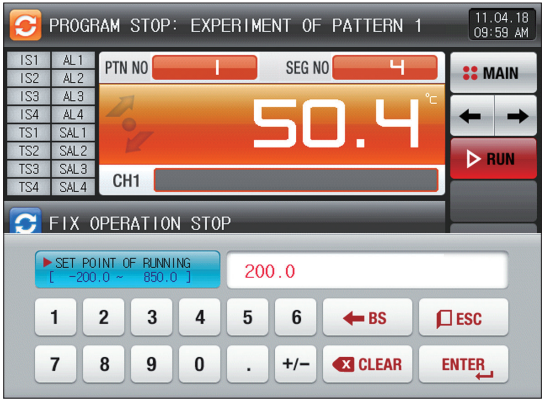
[Fig. 4-22] Program/Stationary operation still screen (Non-synchronized operation)



[Fig. 4-23] Program/Stationary operation still screen (Synchronized operation)



[Fig. 4–24] Screen for pattern number setting input key of program to be operated in program/stationary operation still screen (Non synchronized operation)



[Fig. 4–25] Screen for target value setting input key of program for stationary operation in program/stationary operation still screen (Non synchronized operation)

References

- When the button PTN NO 1 is touched by for inputting the pattern number in channel 1, it is activated as shown in [Fig. 4–24].
- When the button SP 200.0 is touched by for inputting the set value in channel 2, it is activated as shown in [Fig. 4–25].

Parameter	Setting range	Unit	Initial value
Channel 1 #n pattern No.	1~40	ABS	1
Channel 2 setting value (SP)	Channel2.EU(0.0 ~ 100.0%)	Channel2.EU	Channel2.EU(0.0%)

[Fig. 4-26] Screen for target value setting input key for stationary operation program/stationary operation still screen (Synchronized operation)

[Fig. 4-27] Screen for pattern number setting input key for program operation in program/stationary operation still screen (Synchronized operation)

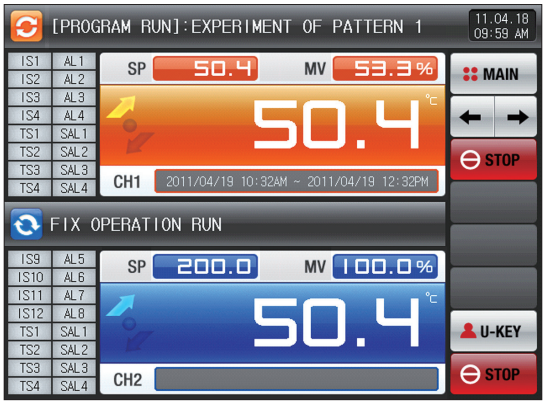
References

- When the button SP 100.0 is touched by for inputting the set value in channel 1, it is activated as shown in [Fig. 4-26].
- When the button PTN NO 1 is touched by for inputting the pattern number in channel 2, it is activated as shown in [Fig. 4-26].

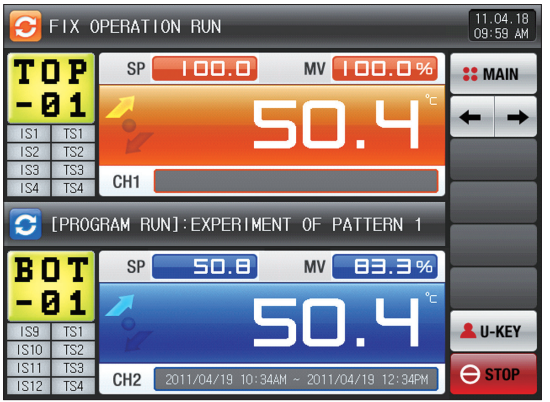
Parameter	Setting range	Unit	Initial value
Channel 1 setting value (SP)	Channel1,EU(0.0 ~ 100.0%)	Channel1,EU	Channel1,EU(0.0%)
Channel 2 #n pattern No.	1~40	ABS	1

(2) Stationary and program operation #1 operation screen

- It is a screen to display the state display lamps for measuring data, setting data and output volume.
- The operation method of channel 1 and 2 can be selected with “Stationary” and “Pattern” in [5. Operation motion setting].
- The synchronized and non-synchronized operation can be selected in [5. Operation motion setting].
- Refer to [4-1(2) Stationary operation #1 operation screen] and [4-2(2) Program operation #1 operation screen] for stationary/program operation #1 operation screen.
- Refer to [4-1(3) Stationary operation #2 operation screen] and [4-2(3) Program operation #2 operation screen] for stationary/program operation #2 operation screen.
- Refer to [4-1(4) Stationary operation #3 operation screen] and [4-2(4) Program operation #3 operation screen] for stationary/program operation #1 operation screen.
- Refer to [4-1(5) Termination screen for stationary time setting] and [4-2(5) Termination screen for program time setting] for termination screen of stationary/program operation #1 operation.
- The operator can operate/stop the channel for operation as the operation/stop button is classified independently in channel 1 and 2 for non-synchronized operation.
- The operation/stop of channel 1 and 2 can be made with one button as single button for the operation/stop is configured in channel 1 and 2 for synchronized operation.



[Fig. 4-28] Program/stationary operation #1 operation screen (Non-synchronized operation)



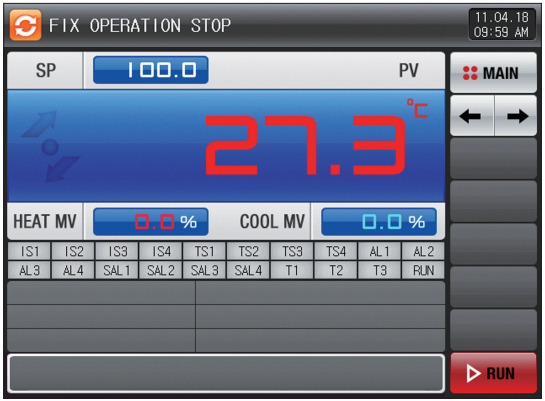
[Fig. 4-29] Stationary/Program operation #1 operation screen (Synchronized operation)

4-4. Stationary operation

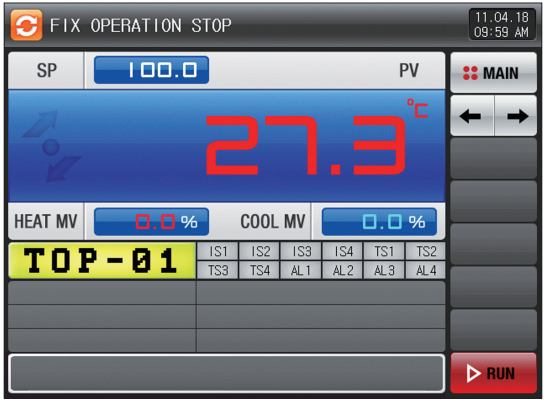
(1) Stationary operation still screen 1

- It converts to "Stationary operation still screen 1" when the operation state screen is selected in [Fig. 2.1 Main screen].
- Select the operation method in channel 1 and 2 with "Stationary" in [5. Operation motion setting].
- It converts to [Fig. 4-34 Stationary operation #1 operation screen] when ▷RUN is touched on the right bottom in [Fig. 4-30 Stationary operation #1 still screen]

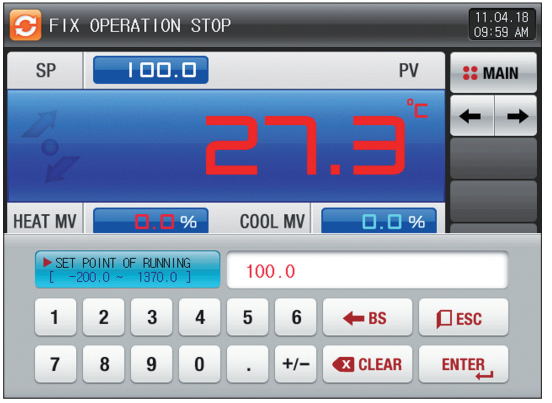
[Fig. 4-30] Stationary operation #1 still screen (General)



[Fig. 4-31] Stationary operation #1 still screen (Heating · Cooling)



[Fig. 4-32] Stationary operation still screen 1 (User tag display)



[Fig. 4-33] Screen for input key for setting target data of operation

Parameter	Setting range	Unit	Initial value
Set value(SP)	EU(0.0 ~ 100.0%)	EU	EU(0.0%)

※ EU : Range of sensor input data
※ Refer to [Engineering units]

References

- When SP 200.0 is touched by for inputting the set data it is activated as shown in [Fig. 4-33] Screen for input key for setting target data of operation
- When the input of set data of completed, operate the stationary operation by selecting RUN.

(2) Stationary operation #1 operation screen

- It is a screen to display the state display lamps for measuring data, setting data and output volume.
- When the "Setting data" is touched even in operation, the input key setting for operation is activated.

[Fig. 4-34] Stationary operation #1 operation screen (General)

[Fig. 4-35] Stationary operation #1 operation screen (Heating · Cooling)

References

- : Setting data〉Measuring data is displayed in temperature increase.
- : Setting data=Measuring data is displayed in temperature maintaining.
- : Setting data〈Measuring data is displayed in temperature decrease.

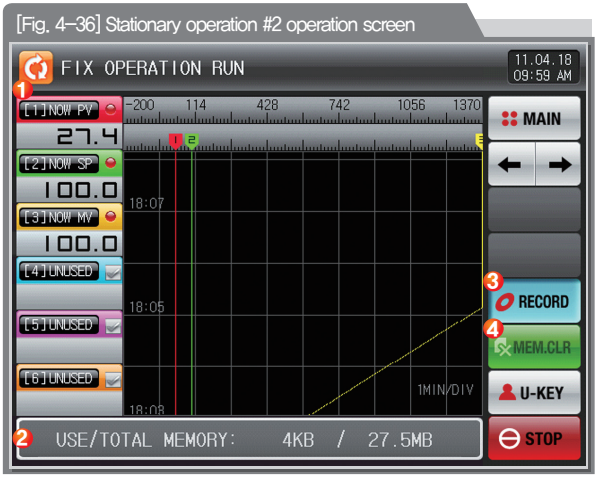
①	It displays the current operation status. • The arrow rotates to the clockwisely during operation
②	It displays the setting data (SP) to be controlled
③	It displays the control output volume (MV).
④	It displays the state lamp and the “ON” state is displayed in red and “OFF” state is displayed in dark grey. • Setting the state lamp in [13. System initial setting screen] in [Installation manual]
⑤	It displays the currently applied PID group number. • The applied PID group can be checked in [8. PID group] in [Operation manual]
⑥	It displays the total process time of stationary operation.
⑦	It displays the present value (PV).
⑧	It displays the current date/time and LCD backlight is off when it is touched. • Red LED lamp at the right top is ON when the backlight is OFF in still state. • Green LED lamp at the right top is ON when the backlight is OFF in operation of any channel.
⑨	Moving to [Fig. 2–1 Main screen] • It displays the key pad to input the password when main button restriction is set. • Refer to [Fig. 5–2 Screen in restriction setting of main button]

⑩	Moving from current screen to next screen
⑪	Execution or releasing the auto tuning with set value (SP). • Y/N of the tuning button display is set in [8. PID group] in [Operation manual]
⑫	User button • Y/N for use in [13. System initial setting] in [Operation manual] • User uses the wanted relay in [10. DO relay setting] in [Operation manual] when the user button is used. Ex) It is used for light the chamber. • The set relay is operated when the “User” button is touched by in the stationary and program operation/stop screen.
⑬	Operation/stop button
⑭	It displays the Heating output volume (H.MV).
⑮	It displays the Cooling output volume (C.MV).
⑯	It displays the user tag. • The setting for use of user tag and name can be made in [8–1 Screen display setting]

(3) Stationary operation #2 operation screen

- The left of the screen is to display the measuring data, setting data and output volume of channel 1 and 2.
- ( ) check box sets Y/N for data display.
- Press RECORD 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.
- Refer to [3-2 Present value (PV) graph view]

[Fig. 4-36] Stationary operation #2 operation screen

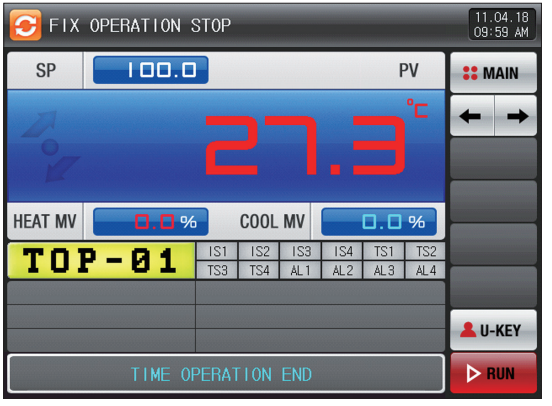


①	It displays the measuring data, setting data and output volume of currently operated channel 1 and 2.
②	It displays the capacity of internal memory. • About 25 days of saving is available when the sampling time is set in 1 second.
③	It is a button to save the measuring data, setting data and output volume of currently recorded channel 1 and 2 into the memory (Internal memory, SD card).
④	It deletes every file saved in the internal memory.

(4) Termination screen for operation of stationary time setting

- The stationary operation is terminated while it shows the message, “The time setting operation is terminated.” as follows when the operation is terminated by the elapse of setting time in channel 1 and 2 in [5. Operation motion setting]
- 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. (It is same with the program operation termination.)

