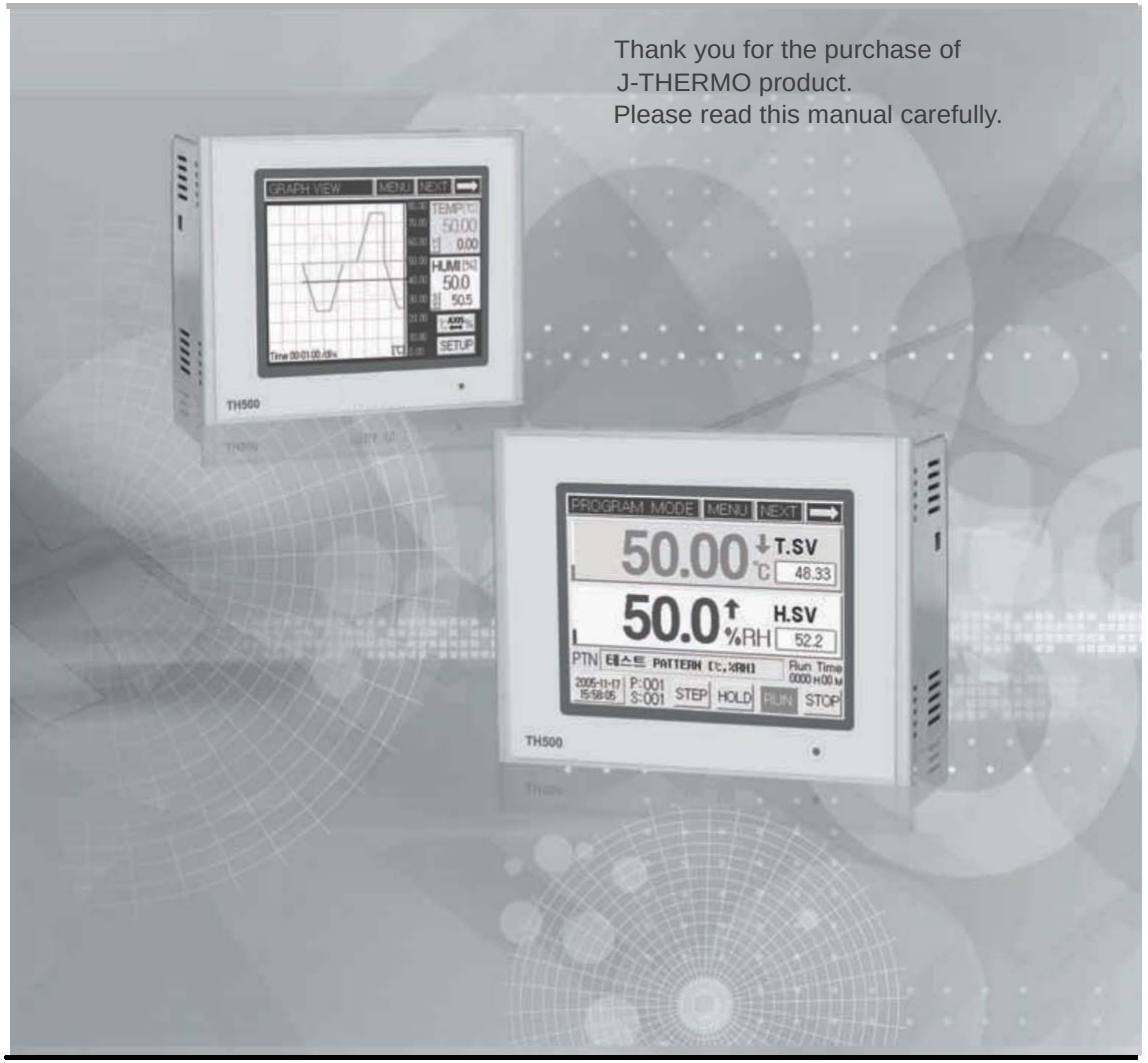
# TH500

## Temperature and Humidity Controller

## MANUAL

Thank you for the purchase of
J-THERMO product.
Please read this manual carefully.




J-THERMO
No. 9, Chen Kung St., Tu Chen City, Taipei County 236, Taiwan.
Telephone : 886-2-2268-3268 Fax : 886-2-2268-4021
www.accutherm.com.tw

# Notice



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# Contents

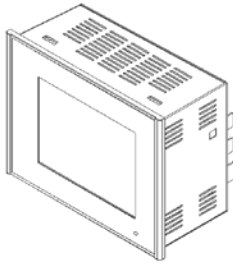
# 1 Before starting

Thank you for the purchase of J-THERMO Temperature and Humidity Controller (Model# TH500).
This manual contains the function of product, install method, caution information and the way of using this controller. So please read this manual before using it.
And also please make this manual to be delivered to the final user and to be placed where can be found and seen easily
(Contents of this user manual can be edited without prior notice for improvement and modification of the product.)

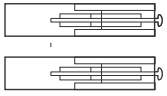
## 1.1 Checking products

After purchasing our product, please check if it is correct item you want. Also please check breakage on exterior and omission parts.
If it is a different controller which you want or you find omission parts, please contact our sales office.

### 1.1.1 TH500 Standard type (TH500-1NN)


Standard body


Resistance 250 Ω x 2

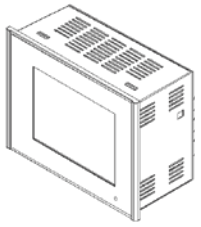

Fixing bracket

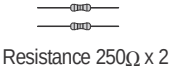
Manual

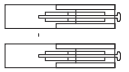


### 1.1.2 TH500 additional type ( with I/O Board)

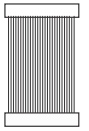
TH500 - 21N

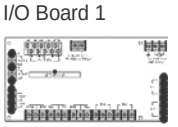

Additional type


Resistance 250Ω x 2

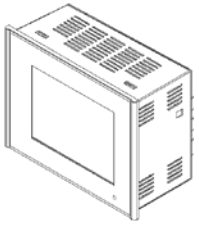

Fixing bracket

Manual

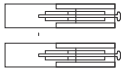

40p cable


I/O Board 1

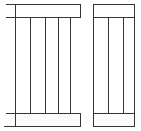
TH500 - 24N

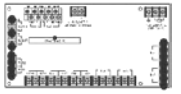

Additional type


Resistance 250Ω x 2


Fixing bracket

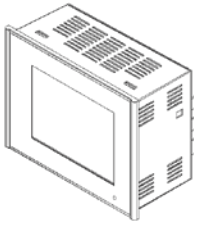
Manual


40p cable
20p cable

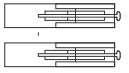

I/O Board 1


I/O Board 2

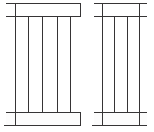
TH500 - 25N

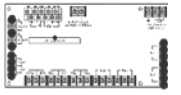

Additional type

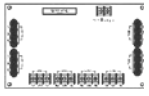

Resistance 250Ω x 2


Fixing bracket

Manual

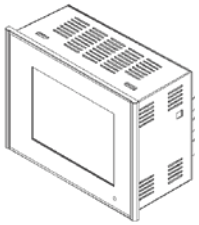

40p cable
20p cable


I/O Board 1

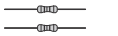

I/O Board 3

### 1.1.3 TH500 Sale separately

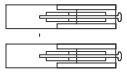
- TH500 - 2NN (※ Attention) is a additional type



Additional type

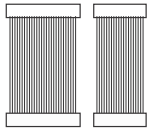


Resistance 250Ω x 2



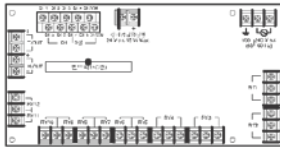
Fixing bracket


Manual

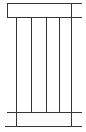


40p cable
20p cable

- TH500 - N1N



I/O Board 1



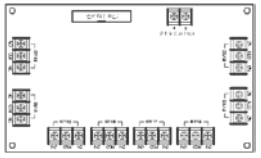
40p cable

- TH500 - N2N

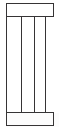
I/O Board 2

20p cable

- TH500 - N3N



I/O Board 3



20p cable



## 1.2 Safety information

### 1.2.1 Safety notice

- For safety and security of the system that is connected to the product, please read and follow this manual carefully.
- We are not responsible for any damages and safety problems due to disregards of the manual or lack of care of the product.
- Please install any extra safety circuitry or other safety materials outside the product for safety of the program that is connected to the product.
- Do not disassemble, repair or reconstruct the product. It can cause electric shock, fire, and errors.
- Do not give impact to products. It can cause of damage or malfunction.

### 1.2.2 Quality guarantee

- Unless it is included company's conditions for warrantee, we are not responsible for any warranties or guarantees.
- We are not responsible for any damages and indirect loss of the use or third person due to unpredicted natural disasters.

### 1.2.3 Quality guarantee conditions of product

- The warranty for this product is valid for 1 year from purchase, and we will fix any breakdowns and faults from proper uses as it is mentioned in this manual for free.
- After the warranty period, repair will be charged according to our standard policies.
- Under following conditions, repair will be charged even during warranty period.
  - Breakdowns due to user's misuses
  - Breakdowns due to natural disasters
  - Breakdowns due to moving the product after installation.
  - Breakdowns due to modification of the product
  - Breakdowns due to power troubles
- Please call our customer service for A/S due to breakdowns.

# 2. Installation Instruction

This is information for installation place and method of TH500 temperature and humidity program controller. So please ready it before installation.

## 2.1 Installation place and caution notice

### 2.1.1 Installation place

To avoid electric shock, please use it after installation to panel.

Please avoid installing the product for following places where

People can touch terminal unconsciously
Directly exposed to the mechanical vibration or impact.
Exposed to the corrosive gas or combustible gas.
It is exposed to mechanical shock or vibration
Danger of corrosion or combustion of gas exist
Temperature changes too frequently
Temperature is either too high or too low
It is exposed to direct rays
It is exposed to electromagnetic waves too much
Humid place
It has many combustible objects
It has dusts and salinity

### 2.1.2 Caution

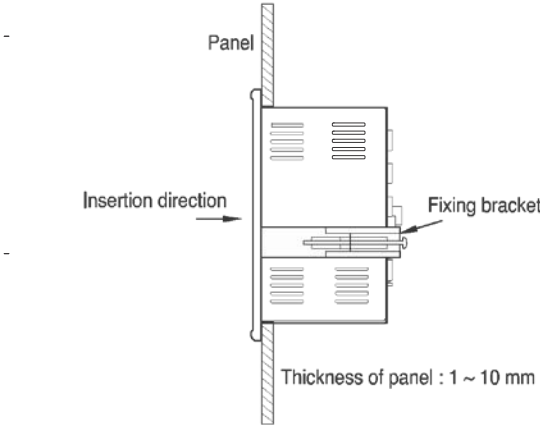
- The case of this controller is chrome-zinc plating and Bezel is made by ABS/PC anti-combustion material but please do not install it to the inflammable place. Especially please do not put it on the inflammable products.
- Please keep it away from the machine or wires that can be cause of noise. Especially, please have enough warn-up when you operate it under 10 ¡ temperature.
- Please install it on horizontally
- When you wire it, please cut out all of electric power.
- This controller is operating in 100 V ~ 240 V a.c, 50 ~ 60 Hz without additional change. If you use other voltage, it may case of fire and electric shock.
- Do not operate controller with wet hand, it may cause of electric shock.



- Please follow Safety Information to prevent any fire, electric shock and any damage.
- Please follow this manual for install and operation of this controller.
- When you put to earth, please refer to install method. But do not it earth to gas pipes, phone lines and lightning rods.
- Please do not turn on power until you install all of parts
- Please do not block ventilating windows. It may cause of break down.
- The grade of over voltage is Catalogue Ⅱ and using environment is Degree Ⅱ

## 2.2 Installation method

(1) Please use 1mm~10mm thickness of a steel sheet for panel.
(2) Please push TH500 in front of panel.
(3) Please fixate TH500 by fixing bracket.
(4) When you fixate TH500 to panel by fixing bracket, please do not tighten it too much. It may cause of break a panel or fixing bracket.




**⚠ Caution**

- To prevent electric shock, please check whether power has turned off or not.
- Before turn on power, please use more than third class grounding.
- When electricity transmits, it may cause electric shock so please do not touch terminal.
- Please wire it after turn off main power
- Please use around 2A fuse to main electronic power line.

## 2.3 Suffix Code

| Code # | Suffix Code | | | | Description |
|---|---|---|---|---|---|
| TH500 | | | | | Temperature-Humidity Program Controller |
| TYPE | N | | | | NONE |
| | 1 | | | | STANDARD TYPE<br>SENSOR INPUT: TEMPERATURE (Pt 100 § / 0-5 V d.c)<br>HUMIDITY (Pt 100 § / 0-5 V d.c)<br>DIGITAL INPUT (D.I): 8 POINT<br>CONTROL OUTPUT: TEMPERATURE (SCR/SSR 1 POINT)<br>HUMIDITY (SCR/SSR 1 POINT)<br>RETRANSMISSION: TEMPERATURE (4-20 mA d.c 1 POINT)<br>HUMIDITY (4-40 mA d.c 1 POINT)<br>CONTACT OUTPUT: RELAY (1a1b) 4 POINTS<br>RELAY (1a) 8 POINTS<br>TRANSISTOR OUTPOUT: OPEN COLLERTOR 8 POINTS<br>COMMUNICATION: RS232C, RS485, USB |
| | 2 | | | | ADDITIONAL TYPE<br>SENSOR INPUT: TEMPERATURE ((Pt100 § / 0-5 V d.c)<br>HUMIDITY (Pt100 § / 0-5 V d.c)<br>RETRANSMISSION: TEMPERATURE (4-20 mA d.c 1 POINT)<br>HUMIDITY (4-40 mA d.c 1 POINT)<br>COMMUNICATION: RS232C, RS485, USB |
| OPTION | | N | | | NONE |
| | | 1 | | | I/O BOARD 1<br>SMPS (24V d.c, 18W) + D.I 8 POINT + RELAY (1a1b:4+1a:8) 12 POINTS |
| | | 2 | | | I/O BOARD 2 O.C 8 POINT |
| | | 3 | | | I/O BOARD 3 RELAY (1a1b) 8 POINTS |
| | | 4 | | | SMPS (24V d.c, 18W) + D.I 8 POINTS + RELAY (1a1b:4+1a:8) 12 POINTS<br>12 POINTS + O.C 8 POINTS<br>I/O BOARD 1 + I/O BOARD 2 |
| | | 5 | | | SMPS (24V d.c, 18W) + D.I 8 POINTS + RELAY (1a1b:4+1a:8) 12 POINTS<br>12 POINTS + RELAY (1a1b) 8 POINTS<br>I/O BOARD 1 + I/O BOARD 3 |
| COMMUNICATION | | | N | | NONE |
| | | | 1 | | ETHERNET (PREPARING) |

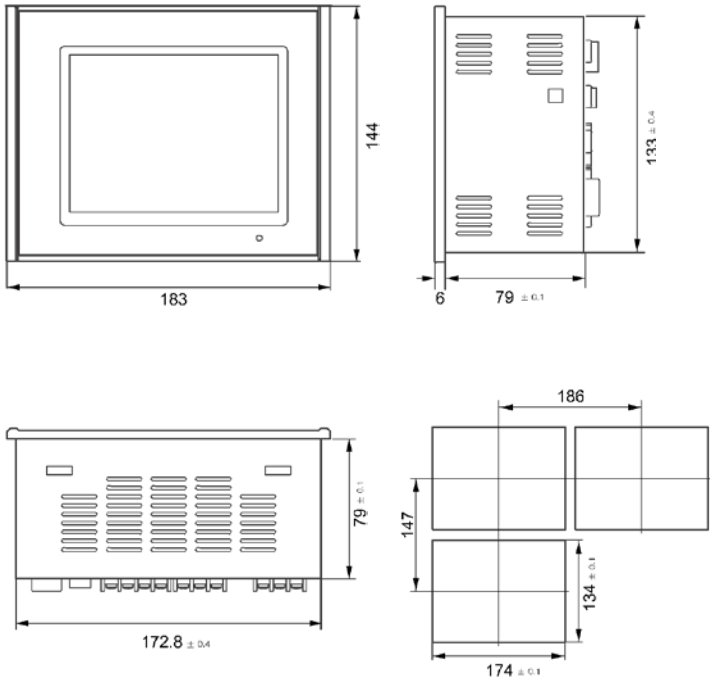
※ There is No option for the STANDARD TYPE



## 2.4 Dimensions/ Panel cutout and Terminal arrangement

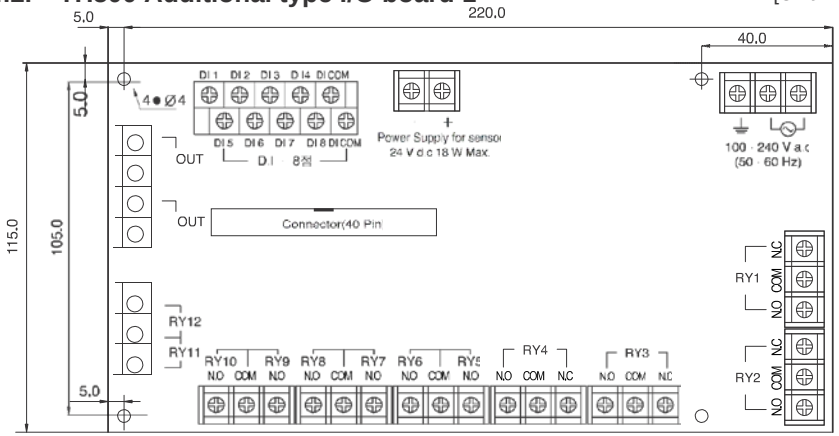
### 2.4.1. TH500 Standard type / Additional type

[Unit: mm]



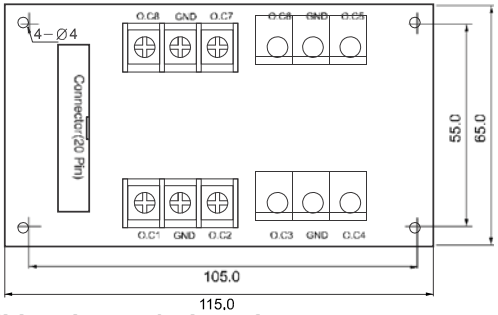
### 2.4.2. TH500 Additional type I/O board 1

[Unit: mm]



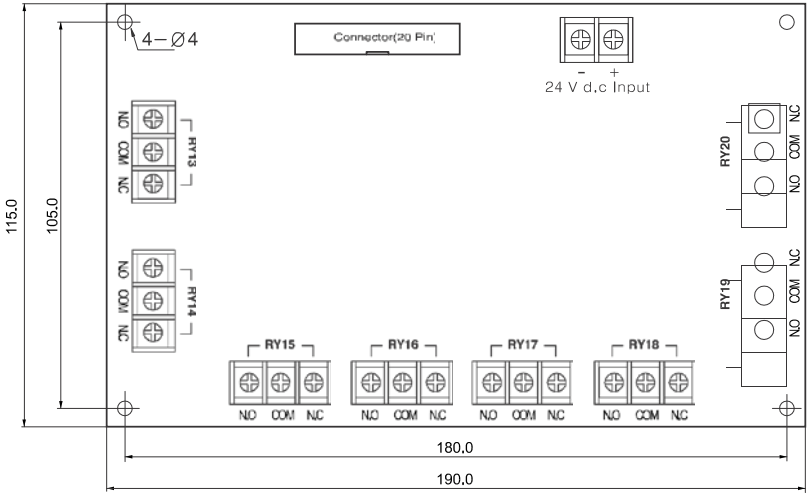

### 2.4.3. TH500 Additional type I/O board 2

[Unit: mm]




### 2.4.4. TH500 Additional type I/O board 3

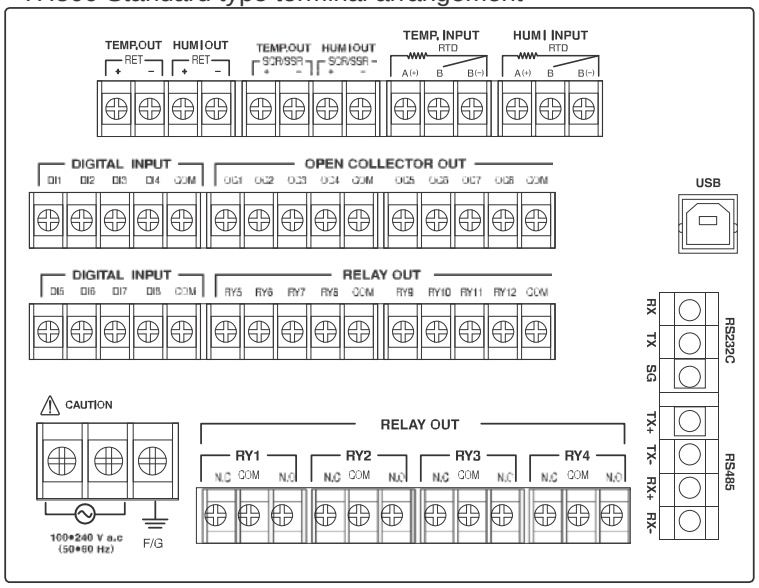
[Unit: mm]



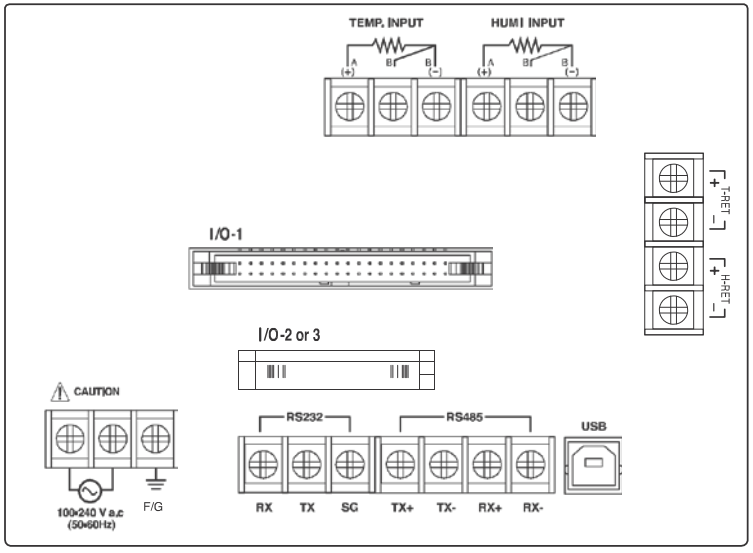



### 2.4.5 TH500 Standard type terminal arrangement

TH500 Standard type terminal arrangement



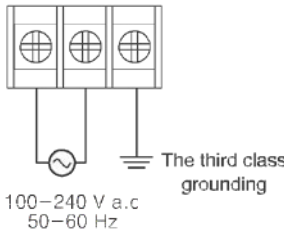

TH500 Additional type terminal arrangement



## 2.5 Connection method

### 2.5.1. Power

⁄ Grounding needs more than 2mm² wire and at least the third class grounding connection (Grounding resistance below 100 § )

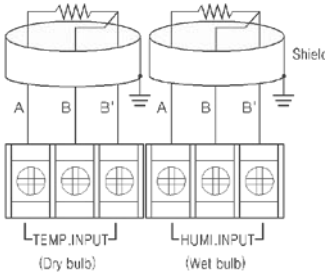



### 2.5.2. Sensor Input

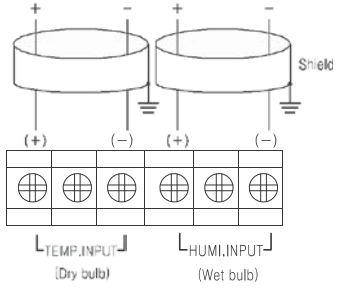
**⚠ Caution**

- Please use input wire with shield. And the shield needs to have 1 point grounding.
- Please leave a space for Sensor line against power line or grounding line.

RTD (Resistance Temperature Detector) input (Pt 100 § )




Direct/Voltage input (0-5V d.c, 4 - 20 mA d.c)




※ If you use voltage input, please contact 250 § 0.1% resistance to the input terminal.

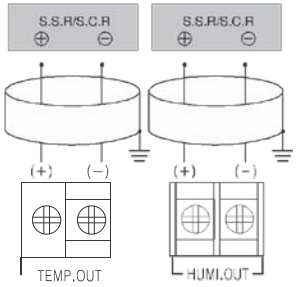


### 2.5.3. Temperature ƒU Humidity control output and retransmission arrangement.

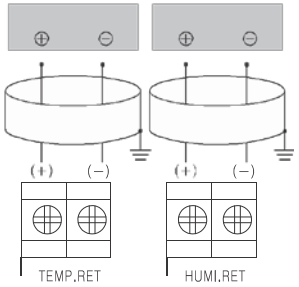
**⚠ Caution**

- Please pay attention when you connect it in polarity of output.
- Please use shield line for output line. And shield needs 1 point ground.

Temperature-Humidity controller output

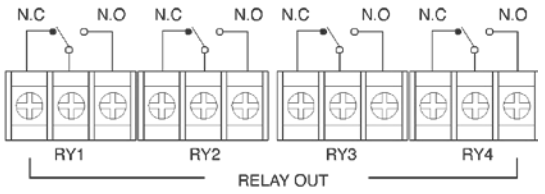



Temperature-Humidity retransmission output (4-20mA d.c)

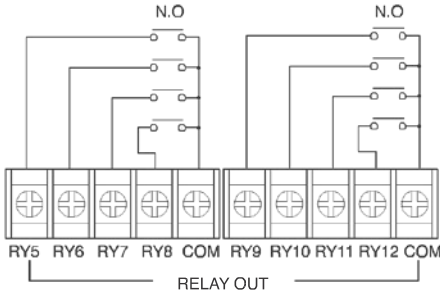



⁄ External output arrangement

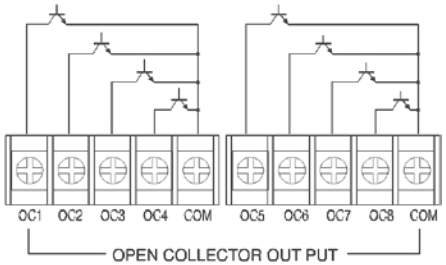
•Relay output




•Relay output



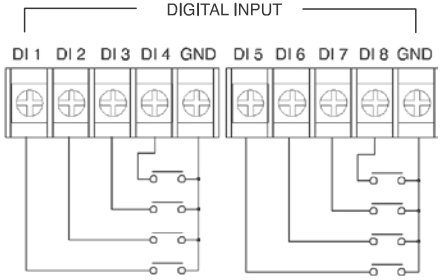
•Open collector output
TH500 separate body has 2 I/O BOARD



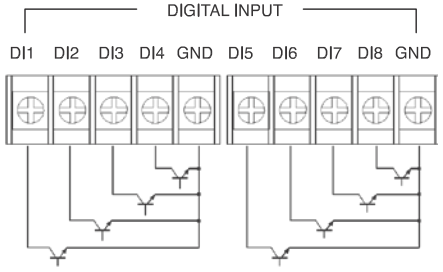

## Contact input & Digital input (D.I)

Please use non-voltage contact as like a Relay.
When you use open collector, the voltage of both of ends should be below 2V and the leakage voltage should be below 100§ in ON contact.

• In case of contact input (DI: 1 ~ 8)



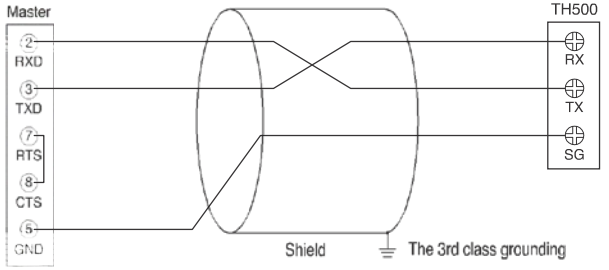

• In case of transistor input (DI: 1 ~ 8)






## Retransmission arrangement

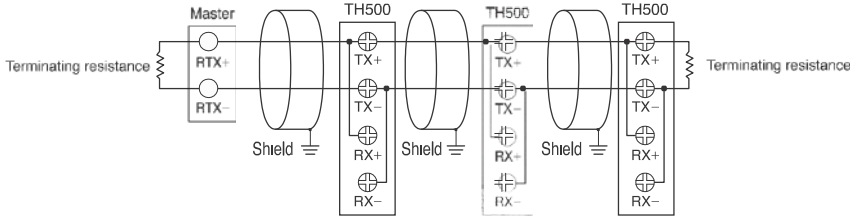
•RS232C arrangement (Base on connector 9 pins)



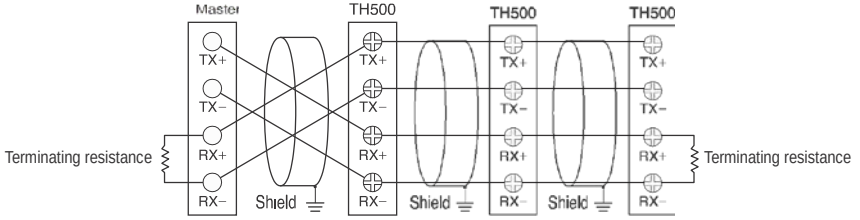

•RS422/RS485 arrangement

TH500 can contact to maximum 32 machines. Please contact Terminating Resistance (100 ~ 200 § 1/4 W) to the both of ends of retransmission lines.

(2 wire connection)




(4 wire connection)



# 3. Setting and operating

## 3.1. Initial screen

When the TH500 power is on, the screen for system check will be appear in order of precedence.

## 3.2. Basic Input Method

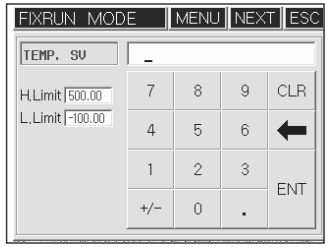
Table 1) Button & Input Box

| | | Function |
|---|---|---|
| BUTTON | Name<br>Select button | Users can select this button on their demand.<br>If you press this button, its color will turn into another.<br>By releasing it back, you can select this button operation. |
| | Active input box<br>(Input available) | Users can enter various set values into this box as they wish. When you press the box, a certain range of numbers or the text input box (Fig.4 to Fig.7) will appear depending on situations. Then, you have only to press the set value. |
| | Inactive input box (Input unavailable) | This box is inactive under current conditions or situations. However, if you put it under certain conditions or situations, it will turn into the active input box as shown above. |



### 3.2.1. Screen for button input

The Fig. 3 is the basic number input box. You can enter integral numbers or real numbers (Decimal point) there. The title of an entered number and its upper and lower limits will be indicated on the left top of the box. The current input value will be indicated at the indication box over the figure board. The entered number will be entered completely only if you enter the ENT key. You can cancel the entered content by pressing the ESC key.




(Fig.3) is the basic number input box

### 3.2.2. Number / English / Sign Input

Fig. 4 to 7 shows the screen for entering the Number/English/Sign. This multi-input screen enables you to enter the Number/English/Sign text respectively by pressing the CHANGE KEYPAD key in turn. Its shift order is¡ Number Input Mode → English Input Mode → Sign Input Mode.You can return to the¡ Number Input Mode ¡ by pressing the CHANGE KEYPAD key. The arrangements of Number/Korean/English/Sign keyboards are different from each other. However, the Function keys on the right side play the same roles as follows.

¡ CLR : Delete all the current texts entered.

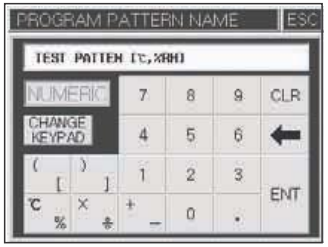
¡ ← : Delete one letter ahead of the current cursor.

¡ ENT : Save the text indicated up to the current cursor into the internal memory.

After typing the text based on the combination of keys and functions, you can save all the texts completely by pressing the ENT key. As they save completely, you will be also escaped from the multi input screen. If you are to cancel the text, you can press the ESC key on the right top side. By doing so, you can delete all the current text while escaping the input box.

User can input program pattern name as followings MENU ¡ PROGRAM SETUP ¡ PROGRAM NAME SETUP ¡ PATTERN NUMBER .

### 3.2.3. Number Input Mode



(Fig. 4) The screen for number input

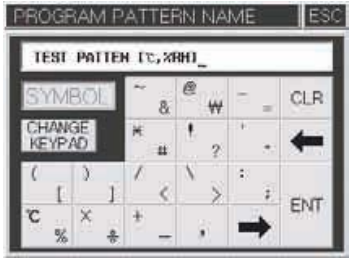
The screen for number input is shown in the Fig.4. If you press the number 0 to 9 and . keys once, they will be indicated on the cursor position. Whenever you press the ([, )], ℃%, x ÷ and + - keys on the left side of the keyboard, they will be indicated in turn. When you press such duplicate keys, the cursor will not move at all while waiting for continuous entry. At that time, if a certain period of time (approx. 1 second) passes, the cursor will move automatically to the next position disabling you from continuous entry.

### 3.2.4. English Input Mode

(Fig.6) The screen for number input

The screen for English input is shown on the Fig. 6. All the keys except the 、 and , , keys consist of duplicate keys

### 3.2.5. Sign Input Mode

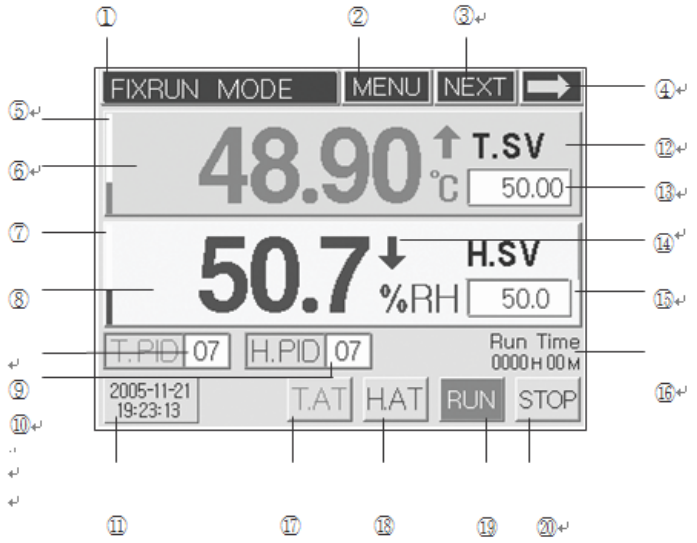


(Fig. 7) The screen for number input

The screen for sign input is shown on the Fig. 7. All the keys except the , key , consist of duplicate keys. Its basic use is tche same as that of the English input mode



## 3.3. The name of each part on the operating screen

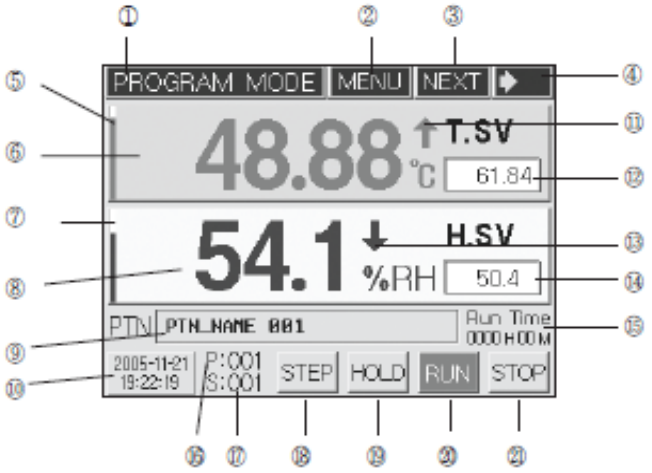


(Fig. 8) The 1st running screen of fix control

1. Current operation status
2. Menu button
3. Operation screen 2 shift button
4. Run/Stop indication
5. Control output BAR for current temperature (MV)
6. Current temperature PV
7. Control output BAR for current humidity (MV)
8. Current humidity PV
9. Temperature PID Zone No. input box
10. Humidity PID Zone No. input box

※ 17, 18 are displayed only in

11. Current date/time
12. Temperature PV Up/Down indication
13. Temperature SV input box
14. Humidity PV Up/ Down indication
15. Humidity SV input box
16. Running time indication
17. Temperature A/T button
18. Humidity A/T button
19. Start button for Fix control
20. Stop button for Fix control




(Fig. 9) The 1st running screen of program control

1. Current operation status
2. Menu button
3. Operation screen 2 shift button
4. Running/Stop indication
5. Control output BAR for current temperature (MV)
6. Current temperature PV
7. Control output BAR for current humidity (MV)
8. Current humidity PV
9. Operation pattern name
10. Current date/time

¡ 16~19 are displayed only in operation

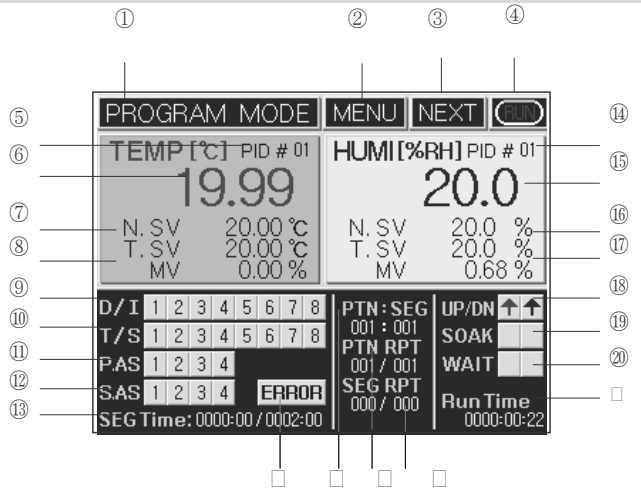
11. Temperature SV Up/Down indication
12. Start pattern No. input box
13. Humidity SV Up/Down indication
14. Start segment No. input box
15. Running time indication
16. Current operating pattern No.
17. Current operating segment No.
18. Program STEP button
19. Program HOLD button
20. Program operation Start button
21. Program operation End button

The operation screen 1 (Fig. 8, Fig. 9) is the basic screen where you can enter either temperature & humidity setting value (SV) or start pattern/loop No. in the Fix/Program mode. After entering your desired setting value, you can press the RUN button to start control.



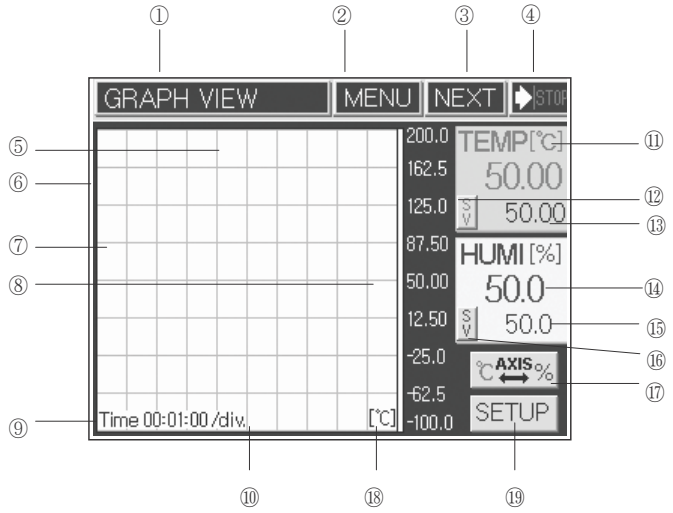
**Attention**

After pressing the RUN button, you are unable to press various setting buttons like MENU or input boxes, because they may have a serious effect on system control operations.




(Fig.10) The 2nd running screen of program control

1. Current operation status
2. Menu button
3. Operation screen 3 shift button
1
4. Running/Stop indication
5. Temperature PID ZONE No.
6. Current temperature PV
7. Current temperature SV
8. MV
9. I/S signal status indication
10. T/S signal status indication
11. D/I signal status indication
12. A/S signal status indication
13. SEG. running time indication
14. Humidity PID ZONE No.
15. Current humidity PV
16. Current humidity SV
17. Current humidity MV
18. Temperature/humidity Up/Down section indication
19. Temperature/humidity holding section indication
20. Temperature/humidity waiting indication
21. Running time indication
22. Buttons for system error indication
23. Current operation pattern/ segment indication (pattern No./segment No.)
24. Current pattern repeat No. indication (Current repeat No./Entire repeat count)
25. Current operation section / repeat info. Indication Current section repeat No. / Section repeat count




(Fig.11) Screen for graph view

1. Current operation status
2. Menu button
3. Operation screen 1 shift button
4. Running/Stop indication
5. Upside screen of Y axis
6. Temperature & humidity SV, PV indication
7. Div time increase of X axis
8. Div time decrease of X axis
9. X axis time / Div
10. Low part screen of Y axis
11. Current temperature PV indication
12. Current temperature MV/SV indicator shift button
13. Current temperature MV or SV indication
14. Current humidity PV indication
15. Current humidity MV or SV indication
16. Current humidity MV/SV indicator shift button
17. Y axis temperature & humidity unit shift button
18. Y axis unit indication
19. Graph/Save setting button

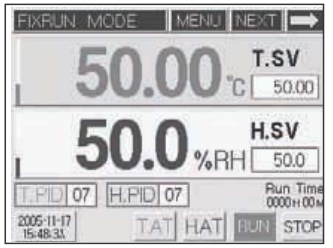


## 3.4. Running of Fix-control

Fix-control is running a temperature and humidity by fixed set value (SV).

### 3.4.1. Running selection of Fix-control 1.


(Fig.12) The 1st running screen of Fix control (Stop screen)




(Fig.13) The 1st running screen of Fix control (Run screen)

Start running : You can start the fixed running just by entering a temperature & humidity setting value (SV) and pressing the RUN button in the 1st running screen of Fix control(Fig. 12). In this case, the arrow indicator will move to indicate its running status, while the indicator on the right bottom will be changed into the RUN button with its red color.

Stop running : Press the STOP button if you want to stop running.

Fix-control or Program control (Fig.12) can be selected from Main Menu, if you press the MENU button in the 1st running screen of Fix control. In the Main Menu, press the FUNCTION SETUP button and select Running mode. Fix control will be selected by press the FIXRUN button. Press the NEXT button to set an each setting item of the 2nd function set up screen.

Whenever you change the setting value (SV) during its running, the PID ZONE numbers for controlling will change automatically. If you want to use a particular PID ZONE number, you should enter a ZONE number again after entering a setting value. After starting the operation, both TAT and HAT buttons will become the temperature and humidity Auto Tuning (A/T) buttons respectively. A/T is available only in the Fix-Running mode. You can execute this A/T by entering its necessary temperature or humidity setting value (SV) and pressing its related button. If you want to stop A/T, you should press its operating button. In other words, you should press the TAT button for temperature, but press the HAT button for humidity again. Of course, you can also stop AT process by pressing the STOP button of fix control

while stopping the controlling operation. In this case, all the operation values related to A/T will not be saved. A/T can running up to 24 hour, beyond which A/T will stop.

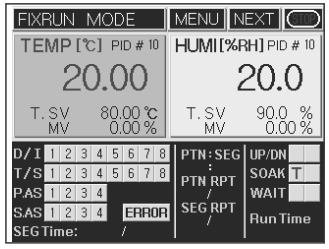
**⚠ Caution 1.** When it comes to temperature, its PV will be always displayed unless the sensor line is disconnected. However, as far as humidity is concerned, its PV will not be indicated unless a setting value (SV) is entered. If you set the SV to 0 and press the RUN button, you can control the temperature only.

**⚠ Caution 2.** It is impossible to run A/T for temperature and humidity at the same time. Therefore, it is desirable to run humidity after maintaining a target temperature. The button concerned will flash during Auto tuning.

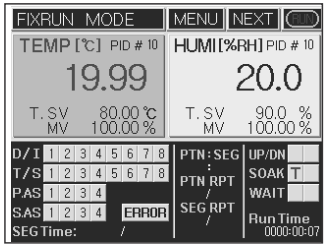
| | |
|---|---|
| T.AT | Temperature Auto Tuning button (Flash during running) |
| H.AT | Humidity Auto Tuning button (Flash during running) |

### 3.4.2. Running selection of Fix-control

Process value and Set value of temperature and humidity is shown basically in the 2nd running stop screen of Fix control. There is shown also for Inner signal(I/S), Time signal(T/S), Digital input signal(D/I), Alarm signal(A/S), and indicate a gradient of initial set value by form of UP/DN and SOAK.




(Fig.14) The 2nd running screen of Fix control (Stop screen)




(Fig.15) The 2nd running screen of Fix control (Run screen)



## 3.5. Running of Program control

Program control is control a Process Value (PV) by change of Set Value (SV) according to course of time. For example, it increase current temperature to 30¡ for 10 min. and maintain 30¡ for 15min., and then increase to 70¡ again for 40 min. and maintain the 70¡ for 1 hour. Program control is especially using widely in the test equipment for environment like as thermostat and electric furnace.

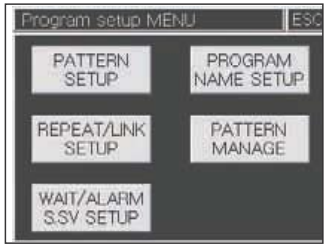
### 3.5.1. Selection of Program Control Running


(Fig.16) The 1st running screen of program control(stop screen)

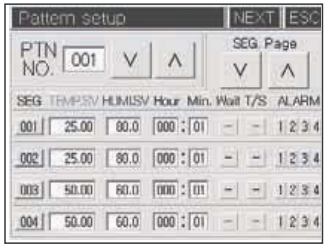

(Fig.17) Main menu for function setup

In order to running with program control, press the MENU button of the top on the1st running screen of program control (Fig.16) and move to the screen for function setting (Fig.17). Move to the screen¡ Function Setup 1¡ ¬by press the FUNCTION SETUP button, and select the program control as running mode by press the PROGRAM button. After finish setting “FUNCTION SETUP 1 & 2 by press NEXT button, and move to¡ Main Menu¡ ¬screen by press ESC button. And then, finish the set for¡ DATE/TIME RESERVE SET¡ ¡¬ GRAP / LOG SETUP¡ ¡¬and move to the Program Set Screen (Fig.18) by PROGRAM SETUP button to set a program.
Set an each item with press the buttons in the Program set screen (Fig.18).

### 3.5.2. Set of Program Control Pattern




(Fig.18) Program Set Screen




(Fig.19) Pattern Set Screen

Press the PATTERN SETUP button in the program set screen (Fig.18) and move to the screen for program pattern set (Fig.19). Establish the set item for each segment of pattern in the screen for program pattern set (Fig.20).

Move to the running stopped screen 1 for program control after input for all, and input a start segment No. in the pattern and program start pattern. And then, program control will be running if you press the RUN button.


(Fig.20) The 1st running screen of program control(Stop screen)

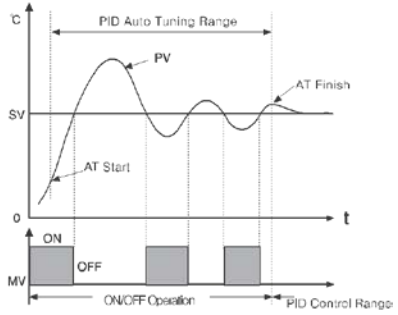

(Fig.21) The 1st running screen of program control(Run screen)

Once the program operation starts, STEP and HOLD buttons will appear newly like as running screen 1 for program control (Fig.21). These buttons has function which is related to progress of segment.

| Button | Name | Function |
|---|---|---|
| STEP | Program STEP button | Stop the present segment within the current program pattern, and start the next segment. |
| HOLD | Program HOLD button | Keep running the current segment unlimitedly within the current program. |

## 3.6. PID Auto Tuning.

Auto Tuning (hereinafter referred to as A/T) is the automatic setting function in which the controller measures the characteristics of the control system automatically and calculates the optimal PID values accordingly. The A/T method measures and calculates a cycle by producing the ON/OFF control output for the two cycles and generating the limit cycle of controlled targets.




(Fig 22) P.I.D Auto Tuning



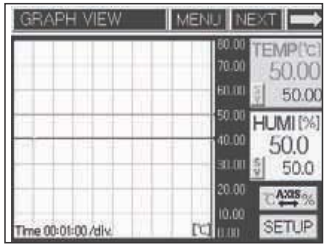
You can execute A/T all the time by entering a target setting value (SV) in the fixed control mode, pressing the RUN button, and pressing the subsequent either TAT or HAT button. After A/T is finished normally, if the unit is set to automatic PID ZONE reference mode, the resulted PID value will be saved into the appropriate PID ZONE. If this unit is set to manual PID ZONE reference mode, the results PID value will be saved into your designated PID ZONE.

**⚠ Caution**

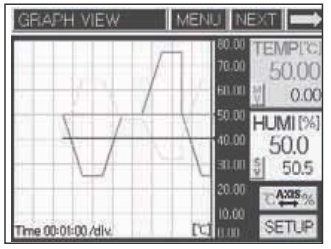
If A/T still runs in 24 hours after A/T execution, A/T operation will come to an end automatically. If you close the A/T operation by force during A/T process, the operating value will not be saved and maintained as a previous setting value.

## 3.7. Graph display and setting

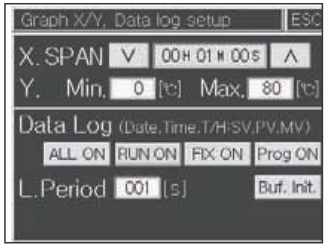
The graph display screen is the screen that shows the SV and PV of a temperature and humidity in graph. You can change the X and Y axes respectively by pressing the SETUP button (You can set a time of the X axis, Max. and Min. range of the Y axis in the graph set screen, and select also a state of save operation like as ALL ON , RUN ON , FIX ON , Prog ON, and save period). And you can also display the Y axis for temperature range and humidity range by pressing the button.




(Fig.23) Screen for fix control graph display



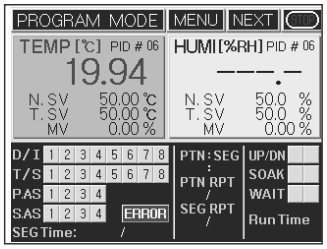

(Fig.24) Screen for program control graph display



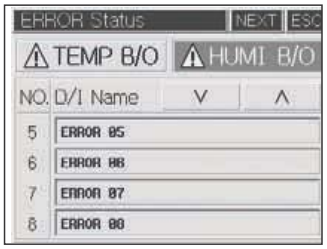

(Fig.25) Graph set screen

### 3.8. Error Indication

The second running screen of program control or fix control (Fifg.26) is indicating an operating state for running.




(Fig.26) The 2nd running screen of program control




(Fig.27) Indication screen for occurrence of error

The indication of errors through sensor disconnection and external D/I is displayed with ERROR button on and off in the 2nd running screen of program control (Fig. 26). If you press the ERROR button, the error occurrence screen will appear. In this case, the error indicator for temperature & humidity disconnection will appear, while D/I(External contact input) no. 1 to 8 will be displayed on the bottom. You can check it by pressing the Up/Down arrow button.

Press the NEXT button to show the operating record indication screen which can check the state of RUN, STOP, Sensor Disconnection and External Contact Input (D/I).


(Fig.28) Operating Rec



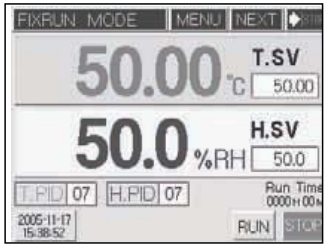
# 4 Displays

Entire displays are mainly composed of three sections which are Working display, Function setting display(Included program installation) and System setting display.

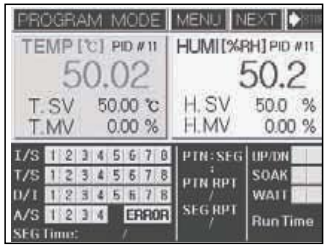
## 4.1 Operating screen

After you finish to connect & turn on the power, Logo signal & System check display will be shown in a moment, and then Working display will be shown. In that time, according to selecting the initial setting program or Fixed driving method, it will be shown to Program control working display or Fixed control working display.


(Fig. 29)The 1st running screen of program control (Stop screen)

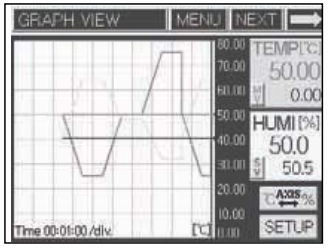



(Fig. 30)The 1st running stop screen of Fix control (Run screen)

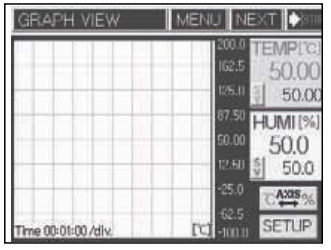



(Fig. 31)The 2nd running screen of program control


(Fig. 32)The 2nd running screen of Fix control




(Fig. 33)Program control Graph screen

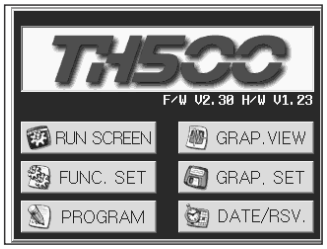



(Fig. 34)Fix control Graph screen

## 4.2 Function setting screen

After you push [MENU] button in working display condition, Function setting menu screen is shown. It is composed of 4 buttons. Push each button to set up under an item.


(Fig. 35)The 1st running screen of program control(Stop screen)



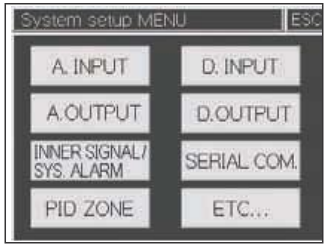

(Fig. 36)Main menu for function Set up

## 4.3 System setting screen

> **Caution** There is no need for System setting made separately by driver. Because the Basic setting condition of this system ¡$|model is set up by the operator, you should be careful especially .

As pushing [MENU] button in running screen, Main Menu screen is shown. Pushing the character of Main Menu in that time, Password input display is shown. Pushing [ENT] after inputting (initial value: 0), the display of System setting function menu shows. It is composed of 8 buttons.


(Fig.37) Password input screen



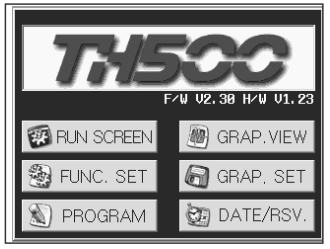

(Fig.38) System setting menu screen



# 5. Function setting

After finishing installation & connection, turn on the power. Logo and system checking are display one after other. And then (Fig.40)the 1st working stop screen of program control is displayed.


(Fig.39)The 1st running screen of program control (Stop screen)

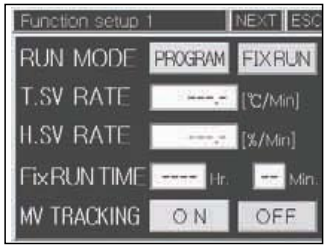



(Fig.40)Main menu for function set up

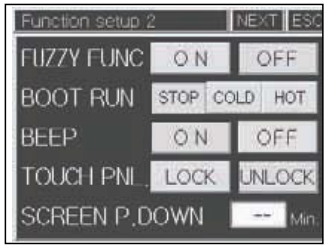
## 5.1 Working method setting

### 5.1.1 Function Setup 1.

Pushing FUNCTION SET UP button in (Fig.40)Function set up menu screen and you can select or set up each setting item in the Function setup 1 screen. Choose Select Program control or Fix control in run mode.




(Fig.41)Function Set up 1 screen




(Fig.42)Function Set up 2 screen

| | | |
|---|---|---|
| Run mode | Program | Select in program control |
| | Fix | Select in fix control |
| T.SV variation | Set it up as the gradient of temperature variations [¡ /m] per hour (minute) from current temperature to setting temperature in fix control. | |
| H.SV variation | Set it up as the gradient of humidity variations [¡ /m] per hour (minute) from current humidity to setting humidity in fix control. | |
| Fix run time | After running the fix-mode control for the time entered, the operation will stop automatically. | |
| MV tracking | Manipulated Variable Tracking<br>The drastic change of setting values will lead abrupt control output.<br>To prevent it, MV tracking runs when set value (SV) changes over ¡ 5.0 ¡ | |

### 5.1.2 Function set up 2

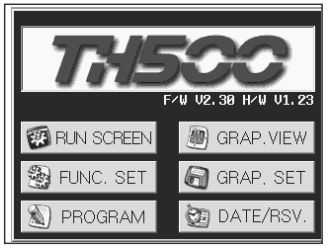
After finishing Function setup 1, press [NEXT] button to set up the item in Function set up 2. In case of outage due to a power failure, it runs according to the BOOT RUN on Function Setup 2. (But power recovers within 5 seconds after failure, the BOOT RUN condition is same as before power failure)

| | | | |
|---|---|---|---|
| Fuzzy Function | At the beginning of running, MV (Measurement Value) may exceed SV (Set value). It is called 'Over Shoot'.. To prevent Over Sheet, please use Fuzzy function. If you turn on Fuzzy function, the rising time may delay or under shoot may happen. | | |
| Boot Run | Setting | Program control | Fix control |
| | Stop | Stop | Stop |
| | Cold | Start from the beginning | Start from same set value as before power failure |
| | Hot | Start from the segment before power failure | Run Start |
| Beep | Turn on/off the buzzer sound to check various input and operation. | | |
| Touch PNL | It is used to limit the touch panel input during system control operating. If select lock, it is impossible to input except [MENU], [NEXT] and [RUN]/[STOP] buttons. | | |
| Screen P. Down | It is a function to turn off power of Back-Light in order to protect LCD display, If you input '0', the backlight turn on all the time. | | |

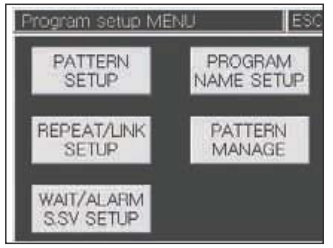


## 5.2 Program Setting

(Fig.41)Press [PROGRAM SETUP] button in Main menu screen, Program set up menu will be shown. It is composed of 5 buttons. Push button to set up each item.



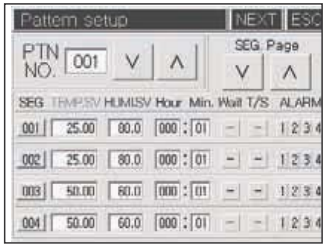

(Fig.43)Main Menu for function Set up



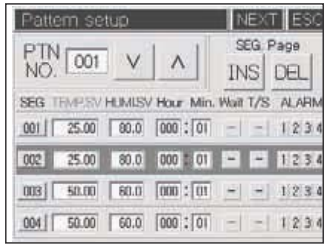

(Fig.44)Program Set up Menu

### 5.2.1 Pattern setting

(Fig.44)Pushing [PATTERN SETUP] button in Program set up menu screen, Program pattern set up screen is indicated. Set segment of each pattern in this screen. Program control will run according to the content & sequence of segment designed.




(Fig.45) Program pattern set up screen




(Fig.46) Segment selection screen

Set up each input item (Fig.45) in reference of the diagram as toll owing

| Name | Function | Range |
|---|---|---|
| Pattern No. | Enter a pattern number to set or select it by pressing Up/Down button. | 1 ~ 300 pattern |
| SEG.Page | Press Up/Down button, it moves each 4 segment. | |
| Temperature SV | Press set up window, set Temperature SV of segment. | -100 ~ 200 ℃ |
| Humidity SV | Press set up window, set Humidity SV of segment | 0 ~ 100 % |

| | | |
|---|---|---|
| Hour/Minute | Setting operation time of segment | 0 hour 0 minute ~ 255 hour 59 minute |
| Wait | Selecting waiting operation function set in waiting operation setting display. | ON/OFF |
| T.S.(Time Signal) | Selecting valid time signal in segment | |
| Alarm | Selecting each action among 4 kinds of signal esigned in pattern signal setting display. (Fig.48)Pattern signal selection screen | 1~4 each On/Off |

↗ SEG. Insert/Delete

Pressing SEG number in the left side of (Fig.45), User can Insert/Delete segement in Fig.46. SEG.. Page button is changed to INS, DEL button in that time. Pressing this button, