TEM2000 SERIES

Installation Manual (Temperature and Humidity Programmable Controller)

Various

SAMWON
Promising the Best

It is temperature and humidity programmable controller which equips with the general control, heating and cooling function by supporting high definition TFT-LCD touch screen and SD card.

http://www.samwontech.com

Being the controller market leader in the 21st century with the best technology

This manual is commonly used for TEMI2000 Series.

Contents

7th Edition of TEMI2000 Series IM : JAN. 04. 2022

01. Cautions (Instructions) for safety

Thank you for your choice of our Temperature and Humidity Programmable Controller(TEMI2000 series). This manual describes the method of installation 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 installation manual.
- This installation 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 installation 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

Safety Instruction (Cautions)

01. Safety Instruction (Cautions)

1-1. Product check

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

(1) Checking the specification of the ordered product

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

TEMI2✱00-0✱✱/✱

- Display part LCD size
  3 : 3.7 inch / 7 : 7.5 inch
- I/O board
  0 : Relay 12 points +DI 16 points / 1 : Relay 32 points + DI 16 points
- Control method
  0 : General control / 1 : Heating-Cooling control
- Option section
  SD : SD card (Basic) / CE : Ethernet communication

(2) How to treat the damaged parts

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

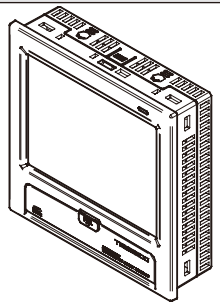
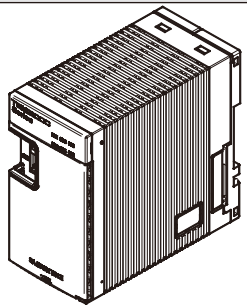
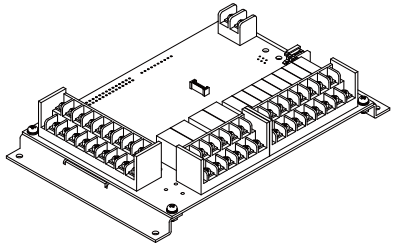
Period of exchange for the part and Expiration

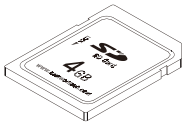
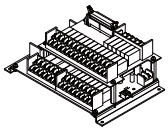
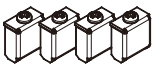
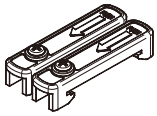
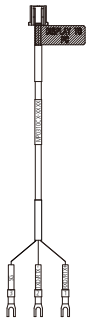
CAUTION

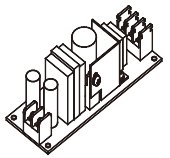
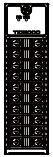
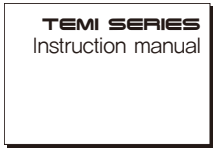
- Please check the corresponding replacing period as shown below and replace p rior to the expiration if it is necessary.
- Only parts that meet the following specifications should be used.
  - Relay JQ1P-24V DC, ALD24V Equivalent : Under 300,000 times of ON/OFF
  - Battery CR2030 3V Equivalent : Under 200,000 hours
- The exchange of the product with expiration date, please contact to the purchasing point (Dealer shop) or SAMWONTECH. LTD.

(3) Check the package

● Check whether the following contents are included.

Main body of TEMI2000 series - Display part	Main body of TEMI2000 - Control part	I/O1 BOARD
		

SD card (In case of option election)	I/O2 BOARD (In case of option election)	Fixing mount	End bar	Cable (2m) PC ⇔ Control part (MP0310CX)	Cable (1m) Control part ⇔ I/O1 (MP0310CW)	Cable (3m) Display part ⇔ Control part (MP0310CV)
						

SMPS (Product for independent selling)	TIO2000 (Product for independent selling)	Instruction manual
		

1-2. Exterior and how to install

(1) Installation location and environment

Cautions for the installation location and environment

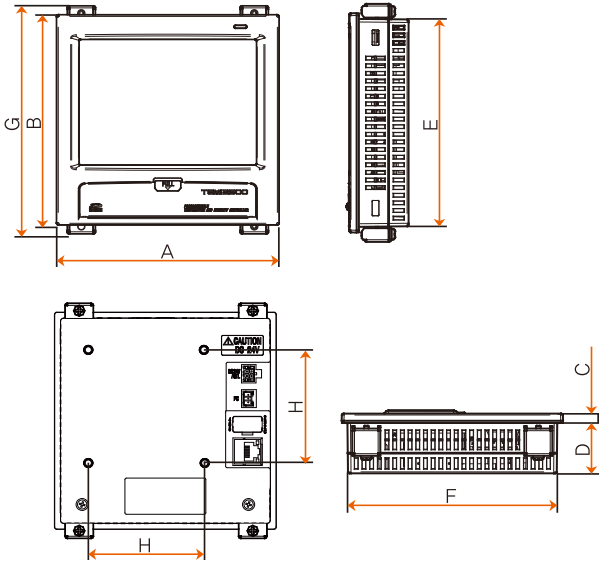
- This product is an industrial product.
- Please manipulate in electricity on state at the installation of this product on the panel because of the electric shock risk. (Caution for electric shock)
- Do not install the product in the following location or environment.
  - A place for contacting the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

Installation Precautions

- Don't put the device or the wiring which cause the noise near to this product.
- Use the product in 10~50℃, in 20~90% RH (It shall not be dewing.) Don't put the heat radiant device closely.
- Don't install the product in declined position.
- Keep the product in -5~70℃ (It shall not be dewing.). Especially, use after full warming up (Switch on) when you use the product under 10 ℃.
- The wiring work shall be made after switching off electric power on the machine.
- This product operates in 24V DC, 22V max without special manipulation. There is a risk of the electric shock or fire when the electric power other than the specification.
- Don't work with wet hands. It has the risk of electric shock.
- Follow up the basic cautions to reduce risk of fire, electric shock and injury during using.
- The installation and the use shall be made according to the specified methods in instruction manual.
- Refer to the installation procedure regarding to the description for ground. However, do not make the ground on the water supply pipe, gas pipe, phone line and lightening rod.
  There is a risk of explosion and fire.
- Do not switch on before finishing the connection of the devices. It may cause the failure.
- Do not close the heat radiating hole on this product. It may cause the failure.
- This product can be used under the following environmental conditions.
  - Indoor
  - Altitude up to 2000m
  - Pollution degree II
  - The level of excessive voltage protection category II

(2) External dimension (Unit : mm)

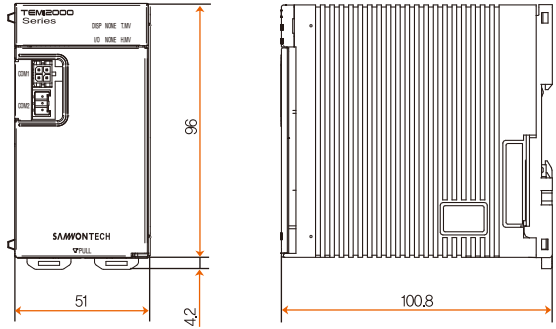
▶ External dimension of display part for each model



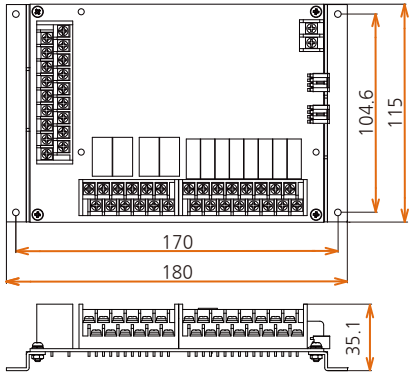
※ Unit : mm

Model name	A	B	C	D	E	F	G	H
TEMI2500	144	144	6.2	33.5	136.5	136.5	156	75
TEMI2700	203	180	6.8	38.2	172.5	195.5	192	75

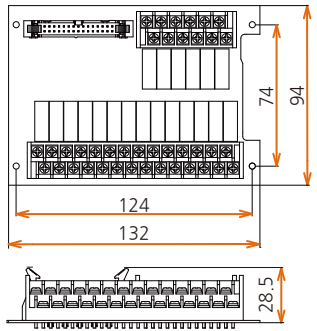
▶ External dimension of control part



▶ I/O1 board external dimension

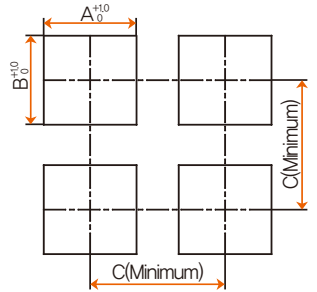


▶ I/O2 board external dimension



(3) Panel cutting dimension

▶ In case of general attachment



※ Panel cutting dimension for each model

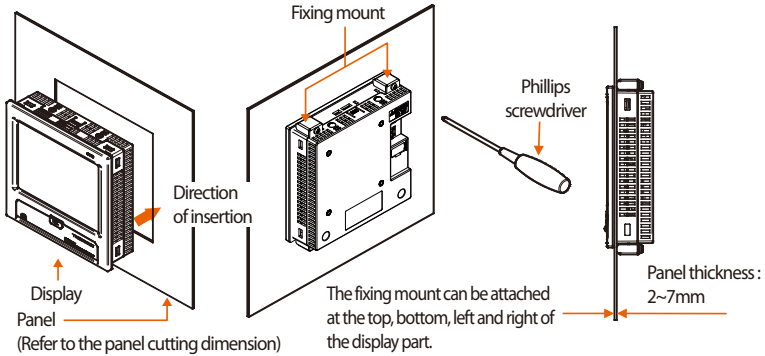
Unit : mm

Model name	A	B	C
TEMI2500	137.5	137.5	250
TEMI2700	196	173	308.5

(4) How to attach on the panel mount

*How to install the product

▶ How to install display unit

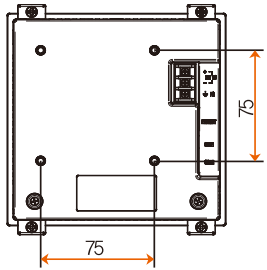


References

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

  Apply 0.2Nm~0.4Nm of torque in case of assembling the fixing mount (Use the Phillips driver)

▶ In case of installing with vesa mount

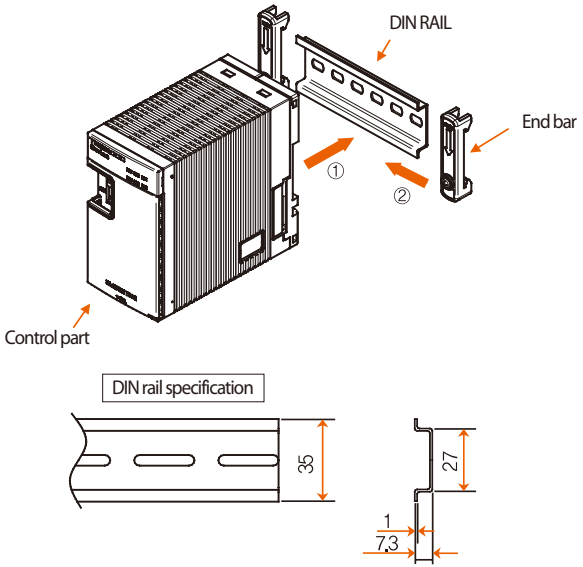


References

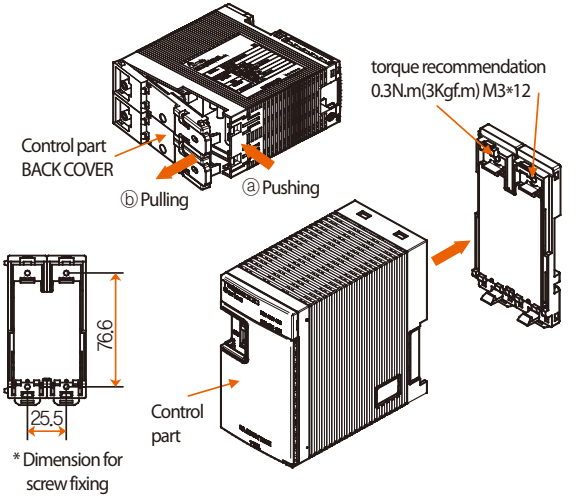
- The dimension of vesa (75 * 75) is same in any product.
- Apply M4 * 4L~6L in case of assembling the bolt on the vesa hole.

* How to install the control part

▶ In case of installing on the DIN rail



▶ In case of installing directly on the wall



References

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

References

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

1-3. Wiring

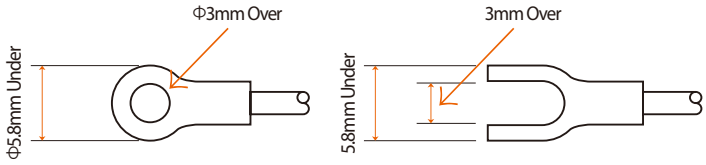
Cautions

CAUTION

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

(1) How to make the wiring

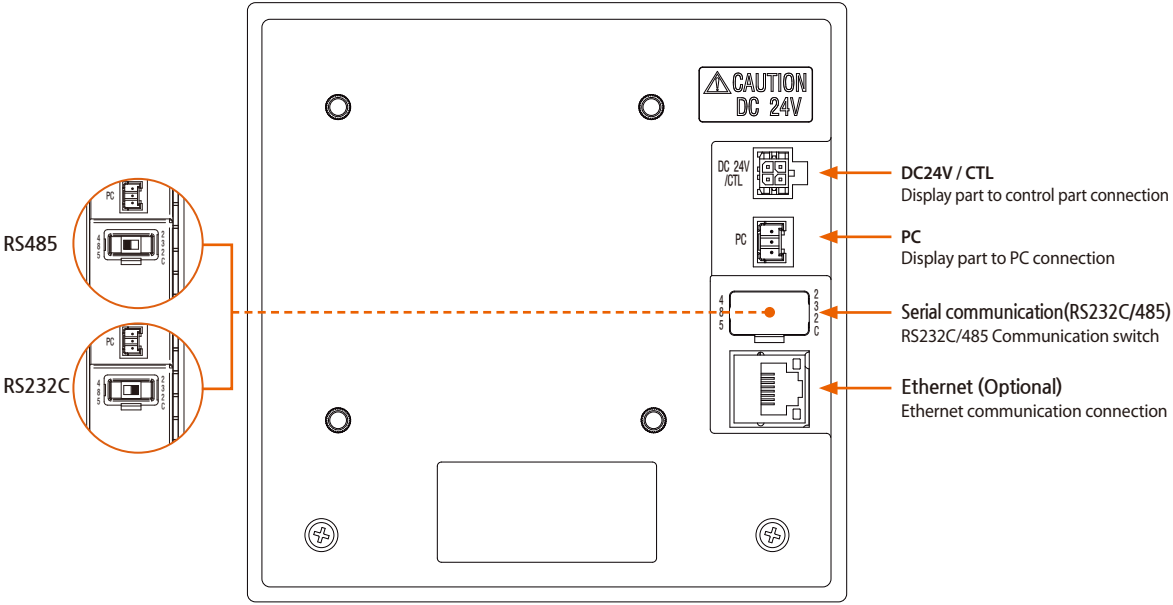
- Recommended specification for electric cable : Vinyl insulated electric cable KSC3304 0.9~2.0mm2
- Recommended specification for terminal : Use the pressed terminal with insulation sleeve which is proper to the M3 screw as shown in [Fig. 1].
- Source of noise
  - (A) Relay and contact point
  - (B) Solenoid coil and solenoid valve
  - (C) Electric power line
  - (D) Induced load
  - (E) Inverter
  - (F) Commutates in motor
  - (G) SCR for controlling the phase angle
  - (H) Wireless communication device
  - (I) Welding machine
  - (J) High pressure ignition device and etc
- Solution for noise
  - (A) Make the wiring with caution for the following points from the noise creation source.
  - (B) Make the wiring for the input circuit with placing the gap from the power circuit and ground circuit.
  - (C) Use the shield line for the noise from the electrostatic induction.
  - (D) Connect the shield line to the ground terminal according to the necessity not to make the 2 point ground.
  - (E) Make the wiring in tight twisting for the noise from the electric induction.



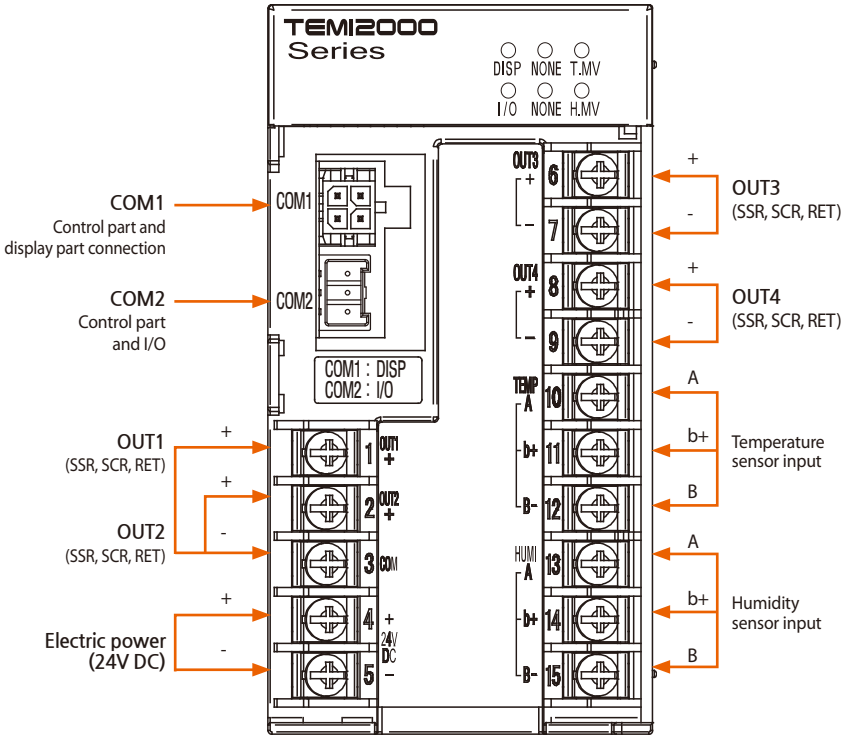
[Fig. 1]

(2) Terminal layout

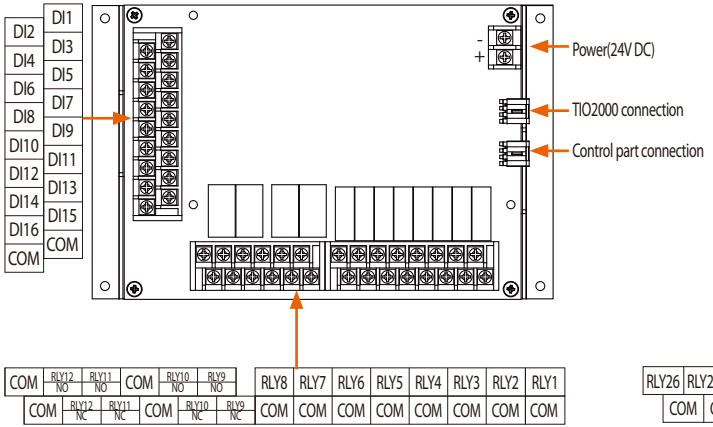
▶ Display part terminal



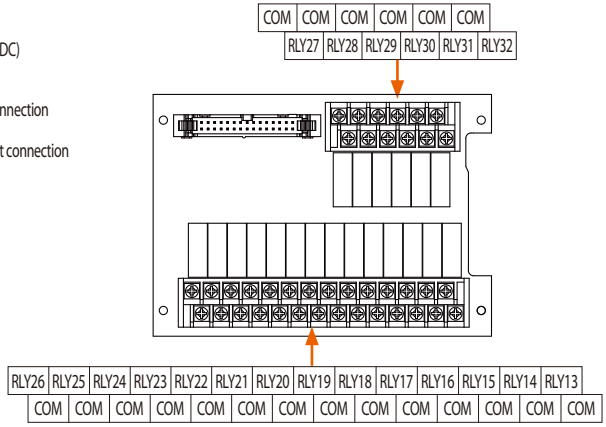
▶ Control part terminal



▶ I/O1 Board terminal



▶ I/O2 Board terminal

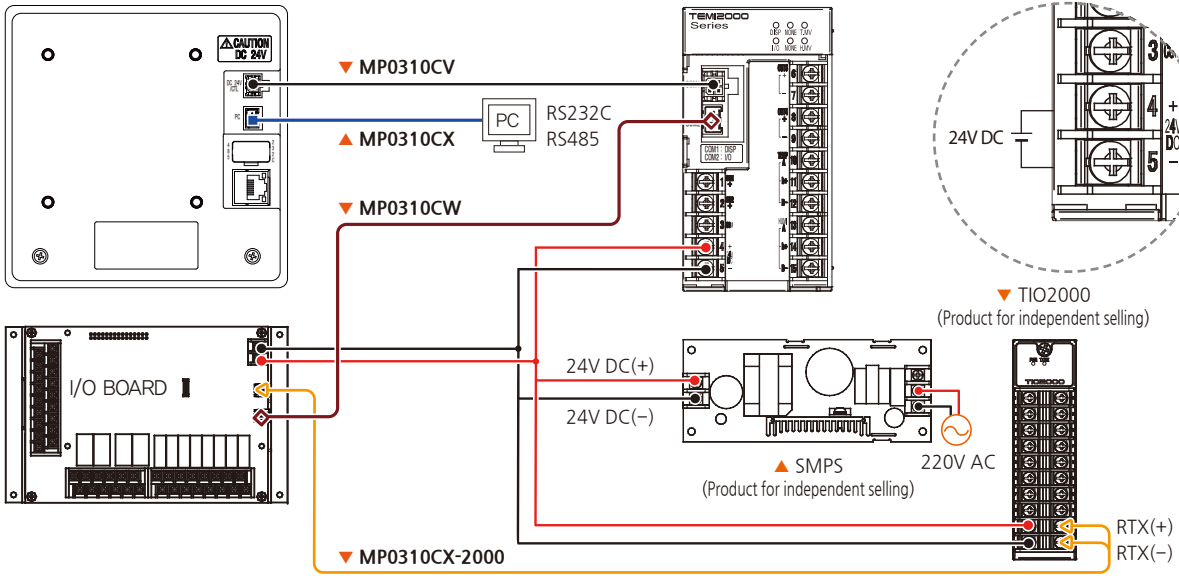


Control part terminal	Setting range	
	General control	Heating·Cooling control
OUT1	Temperature - SSR, SCR, RET	Temperature(Heating) - SSR, SCR, RET
OUT2	Temperature - SSR, SCR, RET	Temperature(Cooling) - SSR, SCR, RET
OUT3	Humidity - SSR, SCR, RET	Humidity(Heating) - SSR, SCR, RET
OUT4	Humidity - SSR, SCR, RET	Humidity(Cooling) - SSR, SCR, RET

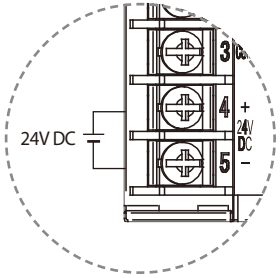
(3) Electric power circuit

● Use the cable with equivalent or above the vinyl insulated cable (KSC3340) or electric cable with vinyl insulated cable.

▶ How to connect the electric power



▶ How to connect the electric power for control unit



▼ TIO2000
(Product for independent selling)

References

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

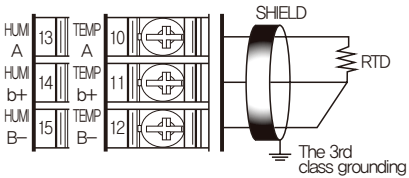
Cautions

CAUTION

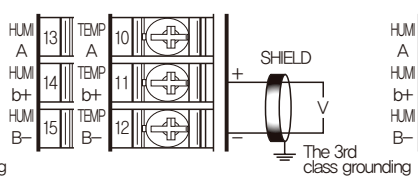
When wiring the MP0310CV / CW / CX cable, wire the cable so that no more than 0.5kgf of force is applied to the cable. Pulling with excessive force may result in connection failure or disconnection.

① Connection of measurement input (Analog input)

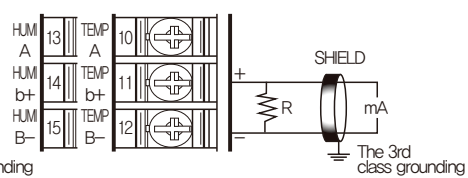
- Switch "OFF" the power of TEMI2000 main body and external power supply certainly for connecting the measurement input because of electric shock risk.
- Use the shield attached input cable and the shield shall be grounded by one point.
- Connect the signal line for measurement input by placing the gap between with electric power cable or ground circuit.
- Use the electric cable with less resistance and no difference in resistance.



▶ Input of the temperature detecting resistor (RTD)



▶ Input of the direct current voltage (DC voltage)

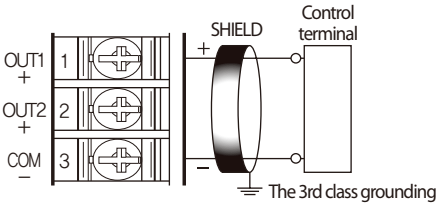


▶ Input of the direct current (DC current)

② Control output connection (Analog output)

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

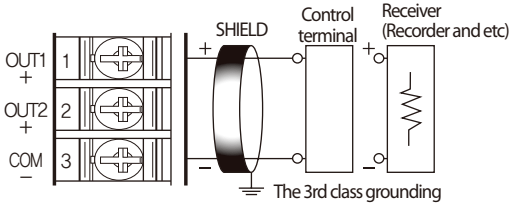
OUT1 and OUT2 electric voltage pulse output (SSR)



SSR : 24V DC(12V DC min, 600Ω min)

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

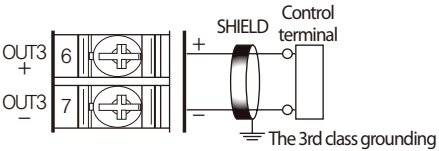
OUT1 and OUT2 electric current output (SCR/RET)



SCR / RET : 4~20mA DC, 600Ω max

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

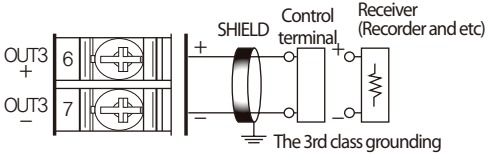
OUT3 and OUT4 voltage pulse output (SSR)



SSR : 24V DC(12V DC min, 600Ω min)

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

OUT3 and OUT4 electric current output (SCR/RET)

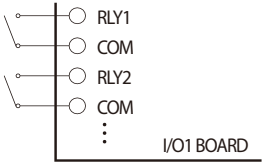


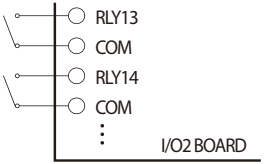
SCR / RET : 4~20mA DC, 600Ω max

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

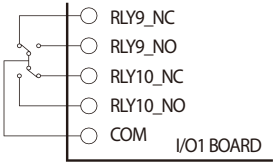
③ Connection for external contact point output

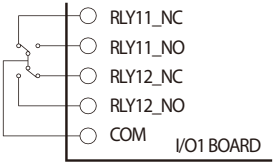
- Switch "OFF" the power of TEMI2000 main body and external power supply certainly for connecting the measurement input because of electric shock risk.
- Contact point output: Under 30V DC 1A, 250V AC 1A for Normal and Open





Under 30V DC 1A, 250V AC 1A

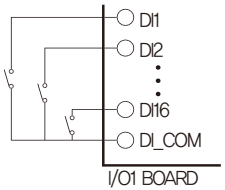




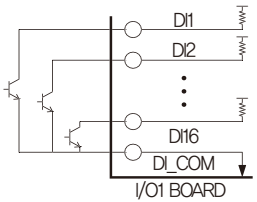
NO (Normal Open): Under 30V DC 1A, 250V AC 1A
NO (Normal Close): Under 30V DC 1A, 250V AC 1A

④ Connection of contact input (DI)

- Use the no voltage contact point (Relay contact point and etc) for the external contact point.
- Use no voltage contact point with sufficient opening and closing function for the terminal voltage (About 5V) "ON" and electric current (About 1mA) in blocking the no voltage contact point.
- Use the open collector for under 2V of both terminal voltage in "ON" for contact point and under 100μA of leaking current in "ON."



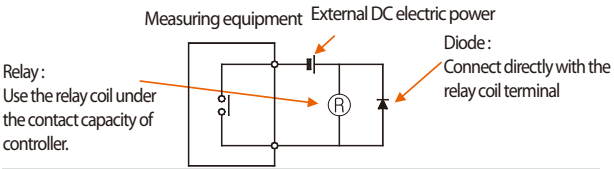
▶ Relay contact point input



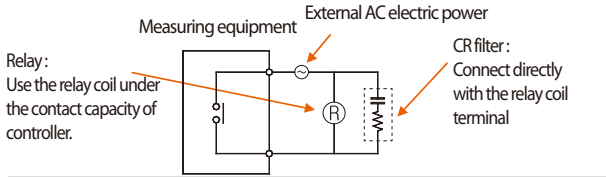
▶ Transistor contact point input

⑤ Use of sub relay

- "ON/OFF" the load by using the sub relay when the resistance load exceeds the relay specification of the product.
- Constitute the spark removing surge suppressor and insert parallel with the CR filter (In case of using AC) or diode (In case of using DC.) certainly because the use of the same inductance (L) load such as sub relay or solenoid valve becomes a reason for mal function or failure in the relay.
- CR filter recommendation
  - Sungho Electronics Co., Ltd : BSE104R120 250V(0.1μ+120Ω)
  - Hana Parts Co., Ltd : HN2EAC
  - Songmi Electric Equipment Co., Ltd : CR unit 953, 955
  - Jiwol Electric Equipment Manufacturing Co., Ltd : SKV, SKVB etc
  - Shinyoung Communication Industry Co., Ltd : CR-CFS, CR-U etc

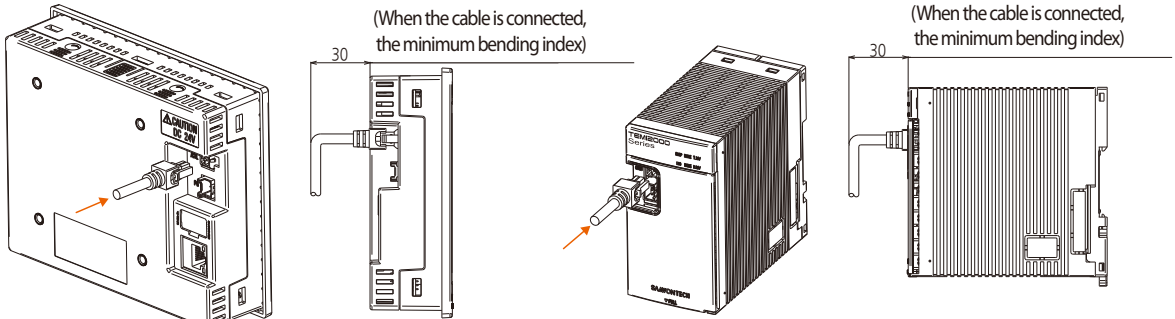


▶ In case of DC relay

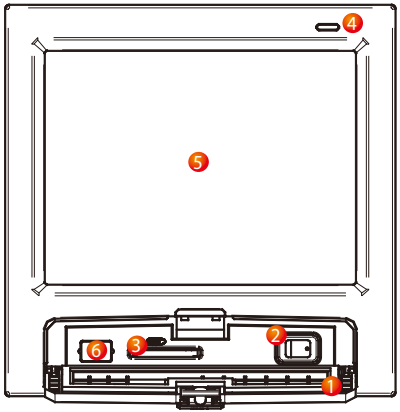


▶ In case of AC relay

⑥ Display/control unit cable connection



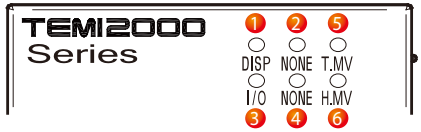
1-4. Display function and name



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

1-5. Control part LED

● The lamps for displaying the state of each part



①	Communication state display lamp for display part and control part (The lamp flashes in normal communication.)
②	Unused
③	Communication state display lamp between the control part and I/O1 board (The lamp flashes in normal communication.)
④	Unused
⑤	Temperature side control output display alamp (The lamp flashes depending on the control output of temperature.)
⑥	Humidity side control output display lamp (The lamp flashes depending on the control output of humidity.)

Part 02

System parameter setting

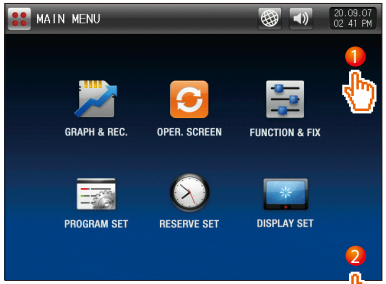
02. System parameter setting

2-1. Setting button operation

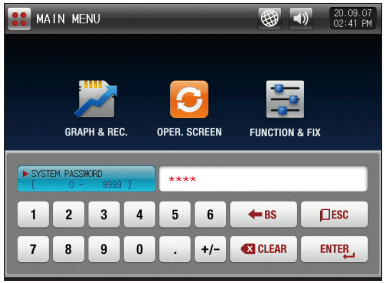
Button type	Button operation
	It is used for inputting the general numbers and name.
	It is used for selection for one out of many types.
	It is used for selection for one out of more than 2 parameter setting. (ON/OFF/Inactive state)
	It is used for selection of Y/N for the corresponding parameter. (ON/OFF/Inactive state)
	It is used for screen conversion.
	It is used for increasing or decreasing of the page within the screen.
	It is used for page conversion by increasing or decreasing of time axis the page on the same screen.

2-2. System parameter setting screen

- This product is a Temperature and Humidity Programmable Controller designed in dialogue type touch screen for easy use.
- Please refer to the [1-1 Basic operation flow chart] in [operation manual].
- When ① and ② on the [Fig. 2-1 Main screen] are pressed sequentially, the password box to move to the system parameter setting screen is activated.
- When the password in input in [Fig. 2-2 password input screen] is input, it is converted to [Fig. 2-3 system parameter setting screen]
  - The password in case of outgoing from the factory is set in the beginning.
  - Set the password in [14-1 Basic screen display setting] certainly at the necessity of blocking the access of the general user.



[Fig. 2-1] Main screen (Basic screen)



[Fig. 2-2] Password input screen

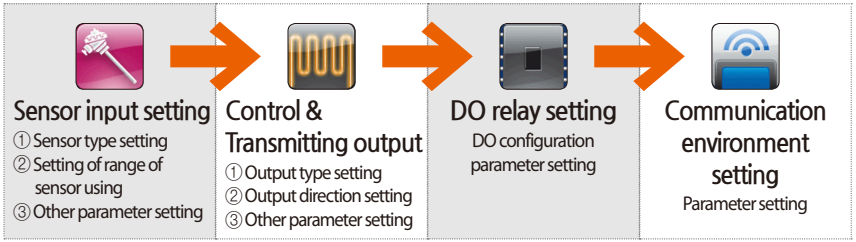
[Fig. 2-3] System parameter setting screen

Symbol	Item	Function
	INPUT SET	Setting of parameter related with the type of input sensor and sensor input [Refer to 3-1]
	OUTPUT SET	Setting of parameter related with the output type and output [Refer to 4-1]
	INNER SIGNAL	Setting of parameter related with inner signal [Refer to 5-1]
	ON/OFF SIGNAL	Setting of parameter related with on/off signal [Refer to 6-1]
	LOGICAL SIGNAL	Setting of parameter related with logical signal [Refer to 7-1]
	ALARM SIGNAL	Setting of parameter related with alarm signal [Refer to 8-1]

Symbol	Item	Function
	PID GROUP	Setting of parameter related with PID [Refer to 9-1]
	COMMUNICATION	Setting of parameter related with communication [Refer to 10-1]
	DO CONFIG	Setting of parameter related with I/O board relay output signal [Refer to 11-1]
	DI CONFIG	Setting of parameter related with the external contact input signals[Refer to 12-1]
	PICTURES VIEW	Setting of parameter related with user setting screen [Refer to 13-1]
	INITIAL SETTING	Setting of parameter related with the basic setting for screen configuration [Refer to 14-1]

2-3. System parameter setting sequence

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



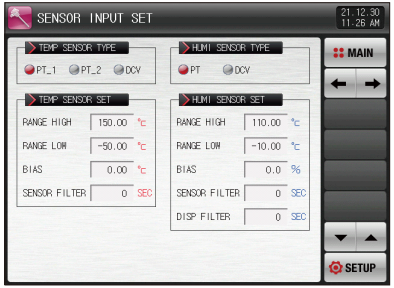
References

- The device may be mal operated in case of changing the setting data is changed into wrong data inside the system setting screen.
- User screen setting: It is activated with SD card option and inactivated without option.

Part 03

Sensor input setting

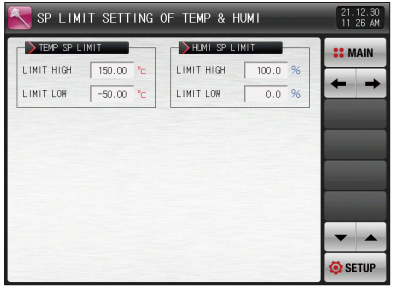
Flow chart



[Fig. 3-1] In case of setting for sensor input PT_1

[Fig. 3-4] Sensor input display screen

[Fig. 3-5] In case of setting the sensor input for each range



[Fig. 3-3] Temperature/humidity limit setting screen

03. Sensor input setting

3-1. Sensor input setting

(1) Sensor input screen 1

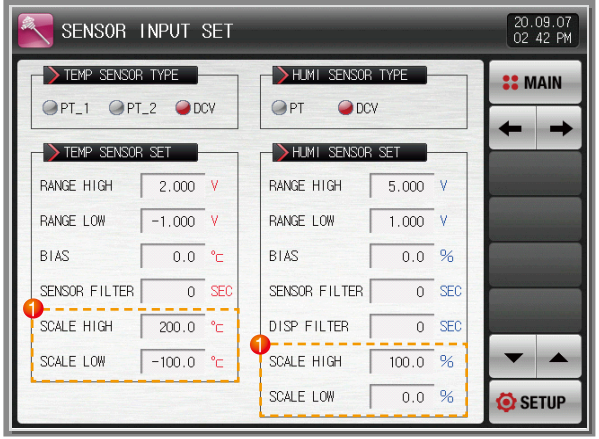
- Select the sensors for temperature (PT_1, PT_2 and DCV) and humidity (PT, DCV).
- The sensors shall be set firstly certainly because when the sensor selected, the parameters will be initialized.
- While Operating is run, the temperature sensor, humidity sensor, sensor type, upper limit range and lower limit shall not be changed.

[Fig. 3-1] Sensor input setting screen (PT_1 selection)

①	Setting of the temperature sensor • In case of changing the sensor, the parameters with expression of EU and EUS are changed in proportion to the current data. However, the setting value for upper and lower limit will be initialized
②	Setting of the humidity sensor • In case of changing the sensor, the parameters with expression of EU and EUS are changed in proportion to the current data. However, the setting value for upper and lower limit will be initialized
③	Setting the use range of the sensor • The parameters related with EU and EUS such as the inner signal and alarm are changed in proportion to the current data in case of changing the lower range (RL) and upper range (RH) • Refer to [Table 3-1]
④	Input calibration (BIAS function) • Calibrate the temperature and humidity input error
⑤	Sensor filter • Setting of the sensor filter time when high frequency noise is included into the input signal
⑥	It is set to relax the shaking of indicator for PV due to the sensitive response of sensor during normal control status.
⑦	Move to [Fig. 2-1 Main screen]
⑧	Move from the current screen to the next screen
⑨	Moving to the next or previous screen using the up/down button
⑩	Move to [Fig. 2-3 System parameter setting screen]

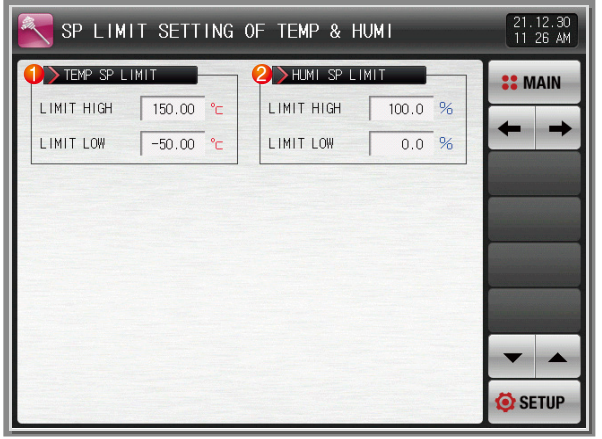
(2) Sensor input screen 2

[Fig. 3-2] Sensor input setting screen (DCV selection)



① It is displayed in case that temperature and humidity sensor set as DCV

[Fig. 3-3] Temperature/humidity limit setting screen



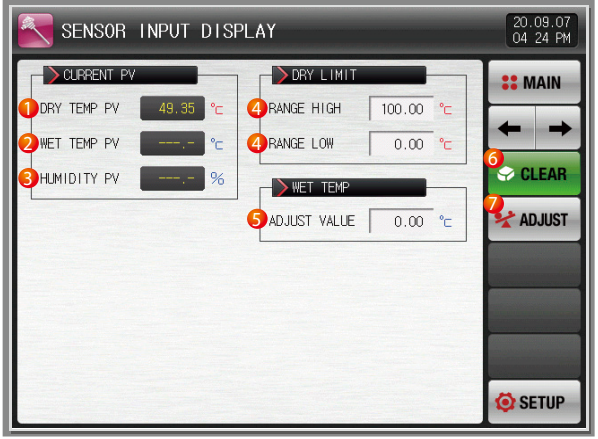
① Set the range of temperature/humidity set value (SP) to be controlled

[Table 3-1] Sensor input setting screen #1 parameter

Parameter		Setting range	Unit	Initial data
Temperature	Sensor	PT_1 (-90.00 ~ 200.00℃) PT_2 (-100.0 ~ 300.0℃) DCV (-1.000 ~ 2.000V)	ABS	PT_1
	Upper limit range	T.EU(0.00 ~ 100.00%) Lower limit range < Upper limit range	T.EU	T.EU(100.00%) However, sensor set as PT_1, it will be "150.00".
	Lower limit range		T.EU	T.EU(0.00%) However, sensor set as PT_1, it will be "- 50.0"
	Input calibration	T.EUS (-100.00 ~ 100.00%)	T.EUS	T.EUS(0.00%)
	Sensor filter	0 ~ 120 SEC	ABS	0
	Scale upper limit	-100.0 ~ 200.0℃ Scale lower limit < Scale upper limit	℃	200.0
	Scale lower limit		℃	-100.0
	Set value limit upper limit	T.EU(0.00 ~ 100.00%)	T.EU	T.EU(100.00%)
	Set value limit lower limit		T.EU	T.EU(0.00%)
Humidity	Sensor	PT (-10.0 ~ 110.0℃) DCV (1.000 ~ 5.000V)	ABS	PT
	Upper limit range	H.EU(0.0 ~ 100.0%) Lower limit range < Upper limit range	H.EU	H.EU(100.0%)
	Lower limit range		H.EU	H.EU(0.0%)
	Input calibration	H.EUS (-20.0 ~ 20.0%)	H.EUS	H.EUS(0.0%)
	Sensor filter	0 ~ 120 SEC	ABS	0
	Display filter	0 ~ 120 SEC	ABS	0
	Scale upper limit	0.0 ~ 100.0℃ Scale lower limit < Scale upper limit	%	100.0
	Scale lower limit		%	0.0
	Set value limit upper limit	H.EU(0.0 ~ 100.0%)	H.EU	H.EU(100.0%)
	Set value limit lower limit		H.EU	H.EU(0.0%)

(3) Sensor input screen 3

[Fig. 3-4] Sensor input display screen



①	Display present value (PV) of dry-bulb temperature • Impossible to change by touching as it is for reading only
②	Display present value (PV) of wet-bulb temperature • Impossible to change by touching as it is for reading only
③	Display present value (PV) of relative humidity • Impossible to change by touching as it is for reading only
④	Set the upper.lower limit of relative humidity display condition range (Dry Limit) • Set to display the relative humidity within the wished dry-bulb temperature.
⑤	It adjusts the sensor data of wet-bulb temperature • It is available only when temperature /humidity sensor type is "PT"
⑥	It deletes the sensor adjusted data of wet-bulb temperature. • It is available only when temperature /humidity sensor type is "PT" • The button is inactive during operation.
⑦	It mates the temperature data of wet-bulb and dry-bulb through automatic calculation of sensor adjusted data in wet-bulb temperature. • It is available only when temperature /humidity sensor type is "PT" • Firmly used before installing the gauze on the temperature sensor in wet-bulb • The button is inactive during operation.

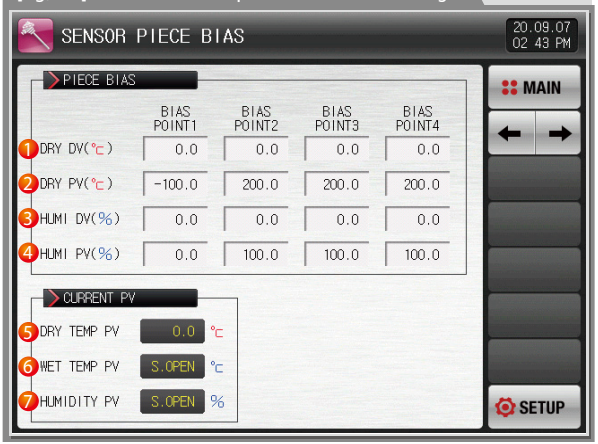
Parameter		Setting range	Unit	Initial data
Relative-Humidity display condition (DRY)	Upper limit range	0.00 ~ 100.00	℃	100.00
	Lower limit range	Lower limit range < Upper limit range	℃	0.00
Wet bulb temperature (Wet)	Sensor adjusted data	H.EUS (-100.00 ~ 100.00%)	H.EUS	H.EUS(0.00%)

※ When input line disconnected, It displays "S.OPEN , and the control output data is fixed in 0.0%.

(4) Sensor input screen 4

- It adjusts Input ranges of temperature and humidity as per the type of humidity sensor.
- The calibration for each range is made in a linear equation method between the calibration points.

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

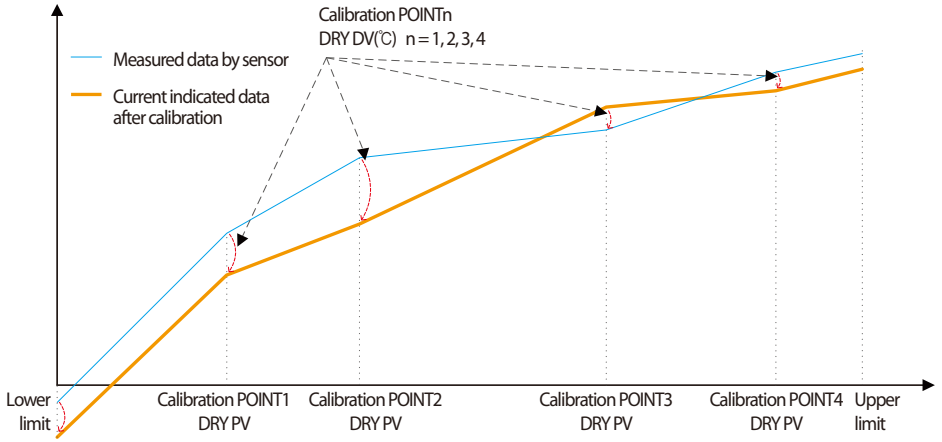


①	It adjusts the calibration temperature of dry-bulb temperature in each standard temperature.
②	It adjusts the calibration temperature of each basic point for calibration of dry-bulb temperature.
③	It adjusts the calibration temperature in each basic temperature of wet-bulb temperature. ● It displays in humidity (%) in case of DCV input type.
④	It sets the temperature for each basic point for calibration of wet-bulb temperature. ● It displays in humidity (%) in case of DCV input type.
⑤	It displays the dry-bulb temperature which is applied input calibration adjusting ● Impossible to change by touching as it is for reading only
⑥	It displays the wet-bulb temperature which is applied input calibration adjusting ● Impossible to change by touching as it is for reading only
⑦	It displays the humidity which is applied input calibration adjusting ● Impossible to change by touching as it is for reading only

Parameter		Setting range	Unit	Initial data
DRY	DV	T.EUS(-10.00 ~ 10.00%)	T.EUS	T.EUS(0.00%)
	PV	T.EU(0.00 ~ 100.00%)	T.EU	T.EU(0.00%)
WET	DV	H.EUS(-10.00 ~ 10.00%)	H.EUS	H.EUS(0.00%)
	PV	H.EU(0.00 ~ 100.00%)	H.EU	H.EU(0.00%)

3-2. Sectional calibration input setting

- It displays the range input calibration adjusting of dry-bulb temperature.
- The input calibration adjusting between wet-bulb temperature and humidity is same with the case for dry-bulb temperature.



References

▶ Calculation for each calibration section

① Temperature at the lower limit ~ calibration 1 point after calibration = Measured data by sensor + calibration 1 point

② Temperature at the calibration 1 point~ calibration 2 point after calibration = Measured data by sensor +

$$(\text{Measured data by sensor} - \text{calibration 1 point DRY PV}) \times \frac{(\text{Calibration 2 point DRY PV} - \text{Calibration 1 point DRY PV})}{(\text{Calibration 2 point DRY PV} - \text{Calibration 1 point DRY PV})} + \text{Data at calibration 1 point DRY PV}$$

References

③ Temperature at the calibration 2 point~ calibration 3 point after calibration = Measured data by sensor +

$$(\text{Measured data by sensor} - \text{calibration 2 point DRY PV}) \times \frac{(\text{Calibration 3 point DRY PV} - \text{Calibration 2 point DRY PV})}{(\text{Calibration 3 point DRY PV} - \text{Calibration 2 point DRY PV})} + \text{Data at calibration 1 point DRY PV}$$

④ Temperature at the calibration 3 point~ calibration 4 point after calibration = Measured data by sensor +

$$(\text{Measured data by sensor} - \text{calibration 3 point DRY PV}) \times \frac{(\text{Calibration 4 point DRY PV} - \text{Calibration 3 point DRY PV})}{(\text{Calibration 4 point DRY PV} - \text{Calibration 3 point DRY PV})} + \text{Data at calibration 3 point DRY PV}$$

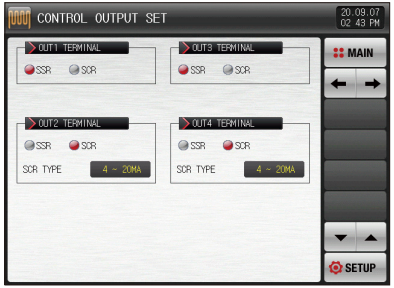
⑤ Temperature at the calibration 4 point~ Temperature at the upper limit after calibration = Measured data by sensor + Calibration 4 point DRY PV

Part 04

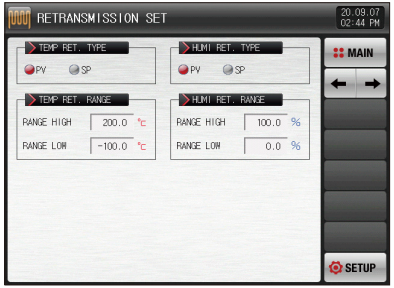
Control & Transmitting output

General control

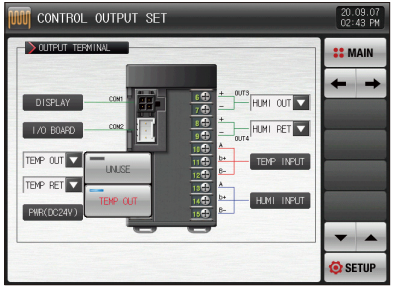
Flow chart Flow chart



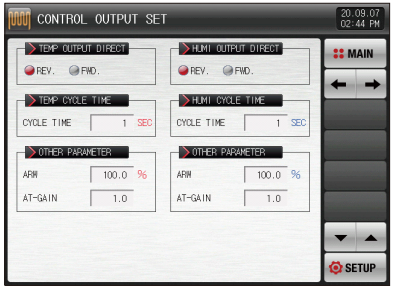
[Fig. 4-1] Output type selection screen (General)



[Fig. 4-9] Transmitting output setting scree
(In case of PV, SP setting)



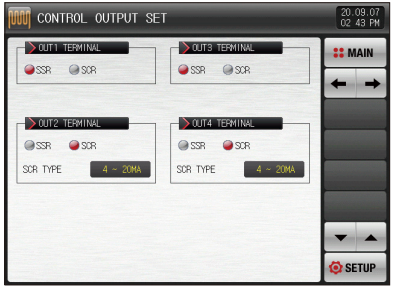
[Fig. 4-2] OUT1 output terminal setting screen (General)



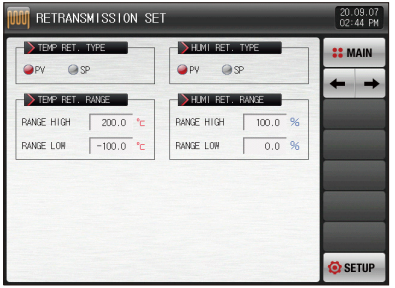
[Fig. 4-4] Output setting screen (General)

Heating·Cooling control

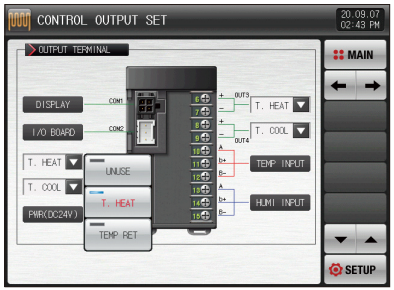
Flow chart Flow chart



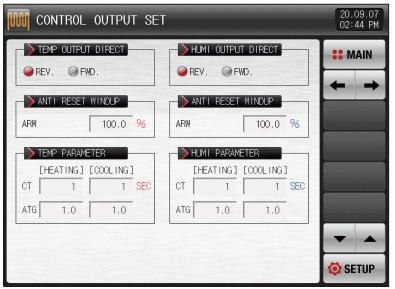
[Fig. 4-5] OUT output type selection screen (Heating·Cooling)



[Fig. 4-9] Transmitting output setting screen (In case of PV, SP setting)



[Fig. 4-6] OUT1 output terminal selection screen (Heating·Cooling)



[Fig. 4-8] Output setting screen (Heating·Cooling)

04. Control & Transmitting output

4-1. General control output setting

(1) Output setting screen 1

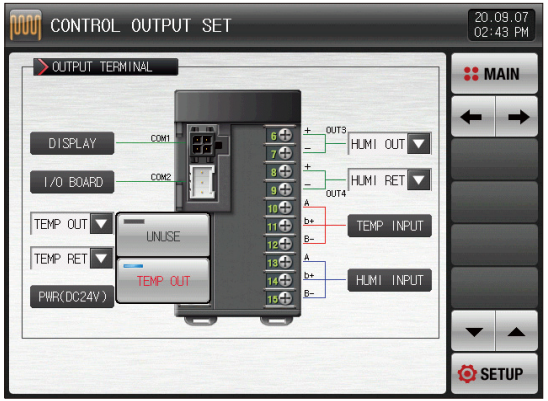
• It sets the type of temperature and humidity control output terminal.

[Fig. 4-1] Output type selection screen (General)

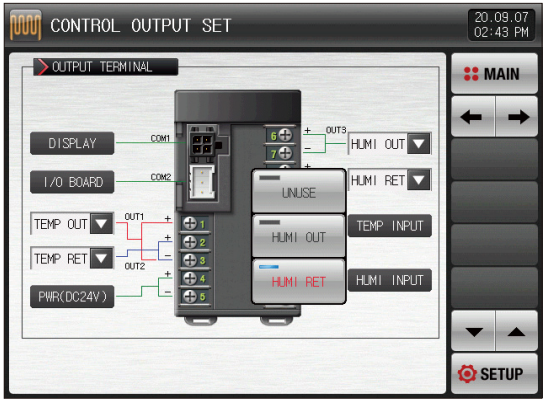
①	Setting the output type of OUT1 • SSR : Setting in case of using temperature control output • SCR : Setting in case of using the temperature control output, temperature transmitting output
②	Setting the output type of OUT2 • SSR : Setting in case of using temperature control output • SCR : Setting in case of using the temperature control output, temperature transmitting output
③	Setting the output type of OUT3 • SSR : Setting in case of using humidity control output • SCR : Setting in case of using the humidity control output, humidity transmitting output
④	Setting the output type of OUT4 • SSR : Setting in case of using humidity control output • SCR : Setting in case of using the humidity control output, humidity transmitting output
⑤	Moving from current screen to the next screen
⑥	Moving to the next or previous screen using the up/down button

(2) Output setting screen 2

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



[Fig. 4-2] OUT1 output terminal selection screen (General)



[Fig. 4-3] OUT3 output terminal selection screen (General)

References

▶ The temperature control output and unused setting screen are display as shown when SSR was set in OUT1 output terminal.

References

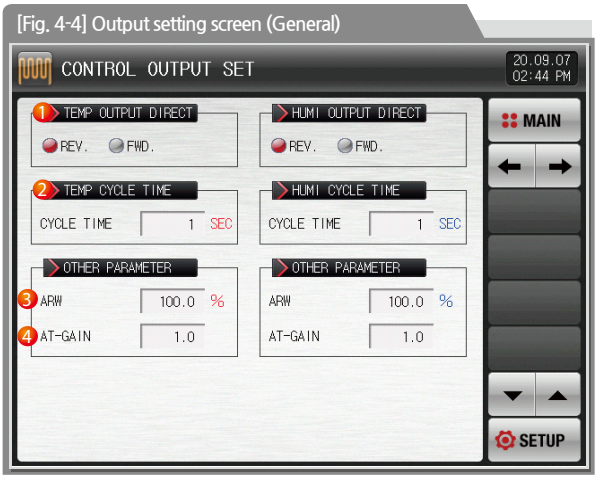
▶ The humidity control output, humidity transmitting output setting screen are display as shown when SCR was set in OUT3 output terminal.

Parameter	Setting range		Unit	Initial data
OUT1 output	SSR : No use, Temperature output	SCR : No use, Temperature output, Temperature transmitting	ABS	Temperature output
OUT2 output	SSR : No use, Temperature output	SCR : No use, Temperature output, Temperature transmitting	ABS	Temperature transmitting
OUT3 output	SSR : No use, Humidity output	SCR : No use, Humidity output, Humidity transmitting	ABS	Humidity output
OUT4 output	SSR : No use, Humidity output	SCR : No use, Humidity output, Humidity transmitting	ABS	Humidity transmitting

(3) Output setting screen 3

- It sets the parameter to temperature and humidity control

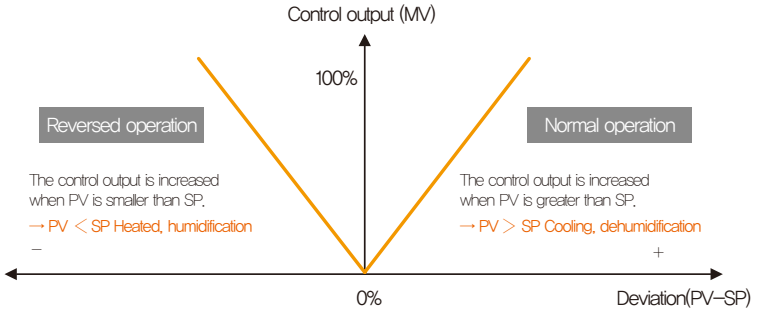
[Fig. 4-4] Output setting screen (General)



①	Setting the PID control operation method • Refer to [① Operation direction]
②	Setting the period for the operation of control output when control output is 'SSR (SOLID STATE RELAY)
③	Setting the anti reset wind-up ratio (Data) adopted in anti reset wind-up function operation • Refer to [③ Anti reset wind-up]
④	Use to control the PID data at once depending on the characteristics of the system after Autotunning • Control output = PID x Control time constant (Gain) • Refer to [④ Control time constant]

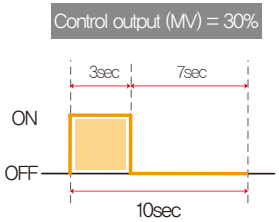
Parameter	Setting range	Unit	Initial data
Operation direction	Reversed operation, normal operation	ABS	Reversed operation
Output period	1~300 SEC	ABS	1
Anti reset wind-up	0.0(AUTO), 0.0 ~ 200.0%	%	100.0
Control time constant	0.1~10.0	ABS	1.0

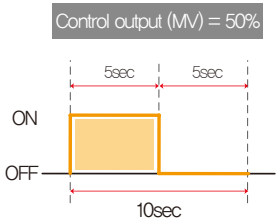
① Operation direction

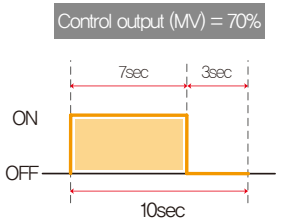


② Output period

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



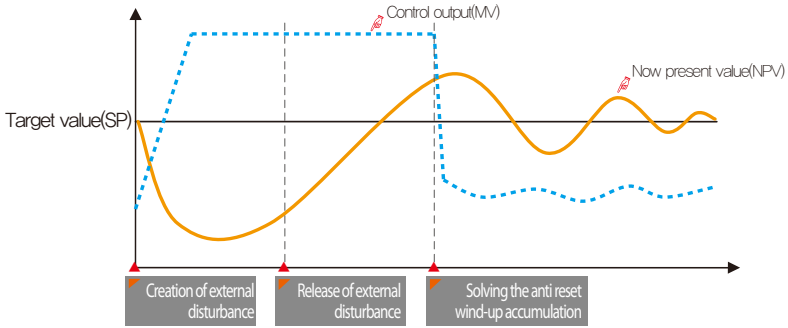




③ Anti reset wind-up

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

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



Creation of external disturbance
: The now present value (NPV) is decreased and control output data (MV) is increased at the moment of external disturbance creation.

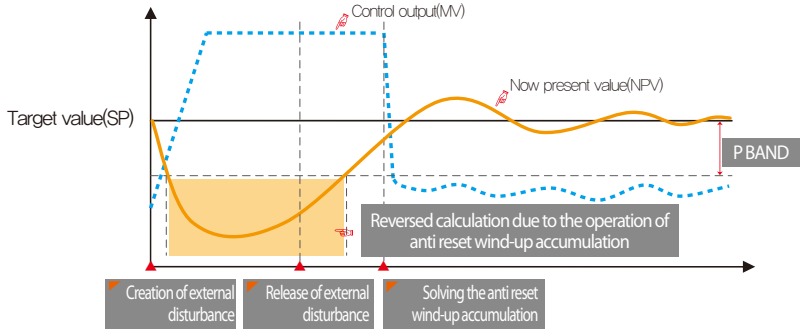
Release of external disturbance
: The control output value (MV) is 100% output by the accumulated anti reset wind-up at the moment of release of external disturbance

Solving the anti reset wind-up accumulation
: Control output value (MV) is decreased by solving the anti reset wind-up accumulation

NOTE

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

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



Creation of external disturbance
: The now present value (NPV) is decreased and control output data (MV) is increased at the moment of external disturbance creation.

Release of external disturbance
: The control output value (MV) is 100% output by the accumulated anti reset wind-up at the moment of release of external disturbance

Solving the anti reset wind-up accumulation
: Control output value (MV) is decreased by solving the anti reset wind-up accumulation

NOTE
The over shoot is small as the time to solve the anti reset wind-up accumulation gets shorter by reversed calculation of the anti reset wind-up before entering of now present value (NPV) to ±P Band and now present value is stabilized soon.

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

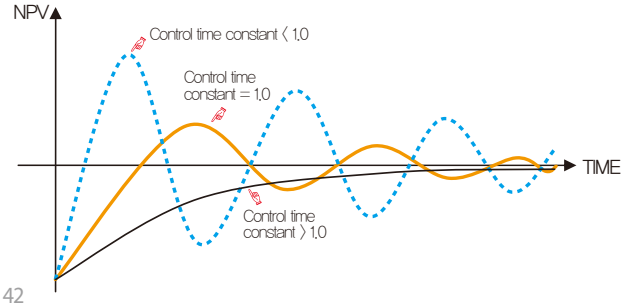
Answer ① Input range = Input upper limit (RH) - Input lower limit (RL) = 100.0℃ - (-100.0℃) = 200.0℃

② Input range Proportional band (P) = 200.0℃ x10.0% = 20.0℃

③ P Band = ② x Anti reset wind-up (ARW) = 20.0℃ x 200% = 40.0℃

④ Control time constant

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



4-2. Heating·Cooling control output setting

(1) Output setting screen 1

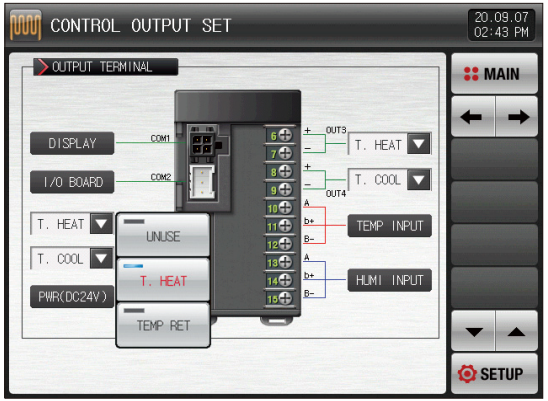
- It sets the type of temperature and humidity control output terminal.
- It can set the Heating·Cooling output for temperature and humidity.

[Fig. 4-5] OUT output type selection screen (Heating·Cooling)

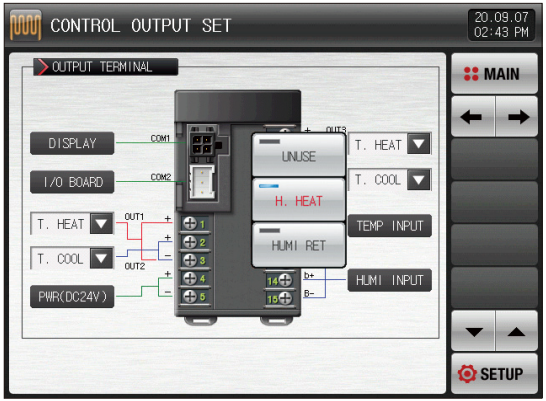
①	Setting the output type of OUT1 • SSR : Setting in case of using temperature heating control output • SCR : Setting in case of using the temperature heating control output, temperature transmitting output
②	Setting the output type of OUT2 • SSR : Setting in case of using temperature cooling control output • SCR : Setting in case of using the temperature cooling control output, temperature transmitting output
③	Setting the output type of OUT3 • SSR : Setting in case of using humidity heating control output • SCR : Setting in case of using the humidity heating control output, humidity transmitting output
④	Setting the output type of OUT4 • SSR : Setting in case of using humidity cooling control output • SCR : Setting in case of using the humidity cooling control output, humidity transmitting output

(2) Output setting screen 2

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



[Fig. 4-6] OUT1 output terminal selection screen (Heating-Cooling)



[Fig. 4-7] OUT3 output terminal selection screen (Heating-Cooling)

References

▶ The temperature heating control output and unused setting screen are display as shown when SSR was set in OUT1 output terminal.

References

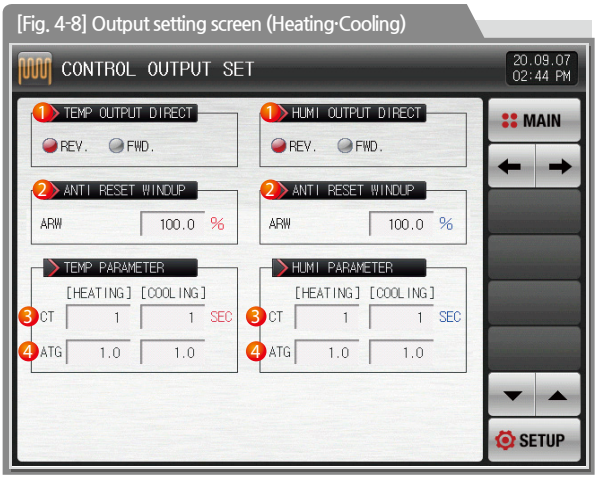
▶ The humidity heating control output, humidity transmitting output setting screen are display as shown when SCR was set in OUT3 output terminal.

Parameter	Setting range		Unit	Initial data
OUT1 output	SSR : No use, Temperature Heating	SCR : No use, Temperature Heating, Temperature transmitting	ABS	Temperature Heating
OUT2 output	SSR : No use, Temperature Cooling	SCR : No use, Temperature Cooling, Temperature transmitting	ABS	Temperature Cooling
OUT3 output	SSR : No use, Humidity Heating	SCR : No use, Humidity Heating, Humidity transmitting	ABS	Humidity Heating
OUT4 output	SSR : No use, Humidity Cooling	SCR : No use, Humidity Cooling, Humidity transmitting	ABS	Humidity Cooling

(3) Output setting screen 3

- It sets the parameter to temperature and humidity control

[Fig. 4-8] Output setting screen (Heating·Cooling)



①	Setting the PID control operation method ● Refer to [① Operation direction]
②	Setting the anti reset wind-up ratio (Data) adopted in anti reset wind-up function operation ● Refer to [③ Anti reset wind-up]
③	Setting the period for the operation of control output when control output is 'SSR (SOLID STATE RELAY)
④	Use to control the PID data at once depending on the characteristics of the system after auto tuning ● Control output = PID x Control time constant (Gain) ● Refer to [④ Control time constant]

4-3. Transmitting output setting screen

- It is a screen to set the type of temperature and humidity transmitting output.
- Either PV or SP can be set for transmitting output.

[Fig. 4-9] Transmitting output selection screen (In case of selecting PV or SP)

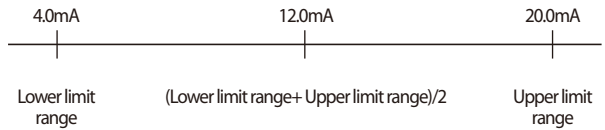
①	Setting the type of temperature transmitting output
②	Setting the upper·lower limit of the temperature transmitting output
③	Setting the type of humidity transmitting output
④	Setting the upper·lower limit of the humidity transmitting output

Parameter	Setting range	Unit	Initial data
Transmitting type	PV, SP	ABS	PV
Temperature transmitting upper limit range	T.EU(0.00~100.00%) Temperature transmitting lower limit range 〈 Temperature transmitting upper limit range	T.EU	T.EU(100.00%)
Temperature transmitting lower limit range		T.EU	T.EU(0.00%)
Humidity transmitting upper limit range	H.EU(0.0~100.0%) Humidity transmitting lower limit range 〈 Humidity transmitting upper limit range	H.EU	H.EU(100.0%)
Humidity transmitting lower limit range		H.EU	H.EU(0.0%)

(2) Output depending on the transmitting type

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

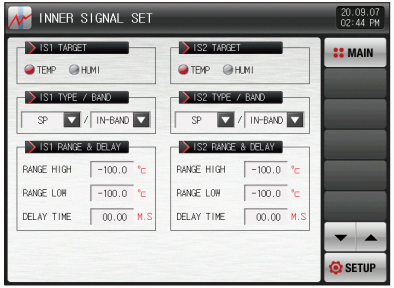
▶ When the type of transmitting output is "PV" or "SP"



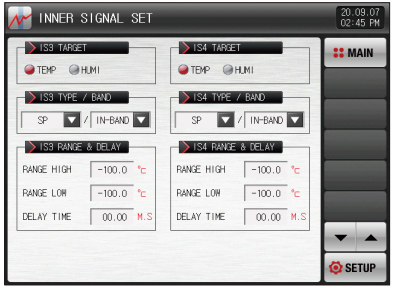
Part 05

Inner signal(IS)

Flow chart



[Fig. 5-1] Inner signal setting screen #1



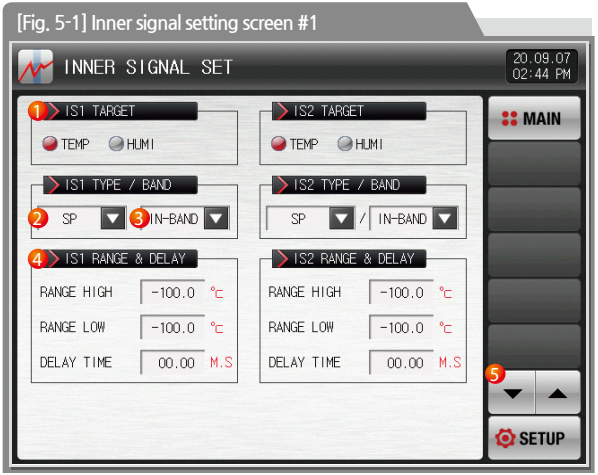
[Fig. 5-2] Inner signal setting screen #2

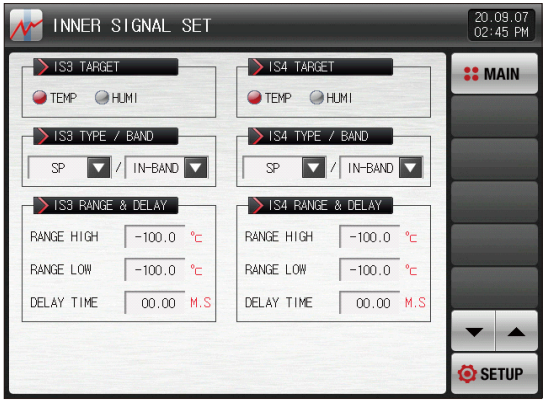
05. Inner signal (IS)

5-1. Inner signal setting

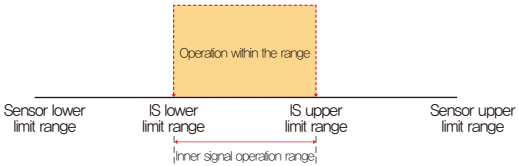
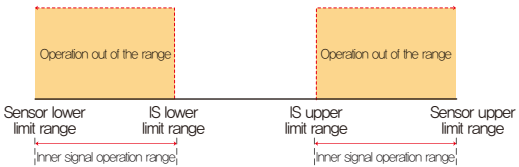
- It is a screen to set the object of application, type and operation of each inner signal.
- Setting of 16 (IS1~IS16) inner signal operations is available
- The operation range and delay time of inner signal can be set in [Fig. 5-1] Inner signal setting screen #1.

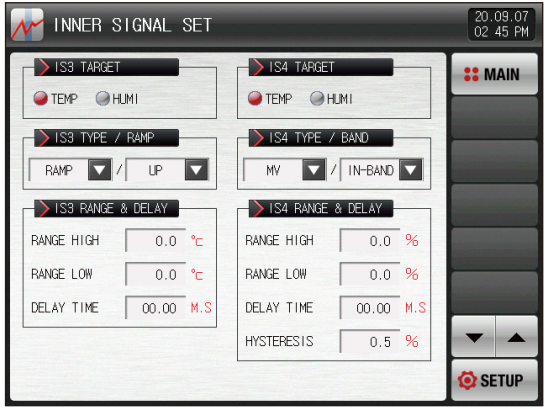
[Fig. 5-1] Inner signal setting screen #1





[Fig. 5-2] Inner signal setting screen #2

①	Setting the application target of inner signal.
②	Setting the application type of inner signal. • SP : Set value • PV : Present value (It has EUS 0.5% fixed hysteresis when PV is selected.) • TSP : Target set value in program control • RAMP : SP change works when rising or falling within the scope of this RAMP operating range. (PROGRAM operate only during operation) • MV : The other enters operation when the MV range or ranges within the operating range of the set.
③	Setting of inner signal operation band • Within the range : The operation of inner signal is "ON" when the selected application  • Out of range: The operation of inner signal is "ON" when the selected application from application type of inner signal (SP, PV, TSP, RAMP and MV) is located out of the upper and lower limit of operation range. 
④	Setting of the upper.lower limit of the operation range and delay time. • Upper limit range.lower limit range: Setting the operation range of inner signal application • Delay time: Setting of the delay time to be applied in inner signal operation
⑤	Moving to the previous or next screen using up/down button.



[Fig. 5-3] RAMP·MV of Inner signal Type setting screen

Parameter		Setting range	Unit	Initial data
Inner signal #n target		TEMP, HUMI	ABS	TEMP
Inner signal #n Type		SP, PV, TSP, RAMP, MV	ABS	SP
Inner signal #n Band		IN-BAND, OUT-BAND	ABS	IN-BAND
		UP, DOWN (Type : RAMP select)		UP
Inner signal #n Range & Delay	Range High	EU(0.0~100.0%)	EU	EU(0.0%)
		EU(0.0~100.0%)/min (Type : RAMP select)		EU(0.0%)/min
	Range Low	EU(0.0~100.0%)	EU	EU(0.0%)
		EU(0.0~100.0%)/min (Type : RAMP select)		EU(0.0%)/min
	Delay Time	00.00 ~ 99.59 (MIN.SEC)	ABS	00.00
	Hysteresis	EUS(0.0~5.0%) (Type : PV or MV select)	EUS	EUS(0.5%)

※ It can be set for #n = 1 ~ 16.

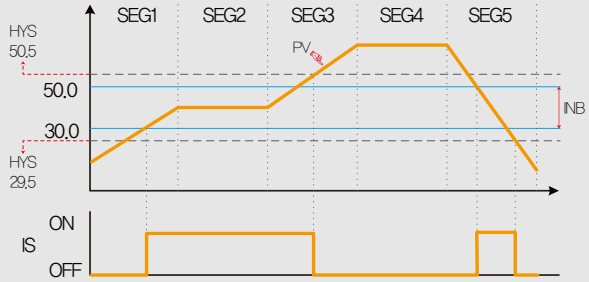
5-2. Inner signal operation

- When the change rate (Slope) is set in stationary operation, the "Target set value (TSP)" operates the same motion with "Target set value (TSP)" of program control, but, when the change rate (Slope) is not set, the "Target set value (TSP)" operates in "Now present value (SP)"

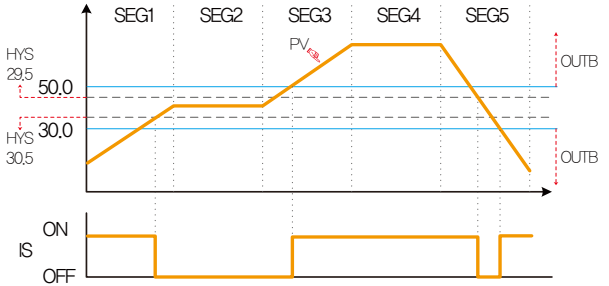
Setting

- ▶ Input = 0.0~100.0
  → EUS 0.5% = 0.5
- ▶ Operation method = Pattern
- ▶ Items = Temperature
- ▶ Application type = Present Value (PV)
- ▶ Upper limit range = 50.0%
- ▶ Lower limit range = 30.0%
- ▶ Operation band = Within range (IN.B)
- ▶ Delay time = 00.00

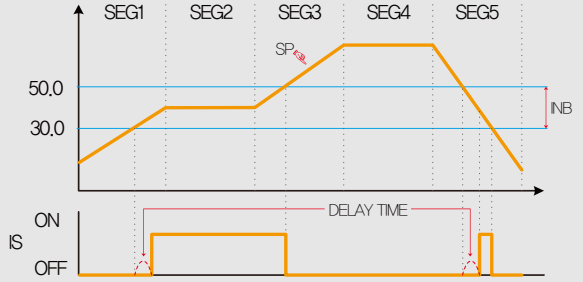
Inner signal operation



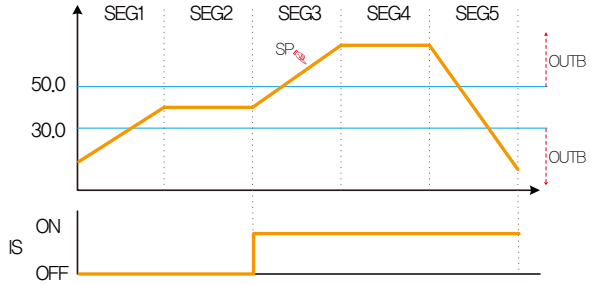
- Input = 0.0~100.0
  → EUS 0.5% = 0.5
- Operation method = Pattern
- Items = Humidity
- Application type = Present Value (PV)
- Upper limit range = 50.0%
- Lower limit range = 30.0%
- Operation band = Out of range (OUT.B)
- Delay time = 00.00



- Input = 0.0~100.0
- Operation method = Pattern
- Items = Humidity
- Application type = Present Value (PV)
- Upper limit range = 50.0%
- Lower limit range = 30.0%
- Operation band = Within range (IN.B)
- Delay time = 00.10

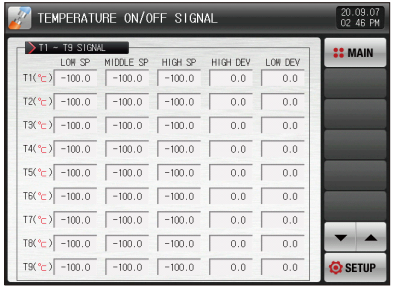


- Input = 0.0~100.0
- Operation method = Pattern
- Items = Humidity
- Application type = Present Value (PV)
- Upper limit range = 50.0%
- Lower limit range = 30.0%
- Operation band = Out of range (OUT.B)
- Delay time = 00.00

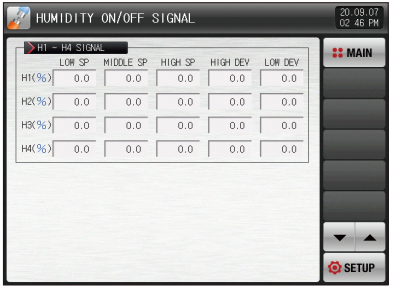


Part 06

ON/OFF signal



[Fig. 6-1] Temperature ON/OFF signal setting screen



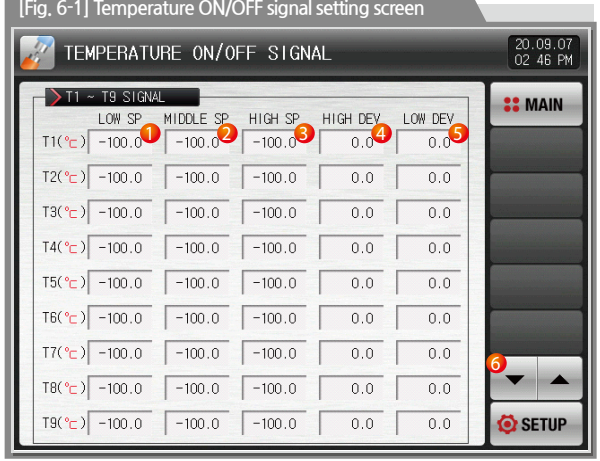
[Fig. 6-2] Humidity ON/OFF signal setting screen

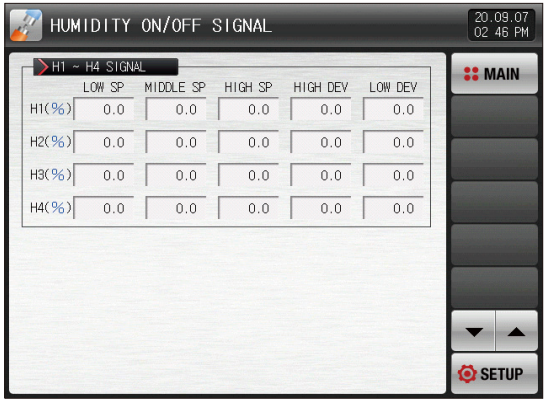
06. ON/OFF signal

6-1. ON/OFF signal setting

- It is a screen to set the range, upper.lower deviation of ON/OFF signal.
- Can set nine pcs of temperature ON/OFF signals and four pcs of humidity ON/OFF signals
- Setting of relay number and delay time is available in [11-1(3) Temperature ON/OFF and Humidity ON/OFF signal relay setting screen].
- Please refer to the [11-1(3) Temperature ON/OFF and Humidity ON/OFF signal relay setting screen], when the Ahaead Of Time.

[Fig. 6-1] Temperature ON/OFF signal setting screen





[Fig. 6-2] Humidity ON/OFF signal setting screen

①	Setting of lower limit SP boundary in ON/OFF signal operation
②	Setting of medium limit SP boundary in ON/OFF signal operation
③	Setting of upper limit SP boundary in ON/OFF signal operation
④	Setting of operation point in upper limit range
⑤	Setting of operation point in lower limit range
⑥	Moving to the previous or next screen using up/down button.

Parameter	Setting range	Unit	Initial data
Temperature T#n LOW SP	T.EU(0.00~100.00%)	T.EU	T.EU(0.00%)
Temperature T#n MIDDLE SP	Temp lower limit rang ≤ Temp T#n LOW SP < Temp T#n MIDDLE SP <	T.EU	T.EU(0.00%)
Temperature T#n HIGH SP	Temp T#n HIGH SP≤ Temp upper limit range	T.EU	T.EU(0.00%)
Temperature T#n HIGH deviation	T.EUS(0.00~20.00%)	T.EUS	T.EUS(0.00%)
Temperature T#n LOW deviation	T.EUS(0.00~20.00%)	T.EUS	T.EUS(0.00%)
Humidity H#m LOW SP	H.EU(0.0~100.0%)	H.EU	H.EU(0.0%)
Humidity H#m MIDDLE SP	Humi lower limit rang ≤ Humi H#m LOW SP < Humi H#m MIDDLE	H.EU	H.EU(0.0%)
Humidity H#m HIGH SP	SP < Humi H#m HIGH SP≤ Humi upper limit range	H.EU	H.EU(0.0%)
Humidity H#m HIGH deviation	H.EUS(0.0~10.0%)	H.EUS	H.EUS(0.0%)
Humidity H#m LOW deviation	H.EUS(0.0~10.0%)	H.EUS	H.EUS(0.0%)

※ It can be set for #n= 1~9. ※ It can be set for #m= 1~4.

References

▶ High, low deviation motion explanation

- High deviation operation

① Middle SP < Present value (PV ≤ In case of upper limit SP

Present value (PV) ≥ Present set value (SP) + High deviation : The operation is "ON"

Present value (PV) < Present set value (SP) + High deviation : The operation is "OFF"

- Low deviation operation

② Lower limit SP ≤ Present value (PV) < In case of middle SP

Present value (PV) ≥ Present set value (SP) - Low deviation : The operation is "ON"

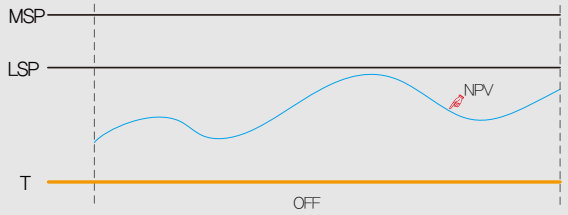
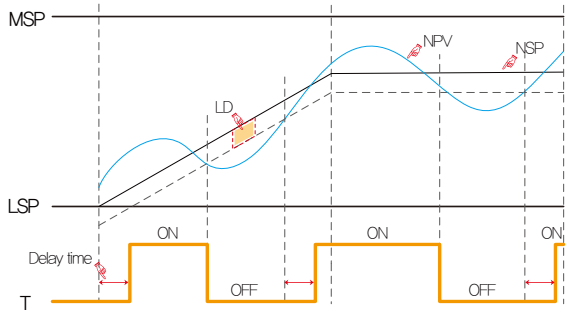
Present value (PV) < Present set value (SP) - High deviation : The operation is "OFF"

※ Refer to [6-2 ON/OFF signal operation]

6-2. ON/OFF signal operation

- Delay time is the set time in ON/OFF signal delay time in DO relay setting.
- LSP = LOW SP, MSP = MIDDLE SP, HSP = HIGH SP, NPV = NOW PV, NSP = NOW SP
- LD = LOW Deviation, HD = HIGH Deviation, T = ON/OFF signal

▶ ON/OFF signal operation depending on PV

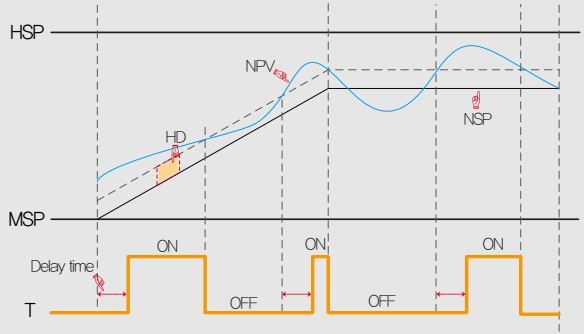
Setting	ON/OFF signal operation
NPV < LSP ▶ Always : OFF	
LSP ≤ NPV < MSP ▶ NPV ≥ NSP - LD : ON ▶ NPV < NSP - LD : OFF ▶ LD : when LD set by "0," always "ON" in signal.	

MSP < NPV ≤ HSP

▶ NPV ≥ NSP + HD : ON

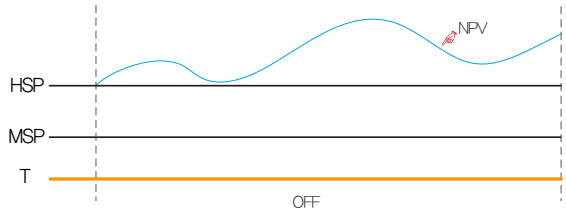
▶ NPV < NSP + HD : OFF

▶ HD : when HD set by "0," always "OFF" in signal.



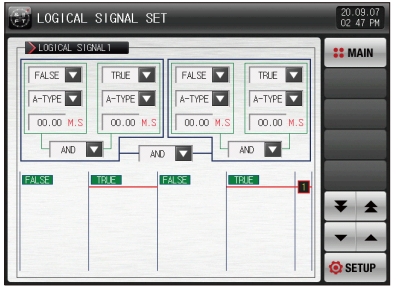
NPV > HSP

▶ Always : OFF

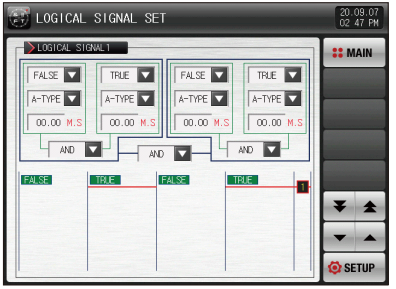


Part 07

Logic signal



[Fig. 7-1] Logic signal setting screen



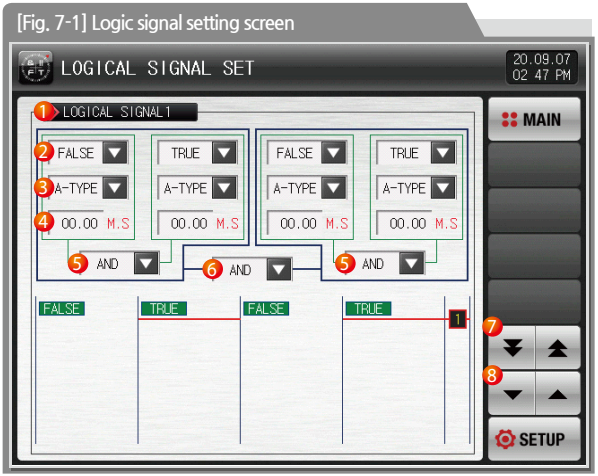
[Fig. 7-6] Logic signal setting screen #1

07. Logic signal

7-1. Logic signal setting

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

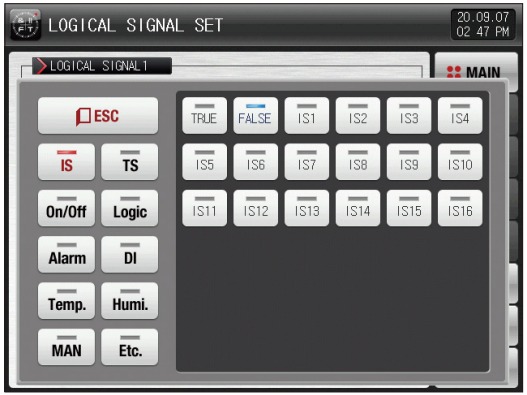
[Fig. 7-1] Logic signal setting screen



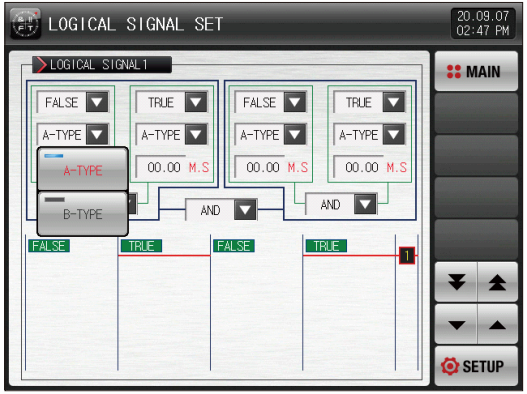
①	Set to operation condition for logic signal
②	Select to applicable object of logic signal • Refer to [Table 7-1]
③	Set to output method of application of the operation signal • A-Contact : Output contact is connected, when signal of applicable object is activated • B-Contact : Output contact is disconnected,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

References

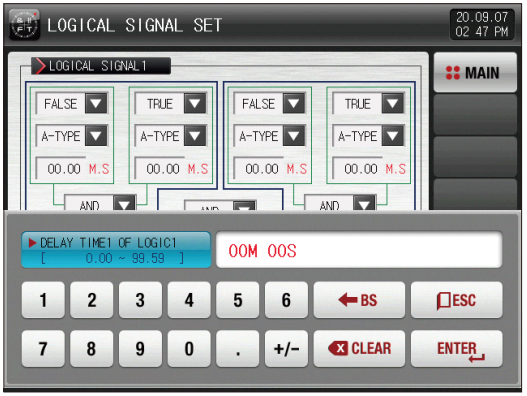
▸ It does not apply to delay time and method of output when selecting a TRUE / FALSE.



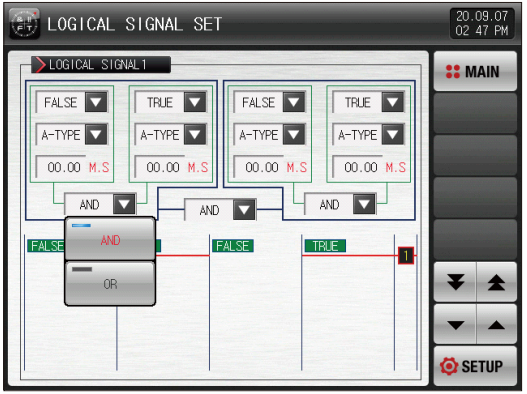
[Fig. 7-2] Applicable object of logic signal setting screen



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



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



[Fig. 7-5] Logic signal operato setting screen

[Table 7-1] Forms of logic signal parameter

Parameter	Setting range		Unit	data
	Display	Logic type		
Logic signal#n applicable object	IS	TRUE, FALSE, IS1~IS16	ABS	FALSE
	TS	TRUE, FALSE, TS1~TS4	ABS	FALSE
	ON/OFF	TRUE, FALSE, T1~T10, H1~H5	ABS	FALSE
	LOGIC	TRUE, FALSE, LOG1~LOG32	ABS	FALSE
	ALARM	TRUE, FALSE, AL1~AL8	ABS	FALSE
	DI	TRUE, FALSE, DI 1~DI 16(DI16(DI30 Option : DI1 ~ DI30)	ABS	FALSE
	TEMP	TRUE, FALSE, T.RUN, T.SOPN, T.WAIT, T.UP, T.SOAK, T.DOWN, T.FTM	ABS	FALSE
	HUMI	TRUE, FALSE, H.RUN, H.SOPN, H.WAIT, H.UP, H.SOAK, H.DOWN, H.FTM	ABS	FALSE
	MAN	TRUE, FALSE, MAN1~MAN12	ABS	FALSE
	ETC	TRUE, FALSE, U-KEY, F.END, PT.END, DRAIN, ERROR, 1.REF, 2.REF, HOLD	ABS	FALSE
Logic signal#n output method	A-Contact, B-Contact		ABS	A-Contact
Logic signal#n delay time	00.00~99.59 (MIN.SEC)		ABS	00.00
Logic signal#n operator	AND, OR		ABS	AND

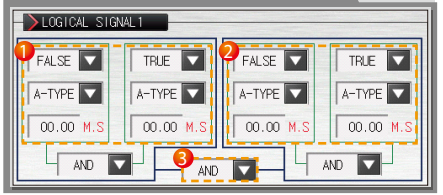
※ #n : 1 ~ 32

7-2. Logic signal operation

References

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

Operating mode of logic group signal



Example) Logic group signal parameter

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

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

<Logic group 1 AND Output>

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

<Logic group 2 OR Output>

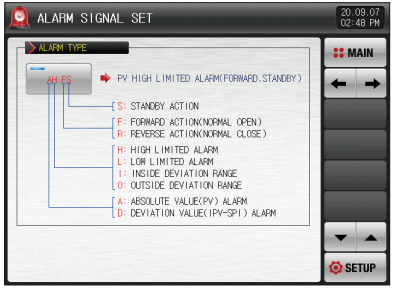
3 Logic group 1 Output <AND> Logic group 2 Output		Output
Logic group 1 Output	Logic group 2 Output	
OFF	OFF	OFF
OFF	ON	OFF
ON	OFF	OFF
ON	ON	ON

<Logic group 1 and Logic group 2 AND Output>

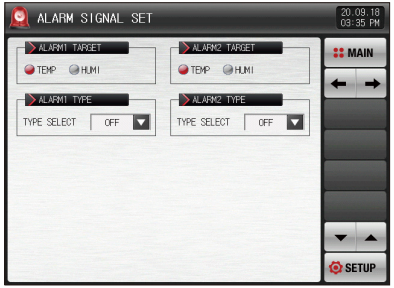
Part 08

Alarm signal

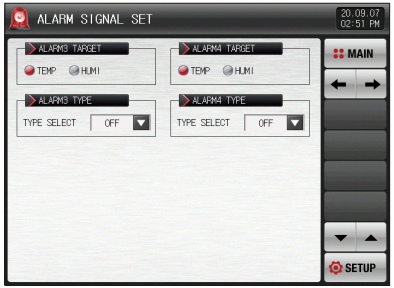
Flow chart Flow chart



[Fig. 8-1] Alarm signal selection screen #1



[Fig. 8-3] Alarm signal selection screen #2



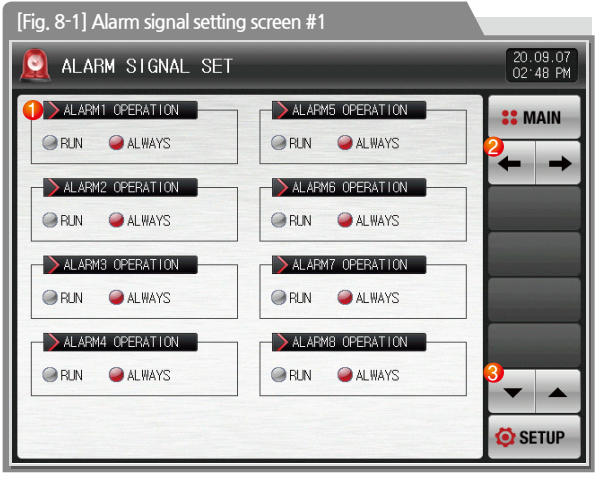
[Fig. 8-3] Alarm signal selection screen #2

08. Alarm signal

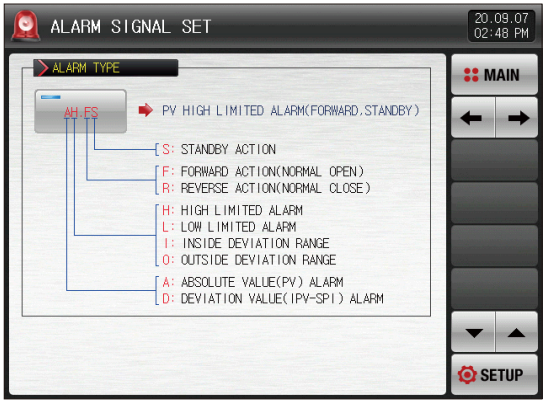
8-1. Alarm signal setting

(1) Alarm signal setting screen 1

[Fig. 8-1] Alarm signal setting screen #1



①	Setting of alarm operation • RUN : The alarm operation is performed only during operation. • ALWAYS : The alarm operation is performed always regardless of run/stop.
②	Moving from current screen to next screen
③	Moving to the next and previous screen using up/down button.



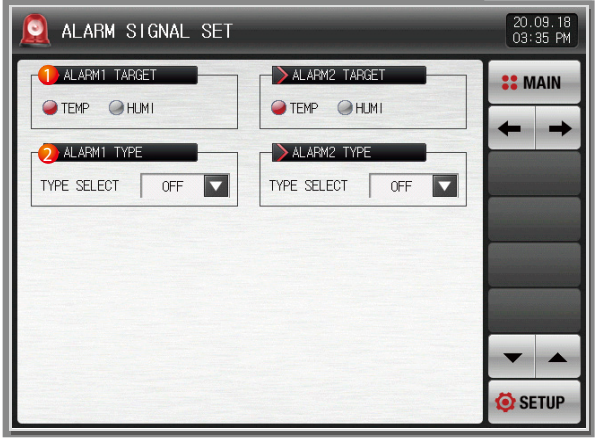
[Fig. 8-2] Alarm signal setting screen#2

Parameter	Setting range	Unit	Initial data
Alarm operation	Run, Always	ABS	Always

(2) Alarm signal setting screen 2

- It is a screen to set the alarm for temperature and humidity
- Alram signals can be set max. 8 points
- There are 20 types of alarm signal.

[Fig. 8-3] Alarm signal selection #1 in screen 2



①	Setting of alarm signal target
②	Setting of alarm signal type

[Fig. 8-4] Alarm signal selection #2 in screen 2

③	Selection of the alarm signal type to be used • Refer to [Table 8-1 Alarm type]

[Fig. 8-5] Alarm signal selection #3 in screen 2

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

References

▶ When the alarm type was set in AH.F and DO.F in [Fig. 8-3 Alarm signal selection #1 in screen 2], the following screen is displayed.

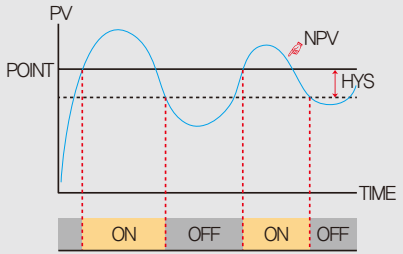
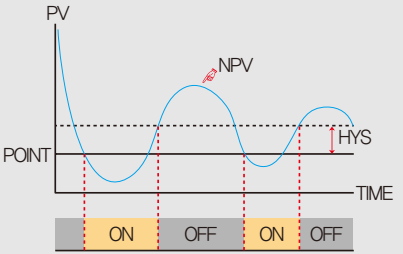
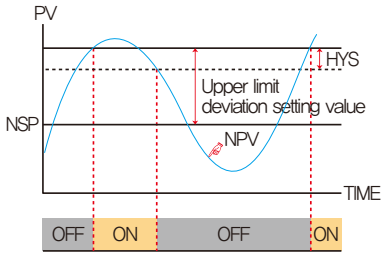
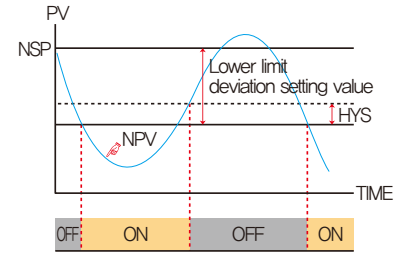
Parameter	Setting range	Unit	Initial data
Alarm #n target	Temperature, Humidity	ABS	Temperature
Alarm #n type	No use, AH.F, AL.F, DH.F , DL.F, DH.R, DL.R DO.F, DI.F, AH.R , AL.R, AH.FS, AL.FS DH.FS, DL.FS, DH.RS , DL.RS, DO.FS, DI.FS , AH.RS, AL.RS	ABS	No use
Alarm #n POINT	T.EU(-5.00~105.00%) / H.EU(-5.0~105.0%)	T.EU / H.EU	EU(100.0%) (Alarm#n type = is not one of DO.F, DI.F, DO.FS, DI.FS)
Alarm #n upper limit POINT	T.EUS(-100.00~100.00%) / H.EUS(-100.0~100.0%)	T.EUS / H.EUS	EUS(0.0%) (Alarm#n type= is one of DO.F, DI.F, DO.FS and DI.FS
Alarm #n lower limit POINT			
Alarm #n hysteresis	T.EUS(0.00~100.00%) / H.EUS(0.0~100.0%)	T.EUS / H.EUS	T.EUS(0.50%) / H.EUS(0.5%)
Alarm #n delay time	00.00~99.59 (MIN.SEC)	ABS	00.00

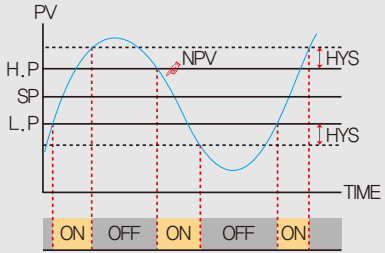
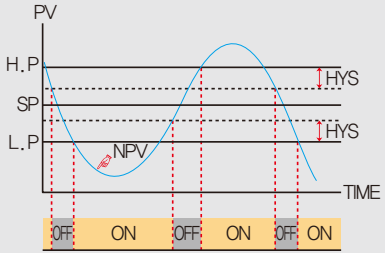
※ #n : 1 ~ 8

[Table 8-1] Alarm type

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

8-2. Alarm signal operation

PV upper limit	 ● POINT : Alarm setting data ● NPV : Now Present Value	PV upper limit	 ● POINT : Alarm setting data ● NPV : Now Present Value
Deviation upper limit	 ● NSP : Now Set Value ● NPV : Now Present Value	Deviation upper limit	 ● NSP : Now Set Value ● NPV : Now Present Value

Within upper. lower deviation limit	 ● L.P : Lower limit deviation setting ● H.P : Upper limit deviation setting	Out of upper. lower deviation limit	 ● L.P : Lower limit deviation setting ● H.P : Upper limit deviation setting

References

▶ HYS(HYSTERESIS) : HYS (Hysterisis): It is a deviation applied in recovery (OFF) after alarming (ON). The initial data is EUS (0.5%) and it is not operated when EUS(0.0%) is set.

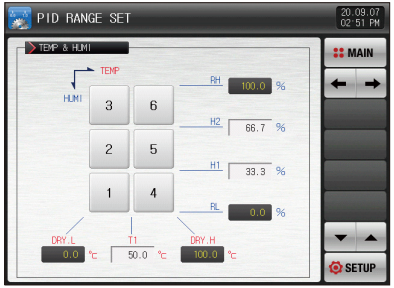
[Fig. 8-6] Alarm operation screen

Part 09

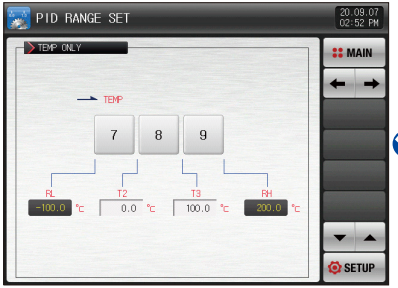
PID Group

General control

Flow chart Flow chart

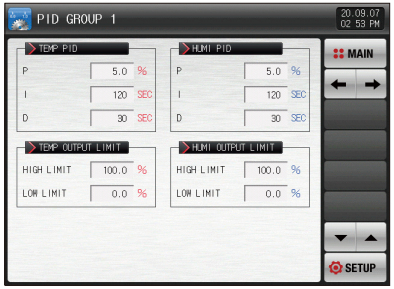


[Fig. 9-1] PID application range setting screen #1



[Fig. 9-2] PID application range setting screen #2

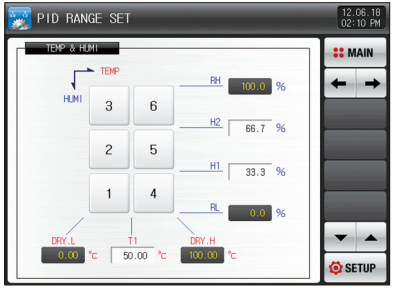
[Fig. 9-3] PID group setting screen (General)



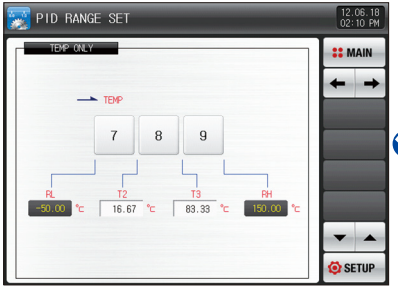
[Fig. 9-4] PID group setting screen (General)

Heating·Cooling control

Flow chart Flow chart

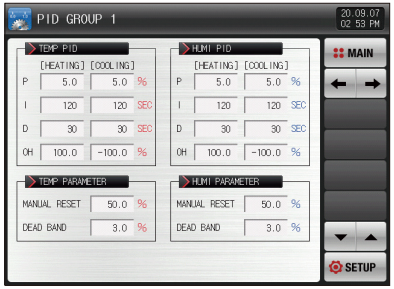


[Fig. 9-1] PID application range setting screen #1



[Fig. 9-2] PID application range setting screen #2

[Fig. 9-5] PID group setting screen (Heating·Cooling)



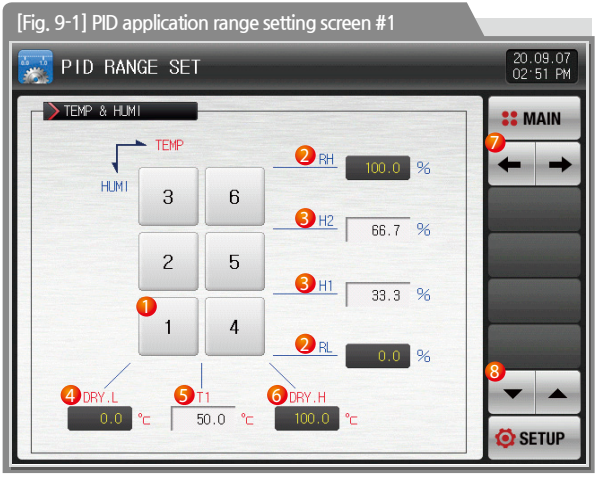
[Fig. 9-6] PID group setting screen (Heating·Cooling)

09. PID Group

9-1. PID application range setting screen 1

- It is composed of six pcs of temperature•humidity PID and three pcs of temperature only PID.
- It is displayed in light yellowish green in the corresponding PID No. in stationary program operation.

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

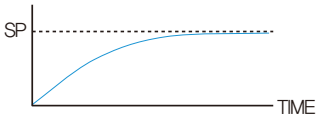


①	Moving to the corresponding PID group setting screen when the number is pressed. • Moving to the PID group setting screen when ← → is pressed.
②	RH, RL : It displays the range for entire range of humidity. • Not changeable as it is only for reading
③	H1, H2 : It sets the boundary value of the PID range for entire humidity scale.
④	DRY.L : It displays the lower limit of the dry-bulb temperature input for displaying the humidity. • Not changeable as it is only for reading
⑤	T1 : It sets the boundary value to classify the range PID for the dry-bulb temperature span for humidity.
⑥	DRY.H : It displays the upper limit of the dry-bulb temperature input for displaying the humidity. • Not changeable as it is only for reading
⑦	Moving from current screen to next screen
⑧	Moving to the next and previous screen using up/down button.

Parameter	Setting range	Unit	Initial data
Temperature boundary value1 (T1)	DRY.L < T1 < DRY.H	ABS	(DRY.L + DRY.H) / 2
Humidity boundary value1 (H1)	H.EU(0.0 ~ 100.0%)	H.EU	(RH - RL) / 3
Humidity boundary value2 (H2)	RL < H1 < H2 < RH	H.EU	2(RH - RL) / 3

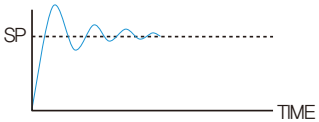
▶ Proportion band(P) : It controls to the direction to reduce the deviation between Now Present Value (NPV) and target value (SP)

Proportion band(P) increase



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

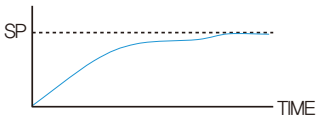
Proportion band(P) decrease



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

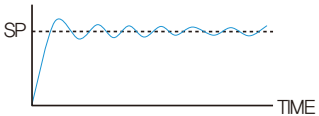
▶ Integral time(I) : It controls to the direction to reduce the residual deviation which can be taken place in proportion(P) control.

Integral time(I) increase



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

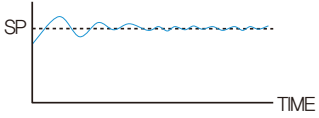
Integral time(I) decrease



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

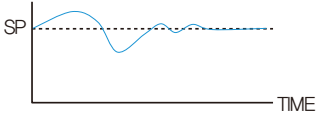
▶ Derivative time(D) : It controls to the direction to reduce the changing rate of deviation between the Now Present Value (NPV) and target value (SP) in abrupt temperature change.

Derivative time(D) increase



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

Derivative time(D) decrease

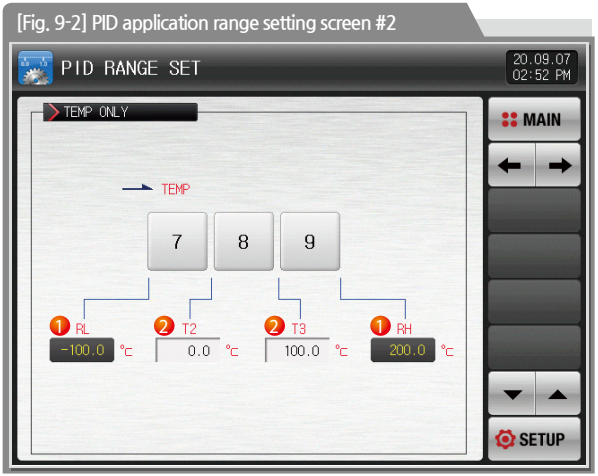


The overshoot and undershoot are created and it takes time for Now Present Value (NPV) to reach to the target value (SP).

9-2. PID application range setting screen 2

● It is a screen which shows temperature PID group only

[Fig. 9-2] PID application range setting screen #2



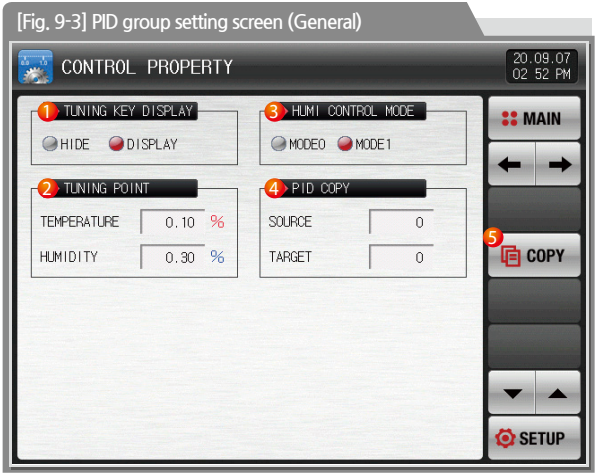
①	RH, RL : It displays the whole range of temperature span without displaying the humidity. ● Not changeable as it is only for reading
②	T2, T3 : It sets the boundary value to classify the whole temperature range PID (Zone PID without displaying the humidity.

Parameter	Setting range	Unit	Initial data
Temperature boundary value2 (T2)	T.EU(0.00 ~ 100.00%)	T.EU	RL + (RH - RL) / 3
Temperature boundary value3 (T3)	RL < T2 < T3 < RH	T.EU	RL+ 2(RH - RL) / 3

9-3. General PID application range setting screen

● It is a screen to set the parameters related to the control characteristics in PID control and to copy the time constant between PID groups.

[Fig. 9-3] PID group setting screen (General)



①	Setting the Y/N for displaying the auto tuning key in operation screen ● Refer to [Fig. 4-5 Stationary operation operation screen #2] and [Fig. 4-12 Program operation operation screen #2] in [Operation manual]
②	It sets the Auto-Tuningpoint of temperature.humidity applied during Auto-Tuning.
③	It sets types of humidity control method. ● Mode 0 : Used in case of adopting the direct reading sensor (DCV) for humidity. Plus, for better stabilized results, recommend using at wider internal area controlling. ● Mode 1 : Used in case of adopting PT or DCV sensor for humidity side. Plus, for better stabilized results, recommend using at smaller internal area controlling.
④	It sets for the original and target number to be copied. ● Set copy both temperature PID data and humidity PID data if the original PID is 1 to 6 and target PID is 1 to 6 or 0(ALL). However, PID 7 to 9 copy the temperature data only. ● Set Copy only temperature PID data,if the original PID is 7 to 9 and target PID is 7 to 9 or 0(ALL). However, PID 1 to 6 copy the temperature data only.
⑤	Copy the set PID time constant

Parameter		Setting range	Unit	Initial data
Y/N for tuning key display		Hiding, Display	ABS	Display
Temperature Auto-Tuning criticality value		0.01 ~ 1.00%	%	0.10
Humidity Auto-Tuning criticality value		0.01 ~ 1.00%	%	0.30
Humidity control type		Mode 0, Mode 1	ABS	Mode 1
Copy	Original to be ccopy	1 ~ 9	ABS	1
	Target to be copy	0(ALL) ~ 9	ABS	1

9-4. General PID group setting screen

- It is a screen to set the details for each PID group.
- It sets PID group 1~6 in temperature and humidity respectively.
- It sets PID group 7~9 in temperature.

[Fig. 9-4] PID group setting screen (General)

References

- OUTPUT LIMIT parameter is displayed only when PID control activated(P≠0)
- ON/OFF HYSTERESIS parameter is displayed only when ON/OFF control activated(P=0)

①	Proportion (P) range : It controls to the direction to reduce the deviation between Set Value (SP) and Present Value (PV) ● When the proportional constant is small, the present value (PV) approaches to the set value (SP) quickly, but the control output value (MV) is oscillated and it makes bad influence on the stability of control. ● When the proportional constant is large, the present value (PV) approaches to the set value (SP) quickly, but there is a possibility to create the residual deviation.
②	Integral time (I) : When the integral time becomes longer, the time to approach to the set value (SP) is extended as the control output value (MV). When the integral time becomes shorter, the time to approach to the set value(SP) is shortened as the control output value (MV) becomes larger. ● The integral motion removes the residual deviation to be created in P operation. ● The control is impossible when the integral time is too short.
③	Derivative (D) time : It prevents the change of deviation (PV-SP) by calculating the control output (MV) corresponding to the deviation (PV-SP) change rate. ● The approach to the set value (SP) becomes speedier and it prevents the abrupt change or external disturbance in present value (PV).
④	Output upper limit·lower limit : Setting the upper·lower value of the control output operation range ● It is operated in 0%, 100% output data regardless of the set limit value and upper limit for output during auto tuning.

Parameter	Setting range	Unit	Initial data
#n Temperature proportional band	0.1~1000.0	%	5.0
#n Temperature integral time	0~6000	SEC	120
#n Temperature derivative time	0~6000	SEC	30
#n Temperature output upper limit	0.0~100.0 %	ABS	100.0
#n Temperature output lower limit	#n Temp output lower limit < #n Temp output upper limit	ABS	0.0
#m Humidity proportional band	0.1~1000.0	%	5.0
#m Humidity integral time	0~6000	SEC	120
#m Humidity derivative time	0~6000	SEC	30
#m Humidity output upper limit	0.0~100.0 %	ABS	100.0
#m Humidity output lower limit	#m Humi output lower limit < #m Humi output upper limit	ABS	0.0

※ #n : 1 ~ 9

※ #m : 1 ~ 6

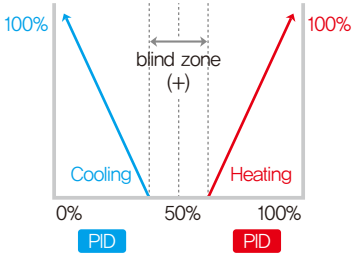
9-5. Heating·Cooling PID application range setting screen

● It is a screen to set the parameters related to the control characteristics in PID control and to copy the time constant between PID groups.

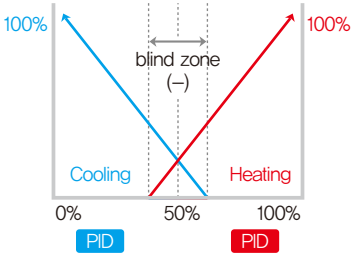
[Fig. 9-5] PID group setting screen (Heating·Cooling)

①	Setting the Y/N for displaying the auto tuning key in operation screen ● Refer to [Fig. 4-6 Stationary operation operation screen #2] and [Fig. 4-13 Program operation operation screen #2] in [Operation manual]
②	It sets the Auto-Tuningpoint of temperature.humidity applied during Auto-Tuning.
③	It sets the hysteresis data to be applied in ON/OFF control for temperature and humidity.
④	It sets types of humidity control method. ● Mode 0 : Used in case of adopting the direct reading sensor (DCV) for humidity. Plus, for better stabilized results, recommend using at wider internal area controlling. ● Mode 1 : Used in case of adopting PT or DCV sensor for humidity side. Plus, for better stabilized results, recommend using at smaller internal area controlling.
⑤	It sets for the original and target number to be copied. ● Set copy both temperature PID data and humidity PID data if the original PID is 1 to 6 and target PID is 1 to 6 or 0(ALL). However, PID 7 to 9 copy the temperature data only. ● Set Copy only temperature PID data,if the original PID is 7 to 9 and target PID is 7 to 9 or 0(ALL). However, PID 1 to 6 copy the temperature data only.
⑥	Copy the set PID time constant

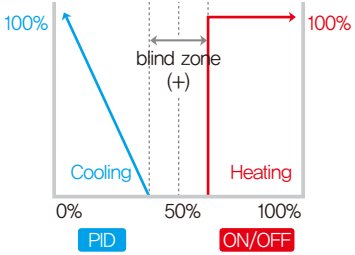
Parameter		Setting range	Unit	Initial data
Y/N for tuning key display		Hiding, Display	ABS	Display
Temperature Auto-Tuning criticality value		0.01 ~ 1.00%	%	0.10
Humidity Auto-Tuning criticality value		0.01 ~ 1.00%	%	0.30
Humidity control type		Mode 0, Mode 1	ABS	Mode 1
Copy	Original to be ccopy	1 ~ 9	ABS	1
	Target to be copy	0(ALL) ~ 9	ABS	1



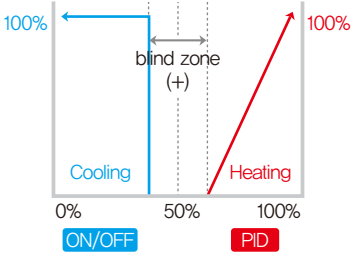
▶ When the Heating-Cooling is PID control



▶ When the Heating-Cooling is PID control



▶ When
Heating = ON/OFF
Cooling = PD

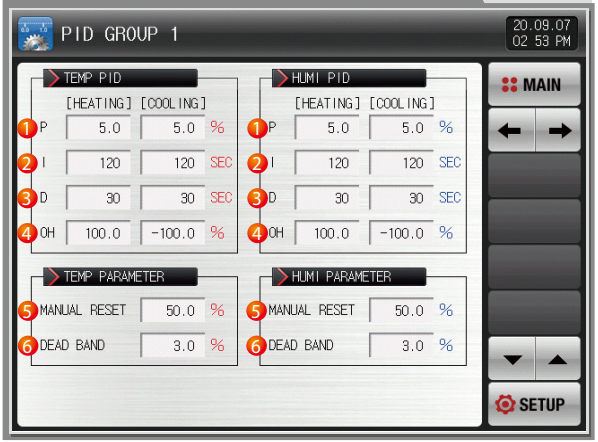


▶ When
Heating = ON/OFF
Cooling = PD

9-6. Heating·Cooling PID group setting screen

- It is a screen to set the details for each PID group.
- It sets group 1~6 in temperature and humidity respectively.
- It sets group 7~9 in temperature.

[Fig. 9-6] PID group setting screen (Heating·Cooling)



References

- HEAT OUTPUT LIMIT parameter runs 100.0% fixed when HEAT side ON/OFF control (P=0)
- COOL OUTPUT LIMIT parameter runs 100.0% fixed when COOL side ON/OFF control (P=0)

①	Proportion (P) range : It controls to the direction to reduce the deviation between Set Value (SP) and Present Value (PV) • When the proportional constant is small, the present value (PV) approaches to the set value (SP) quickly, but the control output value (MV) is oscillated and it makes bad influence on the stability of control. • When the proportional constant is large, the present value (PV) approaches to the set value (SP) quickly, but there is a possibility to create the residual deviation. • ON/OFF control in 0.0% setting
②	Integral time (I) : When the integral time becomes longer, the time to approach to the set value (SP) is extended as the control output value (MV). When the integral time becomes shorter, the time to approach to the set value (SP) is shortened as the control output value (MV) becomes larger. • The integral motion removes the residual deviation to be created in P operation. • The control is impossible when the integral time is too short.
③	Derivative (D) time: It prevents the change of deviation (PV-SP) by calculating the control output (MV) corresponding to the deviation (PV-SP) change rate. • The approach to the set value (SP) becomes speedier and it prevents the abrupt change or external disturbance in present value (PV).
④	Output upper limit·lower limit: Setting the upper limit value of the Heating and Cooling in output operation range
⑤	When the integral time(I) is "0" in PID control, it sets the value to be applied to the integral time item manually in PID calculation.
⑥	Setting of the dead zone for Heating and Cooling output volume depending on the internal control output value (MV) in Heating·Cooling

Parameter		Setting range	Unit	Initial data
#n Temperature proportional band		0.1 ~ 1000.0	%	5.0
#n Temperatureintegral time		0 ~ 6000	SEC	120
#n Temperaturederivative time		0 ~ 6000	SEC	30
#n Temperature output upper limit	Heating	0.0 ~ 100.0 %	ABS	100.0
	Cooling	0.0 ~ -100.0 %	ABS	-100.0
#n Temperature deviation calibration value		-5.0 ~ 105.0 %	%	50.0
#n Temperature dead zone		-100.0 ~ 15.0 %	%	3.0
#m Humidity proportional band		0.1 ~ 1000.0	%	5.0
#m Humidity integral time		0 ~ 6000	SEC	120
#m Humidity derivative time		0 ~ 6000	SEC	30
#m Humidity output upper limit	Heating	0.0 ~ 100.0 %	ABS	100.0
	Cooling	0.0 ~ -100.0 %	ABS	-100.0
#n Humidity deviation calibration value#n		-5.0 ~105.0 %	%	50.0
#n Humidity dead zone		-100.0 ~ 15.0 %	%	3.0

※ #n : 1 ~ 9

※ #m : 1 ~ 6

Part 10

Setting communication environment

10. Setting communication environment

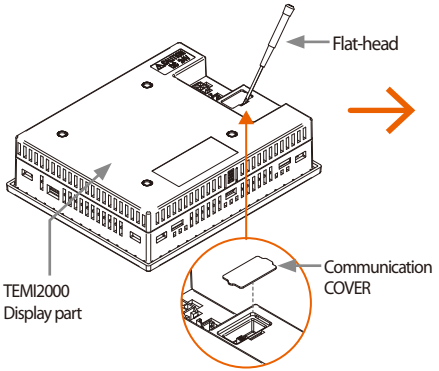
10-1. RS232C/485 Communication setting

- When TEMI2000 is RS232C/485 communication is provided basically.
- It was set in RS232C at the delivery from the factory.
- The necessity of changing into RS485 is shown as follows.

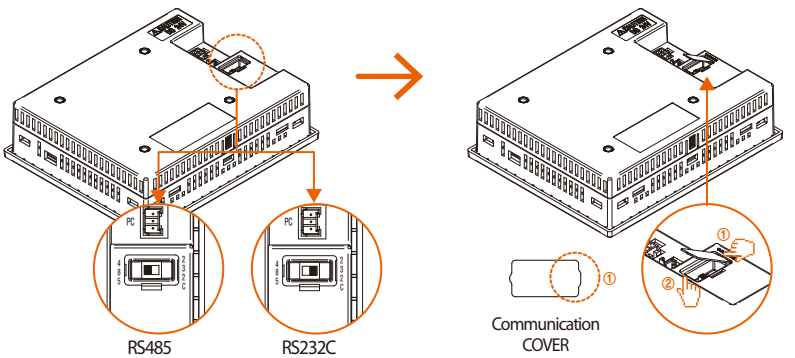
① To disassemble the cover, Insert and push into the right side crack on communication part with small driver from [Fig 10-1 TEMI2000 display part]

② RS232C move to RS485 from [Fig. 10-2 Serial communication setting].

③ Finally, insert the wide protrusion (①) of the communication cover into the groove on the "RS232C" side and push the opposite side to close the cover.



[Fig. 10-1] TEMI2000 Display part



[Fig. 10-2] Serial communication setting

10-2. Communication environment setting screen

- It is a screen to set the communication conditions such as communication protocol and speed.

[Fig. 10-3] Communication environment setting screen (RS232C/485)

①	Setting the communication
②	Setting the communication speed • Refer to [Communication speed setting screen in [Fig. 10-4 in communication environment]
③	Setting the stop beat
④	Setting the communication address • In case of RS485 communication, it can be used by defining address differently up to maximum 99
⑤	Setting the response time
⑥	Setting the parity • NONE: No parity • EVEN: Even number parity • ODD: Odd number parity
⑦	Setting the data length • The data length is fixed in 7, when communication protocol is set in MODBUS ASC. • The data length is fixed in 8, when communication protocol is set in MODBUS RTU.
⑧	Set communication setting lock

[Fig. 10-4] Communication speed setting screen in communication environment

Parameter	Setting range	Unit	Initial data
Communication protocol	PC LINK, PC LINK + SUM, MODBUS ASC, MODBUS RTU	ABS	PC LINK + SUM
Communication speed	9600, 19200, 38400, 57600, 115200	ABS	9600
Stop beat	1, 2	ABS	1
Communication address	1 ~99	ABS	1
Response time	0~10	ABS	0
Parity	NONE, EVEN, ODD	ABS	NONE
Data length	7, 8	ABS	8
Lock of communication set	OFF, ON	ABS	OFF

10-3. Ethernet communication environment setting screen

- It is a screen to set the parameter for Ethernet communication (TCP/IP).

[Fig. 10-5] Ethernet DHCP no use screen

①	Setting Y/N for Ethernet communication use
②	Manual setting of network IP
③	Use to apply the changed conditions of Ethernet related parameters

Cautions

- The parameters are not changed when APPLY button is not pressed after changing the network setting.

[Fig. 10-6] Ethernet DHCP use screen

References

Message box

- ETHERNET APPLY : Ethernet normal operation
- ETHERNET READY : Ready for Ethernet
- NET ADDRESS ERROR : Incorrect net address
- CONNECTION ERROR : No connection of Ethernet cable or in failure
- DHCP FAILURE : Ethernet communication error

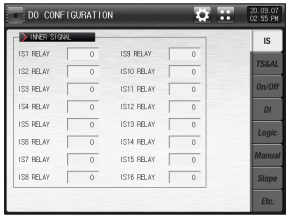
References

- RS232C/485 communication is provided as a basic and RS232C/485 communication is not usable in case of using Ethernet option.
- The serial communication using RS232C/485 is not available in case of Ethernet communication selection
- When DHCP is not used in Ethernet setting, it can be used when IP address, subnet mask, gateway are set. Refer to [Fig. 10-5 Ethernet DHCP no use screen]
- Network setting is made automatically when DHCP is used in Ethernet setting. Refer to [Fig. 10-6 Ethernet DHCP use screen]

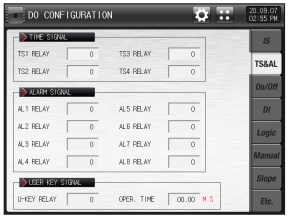
Part 11

DO relay output

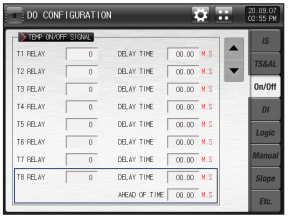
Flow chart



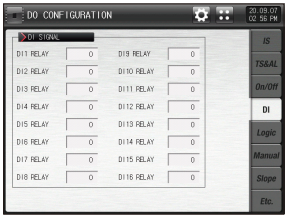
[Fig. 11-1] Inner signal relay setting screen



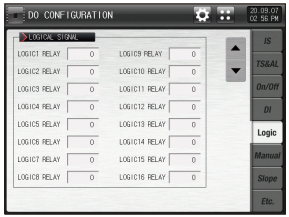
[Fig. 11-2] Time signal/Alarm signal/User key signal relay setting screen



[Fig. 11-3] Temp ON/OFF signal relay setting screen



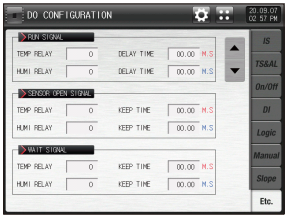
[Fig.11-5] DI signal relay setting screen



[Fig.11-6] Logic signal relay setting screen#1

[Fig.11-7] Manual signal relay setting screen

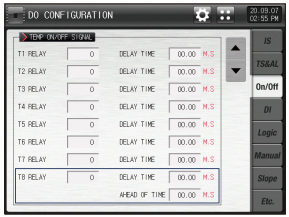
[Fig.11-8] Up/soak/down signal relay setting screen



[Fig.11-9] Sub output relay setting screen #1

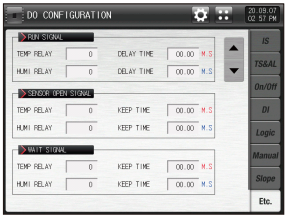
DO relay output flow chart

Flow chart



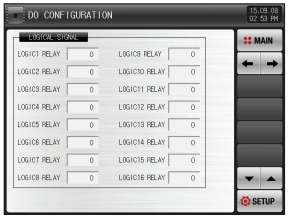
[Fig. 11-3] Temp ON/OFF signal relay setting screen

[Fig.11-6] Manual signal relay setting screen



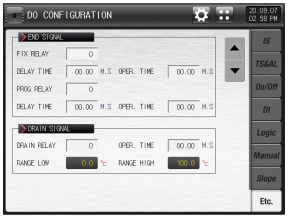
[Fig. 11-9] Sub output relay setting screen #1

[Fig. 11-4] Humi ON/OFF signal relay setting screen



[Fig.11-7] Logical signal relay setting screen

[Fig. 11-10] Sub output relay setting screen #2



[Fig. 11-11] Sub output relay setting screen #3

11. DO relay output

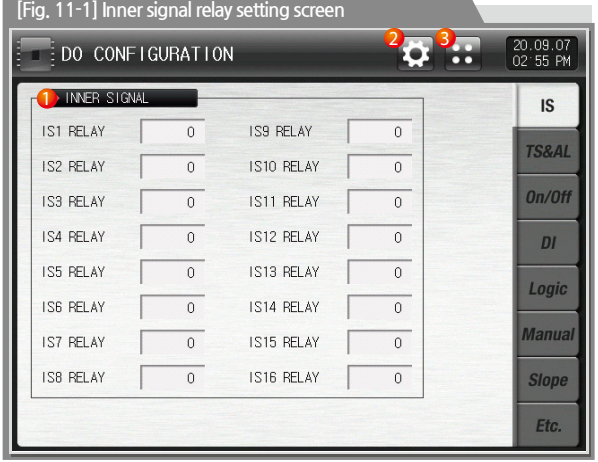
11-1. Relay No. and parameter setting

- When various states created during operation are output to the I/O relay board, the relay number for the corresponding state is set.
- The relay operates ("OR" condition) when any signal out of the set signals is output when the set relay number is overlapped.
- Relay number 13~32 can be used when I/O2 board option is added.
- Relay No. 33 ~ 56 can be used when TIO2000-B is additionally connected. (After connecting TIO2000-B, change the DO option in 'System initial setting')

(1) Inner signal/time signal relay setting screen

- The Inner signal relay set screen.
- It outputs the Contact Point Output via the set relay when inner signal occures.

[Fig. 11-1] Inner signal relay setting screen



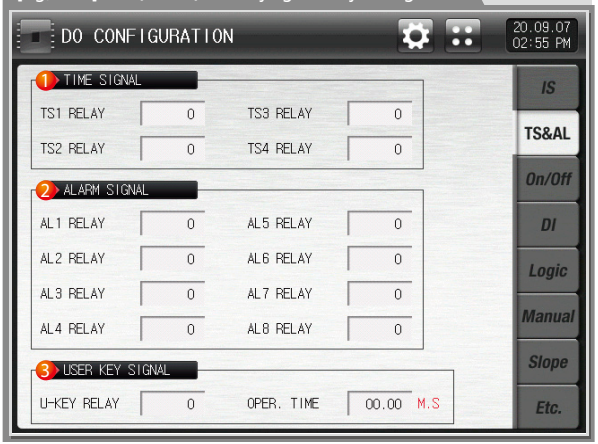
①	Setting the relay number of inner signal
②	Move to [Fig. 2-3 System parameter setting screen]
③	Move to [Fig. 2-1 Main screen]

Parameter	Setting range	Unit	Initial data
inner signal1~ inner signal16 relay	0~56	ABS	0

(2) Time signal/Alarm signal/User key signal relay setting screen

- The time signal relay /alarm signal relay /user signal relay set screen.
- It outputs the the Contact Point Output via the set relay when time signal/alarm signal /user signal occures

[Fig. 11-2] Time/Alarm/User key signal relay setting screen



①	Setting the relay number of time signal
②	Setting the relay number of alarm signal
③	Setting the user button relay ● Y/N for use of the button is set in [14. System initial setting] ● When the user button is set, the user can use the wanted relay by setting in [11. DO relay output] and the set relay is operated when U-KEY is pressed at the screen for stationary, program stop/operation and the corresponding button is displayed on the operation screen.

Parameter	Setting range	Unit	Initial data
Time signal1~Time signal4 relay	0~56	ABS	0
Alarm signal1~ Alarm signal8 relay	0~56	ABS	0
User output button relay	0~56	ABS	0

※ #n : 1 ~ 4

(3) Temperature ON/OFF and Humidity ON/OFF signal relay setting screen

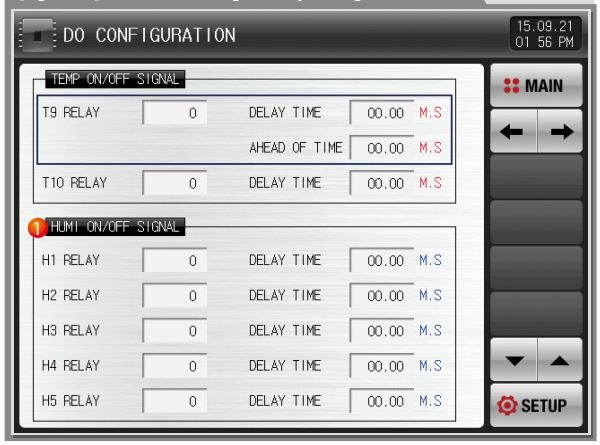
- It sets the relay number of temperature & humidity ON/OFF signal and delayed time for each ON/OFF signal.
- This set ON/OFF signal outputs the contact output after passing the set time for delay time when the signal generation condition is fulfilled.

[Fig. 11-3] Temp ON/OFF signal relay setting screen

①	Setting the relay number of temperature ON/OFF signal and delay time • The set relay is "ON" after elapsing the set relay time • Delay time: Setting of delay time to be applied in ON/OFF signal operation
②	Setting the Ahead of time • Ahead of Time : When you run the program and then descends in the segment maintenance intervals, From the time the 'End time - Ahead of time' of the current segment(Maintenance interval) T8, T9(ON/OFF) signal is activated as standard TSP next segment.
③	Moving to the next or previous screen using the up/down button

Parameter	Setting range	Unit	Initial data
Temp ON/OFF signal1 ~ Temp ON/OFF signal10 Relay	0~56	ABS	0
Temp ON/OFF signal1 ~ Temp ON/OFF signal10 Delay Time	00.00 ~ 99.59 (MIN.SEC)	ABS	00.00
#n Ahead of time	00.00 ~ 99.59 (MIN.SEC)	ABS	00.00

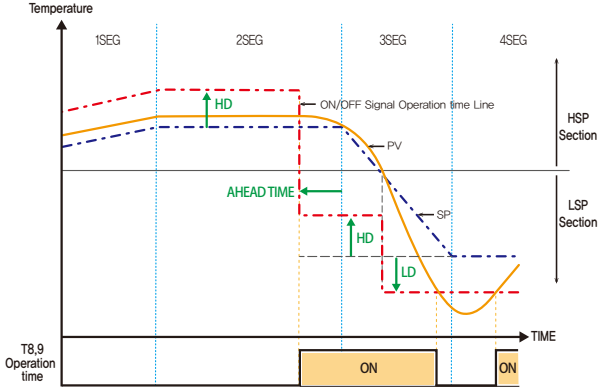
[Fig. 11-4] Humi ON/OFF signal relay setting screen



①	Setting the relay number of humidity ON/OFF signal and delay time • The set relay is "ON" after elapsing the set relay time • Delay time: Setting of delay time to be applied in ON/OFF signal operation

Parameter	Setting range	Unit	Initial data
Humi ON/OFF signal 1 ~ Humi ON/OFF signal 5 Relay	0~56	ABS	0
Humi ON/OFF signal1 ~ Humi ON/OFF signal5 Delay Time	00.00 ~ 99.59 (MIN.SEC)	ABS	00.00

▶ When It set the T8, T9 Ahead of time works



References

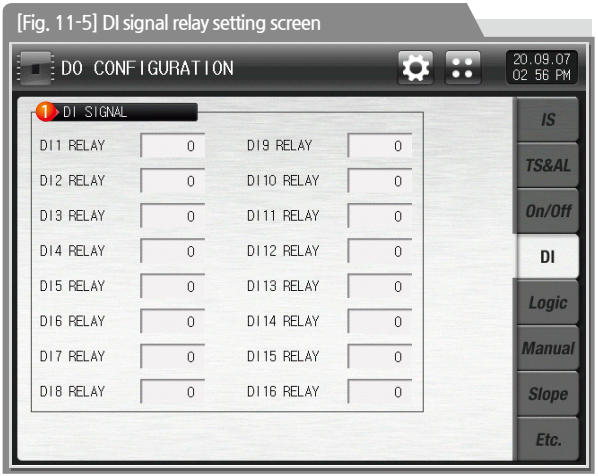
▶ T10 operation: It operates after T9 operation and T10 delay time.

▶ H5 operation: It operates after H4 operation and H5 delay time.

(4) DI signal relay setting screen

- It is a screen to set the relay number for DI signal.
- DI signal transmits the set actual contact point output in DI error creation for corresponding number.

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



①	Setting the relay number of DI signal (DI1~DI16) • DI signal operates when the operation method is set in "Error" in [12-2 DI error name]

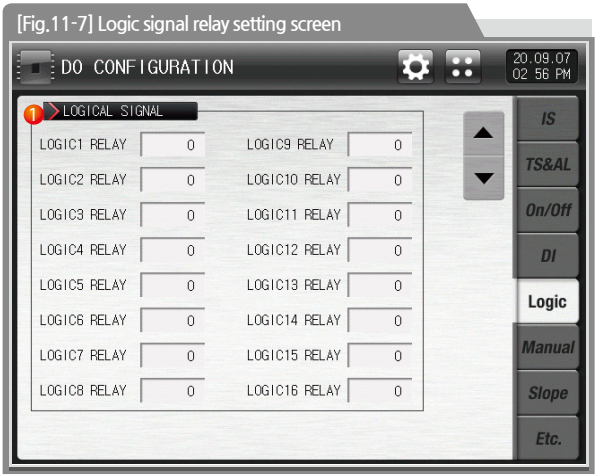
Parameter	Setting range	Unit	Initial data
DI signal1 ~DI signal 16 relay	0~56	ABS	0

Parameter	Setting range	Unit	Initial data
DI signal 1 ~DI signal 16 relay (DI58 Option : DIsignal1 ~ DIsignal58)	0~56	ABS	0

(5) Logic signal relay setting screen

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

[Fig.11-7] Logic signal relay setting screen



① Setting the relay number of logic signal

Parameter	Setting range	Unit	Initial data
Logic relay #n	0~56	ABS	0

※ #n = 1 ~ 32

(6) Manual signal relay setting screen

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

[Fig. 11-6] Manual signal relay setting screen

①	Setting the relay number of manual signal (Manual1~Manual12)
②	Switch "ON" the relay for the corresponding number manually. • Key operation: The output of relay "5" is "ON" when "Manual 1" button is pressed after inputting "5" on the "Manual1" relay column.

Parameter	Setting range	Unit	Initial data
Manual signal1 ~ Manual signal 12 relay	0~56	ABS	0

(7) Up/soak/down signal relay setting screen

[Fig. 11-9] Up/soak/down signal relay setting screen

①

Up relay : Setting the relay number of up signal

Down relay : Setting the relay number of down signal

Operation condition : Setting the operation condition of up and down signal |TSP - NSP| and |TSP - NPV|

Application deviation : Setting the application deviation in operation of up and down signal

①

※ |TSP - NSP| operation

- Up signal : The relay is "ON" in up range when the Now set value (NSP) < |Target set value (TSP) - Applied deviation|, and it is "OFF" when the set value (SP) > |Target set value (TSP) - Applied deviation|
- Down signal : The relay is "ON" in down range when the Now set value (NSP) > |Target set value (TSP) + Applied deviation|, and it is "OFF" when the set value (SP) < |Target set value (TSP) + Applied deviation|
- Even |TSP-NSP| is set in stationary operation, it operates in |TSP-NPV|

※ |TSP - NPV| operation

- Up signal : The relay is "ON" in up range when the Now Present Value (NPV) < |Target set value (TSP) - Applied deviation|, and it is "OFF" when the Now Present Value (NPV)> |Target set value (TSP)- Applied deviation|
- Down signal : The relay is "ON" in down range when the Now Present Value (NPV) > |Target set value (TSP) + Applied deviation|, and it is "OFF" when Now Present Value (NPV) |Target set value (TSP) + Applied deviation|

②

Keeping relay : Setting the relay number of the keeping signal

Holding Time : Setting the Holding Time to be maintained during the keeping signal operation

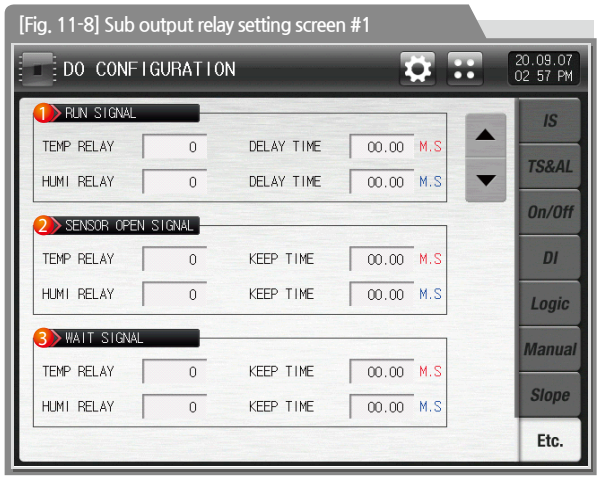
- The keeping relay is "ON" when it is entered into the keeping range while it is in the Program operation . Plus, In case of "|Keeping SEG operation time=Keeping SEG setting time – Holding Time|," the relay is "OFF."
- The state lamp is displayed in the operation screen in the Stationary Operation and the relay output is not created.

Parameter	Setting range	Unit	Initial data
Temp Up signal relay	0~56	ABS	0
Temp Up signal deviation	EUS(0.0~10.0%)	EUS	EUS(0.0%)
Humi Up signal relay	0~56	ABS	0
Humi Up signal deviation	EUS(0.0~10.0%)	EUS	EUS(0.0%)
Temp Keeping signal relay	0~56	ABS	0
Temp Signal Holding Time	00.00~99.59(MIN.SEC)	ABS	00.00
Humi Keeping signal relay	0~56	ABS	0
Humi Signal Holding Time	00.00~99.59(MIN.SEC)	ABS	00.00
Temp Down signal relay	0~56	ABS	0
Temp Down signal deviation	EUS(0.0~10.0%)	EUS	EUS(0.0%)
Humi Down signal relay	0~56	ABS	0
Humi Down signal deviation	EUS(0.0~10.0%)	EUS	EUS(0.0%)

(8) Sub output relay setting screen

- It is a screen to set the sub output relay signal.
- It transmits the contact point output to the set sub output relay when sub output signal is created.

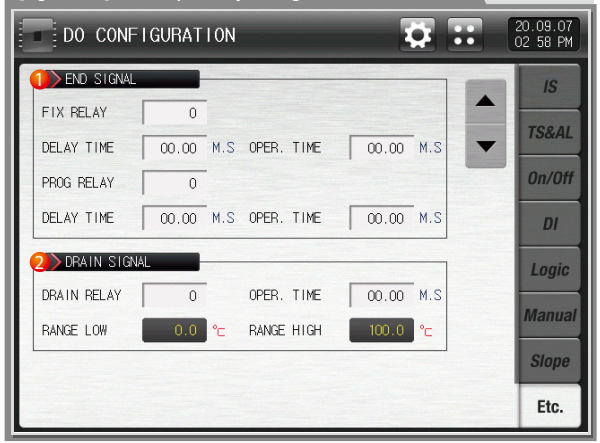
[Fig. 11-8] Sub output relay setting screen #1



①	Setting the temp, humi operation(RUN) signal relay and delay time ● Temp relay : The set temp relay is "ON" in stationary or program operation ● Humi relay : The set humi relay is "ON" in stationary or program operation However, the humidity relay will be "OFF" when the present value (PV) for humidity is ---.-% ● Delay time : The set relay is "ON" after set delay time is elapsed.
②	Setting the temp, humi sensor short relay and Holding Time ● Temp relay : When the temp sensor is short, the set relay is "ON" ● Humi relay : When the sensor is short, the set relay is "ON" ● Holding Time : The relay is "ON" during the set Holding Time and the operating state is maintained later on when the sensor is short.
③	Setting the temp, humi wait signal relay and Holding Time ● Temp relay : The set relay is "ON" during standby in program operation ● Humi relay : The set relay is "ON" during standby in program operation ● Holding Time : The relay is "ON" during the set Holding Time and the operating state is maintained later on depending on the standby operation condition.

Parameter	Setting range	Unit	Initial data
Temp Operation signal relay	0~56	ABS	0
Temp Operation signal delay time	00.00~99.59 (MIN.SEC)	ABS	00.00
Humi Operation signal relay	0~56	ABS	0
Humi Operation signal delay time	00.00~99.59 (MIN.SEC)	ABS	00.00
Temp Sensor short signal relay	0~56	ABS	0
Temp Sensor short signal Holding Time	00.00~99.59 (MIN.SEC)	ABS	00.00
Humi Sensor short signal relay	0~56	ABS	0
Humi Sensor short signal Holding Time	00.00~99.59 (MIN.SEC)	ABS	00.00
Temp Standby signal relay	0~56	ABS	0
Temp Standby signal Holding Time	00.00~99.59 (MIN.SEC)	ABS	00.00
Humi Standby signal relay	0(OFF)~56	ABS	0
Humi Standby signal Holding Time	00.00~99.59 (MIN.SEC)	ABS	00.00

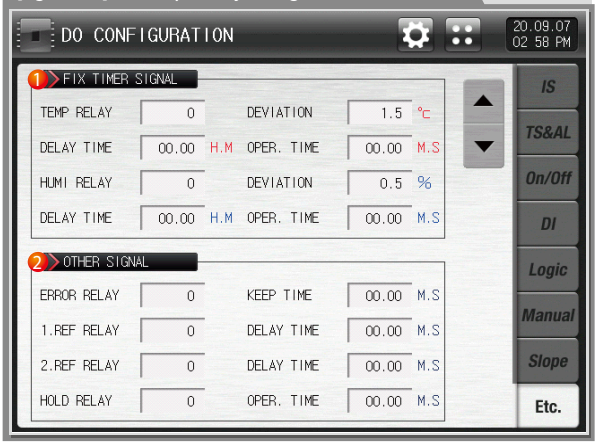
[Fig. 11-10] Sub output relay setting screen #2



①	Setting the stationary operation, program operation termination relay and delay time operation time • FIX relay : The set relay is "ON" when the stationary time set operation is terminated. • PROG relay : The set relay is "ON" when the program operation is terminated. • Delay time : The set relay is "ON" when the set delay time is passed. • Operation time : The relay is "OFF" when the stationary or program termination signal relay is "ON" after the set operation time is passed.
②	It sets the Drain signal relay and operation time. • The display for upper / lower limit is set in the [Relative humidity display condition] in [3-1(2) Sensor input screen #2]. • Power ON : The set relay is "ON" if operation stops. • During operation (RUN): The set relay is "ON" during operation time in the state out of upper.lower limit, 0.0~100.0℃ for temperature indication (T.PV) and 0,0% for humidity set data (H.SP) • In case when it operates(RUN) and then Stops(STOP) :"The set relay is "ON" during operation time when it is stopped during while it outputs Humidity Operation Signal.

Parameter	Setting range	Unit	Initial data
Stationary control termination signal relay	0~56	ABS	0
Stationary control termination signal delay time	00.00 ~ 99.59 (MIN.SEC)	ABS	00.00
Stationary control termination signal operation time	00.00 ~ 99.59 (MIN.SEC)	ABS	0
Program control termination signal relay	0~56	ABS	00.00
Program control termination signal delay time	00.00 ~ 99.59 (MIN.SEC)	ABS	00.00
Program control termination signal operation time	00.00 ~ 99.59 (MIN.SEC)	ABS	00.00
Drain signal relay	0~56	ABS	0
Drain signal operation time	00.00 ~ 99.59 (MIN.SEC)	ABS	00.00
Upper limit range	It is same with the upper.lower limit for relative	℃	100.00
lower limit range	humidity display condition in input screen #2.	℃	0.00

[Fig. 11-11] Sub output relay setting screen #3



① Setting the stationary timer signal relay, deviation, delay time and operation time

- Deviation : | Present value(PV) – Set value (SP)|≤the relay is "ON" during operation time (M.S) from deviation till delay time (H.M) Namely, the relay is "ON" during operation time (M.S) when the data of | Present value(PV) – Set value (SP)| is within the deviation.
- Delay time : The set relay is "ON" after the set delay time is elapsed.
- Operation time : The set relay is "OFF" after the set operation time elapse when the stationary timer signal relay operation state is maintained.
- Operation only in stationary operation
- Stop or operation time = The relay is "OFF" when 00.00 M.S is input
- The processing time is continued out of the deviation during relay time operation.

② Error relay : Setting the error signal relay number

Holding Time : Setting the Holding Time to be applied in error signal operation

- The relay is "ON" until error recovery when the DI error is being created after the error signal relay is "ON" after maintaining time during the set maintaining time in DI error creation.
- Error signal : It is operated when error is created in DI1~16.
- When DI sensing is set in "Operation", the error signal output is not created.

1. REF relay : Setting the 1st freezer signal relay number

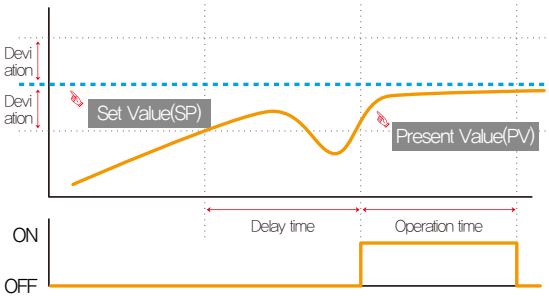
2. REF relay : Setting the 2nd freezer signal relay number

Delay time : Setting the delay time to be applied in the 1st and the 2nd freezer signals are operating.

- The signals in the 1st and the 2nd freezer are "ON" after operation of inner signal (S1) and set delay time is elapsed.

Parameter	Setting range	Unit	Initial data
Temp Stationary timer signal relay	0~56	ABS	0
Temp Stationary timer signal deviation	EUS (0.0 ~ 10.0%)	EUS	EUS (0.5%)
Temp Stationary timer signal delay time	00.00~99.59 (HOUR.MIN)	ABS	00.00
Temp Stationary timer signal operation time	00.00~99.59 (MIN.SEC)	ABS	00.00
Humi Stationary timer signal relay	0~56	ABS	0
Humi Stationary timer signal deviation	EUS (0.0 ~ 10.0%)	EUS	EUS (0.5%)
Humi Stationary timer signal delay time	00.00~99.59 (HOUR.MIN)	ABS	00.00
Humi Stationary timer signal operation time	00.00~99.59 (MIN.SEC)	ABS	00.00
Error signal relay	0~56	ABS	0
Error ignal Holding Time	00.00~99.59 (MIN.SEC)	ABS	00.00
1st Freezer operation signal relay	0~56	ABS	0
1st Freezer operation signal delay time	00.00~99.59 (MIN.SEC)	ABS	00.00
2nd Freezer operation signal relay	0~56	ABS	0
2nd Freezer operation signal delay time	00.00~99.59 (MIN.SEC)	ABS	00.00

▶ Stationary timer signal relay operation



References

▶ The stationary timer signal operation is calculated again in operation starting, changing the set value (SP), electric power "ON" (When it is set for immediate operation in electricity "ON", recovery operation in black out or product is ON.
※ When the recovery motion is re-starting or continue in black out, it operates in same pattern.Namely, the delay time starts again after recover of electric power in operation state

(8) Definition of relay operation time for each signal

Signal	Condition	Relay ON time
Drain signal	In case that recovers, after the relay operation time for set relay and after output occuration.	Operation until the set operation time
	In case that recovers during the relay operation time for set relay after output occuration.	Operates until recovery
Termination signal	In case of deleting the message by touching the screen after output creation and set relay maintaining time is elapsed.	Operation until the set operation time
	In case of deleting the message by touching the screen during relay maintaining time after set output creation is made.	Operation until screen touch
Error signal/Sensor short signal/ Standby signal	In case of recovery after output creation and set relay maintaining time is elapsed.	Operation until error recovery
	In case of recovery during relay maintaining time after set output creation is made.	Operation until set Holding Time

11-2. UP, SOAK, DOWN signal operation

- Input sensor = Temperature (k2), range = -200.0℃ ~1370.0℃
- Up, down signal range → [EUS 0%~EUS 10%] = [0.0℃ ~ 157.0℃]

Setting

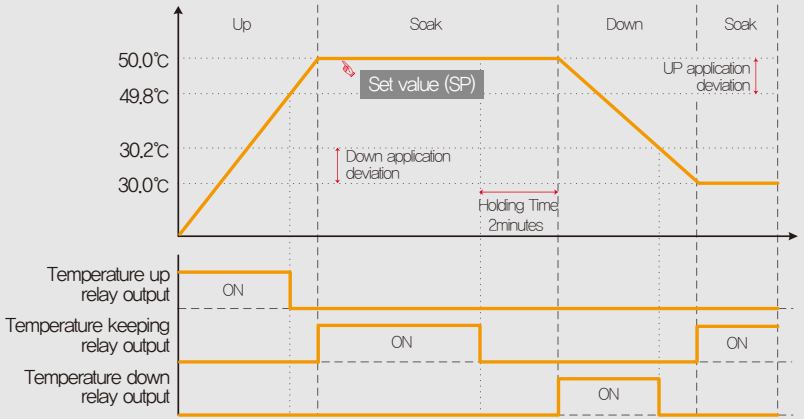
▶ Operation method
→ Pattern operation

▶ Up application deviation
→ 0.2℃

▶ Holding Time
→ 2 minutes

▶ Down application deviation
→ 0.2℃

Up, Soak, Down operation depending on the set value



Setting

▶ Operation method
→ stationary operation

▶ Up application deviation
→ 0.2℃

▶ Holding Time
→ 2 minutes

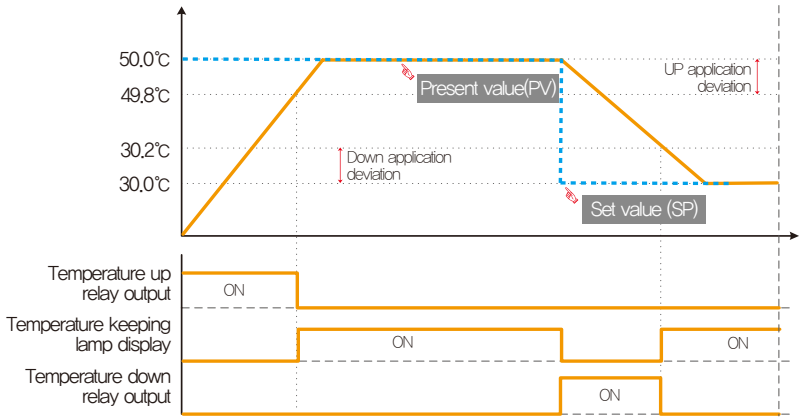
▶ Down application deviation
→ 0.2℃

▶ It operates with 

regardless of the conditions of deviation application in stationary operation.

▶ The Soak signal relay is not "ON" in stationary operation and only the state lamp in operation screen is "ON".

Up, Soak, Down operation depending on the set value

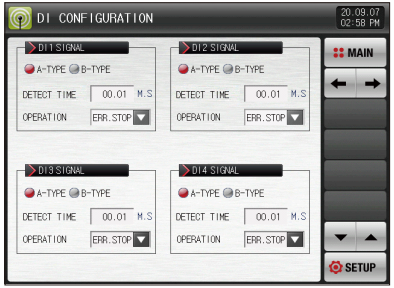


Part 12

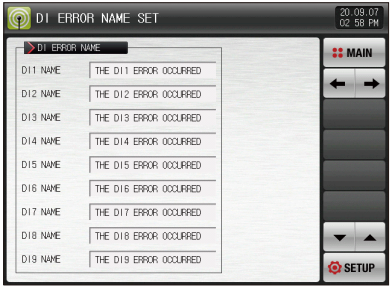
DI function and Operation

Flow chart Flow chart

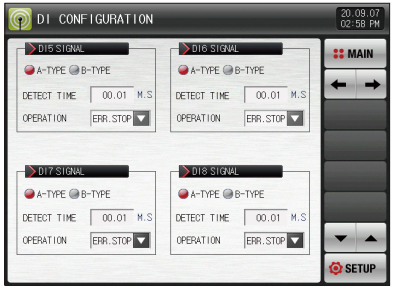
[Fig. 12-1] DI function and Operation setting screen 1



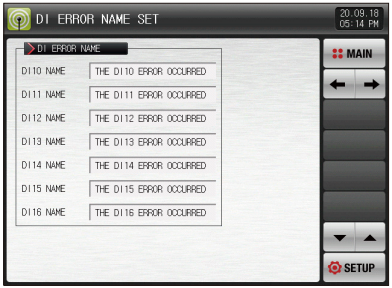
[Fig. 12-2] DI function and operation setting screen 2 #1



[Fig. 12-5] DI function and operation setting screen 3 #1



[Fig. 12-4] DI function and operation setting screen 2 #2



[Fig. 12-5] DI function and operation setting screen 3 #1

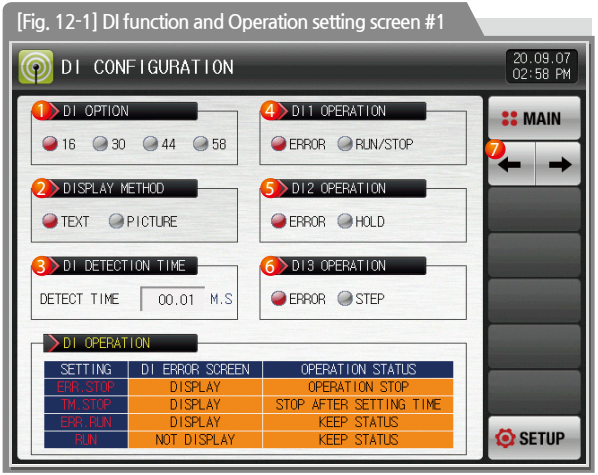
12. DI function and Operation

12-1. DI Operation setting

(1) DI function and Operation setting screen 1

• Screen for setting the operation type for DI function and each DI signal.

[Fig. 12-1] DI function and Operation setting screen #1



①	Setting DI options • 16 : DI 16 points • 30 ~ 58 : DI30 ~ 58 points (Available when additional DIO2000 is connected)
②	Setting the error display method in DI error creation • Letter : The error is displayed in letter in DI error creation • Photo : The error is displayed with input photo in DI error creation • The uploaded photo file into the internal memory is displayed into the DI error and basic photo is displayed when it is not uploaded.
③	Setting the buzzer ringing time in DI error creation • The buzzer ringing is made in DI error creation in spite of setting into "0" • The buzzer ringing is not made when DI operation method is set in Operation/Stop, Hold, Step and Pattern
④	Setting the DI1 operation method • Error : Use the DI1 operation for error detection • Operation/Stop : The operation is stopped at the time of releasing error while the operation is being made at the DI1 error creation
⑤	Setting the DI2 operation method • Error : Use the DI2 operation for error detection • Hold : It holds the current operation screen at the DI2 operation and the hold is released at the time of error releasing (It is possible in program operation only.)
⑥	Setting the DI3 operation method • Error : Use the DI3 operation for error detection • Step : Force moving from the current segment to the next segment at DI3 error creation (It is possible in program operation only.)
⑦	Moving from current screen to the next screen

Parameter	Setting range	Unit	Initial data
DI option	16, 30, 44, 58	ABS	16
Display method	Text, Picture	ABS	Text
Buzzer Holding Time	00.00 ~ 99.59 (MIN.SEC)	ABS	00.01
DI1 Operation method	Error, Run/stop	ABS	Error
DI2 Operation method	Error, hold	ABS	Error
DI3 Operation method	Error, step	ABS	Error

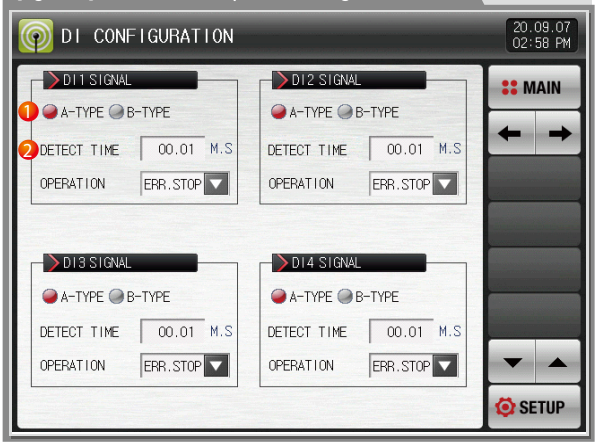
DI1	DI2	DI3	operation
Error	Hold	Step	
ON			Operation
OFF			Stop
	ON		Hold operation
	OFF		Hold release
		ON	Step operation

▶ DI sensing pattern A- Contact point selection

(2) DI function and Operation setting screen 2

- It sets the sensing method for each DI signal.

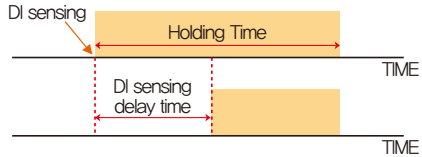
[Fig. 12-2] DI function and Operation setting screen 2 #1



①	Setting the DI1 sensing method • A-TYPE : It senses the input of DI in case of physical DI contact point creation. (When the external signal is entered.) • B-TYPE: It senses the input of DI in case of physical DI contact point release. (When the external signal is disconnected.)
②	DI detection delay time setting • When a physical DI contact occurs, if the contact becomes "ON" for the set time, it operates as DI input.

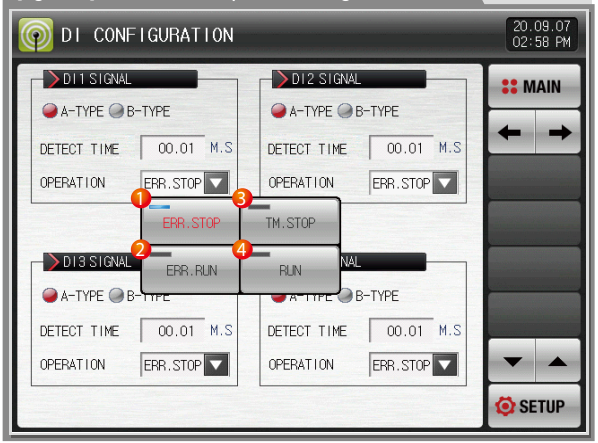
References

▶ ON/OFF operation is opposite in case of selection of DI sensing type B-contact point.



DI function operation setting

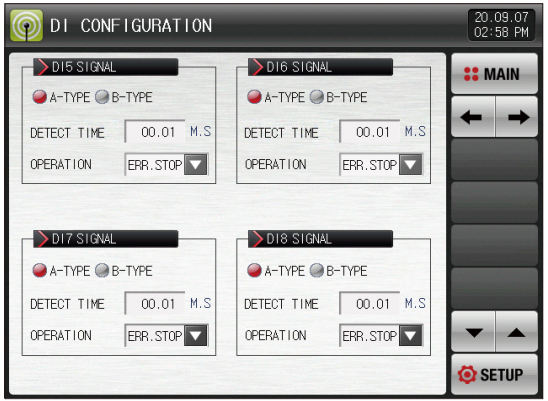
[Fig. 12-3] DI function and operation setting screen 2 #2



①	Error stop	: It displays DI error screen in case of DI error creation and stops operation.
②	Error operation	: It displays DI error screen in case of DI error creation and maintains the current operation state.
③	Time stop	: It displays DI error screen in case of DI error creation and stops operation after the set delay time.
④	Operation	: It displays DI error screen in case of DI error creation and maintains the current operation state.

References

- It displays the operation state and Y/N for display in case of each DI error creation
- The error signal relay is not operated in case of each DI error creation when it is set in "Operation" and DI signal relay output is operated.
- The state display lamp and error signal are created in [Operation screen 2].



[Fig. 12-4] DI function and operation setting screen 2 #3

Parameter	Setting range	Unit	Initial data
DI #n dctection	A-TYPE, B-TYPE	ABS	A-TYPE
DI #n signal delay time	0.00 ~ 99.59(MIN.SEC)	ABS	00.01
Operation after sensing DI #n signal	Error stop, Time stop, Error operation, Operation	ABS	Error stop

※ #n = 1 ~ 58

12-2. DI error name

(1) DI error name setting

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

[Fig. 12-5] DI function and operation setting screen 3 #1

[Fig. 12-6] DI function and operation setting screen 3 #2

Parameter	Setting range	Unit	Initial data
DI #n name	0~9, A~Z, Special letters (24 letters in maximum)	ABS	THE DI#n ERROR OCCURRED

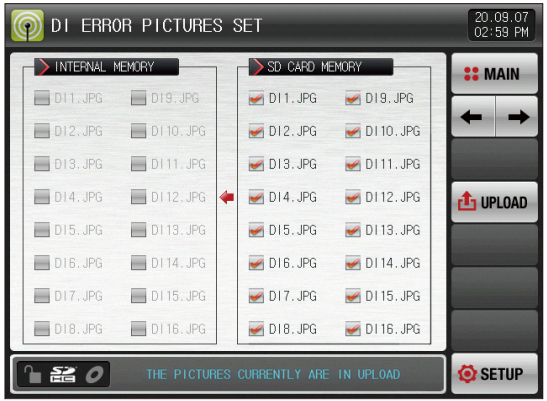
※ #n = 1 ~ 58

(2) DI error creation photo setting

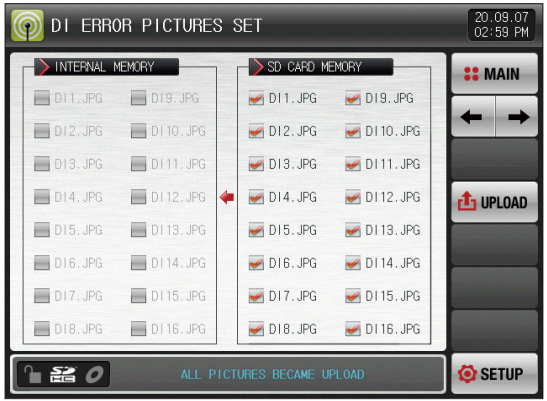
- The setting is available when the display method is "Photo".
- The uploaded photo file (JPG) into the internal memory is displayed in DI error and basic photo is displayed when it is not uploaded.
- The photo can be uploaded when there is a SD card option and refer to [13. User screen].

[Fig. 12-7] DI function and Operation setting screen 4 #1

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



[Fig. 12-8] DI function and operation setting screen 4 #2



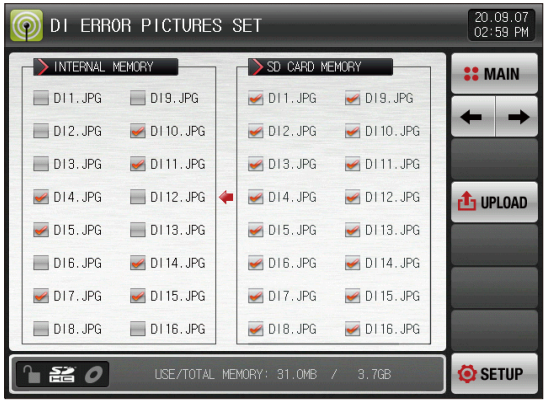
[Fig. 12-9] DI function and operation setting screen 4 #3

References

- In case of file management for SD card, it recognizes when the folder name shall be JPG. and file name shall be DI*.JPG.
- The message, "It is uploaded now." is displayed at the bottom of screen during upload.
- JPG files can be used from Ver.8, and versions prior to Ver.8 must be used as BMP files. For more information, refer to [13-2. JPG & BMP file making method]

References

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



[Fig. 12-10] DI function and operation setting screen 4 #4

References

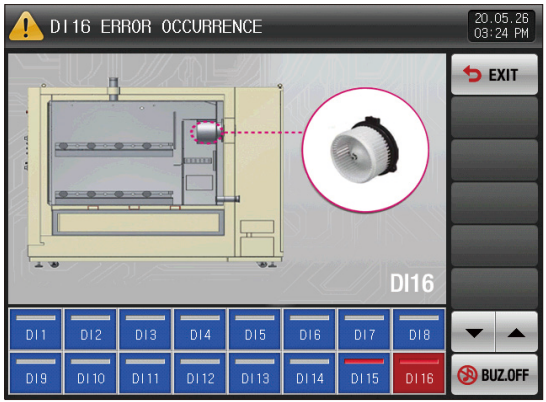
- When the wanted file is selected( ), it can be used for screen in case of DI error creation.
- The basic photo inside the memory is displayed when the error is made from the unselected DI.

12-3. DI error creation screen

- It is a screen in case of DI error creation.
- It is converted to the operation screen after escaping from the DI error screen when EXIT is touched by user.
- The same DI error creation is neglected for 1 minute when the screen is changed by pressing EXIT button after DI creation.

  Ex) When it is exit with 'Revert" in creation of D11, neglect it for 1 minute in spite of DI1 creation. It displays DI error screen when DI1 is created after 1 minute.
- Here, the neglecting means the DI error screen.
- BUZ.OFF button is to block the alarming sound when DI error is occurred.
- DI error no creation ("OFF" state) (THE DI1 ERROR OCCURRED letter, photo) 1
- DI error creation ("ON" state) (THE DI1 ERROR OCCURRED letter, photo) 1
- Release after DI error creation ("ON" state after "OFF") (THE DI1 ERROR OCCURRED letter, photo) 1

[Fig. 12-11] The screen with letter for DI error display method

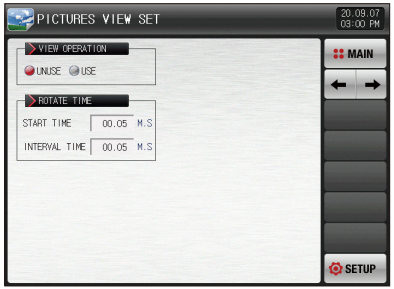


[Fig. 12-12] The screen with photo for DI error display method

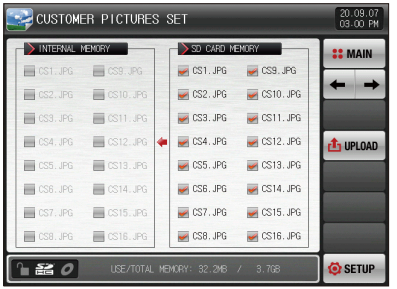
Part 13

User screen

Flow chart



[Fig. 13-1] User screen setting screen 1



[Fig. 13-2] User screen #1 setting screen 2

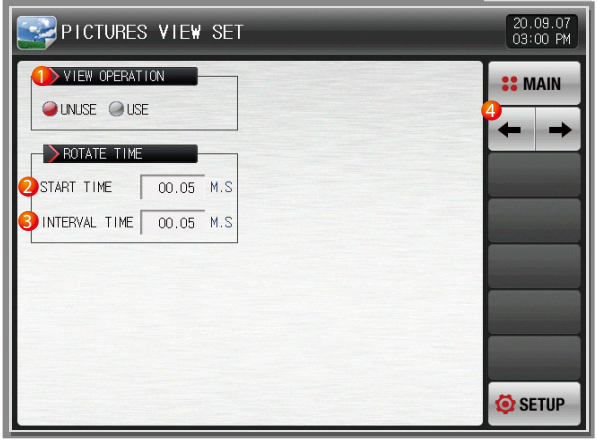
13. User screen

13-1. User screen setting

(1) User screen setting 1

- It is a screen to set the user screen operation.
- It has an electronic album function which displays maximum 16 photos on the operation screen in turn.
- It can be used for company promotion and equipment explanation.

[Fig. 13-1] User screen setting screen 1



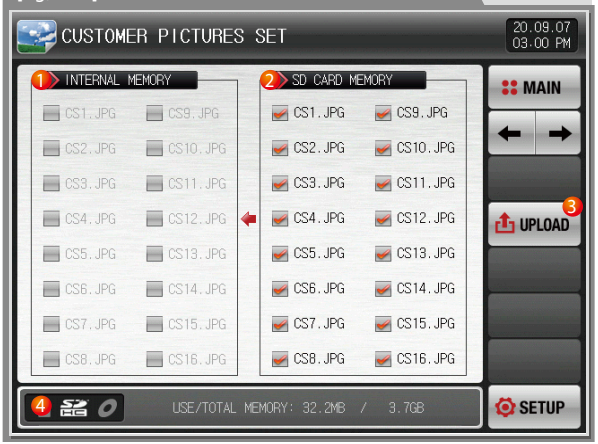
①	Setting Y/N for using the user screen • User screen operation is "ON" when more than one selected photo file stays into the internal memory.
②	Setting the user screen operation time • The operation is started when there is no key input during set time.
③	Setting the user screen conversion time • The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

Parameter		Setting range	Unit	Initial data
User screen display		Use, No use	ABS	No use
Operation time setting	Starting time	0.05 ~ 99.59(MIN.SEC)	ABS	00.05
	Screen conversion time	0.01 ~ 99.59(MIN.SEC)	ABS	00.05

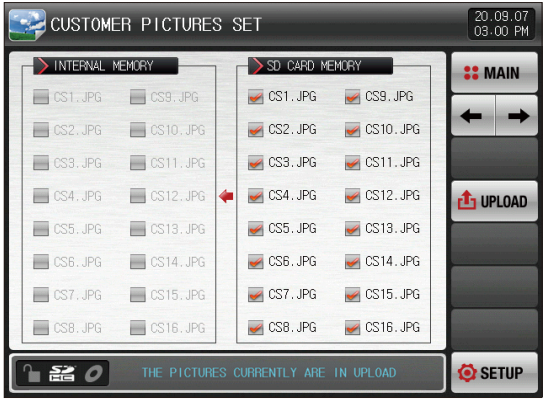
(2) User screen setting screen 2

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

[Fig. 13-2] User screen selection #1 in screen 2



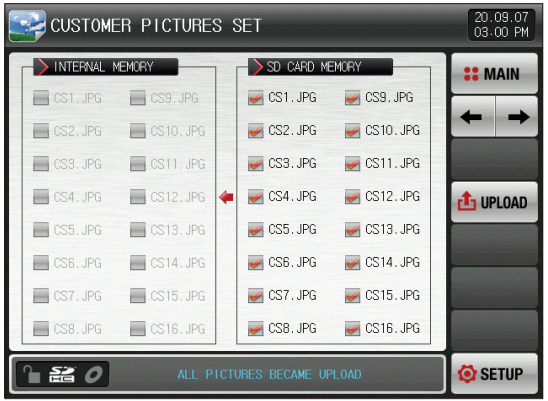
①	The photo file corresponding of its name to CS out of the saved photo files (JPG) into the memory is displayed and it is inactive ( ) when there is no corresponding file.
②	The photo file corresponding of its name to CS out of the saved photo files (JPG) into the SD card is displayed. • The file selected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



[Fig. 13-3] User screen selection #2 in screen 2

References

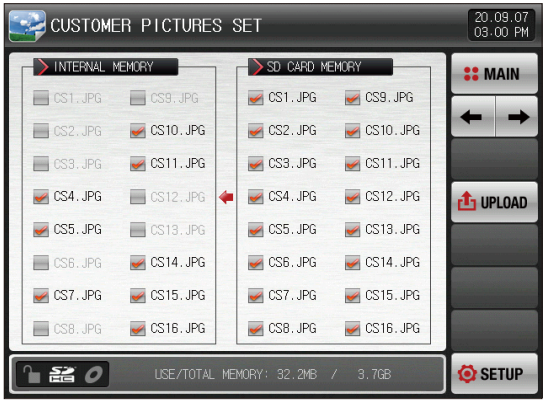
- In case of file management for SD card, it recognizes when the folder name shall be JPG and file name shall be DI*.JPG
- The message, "It is uploaded now." is displayed at the bottom of screen during upload.
- JPG files can be used from Ver.8, and versions prior to Ver.8 must be used as BMP files. For more information, refer to [13-2. JPG & BMP file making method]



[Fig. 13-4] User screen selection #3 in screen 2

References

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



[Fig. 13-5] User screen selection #4 in screen 2

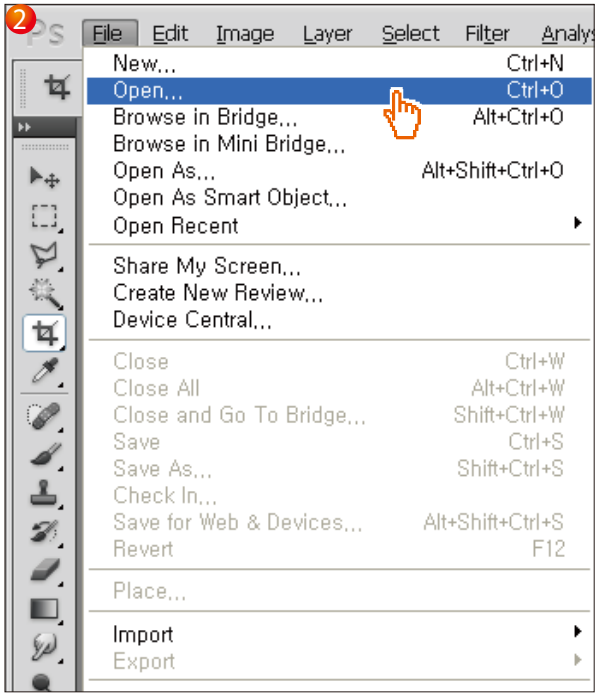
References

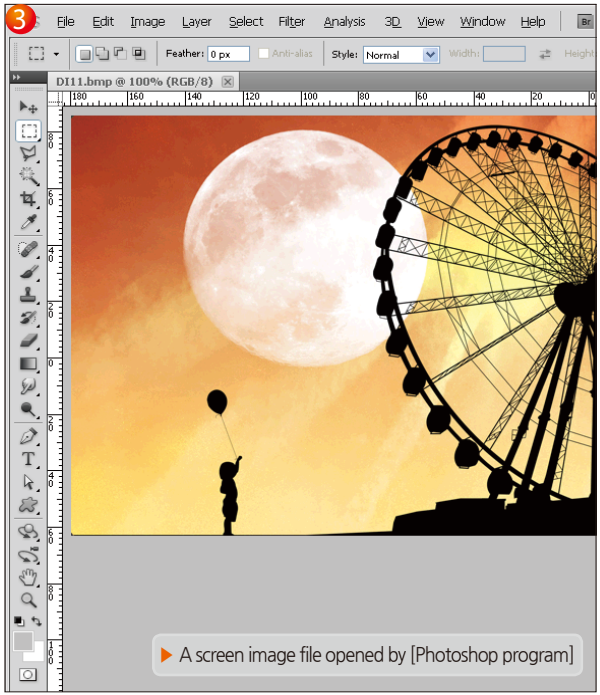
- When the files ( ) needed from the internal memory is selected, it can be used for user screen in operation of user screen

13-2. JPG & BMP file making method

- JPG files can be used from Ver.8, and versions prior to Ver.8 must be used as BMP files
- JPG / BMP files can be created BitEditor or Adobe Photoshop.(JPG can be saved as paint.)
  BitEditor can be downloaded from our website, please refer to BitEditor manual. How to create it in Adobe Photoshop is as follows.

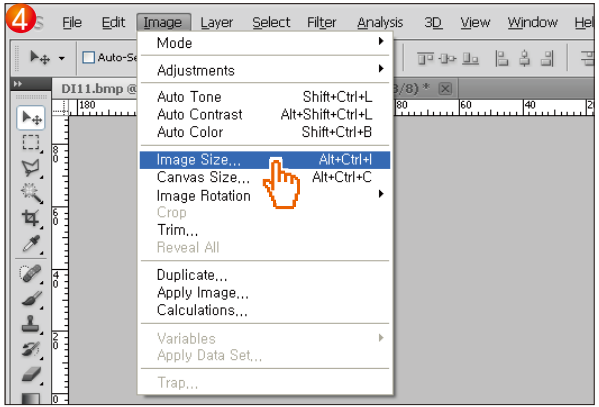
1 Adobe Photoshop

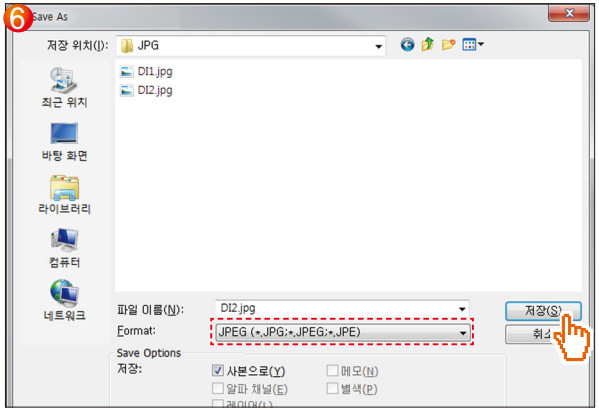


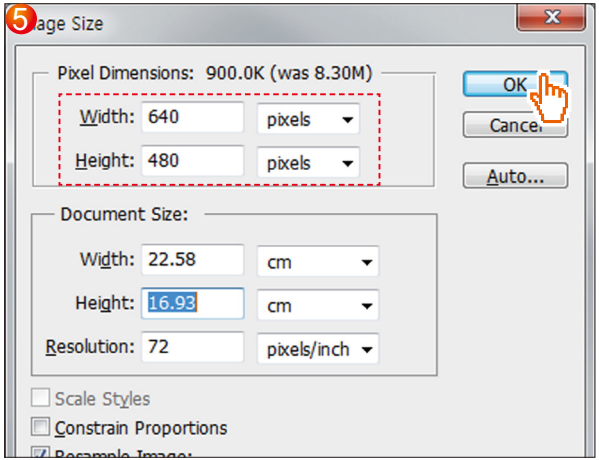


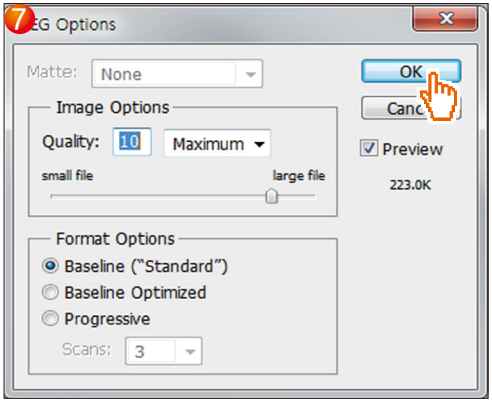
▶ A screen image file opened by [Photoshop program]

(1) Create JPG file

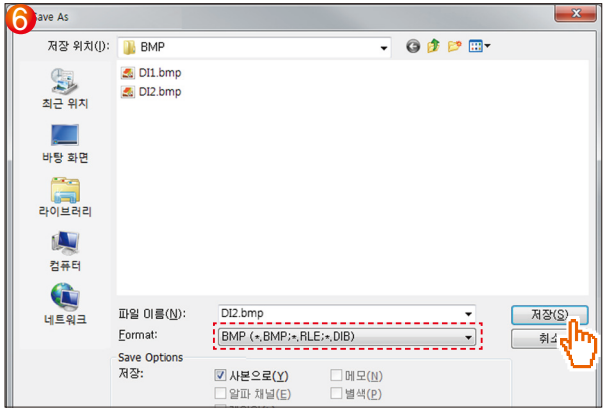


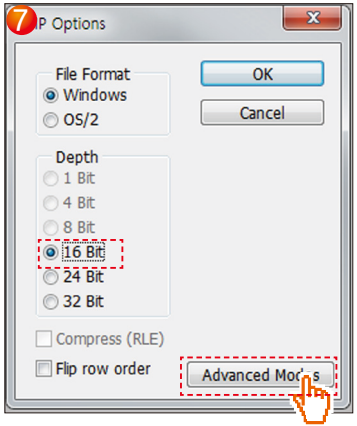




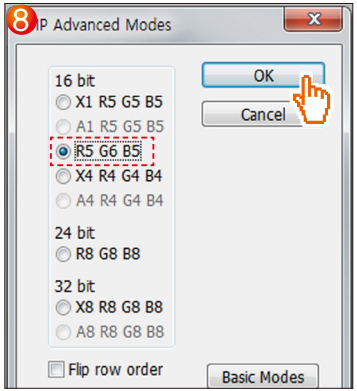


(2) Create BMP file





▶ After saving the file extension as ".BMP", if the BMP option active window appears, set it to 16-bit and then select [Advanced Mode].



▶ [In the 16-bit setting box of [Advanced Mode], set R5 to G6 B5, then select OK to complete.

Division	DI error screen	User screen	Initial screen
JPG resolution	528 X 304 pixels (within 360K)	640 X 480 pixels (within 500K)	
BMP resolution	520 X 422 pixels	640 X 480 pixels	
File name	DI#n.JPG / DI#n.BMP	CS#n.JPG / CS#n.BMP	INIT.JPG / INIT.BMP
Number of files	16 pcs	16 pcs	One

#n : 1~16

References

- When the files are saved in different name with the defined one in the DI error screen, they cannot be used.
- The folder name inside the SD card is defined in BMP or JPG.
- When creating a BMP file, it is recommended to use [Photoshop program].
- When saving BMP files, "Paint", which is commonly used in computers, cannot be used because bitmaps cannot be saved in 16BIT.

13-3. Operation of user screen

- Refer to [Fig. 13-1 User screen setting screen #1].
- 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.

[Fig. 13-6] User screen

①	▼ : ▼ ◀◀ ❚❚ ▶▶ ⊗ is disappeared in the user screen. ● Button is displayed in any part of the screen when the screen is touched during execution of 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.JPG

User screenCS2.JPG

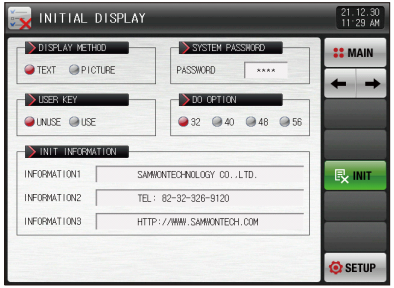
The user screen is terminated and return to the operation screen

User screenCS4.JPG

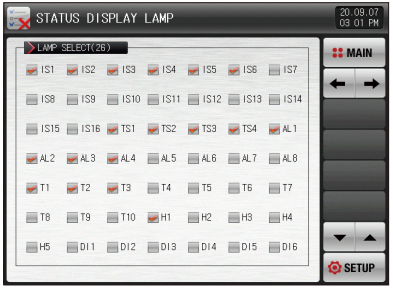
User screenCS3.JPG

Part 14

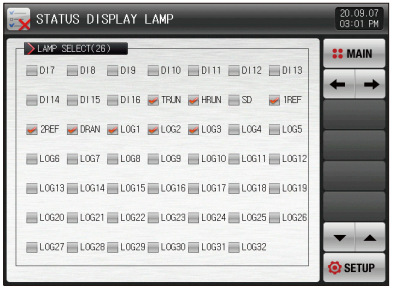
System initial setting



[Fig. 14-1] The screen adopted the letter for display method



[Fig. 14-5] System initial setting screen 2 #1



[Fig. 14-6] System initial setting screen 2 #2

14. System initial setting

14-1. Basic screen display setting

[Fig. 14-1] The screen adopted the letter for display method

[Fig. 14-2] The screen displayed with letter in electric power ON

①	Setting the display on the initial screen with electric power ON
②	Setting Y/N of user button in stationary and program operation screen
③	Display the wording on the initial screen with electric power ON • Setting 1, 2, 3 wording for information is available and maximum 24 characteristics can be input • Display method is set with letter.
④	Setting the password used in system screen entering • The password was set in "0" when it is delivered from the factory.

⑤	Set the do option • 32 : DO32 point • 40~56 : DO33~56 points (available when TIO2000-B is additionally connected)
⑥	Changing every parameter into the factor initial state
⑦	Move from current user screen to the previous user screen.

[Fig. 14-3] The screen adopted the photo for display method

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

[Fig. 14-4] The screen adopted the photo in electric power ON

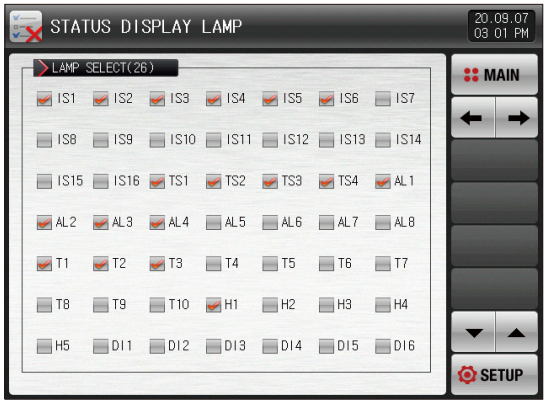
References

▶ JPG files can be used from Ver.8, and versions prior to Ver.8 must be used as BMP files. For more information, refer to [13-2. JPG & BMP file making method]

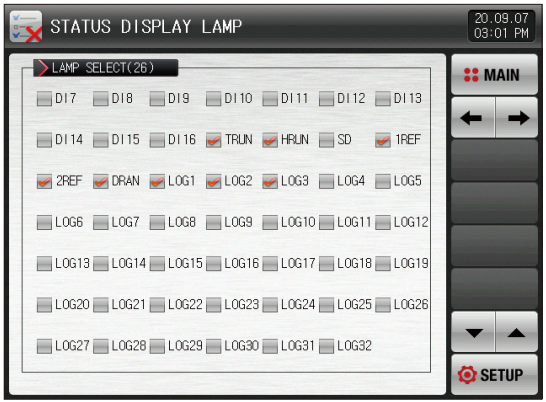
Parameter		Setting range	Unit	Initial data
Display method		Letter, Photo	ABS	Letter
System password setting		0 ~ 9999	ABS	0
User button		No use, Use	ABS	No use
DO option		32, 40. 48, 56	ABS	32
Initial screen information	Information display 1	0~9, A~Z, Special character (Maximum 24 characters)	ABS	SAMWONTECHNOLOGY CO.,LTD.
	Information display 2	0~9 A~Z, Special character (Maximum 24 characters)	ABS	TEL : 82-32-326-9120
	Information display 3	0~9 A~Z, Special character (Maximum 24 characters)	ABS	HTTP://WWW.SAMWONTECH.COM

14-2. State display lamp setting

- It is a screen to set the type of lamps to be display in the stationary and program operation screen #2.
- Maximum 20 lamps can be selected.



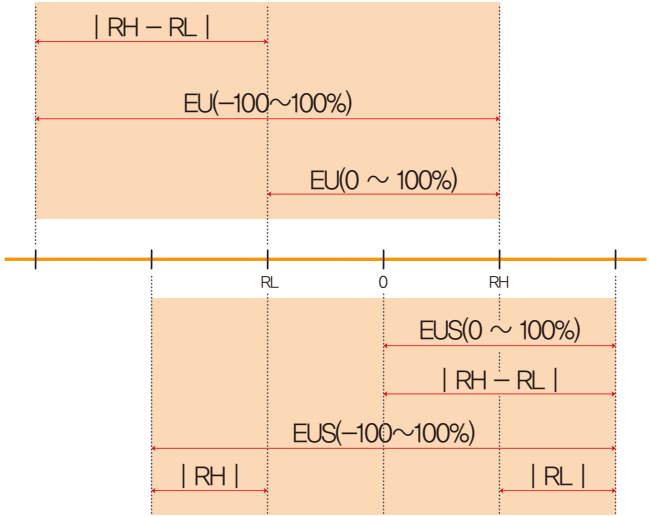
[Fig. 14-5] System initial setting screen 2 #1



[Fig. 14-6] System initial setting screen 2 #2

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 = PT_1

▶ RANGE = -90.00℃(RL) ~ 200.00℃(RH)

	Range	Center point
EU(0 ~ 100%)	- 90.00 ~ 200.00℃	55.00℃
EU(-100 ~ 100%)	- 380.00 ~ 200.00℃	- 90.00℃
EUS(0 ~ 100%)	0 ~ 290.00℃	145.00℃
EUS(-100 ~ 100%)	- 290.00 ~ 290.00℃	0.00℃

Queries related with after sales service for TEMI2000 series

Please inform the TEMI2000 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 TEMI2000 series

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

■ Internet
www.samwontech.com

■ E mail
webmaster@samwontech.com
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