[Fig. 4–37] Termination screen for operation of stationary time setting (General)

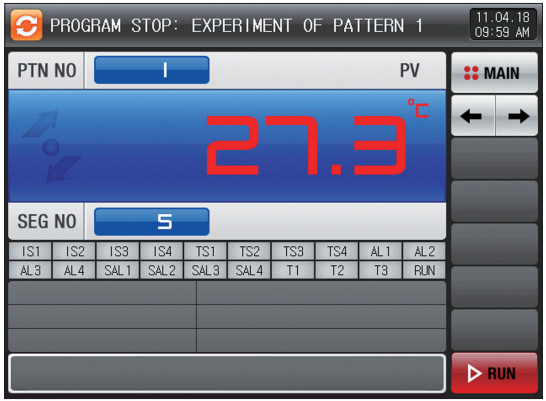


[Fig. 4–11] Termination screen for operation of stationary time setting (Heating · Cooling)

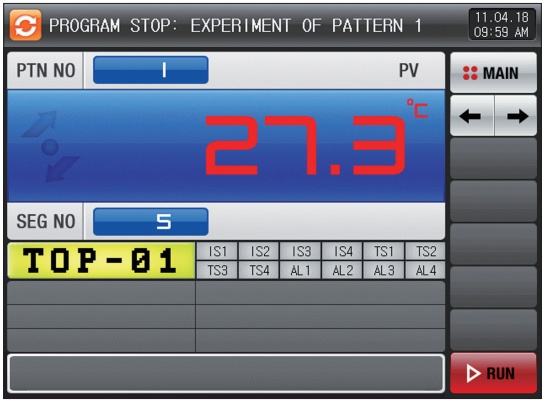
4-5. Program operation

(1) Program operation still screen 1

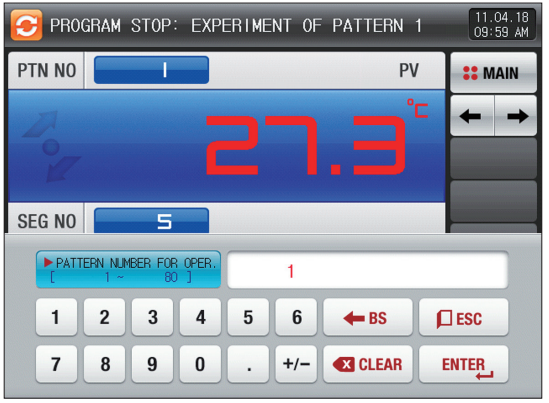
- It converts to “Program operation still screen 1” when the operation state screen is selected in [Fig. 2.1 Main screen].
- Select the operation method “Pattern” in [5. Operation motion setting].
- Refer to [6-1 Program pattern setting] for pattern setting method.
- It converts to [Fig. 4-42 Program operation #1 operation screen] when ▷ RUN is touched by on the right bottom in [Fig. 4-39 Program operation #1 still screen]



[Fig. 4-39] Program operation #1 still screen



[Fig. 4-12] Program operation #1 still screen (User tag display)



[Fig. 4-41] Screen for pattern number setting input key to be operated

References

- When the button PTN NO 1 is touched by for inputting the pattern number setting to be operated, it is activated as shown in [Fig. 4-41] Screen for pattern number setting input key to be operated.
- Execute the program by selecting RUN button when the input for the pattern number setting to be operated is completed.

Parameter	Setting range	Unit	Initial value
Pattern No.	1~80	ABS	1

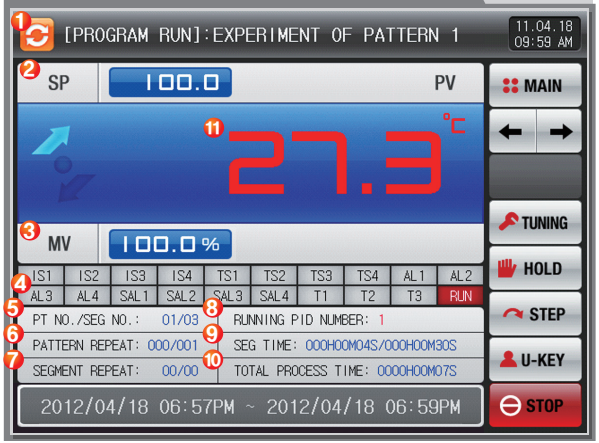
Cautions in operation

- It is not operated when the program is not input into the pattern number on the screen.
- Refer to [6-1 Program pattern setting]

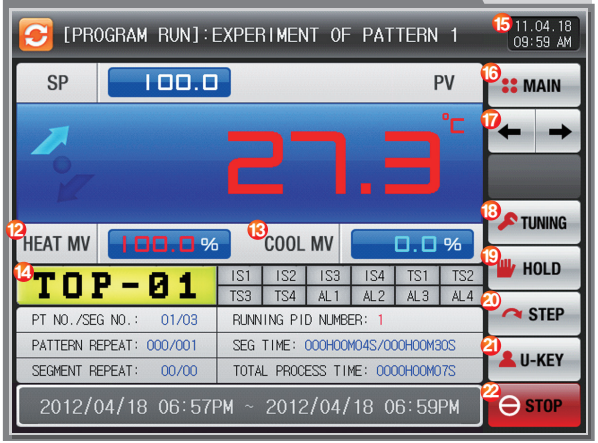
(2) Program operation #1 operation screen

- It is a screen to display the state display lamps for measuring data, setting data and output volume.
- The pattern number cannot be set during operation.

[Fig. 4-42] Program operation #1 operation screen (General)



[Fig. 4-43] Program operation #1 operation screen (Heating · Cooling)



References

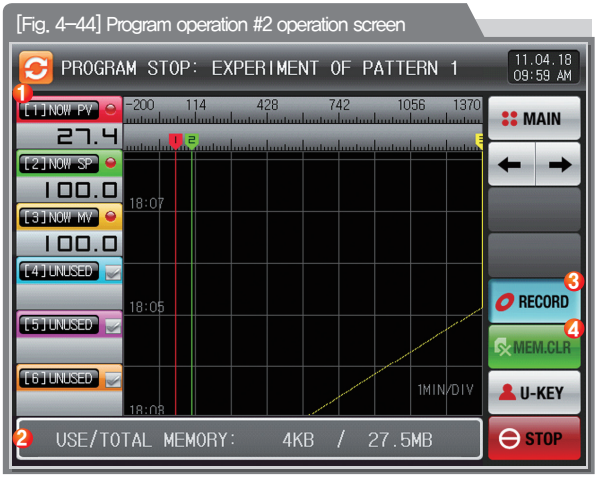
- It displays the direction of current pattern processing.
- : It displays the increase of the set value.
- : It displays the maintaining of the set value.
- : It displays the decrease of the set value.

①	It displays the current operation status. • The arrow rotates to the clockwisely during operation
②	It displays the setting data (SP) to be controlled.
③	It displays the control output volume (MV).
④	It displays the state lamp and the "ON" state is displayed in red and "OFF" state is displayed in dark grey. • Setting the state lamp in [13. System initial setting screen] in [Installation manual]
⑤	It displays the currently operated program pattern number and segment number.
⑥	It displays the pattern repetition state. • The figure in the front in PATTERN REPEAT: 000/001 shows the frequency of repetition and the figure at the end shows the set repetition frequency.
⑦	It displays the partial repetition state. • The figure in the front of SEGMENT REPEAT: 00/00 shows the frequency of repetition and the figure at the end shows the set repetition frequency.
⑧	It displays the currently applied PID ground number. • The applied PID group can be checked in [8. PID group] in [Operation manual].
⑨	It displays the segment process time and setting time of currently processing segment. • The time in the front of SEG TIME: 000H00M04S/000H00M30S shows the segment processing time and the time at the end shows the set time in [6-1 Program pattern setting]
⑩	It displays the total process time of program operation.
⑪	It displays the present value (PV).
⑫	It displays the Heating output volume (H.MV).
⑬	It displays the Cooling output volume (C.MV).
⑭	It displays the user tag. • The setting for use of user tag and name can be made in [8-1 Screen display setting]
⑮	It displays the current date/time and LCD backlight is off when it is touched. • Red LED lamp at the right top is ON when the backlight is OFF in still state. • Green LED lamp at the right top is ON when the backlight is OFF in operation of any channel.
⑯	Moving to [Fig. 2-1 Main screen] • It displays the key pad to input the password when main button restriction is set. • Refer to [Fig. 5-2 Screen in restriction setting of main button]
⑰	Moving from current screen to next screen
⑱	Execution or releasing the auto tuning with set value (SP). • Y/N of the tuning button display is set in [8. PID group] in [Operation manual]
⑲	Maintaining (Hold On) or Release (Hold Off) the currently operating temperature set value.
⑳	Terminating the currently processing segment and forced moving to the next segment.
㉑	User button • Y/N for use in [13. System initial setting] in [Operation manual] • User uses the wanted relay in [10. DO relay setting] in [Operation manual] when the user button is used. Ex) It is used for light the chamber. • The set relay is operated when the "User" button is touched by in the stationary and program operation/stop screen.
㉒	Operation/stop button

(3) Program operation #2 operation screen

- The left of the screen is to display the measuring data, setting data and output volume of channel 1 and 2.
- ( ) check box sets Y/N for data display.
- Press RECORD 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.
- Refer to [3-2 Present value (PV) graph view]

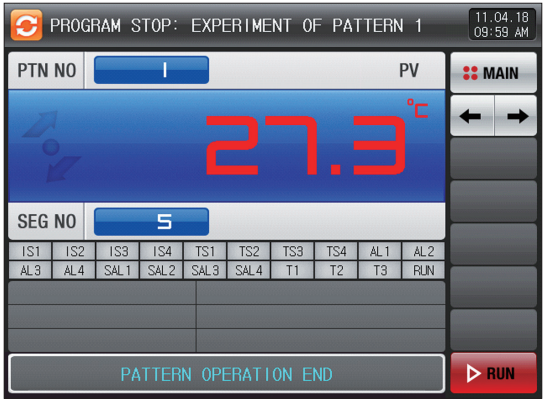
[Fig. 4-44] Program operation #2 operation screen



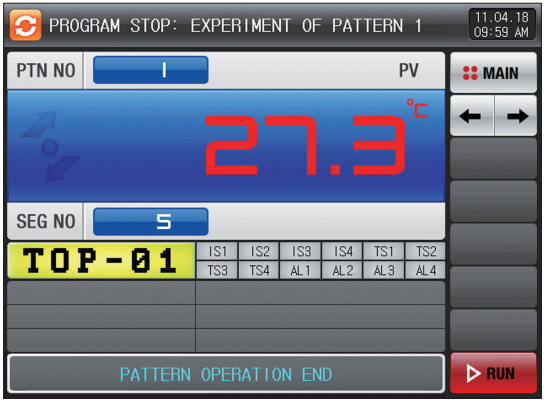
①	It displays the measuring data, setting data and output volume of currently operated.
②	It displays the capacity of internal memory. • About 25 days of saving is available when the sampling time is set in 1 second.
③	It is a button to save the currently recording measuring data, setting data and output volume into the memory (Internal memory, SD card).
④	It deletes every file saved in the internal memory.

(4) Termination screen for operation of program

- The program operation is terminated while it shows the message, “The program operation is terminated.” when the operation for segment setting range saved into the pattern is terminated.
- 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. (It is same with the stationary operation termination.)



[Fig. 4–45] Termination screen for operation of program



[Fig. 4–46] Termination screen for operation of program (User tag display)

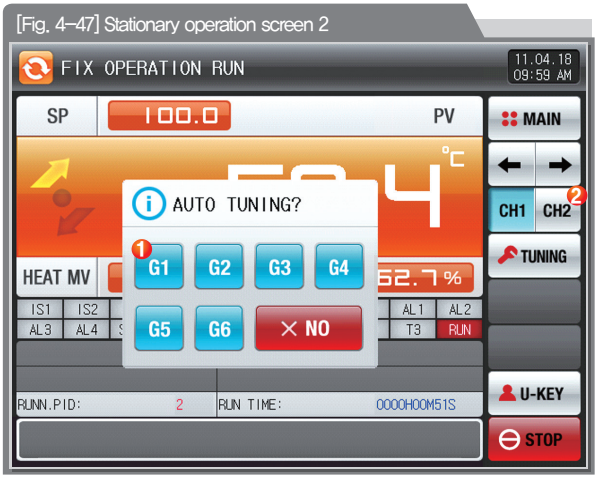
4-6. Auto tuning

- Auto tuning is classified into SEG PID method and zone PID method.
- The Hold and Step key shall not be used during program operation and auto tuning.

(1) Auto tuning (SEG PID method)

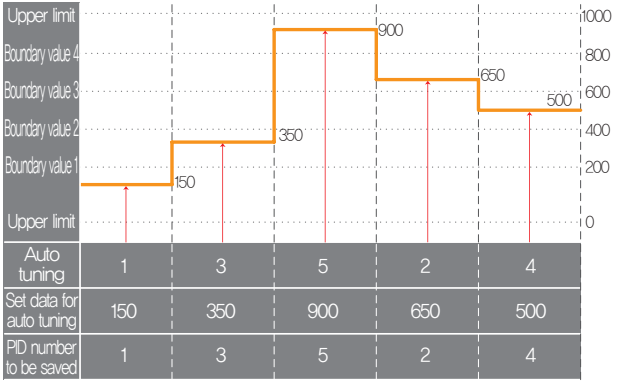
- The auto tuning is made based on the set value (SP) in SEG PID method and the tuning data is saved into "PID number" set in the auto tuning parameter.
- The segment is held during program operation and the segment is processed when the auto tuning is terminated.
- It is operated in set value (SP) at the termination of auto tuning in the stationary operation.
- The following screen is an explanation for channel 1 and channel 2 screen is same with channel 1.

[Fig. 4-47] Stationary operation screen 2



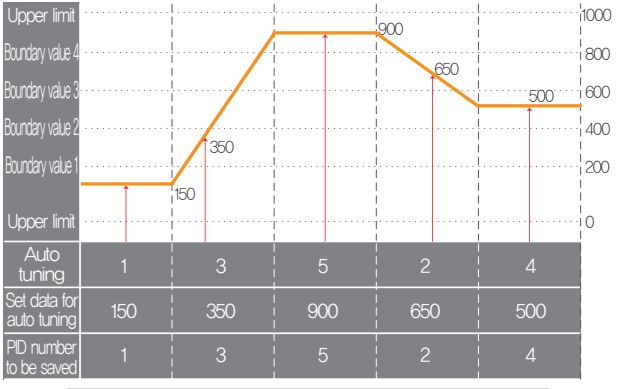
①	It sets the PID number. • The tuning data are saved in selected number at the moment of auto tuning termination.
②	Moving to channel 1 or 2

Parameter	Setting range	Unit	Initial value
Auto tuning	OFF, 1 ~ 6	ABS	OFF



Auto tuning	1	3	5	2	4
Set data for auto tuning	150	350	900	650	500
PID number to be saved	1	3	5	2	4

Stationary operation auto tuning (SEG)



Auto tuning	1	3	5	2	4
Set data for auto tuning	150	350	900	650	500
PID number to be saved	1	3	5	2	4

Program operation auto tuning (SEG)

References

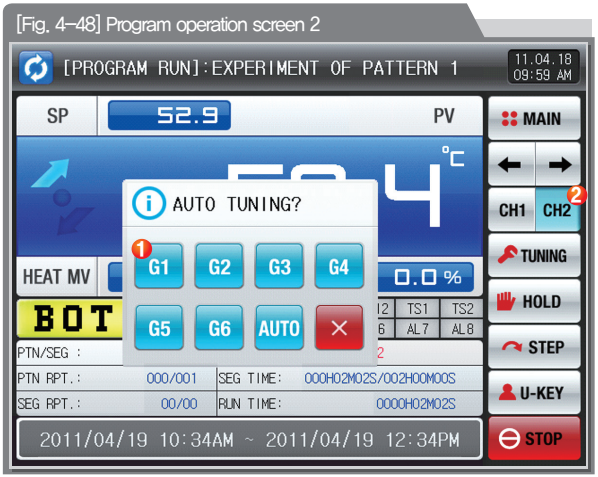
▶ Stationary/program operation auto tuning (SEG)

- Upper limt, Lower limit : It displays the range of input sensor.
- Boundary value 1~4 : It displays the boundary value of PID number.
- Auto tuning : It displays the PID number selected in auto tuning.
- Set data for auto tuning : It displays the currently operating set data.
- PID number to be saved : It displays the PID number to be saved after finishing the auto tuning.

(2) Auto tuning (Zone PID method)

- The tuning is made at the center point of the PID group boundary value set in the auto tuning parameter not with the set value (SP) in zone PID method.
- The segment is held during program operation and the segment is processed when the auto tuning is terminated.
- The set value (SP) at the termination of auto tuning is changed to the set value before auto tuning in the stationary operation.
- The following screen is an explanation for channel 2 and channel 1 screen is same with channel 2.

[Fig. 4-48] Program operation screen 2

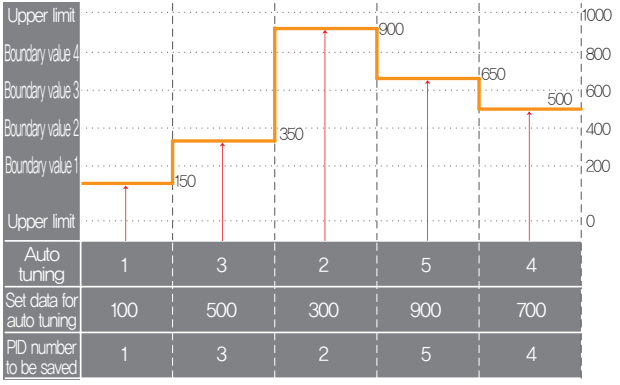


①	It sets the PID number. • The tuning data are saved in selected number at the moment of auto tuning termination.
②	Moving to channel 1 or 2

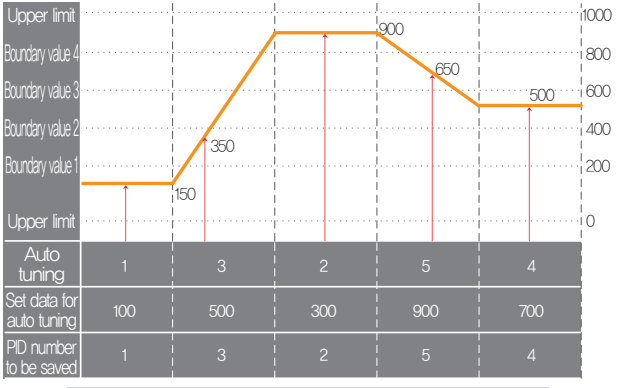
Parameter	Setting range	Unit	Initial value
Auto tuning	OFF, 1 ~ 6, Auto	ABS	OFF

Cautions in operation

- Any number is not saved as PID number when the auto tuning is forcibly stopped with AUTO
- Any number is not saved as PID number in black out.



Stationary operation auto tuning (Zone)



Program operation auto tuning (Zone)

References

▶ Stationary/program operation auto tuning (Zone)

– Upper limit, Lower limit: It displays the range of input sensor.

– Boundary value 1~4: It displays the boundary value of PID number.

– Auto tuning: It displays the PID number selected in auto tuning.

– Set data for auto tuning: It displays the currently operating set data.

– PID number to be saved: It displays the PID number to be saved after finishing the auto tuning.

▶ The calculation for tuning point is made as follows.

① Tuning point: 1 (It executes the PID 1 range auto tuning.)

– PID1 auto tuning set value = Lower limit + $\frac{\text{Boundary value1} - \text{lower limit}}{2}$

② Tuning point: 2 (It executes the PID 2 range auto tuning.)

– PID2 auto tuning set value = Boundary value1 + $\frac{\text{Boundary value2} - \text{Boundary value1}}{2}$

③ Tuning point: 3 (It executes the PID 3 range auto tuning.)

– PID3 auto tuning set value = Boundary value2 + $\frac{\text{Boundary value3} - \text{Boundary value2}}{2}$

④ Tuning point: 4 (It executes the PID 4 range auto tuning.)

– PID4 auto tuning set value = Boundary value3 + $\frac{\text{Boundary value4} - \text{Boundary value3}}{2}$

⑤ Tuning point: 5 (It executes the PID 5 range auto tuning.)

– PID5 auto tuning set value = Boundary value4 + $\frac{\text{Upper limit} - \text{Boundary value1}}{2}$

References

⑥ Tuning point: 6 (It executes the PID 6 range auto tuning.)

– PID6 auto tuning set value = Lower limit + $\frac{\text{Boundary value1} - \text{lower limit}}{2}$

⑦ Tuning point: Automatic

- The auto tuning for PID 1~6 ranges are executed in sequence.
- The auto tuned PID values are saved into PID 1~6 ranges.

– – PID1 auto tuning set value = Lower limit + $\frac{\text{Boundary value1} - \text{lower limit}}{2}$

– – PID2 auto tuning set value = Boundary value1 + $\frac{\text{Boundary value2} - \text{Boundary value1}}{2}$

– – PID3 auto tuning set value = Boundary value2 + $\frac{\text{Boundary value3} - \text{Boundary value2}}{2}$

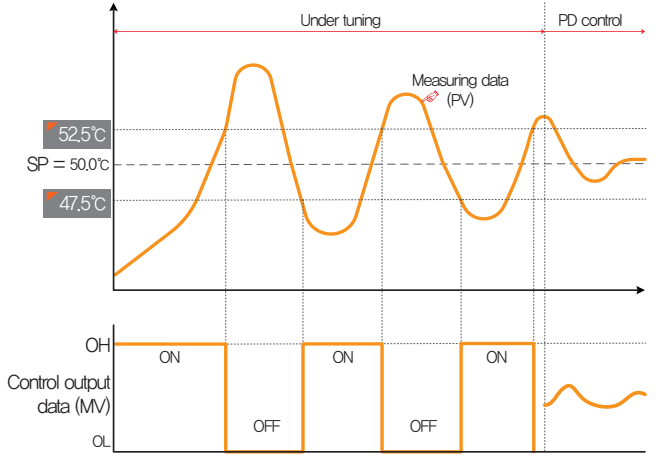
– – PID4 auto tuning set value = Boundary value3 + $\frac{\text{Boundary value4} - \text{Boundary value3}}{2}$

– – PID5 auto tuning set value = Boundary value4 + $\frac{\text{Upper limit} - \text{Boundary value4}}{2}$

– – PID6 auto tuning set value = Lower limit + $\frac{\text{Upper limit} - \text{Lower limit}}{2}$

4-7. Auto tuning and tuning point

- 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 PID data automatically based on the period and oscillation magnitude using the limit cycle to the object to be controlled.
- Auto tuning is available in the stationary and program operation.
- When the "Auto" is selected in auto tuning parameter, auto tuning is made in sequence and it is saved into the PID memory in sequence.



Auto tuning operation

References

▶ An example of auto tuning depending on the set value.

– Operation method: Stationary operation/Sensor input: Temperature (k2)
– Range : 0.0℃~1000.0℃
– Temperature auto tuning point : 0.25% → EUS 0.25% = 2.5℃
– Set value (SP) : 50.0℃
– Output lower limit (OL) : 0.0% / Output upper limit (OH) : 100.0%

52.5℃ 47.5℃ : Auto tuning point

Cautions in operation

- Any change in set value (SP) in auto tuning does not change the tuning point. And the tuning is started with changed set value (SP) for target set value (TSP) after auto tuning termination.
- The auto tuning is stopped in case of "Sensor short" in input during auto tuning. At this time, the PID data is kept with the previous set value.
- When auto tuning is processed beyond 27 hours, the auto tuning is stopped.
- The PID set value can be changed during auto tuning, but the obtained PID data from calculating in auto tuning termination is reset with the obtained PID data.
- The PID set value is maintained with previous set value when the auto tuning is forcibly terminated.

Part 05

Operation motion setting

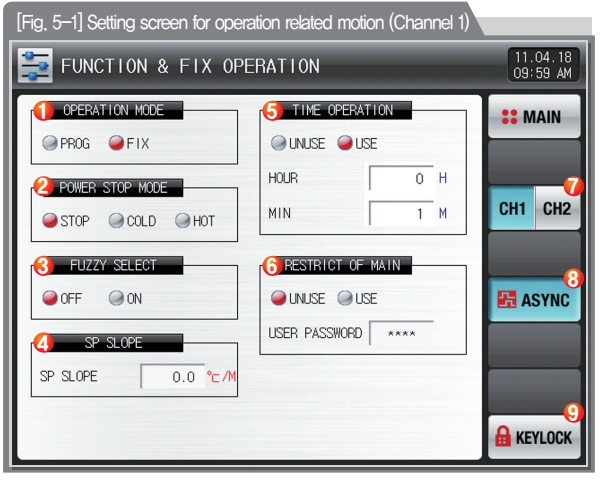
05. Operation motion setting

Explanation with CH1 CH2 corresponds to TEMP2*2D ONLY (TEMP2*DD series not support this setting)
It is a screen for general additional functions and additional setting in stationary operation.

5-1. Operation method setting

- It converts to the "Setting screen for operation related motion" when the operation motion setting is selected in [Fig. 2-1 Main screen]
- The following screen is an explanation for channel 1 and screen of channel 2 is same with that of channel 1.

[Fig. 5-1] Setting screen for operation related motion (Channel 1)



①	Setting with selection either of pattern or stationary operation for operation mode.(It cannot be changed during operation.) • Pattern : Setting in program operation • Stationary : Setting in stationary operation
②	Setting the recovery motion in black out • Stop : A motion to return to the operation stop state after power on from the black out. • Re-start : An operation from the beginning after power on from the black out. • Continue : A motion to return to the previous operation state after power on from the black out.
③	The overshoot is prevented in case of set value change. • No operation : No use of fuzzy function • Operation : Use of fuzzy function
④	Automatic increase or decreased with the set rate in case of set value change • It is adopted in stationary operation only.
⑤	Total operation in set time and in [4-1(3) Stationary operation #2 operation screen The operation stops when the process time is coincided with the set time. • It is adopted in stationary operation only.

⑥	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]
⑦	Moving to channel 1 or 2
⑧	A button to select the operation method for “Synchronized operation” and “Non–synchronized operation” • Synchronized operation : The operation/stop can be operated concurrently as single button for “Operation/Stop” was configured in “Stationary/program” operation screen. • Non–synchronized operation : he operation/stop can be operated independently as buttons for “Operation/Stop” were configured independently in “Stationary/program” operation screen.
⑨	The parameter setting is impossible when KEYLOCK button is touched by • Screen rolling and key block releasing is possible.

Return motion in black out	Program operation	Stationary operation
Stop	Program stop	Stop
Re–start	Operation from the first segment	Operation
Continue	Operation from the segment before black out	Operation

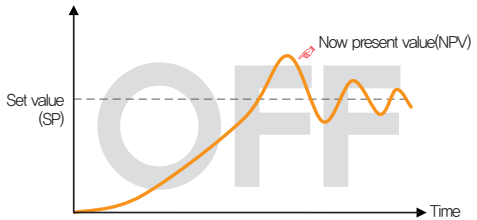
※ #n : 1 ~ 2

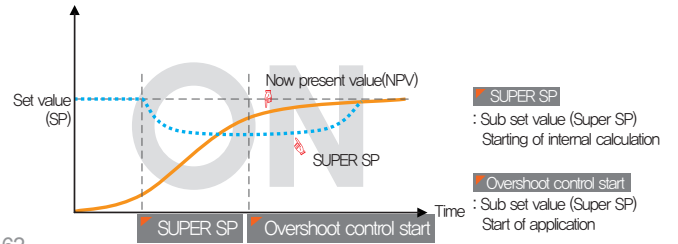
Parameter	Setting range	Unit	Initial value
Operation method	Pattern, stationary	ABS	Pattern
Returning motion in black out	Stop, re–start, continue	ABS	Stop
Fuzzy function	No operation, Operation	ABS	No operation
Channel #n set data change rate	Channel #n.EUS(0.00~100.00%)/Min	Channel #n.EUS/Min	Channel #n.EUS(00.00%)/Min
Time setting operation	No use, Use	ABS	No use
Hour	0~9999 hours	ABS	0
Minute	0~59 Min	ABS	0
Main button restriction	No use, Use	ABS	No use
Operation/stop operation method	Synchronized operation, Non–synchronized operation	ABS	Non–synchronized operation
Key block	No use, Use	ABS	No use

[Fig. 5-2] Main button restriction setting screen

5-2. Fuzzy operation

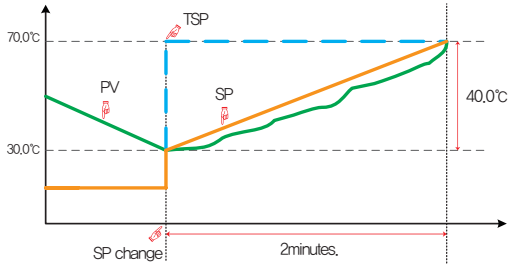
- The overshoot may be taken place in case of severe change in operation or frequent changes in present value (SP).
  More effective control can be made when the fussy function is operated at this time.
- Internal operation sequence of fuzzy function: It controls the overshoot by calculating the control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





5-3. Setting value change rate (SLOPE) operation

- The set value is changed by fixed changing rate from the now present value (PV) to set value when the set value is changed.



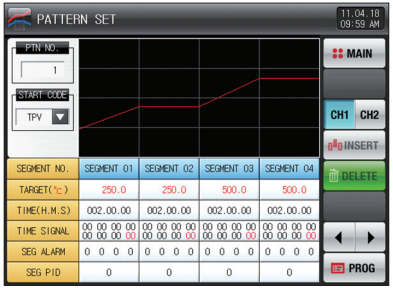
Change rate (Slope) operation

References

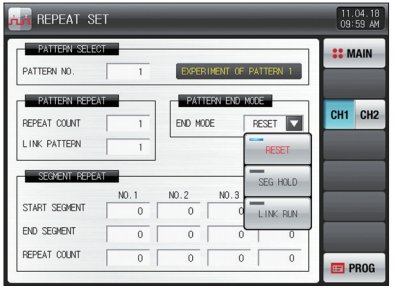
- Operation method: Stationary operation
- Temperature change rate: 20.0℃/Min
- Change [Changed SP(TSP) – PV at the SP changing point] with slope of 20.0℃ per minute: (70.0–30.0)℃ = Change 40.0℃ with the slope of 20℃
- Increase the current set value (SP) from 30.0℃ to 70.0℃ with uniform increasing rate for 2 minutes.

Part 06

Program setting



[Fig. 6-2] Pattern editing screen

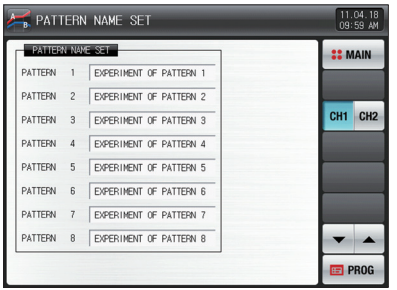


[Fig. 6-3] Pattern and segment repetition setting screen

[Fig. 6-4] File editing screen #1

[Fig. 6-6] Time signal setting #1

[Fig. 6-10] Standby operation setting screen



[Fig. 6-2] Experiment name setting screen

06. Program setting

Explanation with CH1 CH2 corresponds to TEMP2*20 ONLY (TEMP2*00 series not support this setting)

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

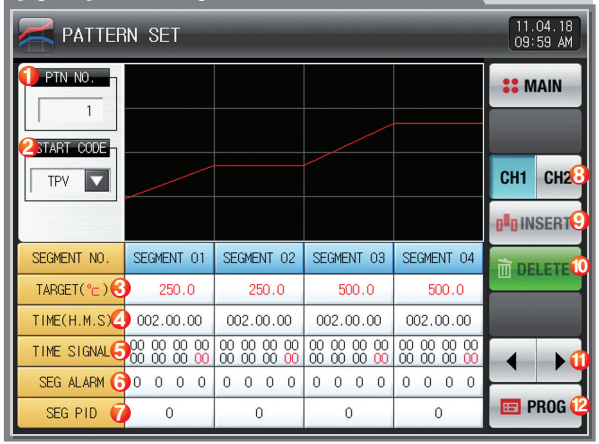
[Fig. 6–1] Program setting screen

①	Moving to the pattern editing screen
②	Moving to the screen for repetitive setting of pattern and segment
③	Moving to the screen for setting pattern copy and deletion
④	Moving to the screen for time signal setting
⑤	Moving to the screen for setting the standby screen
⑥	Moving to the screen for experiment name

6-1. Program pattern setting

- It is a screen to set the segment depending on the pattern number.
- Refer to [6-4 Time signal operation] for time signal setting.
- The following screen is an explanation for channel 1 and the screen of channel 1 is same with that of channel 1.

[Fig. 6-2] Pattern editing screen



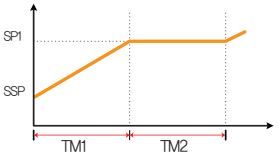
①	Input the pattern number for segment setting
②	Setting the start condition for program operation. • TPV : The set value (SP) is processed to the set time (TM1) from present value (PV) to the present value (SP1) set in segment 1 (SEG1) regardless of the slope or the start set value (SSP) in starting of the program operation. • SPV : The set value (SP) is processed to the set value (SP1) set in segment 1(SEG1) from present value (PV) in starting of the program operation. At this time, the residual time of operation time is calculated by regarding of time elapse to the program operation starting point by referring the set program pattern. • SSP : The set value (SP) is processed to the set value (SP1) set in segment 1(SEG1) from start set value (SSP) in starting of the program operation during the set time (TM1).
③	Setting the segment set data to be operated.
④	Setting the time of segment to be operated.
⑤	Setting the time signal and sub output of the segment to be operated. • 8 time signals can be set for each segment and each time signal is set by selection from 20 types of time signal. • Refer to [6-4 Time signal operation] • 1 sub output can be set for each segment and 4~20mA DC is output by inputting 4~20. Refer to [page 70].

⑥	Setting the SEG alarm of the segment to be operated.
⑦	Setting the SEG PID of the segment to be operated.
⑧	Moving to channel 1 or 2
⑨	When one of the buttons SEGMENT 01 (Segment 01~99) is touched by for segment insertion, the selected button SEGMENT 01 (Segment 01~99) and INSERT button are activated and the selected segment can be inserted when INSERT is touched by
⑩	When one of the buttons SEGMENT 01 (Segment 01~99) is touched by for segment deletion, the selected button SEGMENT 01 (Segment 01~99) and DELETE button are activated and the selected segment can be inserted when DELETE is touched by
⑪	Moving to left/right on the screen by 4 segment units.
⑫	Moving to [Fig. 6-1 Program setting screen] when PROG is touched by

Program operation start

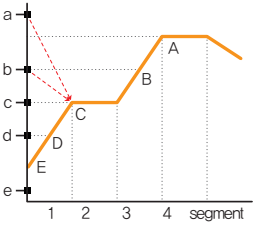
NOTE

- The start of the program is processed depending on the starting condition (STC : Start code) setting.
- Set data priority program operation (STC = SSP)
  : The set value (SP) is processed for the set time ITM1) to the set value (SP1) set in segment 1(SEG1) from start set value (SSP) in starting of the program operation.



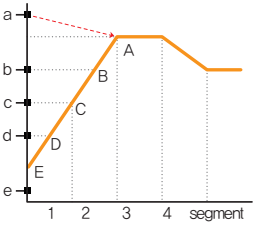
- Slope priority program operation (STC = SPV)
  : The set value (SP) is processed to the set value (SP1) set in segment 1(SEG1) from present value (PV) in starting of the program operation. At this time, the residual time of operation time is calculated by regarding of time elapse to the program operation starting point by referring the set program pattern.

① When the segment 2 is the first maintaining range



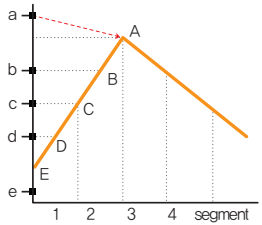
Now present value	Program operating starting point
a	C
b	C
c	C
d	D
e	E(SSP)

② When the segment 3 is the first maintaining range



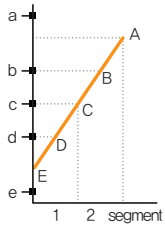
Now present value	Program operating starting point
a	A
b	B
c	C
d	D
e	E(SSP)

③ When there is no maintaining range



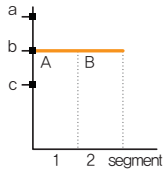
Now present value	Program operating starting point
a	A
b	B
c	C
d	D
e	E(SSP)

④ When there is only maintaining range without maintaining



Now present value	Program operating starting point
a	No operation
b	B
c	C
d	D
e	E(SSP)

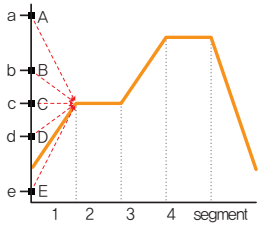
⑤ When the maintaining range is started from segment 1



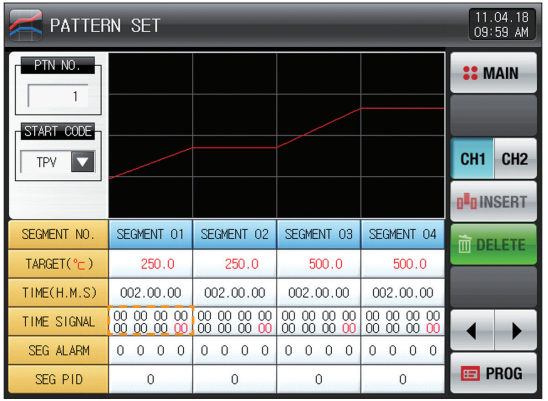
Now present value	Program operating starting point
a	B
b	B
c	A(SSP)

● Time priority program (STC = TPV)

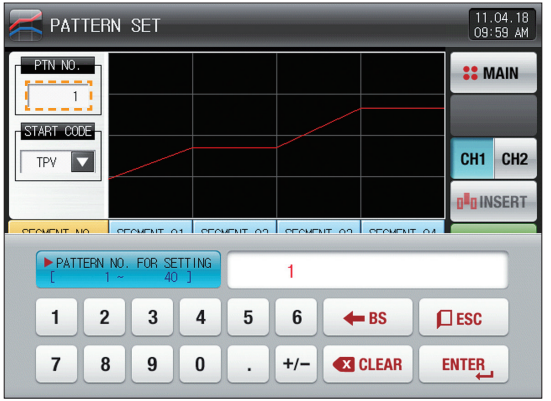
: The set value (SP) is processed to the set time (TM1) from present value (PV) to the present value (SP1) set in segment 1 (SEG1) regardless of the slope of set value (SP) or the start set value (SSP) in starting of the program operation.



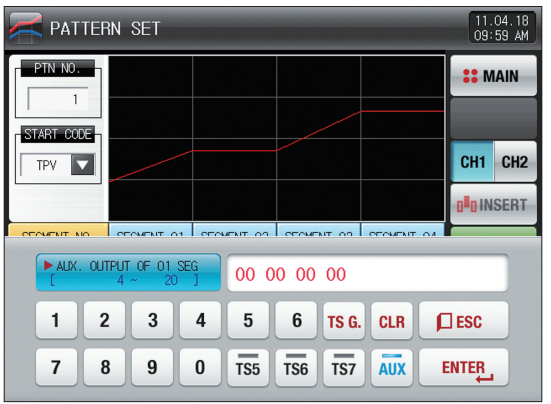
Now present value	Program operating starting point
a	A
b	B
c	C
d	D
e	E



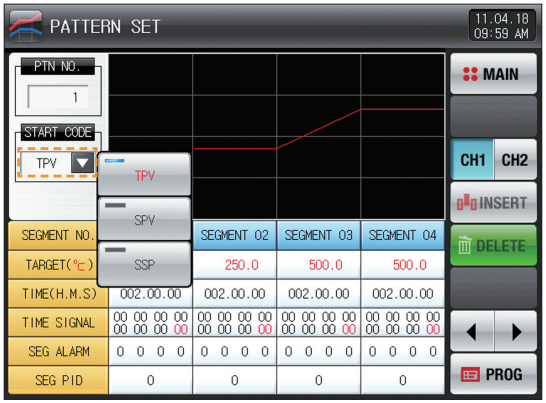
▲ It is a screen for sub output setting.
Select the sub output in [4. Control & Transmitting output] in [Installation manual]. It is displayed in red in pattern edition screen and the sub output can be set.



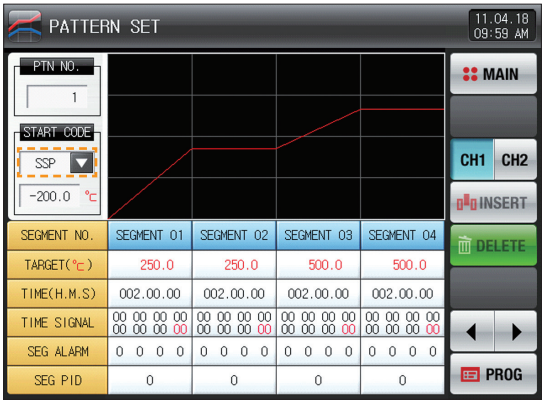
▲ The input key to set the pattern number is displayed when the "Pattern number" button is touched by.



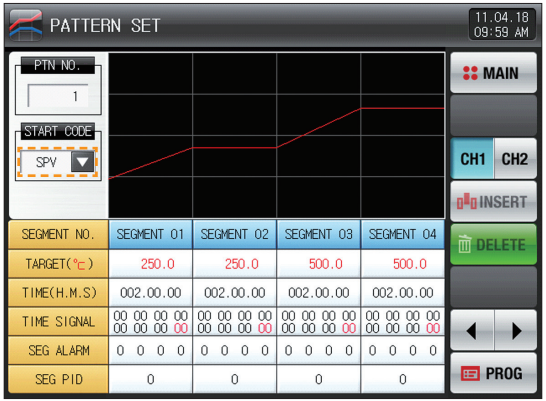
▲ The input key is displayed when 00 00 00 00 (Time signal) is touched by. The button TS G. to set the sub output is appeared when AUX button on the right top is touched by.



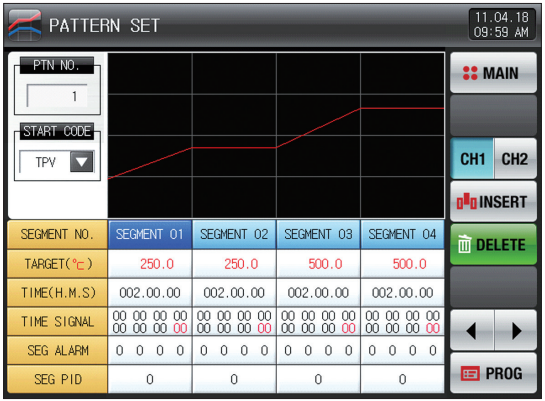
▶ When the "Starting condition" button is touched by, the input key to set the starting condition is displayed



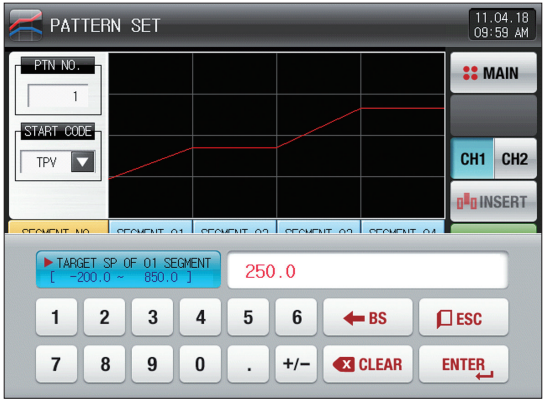
▲ It is a screen set with "SSP" for starting condition.



▲ It is a screen set with "SPV" for starting condition.

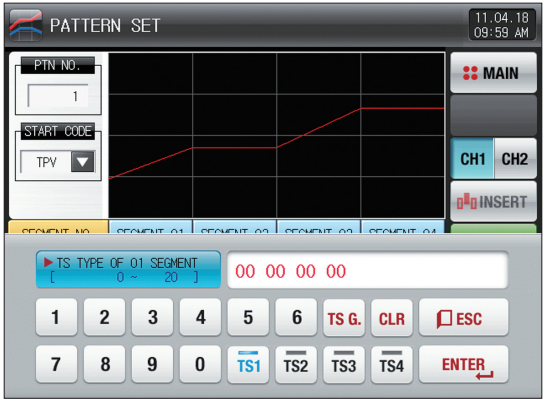


▲ INSERT, DELETE buttons are activated when SEGMENT 01 button is activated.

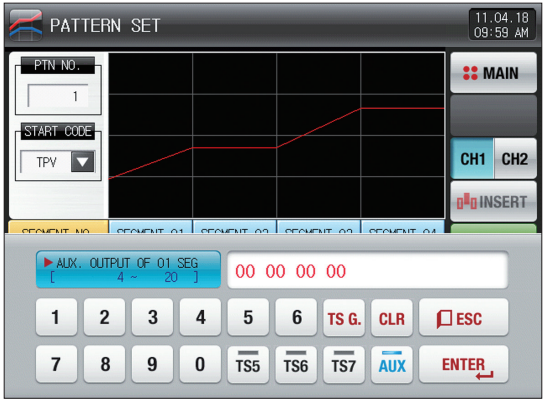


▲ The input key to set the set value is displayed when 250.0 (Set value) button is touched by.

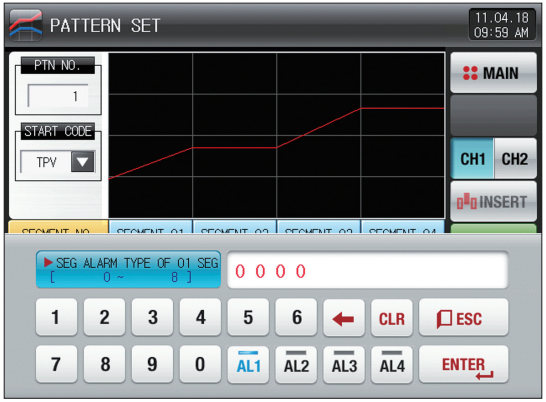
▲ The input key to set the segment time is displayed when 002.00.00 (Time) button is touched by.



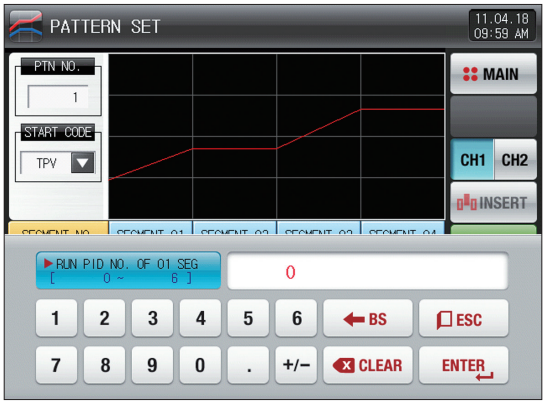
▲ The input key to set the time signal is displayed when 00 00 00 00 00 00 00 00 (Time signal) button is touched by. The time signal can be set for TSetting~TS8 when TS G. button is touched by.



▲ The input key is displayed when 00 00 00 00 / 00 00 00 00 (Time signal) is touched by. The button TS G. to set the sub output is appeared when AUX button on the right top is touched by.



▲ The input key to set the segment alarm is displayed when 0 0 0 0 (SEG alarm) button is touched by.



▲ The input key to set the segment PID is displayed when 0 (SEG PID) button is touched by.

References

- Input by pressing ENTER for time signal and SEG alarm input.
- Select ESC to escape from input screen.
- The wanted time signal group can be input by pressing TSetting~TS8 for the set value in [6-4 Time signal operation].
- Time signal #8 cannot be used in sub output use in OUT1~4 control output terminal.

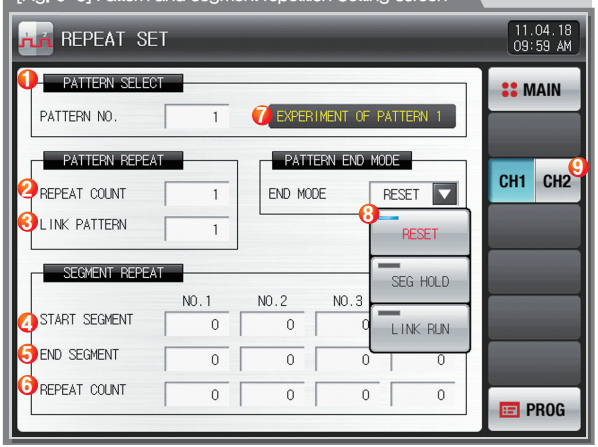
Parameter	Setting range	Unit	Initial value
Channel #n pattern number	1~40 (TEMP2*□□ : 1~80)	ABS	1
Starting condition	TPV, SPV, SSP	ABS	TPV
Starting condition(SSP)	#m.EU(0.0~100.0%)	#m.EU	#m.EU(0.0%)
Segment #m Target SP	#m.EU(0.0~100.0%)	#m.EU	#m.EU(0.0%)
Segment #m Time	-00.00.01(OFF)~999.59.59 (Hour, Min, Sec)	ABS	-00.00.01
Segment #m Time signal 1~8	0~20	ABS	0
Segment # Sub output	4~20	ABS	0
Segment #m SEG alarm 1~4	0~8	ABS	0
Segment #m SEG PID	0~6	ABS	0

※ #n : 1 ~ 2
※ #m : 1 ~ 99

6-2. Pattern repetition setting

- It is a screen to set the function for entire or partial repetition of set pattern.
- The operation method in pattern operation termination can be set.
- The following screen is an explanation for channel 1 and the screen of channel 1 is same with that of channel 1.

[Fig. 6-3] Pattern and segment repetition Setting screen



①	It sets the pattern number to perform the repetitive operation.
②	It sets the repetition operation frequency of the set pattern.
③	It sets the pattern number for repetitive operation in termination of set pattern operation.
④	It sets the segment to start the partial repetitive operation out of the set patterns. • It starts from start set value (SSP) in partial repetitive operation regardless of the start time condition (STC) when the start segment is "1."
⑤	It sets the segment to terminate the partial repetitive operation out of the set patterns.
⑥	It sets the repetition frequency of the partial repetitive operation out of the set patterns.
⑦	It displays the experiment name of the set pattern. • The change of the experiment name can be changed in [6-6 Experiment name setting] • The change is impossible as it is only for reading.
⑧	It decides the next operation when the set pattern operation is finished. • Operation stop : The pattern termination signal is generated and the operation state is in program stop. • SEG hold : It is operated in last operation set value and hold state is maintained. • Connection operation : The pattern set in the connection pattern is operated.
⑨	Moving to channel 1 or 2

Parameter	Setting range	Unit	Initial value
Channel #n pattern No.	1~40 (TEMP2*□□ : 1~80)	ABS	1
Repetition frequency	0(Indefinite repetition)~999	ABS	1
Channel #n connection pattern	1~40 (TEMP2*□□ : 1~80)	ABS	1
Operation in pattern termination	Operation stop, SEG hold, Continuation operation	ABS	Operation stop
Start segment for repetition setting 1~4	0~99	ABS	0
Termination segment for repetition setting 1~4	0~99	ABS	0
Repetition frequency for repetition setting 1~4	0~99	ABS	0

※ #n : 1 ~ 2

6-3. File editing

- It is a screen to copy or delete the input segment values in [Fig. 6–1 Program pattern setting].
- The following screen is an explanation for channel 1 and the screen of channel 1 is same with that of channel 1.
- The pattern cannot be copied between the channels.
- The pattern number in operation cannot be deleted.
- The deleted pattern cannot be recovere.

[Fig. 6–4] 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 deletes the first and last pattern number to be copied. • The first pattern is deleted only when the last pattern is “0.”.
④	It displays the total patterns set in [Fig. 6–1 Program pattern setting]. • The change is impossible as it is only for reading.
⑤	It displays the total segments set in [Fig. 6–1 Program pattern setting]. • The change is impossible as it is only for reading.
⑥	It copies the set pattern ① to the set pattern ②.
⑦	Moving to channel 1 or 2
⑧	It initializes the set value of the pattern set in ③.
⑨	It initializes the set value of every pattern.

[Fig. 6-5] File editing screen #2

References

▶ The message like "It is a parameter setting error." is displayed at the bottom of the screen when the copy or deletion is made without inputting the pattern number.

Parameter	Setting range	Unit	Initial value
Channel #n pattern number	1~40 (TEMP2*□□ : 1~80)	ABS	0
Copy: Channel #n start pattern	0~40 (TEMP2*□□ : 0~80)	ABS	0
Copy: Channel #n end pattern	0~40 (TEMP2*00:0~80)	ABS	0
Copy	No use, Use	ABS	No use
Selective deletion: Channel #n start pattern	0~40 (TEMP2*□□ : 0~80)	ABS	0
Selective deletion: Channel #n end pattern	0~40 (TEMP2*□□ : 0~80)	ABS	0
Selective deletion	No use, Use	ABS	No use
All deletion	No use, Use	ABS	No use

※ #n : 1 ~ 2

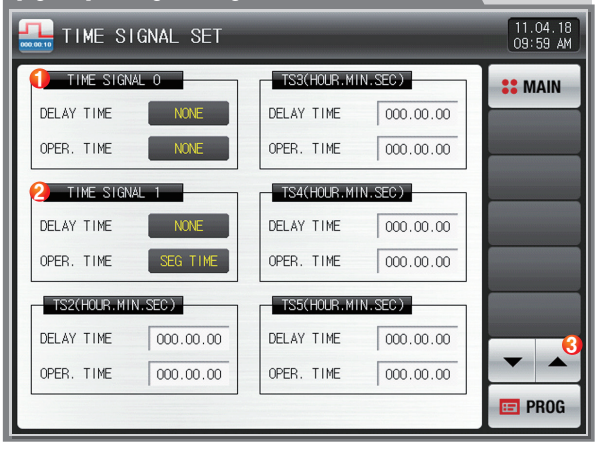
Message display	Explanation
"There is no saved information in the selected pattern."	It is displayed in case of copy when there is nothing saved in pattern number.
"The copy is completed in the selected pattern."	It is displayed in completion of selected pattern copy.
"The deletion is completed in the 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.

6-4. Time signal operation

- The time signal operation is classified into ON/OFF operation, time setting operation and the set time signal is used for setting the time signal No. in segment setting in [6–1 Program pattern setting]

(1) Time signal ON/OFF operation

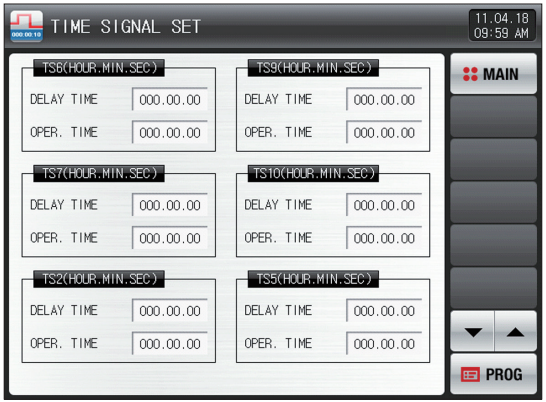
[Fig. 6–6] Time signal setting #1



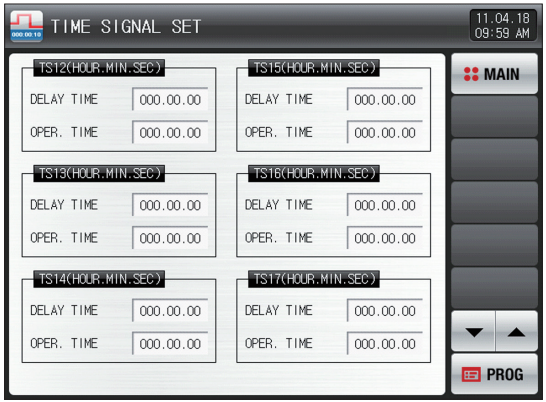
①	The time signal is OFF during corresponding segment operation when “0” is selected. • The change is impossible as it is only for reading.
②	The time signal is ON during corresponding segment operation when “1” is selected. • The change is impossible as it is only for reading.
③	Moving the screen up/down by 6 time signal units.

(2) Time signal time setting operation

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

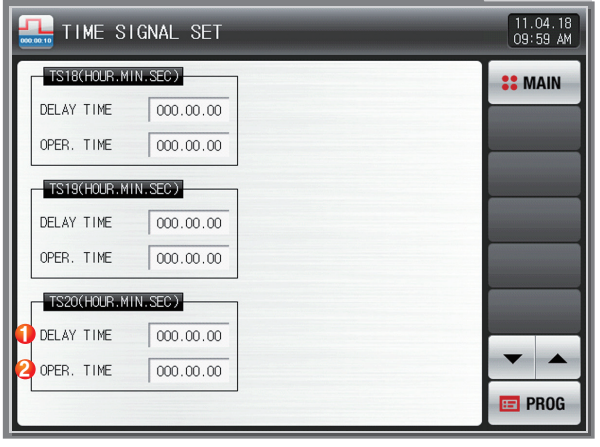


[Fig. 6-7] Time signal setting #2



[Fig. 6-8] Time signal setting #3

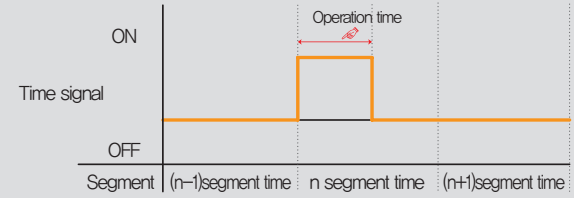
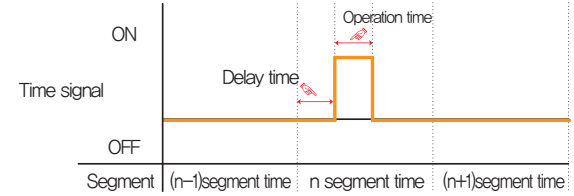
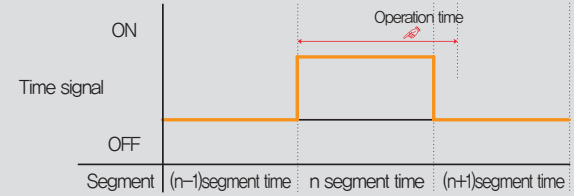
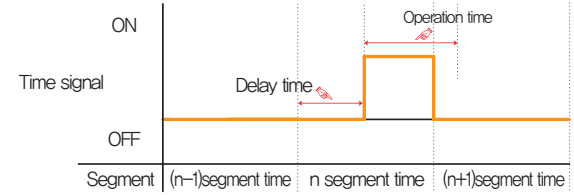
[Fig. 6-9] Time signal setting #4



①	The time signal is "ON" after setting time is elapsed in delay time from the corresponding segment starting point. • However, the time signal is not operated when the corresponding segment time is bigger than delay time.
②	The time signal is "ON" by the delay time in corresponding segment is "ON" only for set time in operation time. . • However, the time signal is "ON" for the corresponding segment operation when the (delay time+operation time) is bigger than corresponding segment time and it is not operated in the next segment.

Parameter	Setting range	Unit	Initial value
Delay time	000.00.00(OFF)~999.59.59 (Hour, Min, Sec)	ABS	000.00.00
Operation time	000.00.00(OFF)~999.59.59 (Hour, Min, Sec)	ABS	000.00.00

(3) Example of operation in time signal input

	Setting	Time signal operation
Segment N time ≥ Delay time + Operation time	1. Delay time = 000.00.00	
	2. Delay time ≠ 000.00.00	
Segment N time(Delay time + Operation time ☞ It does not make influence on the next segment.	3. Delay time = 000.00.00	
	4. Delay time ≠ 000.00.00	

6-5. Standby operation

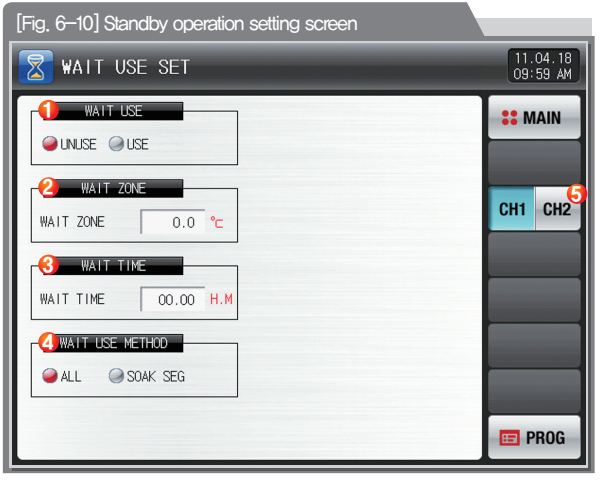
- It is a screen to set the range and time for standby operation during program operation.
- The set standby operation here is applied to [Fig. 6–1 Program pattern setting].
- The following screen is an explanation for channel 1 and the screen of channel 1 is same with that of channel 1.
- Definition of standby operation

– Standby operation entry condition : When the measure data is not in the standby operation setting range

– Standby operation releasing condition : When the measure data is in the standby operation setting range

– The standby time has indefinite value when the standby time is not set (Initial value).

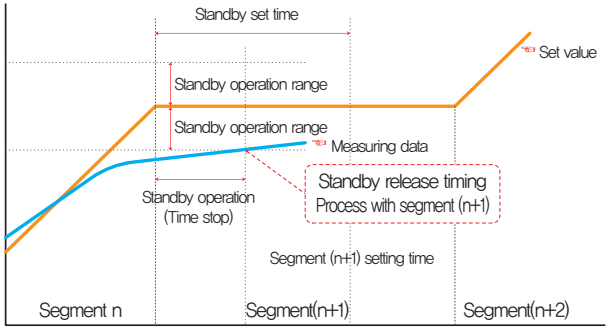
[Fig. 6–10] Standby operation setting screen



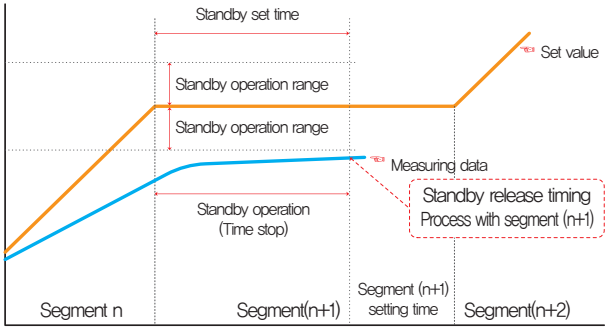
①	It sets Y/N of standby operation.
②	It sets the operation range to be applied for standby operation. • The standby motion is not operated when the range is set in “0.0.”
③	The standby time to be applied is set when the measuring data is not in the standby operation range. • It standbys indefinitely for entry to the standby operation range when the standby operation time is set in “00.00.”
④	It decides either of “Entire” and “Maintain SEG” for standby operation method. • Entire : The standby operation is applied to the set entire segment in [6–1 Program pattern setting] • Maintain SEG : The standby operation is applied only to the set maintain range segment in [6–1 Program pattern setting]
⑤	Moving to channel 1 or 2

Parameter	Setting range	Unit	Initial value
Standby operation setting	No use, Use	ABS	No use
Channel #n standby operation range	Channel #n.EUS(0.00~100.00%)	Channel #n.EUS	Channel #n.EUS(0.00%)
Standby operation time	00.00~99.59(Hour, Min)	ABS	00.00
Standby operation method	ALL, SOAK SEG	ABS	ALL

※ #n : 1 ~ 2



In case of standby operation release within standby time (Wait time)



In case of no entry of the measuring data into standby operation range within the standby time (Wait time)

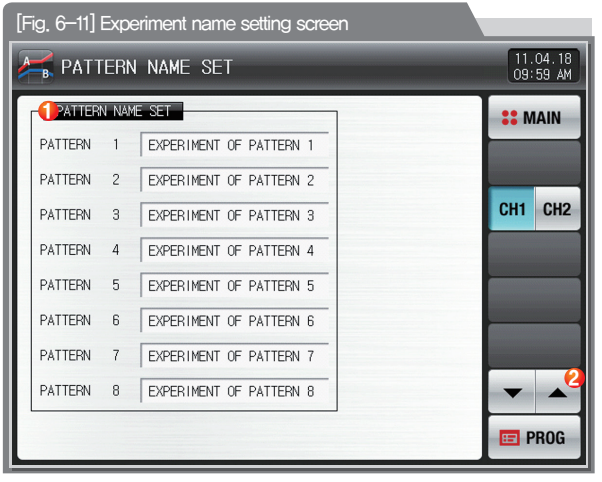
References

- It is a graph for interactive relation between standby operation and standby time.
- Standby operation range : It displays the temperature range with adoption of standby operation.

6-6. Experiment name setting

- The experiment name can be set for each pattern. Refer to [4–2(2) Program operation #1 operation screen]
- The following screen is an explanation for channel 1 and the screen of channel 1 is same with that of channel 1.

[Fig. 6–11] Experiment name setting screen



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

[Fig. 6–12] Experiment name setting screen

References

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

Parameter	Setting range	Unit	Initial value
Channel 1 experiment name 1~40	0~9, A~Z, Special letter (Maximum 24 letters)	ABS	EXPERIMENT OF PATTERN 1~ 40
Channel 1 experiment name 1~40	0~9, A~Z, Special letter (Maximum 24 letters)	ABS	EXPERIMENT OF PATTERN 1~ 40

Part 07

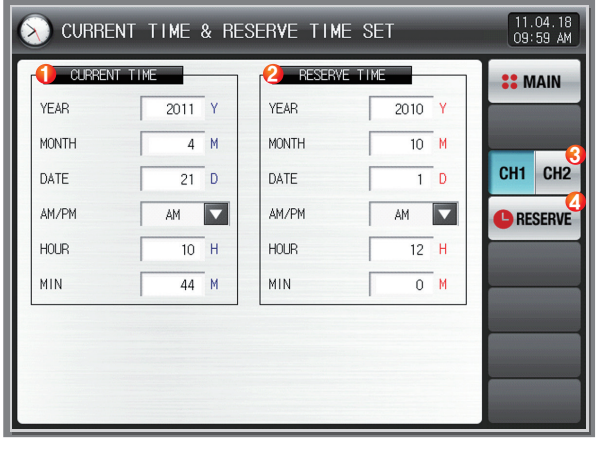
Appointed operation setting ····· 88

07. Appointed operation setting

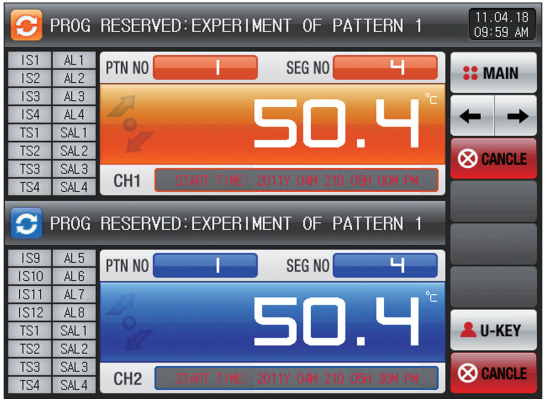
Explanation with CH1 CH2 corresponds to TEMP2*20 ONLY (TEMP2*00 series not support this setting)

- It converts to [Fig. 7–1 Time setting screen] when the appointed operation setting button is touched by in [Fig. 2–1 Main screen].
- It is a screen to set the current time and appointed operation time.
- The following screen is an explanation for channel 1 and the screen of channel 1 is same with that of channel 1.

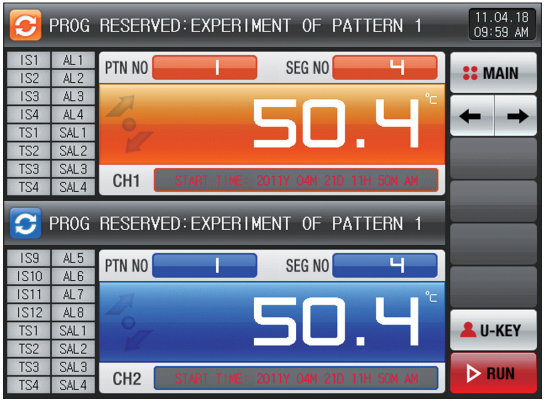
[Fig. 7–1] Time setting screen



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	Moving to channel 1 or 2
④	The operation is possible in the set appointed time when RESERVE is touched by. • The appointed time is displayed on the operation screen as shown in [Fig. 7–2 Operation appointed setting screen] when RESERVE is touched by.



[Fig. 7-2] Operation appointed setting screen
(Non-synchronized operation)



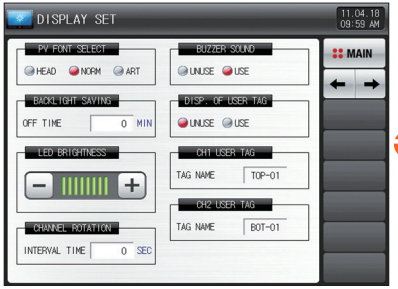
[Fig. 7-3] Operation appointed setting screen
(Synchronized operation)

Parameter		Setting range	Unit	Initial value
Current time	Year	2000~2009	ABS	–
	Month	1~12	ABS	–
	Day	1~31	ABS	–
	AM/PM	AM, PM	ABS	–
	Hour	1~12	ABS	–
	Minute	0~59	ABS	–
Appointed operation time	Year	2000~2009	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
Appointment		Click for appointment.		

※ AM12:00: Night 00:00/PM12:00: PM 12:00

Part 08

Screen display setting



[Fig. 8-1] Screen display setting screen

[Fig. 8-3] DI error creation history screen

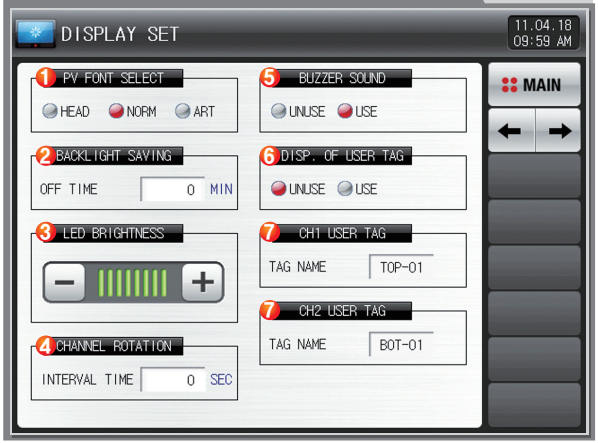
08. Screen display setting

Explanation with CH1 CH2 corresponds to TEMP2*20 ONLY (TEMP2*00 series not support this setting)

8-1. Screen display setting

- It converts to [Fig. 8–1 Screen display setting screen] when the screen display setting button is touched by in [Fig. 2–1 Main screen].

[Fig. 8–1] Screen display setting screen



①	It sets the font of present value (PV) in operation screen.
②	It sets the backlight electricity saving time. • The electricity saving time sets the operation timing of backlight OFF when there is not key operation.
③	The brightness of LCD is controlled by −, + button.
④	It sets the conversion of operation screen in channel 1 and 2. • When the screen conversion time is set and Channel 1 and 2 operation screen is converted repeatedly with "Beep" sound after 1 minute of set time is elapsed without any touch in operation screen 2. • When the screen is converted, every touch is key blocked and key block can be released by touching anywhere on the screen. • It is operated in the screen 2 in operation screen.
⑤	It sets Y/N of use buzzer sound. • The buzzer sound generated in DI error is operated when it is set for no use.
⑥	It sets Y/N for user tag display.
⑦	It sets the tag name of channel 1 and 2. • Maximum 6 digits can be input and the set tag is displayed on the operation screen. Refer to [Fig. 4–6 Stationary operation #1 operation screen]

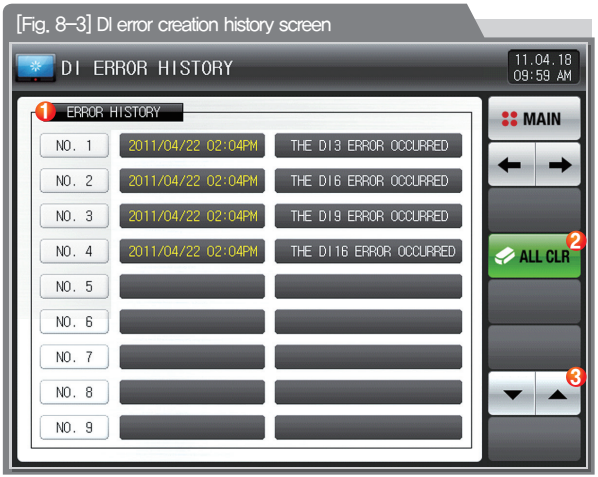
[Fig. 8-2] User tag name setting screen in channel1 and 2

Parameter	Setting range	Unit	Initial value
PV font selection	HEAD, NORM, ART	ABS	Head
Electricity saving operation time	0 ~ 99 MIN	ABS	10
LED brightness	1 ~ 8	ABS	8 steps
Buzzer sound	No use, Use	ABS	Use
Screen conversion time	0 ~ 99 SEC	ABS	0
User tag	No use, Use	ABS	No use
Channel 1 tag name	0~9, A~Z, Special letter (Maximum 6 letters)	ABS	Top-01
Channel 2 tag name	0~9, A~Z, Special letter (Maximum 6 letters)	ABS	BOT-01

8-2. DI error creation history view

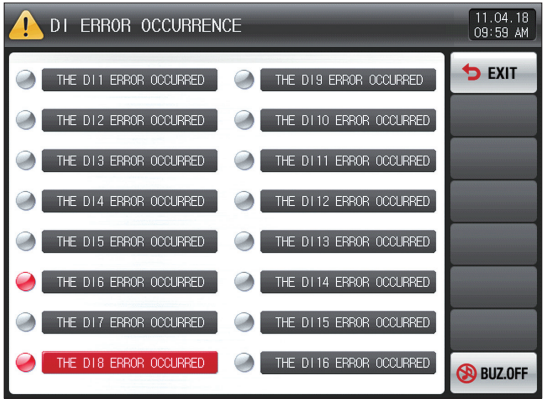
- It is a screen to display the type, date and time of error created DI.
- The error history is saved up to 30 cases and the later history is saved after deletion of the saved history.

[Fig. 8-3] DI error creation history screen



①	It displays the history of DI error creation. • The name set in [11-2 Error name] in [Operation manual] is displayed. • 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.

Parameter	Setting range	Unit	Initial value
Entire deletion	No use, Use	ABS	No use



[Fig. 8-4] Screen for DI error display method by letter

[Fig. 8-5] Screen for DI error display method by photo

References

- It is a screen in case of DI error creation.
- The setting for letter and photo screen setting can be set in [11. DI function and operation setting] in [Installation manual].
- It is converted to the operation screen after escaping from the DI error screen when EXIT is touched by.
- The same DI error creation is neglected for 1 minute when the screen is changed by pressing EXIT button after DI creation. (Here, the neglecting means the DI error screen.)
  Ex) It neglects even DI1 is created by escaping with "Return" in the stat of DI1 creation and the DI error screen is displayed when DI1 has been created even after 1 minute.
- BUZ.OFF button is to block the alarming sound when DI error is created.
  EX) Explanation depending on lamp state
  - DI error no creation ("OFF" state) (THE DI1 ERROR OCCURRED letter, 1 photo)
  - DI error creation ("OFF" state) (THE DI1 ERROR OCCURRED letter, 1 photo)
  - Release after DI error creation ("OFF" state after "ON") (THE DI1 ERROR OCCURRED letter, 1 photo)

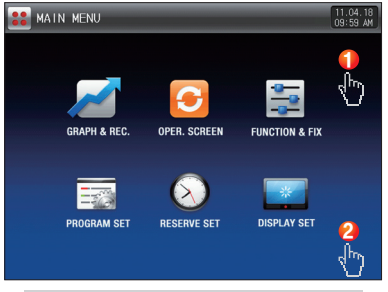
Part 09

User screen setting

09. User screen

9-1. Entry process to set the user screen

- The password box to move to the system parameter setting screen is activated when ① and ② are touched by in sequence in [Fig. 9–1] Main screen (Basic screen).
- It converts to [Fig. 9–3 System parameter setting screen] when the password is input in [Fig. 9–2 Password input screen].
  - The password was set in “0” when it is delivered from the factory.
  - Set the password certainly in [13–1 Basic screen display setting] in [Operation Manual] at the necessity of blocking the general user access.
- Refer to [12. User screen] in [Operation Manual] for user screen display, operation explanation and file upload.
- Do not operate the system parameter setting randomly. It may become the reason of mal function.



[Fig. 9–1] Main screen (Basic screen)

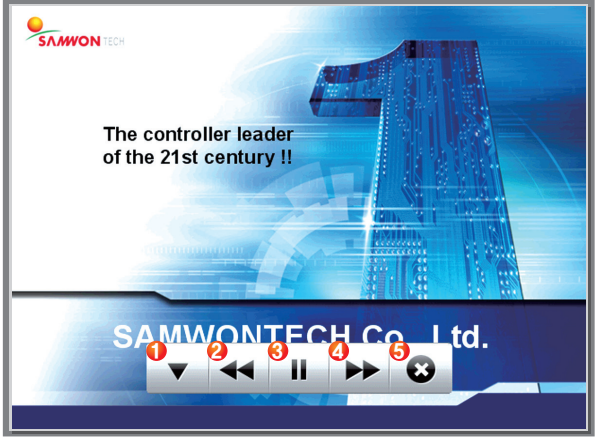
[Fig. 9–2] Password input screen

[Fig. 9–3] System parameter setting screen

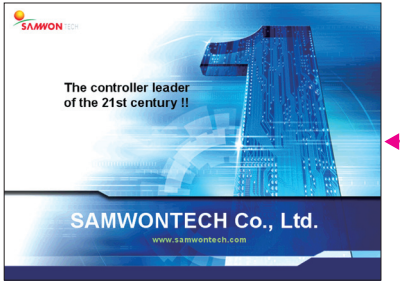
9-2. User screen

- 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.
- It operates at the set time in [12–1 User screen setting] of [Installation manual] and the screen is displayed by circulating when there are many saved photos.
- DI error screen is displayed when DI error is created in the user screen operation.
-  button appears when anywhere is touched during the execution of user screen.

[Fig. 9–4] User screen



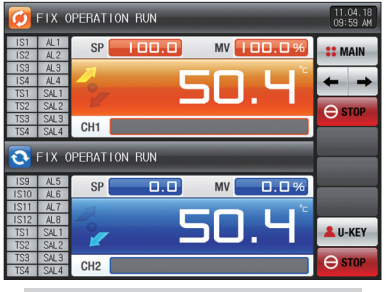
①		is disappeared in the user screen.
②		Move to the previous user screen from current user screen. • It is not operated when the user file is one.
③		Instantaneous stop of the user screen
④		Move to the previous user screen from current user screen. • It is not operated when the user file is one.
⑤		Return to the operation screen after terminating the user screen. • The user screen is operated when the time is elapsed.



No button in the user screen

User screenCS1.BMP

User screenCS2.BMP



The user screen is terminated and
return to the operation screen

User screenCS4.BMP

User screenCS3.BMP

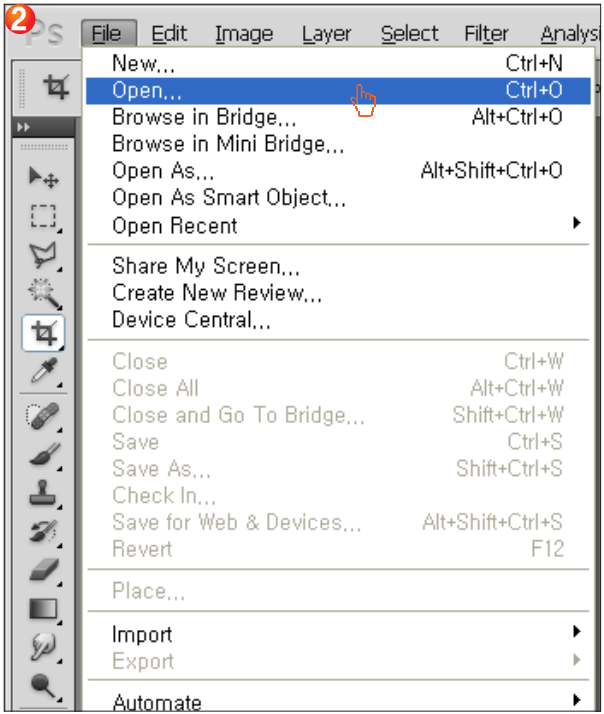
9-3. BMP file making method

- It is a process to provide the initial screen wanted by the user and user screen.

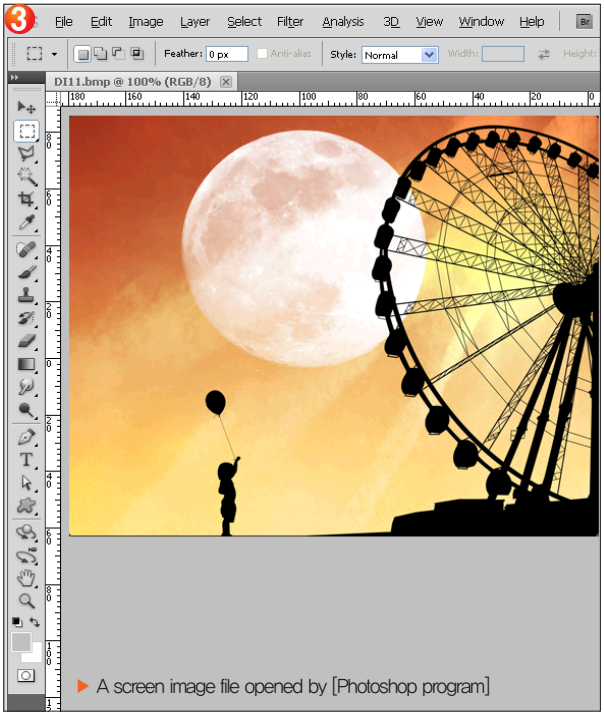
1 Adobe Photoshop

- [Photoshop program] is recommended in make the BMP file.
- The "picture plate" used generally in the computer cannot be used as it is not saved into 16 bit.

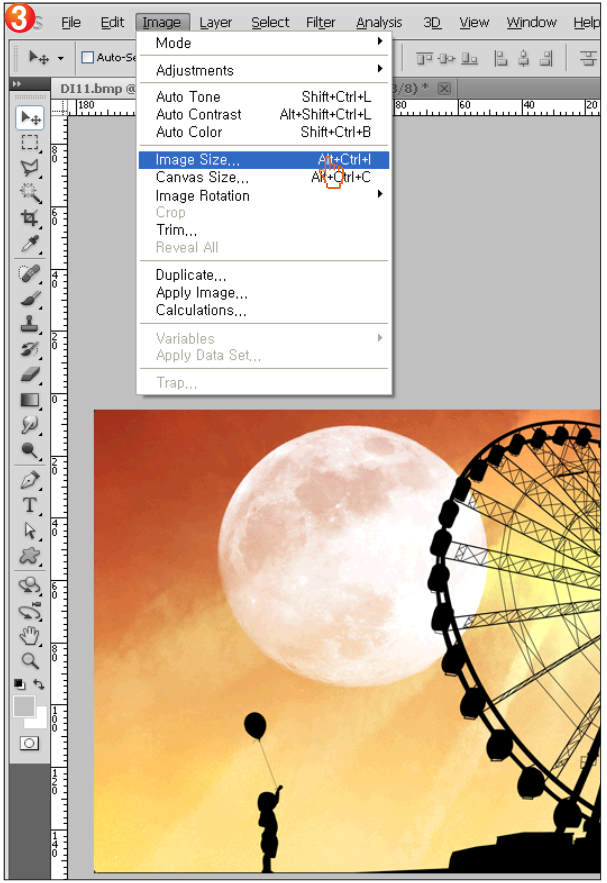
2

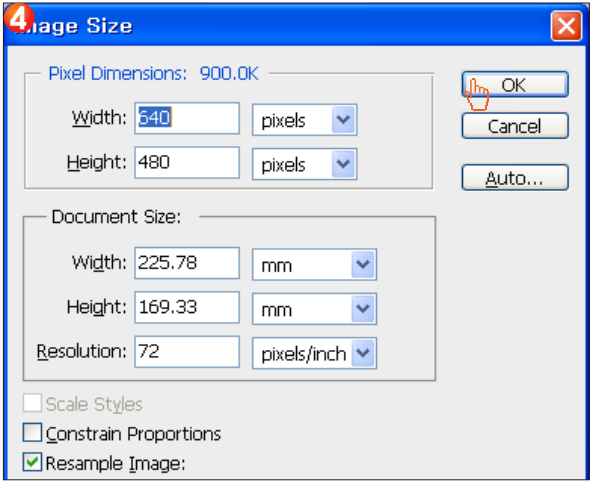


3

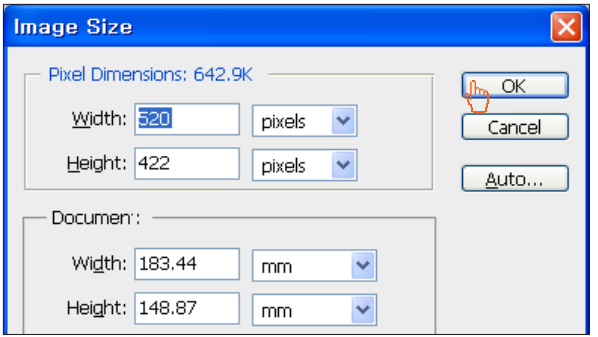


- A screen image file opened by [Photoshop program]

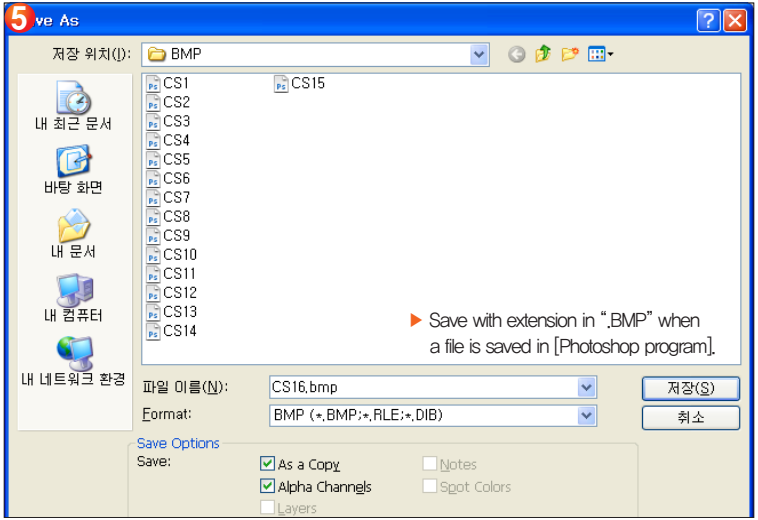


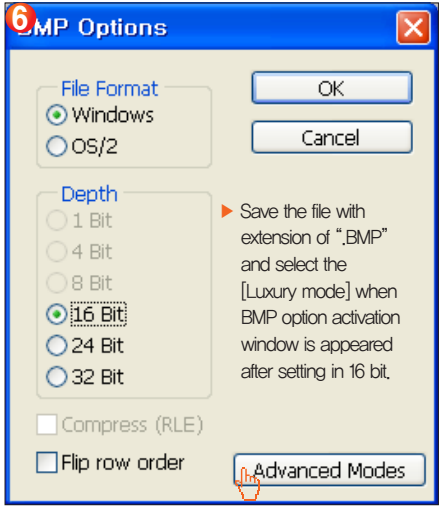


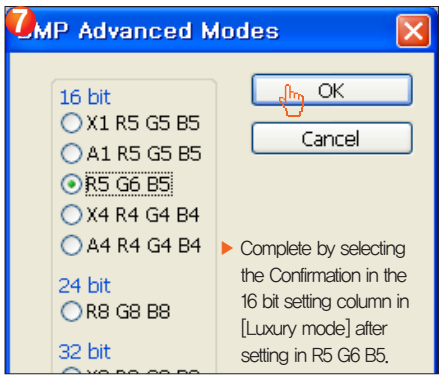
▶ Image size: User screen, initial screen 640 x 480 pixel



▶ Image size: DI error screen 520 x 422 pixel







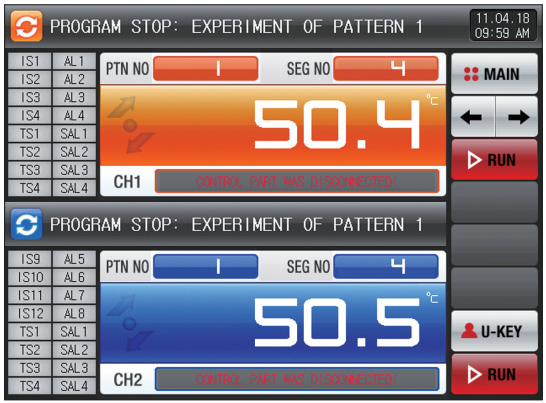
References

- BMP file format : 16 bit (R5 G6 B5) BMP
- File name – User screen : CS1.BMP ~CS16.BMP (Total 16)
  – Initial screen : INT.BMP
  – DI error screen : DI1.BMP~DI16.BMP (Total 16)
- When the files are saved in different name with the defined one in the user screen and initial screen, they cannot be used.
- The folder name inside the SD card is defined in ".BMP".
- Download more detail at BMP making manual our website : samwontech.com/eng.

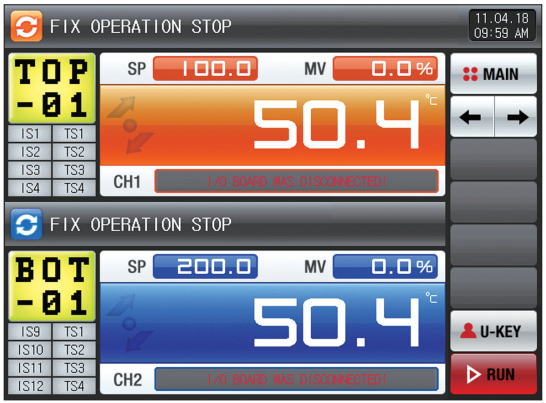
Part 10

Communication error

10. Communication error



[Fig. 10–1] Control unit communication error screen



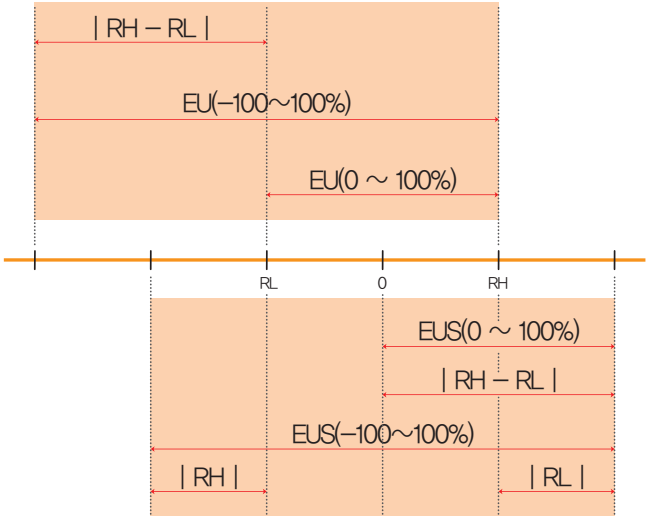
[Fig. 10–2] I/O board communication error screen

References

- When there is an error between display and control unit
  The message, "The control part is not connected." is displayed at the bottom of the screen as shown in [Fig. 10–1] Control unit communication error screen.
- When there is an error between control unit and I/O board communication
  The message, "The I/O board is not connected." is displayed at the bottom of the screen as shown in [Fig. 10–2] I/O board communication error screen.
- Communication failure : Communication cable defect
  Communication cable connection defect

Engineering Units - EU, EUS

- 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.)
- Download the instruction manual and communication manual from the homepage.
- EU( ) : Value of engineering unit depending on the range of instrument
  EUS( ) : Value of engineering unit depending on the span of instrument



RL: Lower limit of input range
RL: Upper limit of input range

▶ Range of EU( ) and EUS( )

	Range	Center point
EU(0 ~ 100%)	RL ~ RH	| RH – RL |/2 + RL
EU(–100 ~ 100%)	–(| RH – RL | + | RL |) ~ RH	RL
EUS(0 ~ 100%)	0 ~ | RH – RL |	| RH – RL |/2
EUS(–100 ~ 100%)	– | RH – RL | ~ | RH – RL |	0

(Example)
▶ INPUT = T/C(K2)
▶ RANGE = –200.0℃(RL) ~ 1370.0℃(RH)

	Range	Center point
EU(0 ~ 100%)	– 200.0 ~ 1370.0℃	585.0℃
EU(–100 ~ 100%)	– 1770.0 ~ 1370.0℃	– 200.0℃
EUS(0 ~ 100%)	0 ~ 1570.0℃	785.0℃
EUS(–100 ~ 100%)	– 1570.0 ~ 1570.0℃	0.0℃

MEMO

MEMO

Queries related with after sales service for TEMP 2000 series

Please inform the TEMP2000 model name, failure condition and contact point for queries of after sales service.

T : 82-32-326-9120
F : 82-32-326-9119

Customer contact for TEMP 2000 series

Quotation request / Product request
Specification request / Data request/ Other request

- Internet
  www.samwontech.com
- E mail
  webmaster@samwontech.com
  sales@samwontech.com

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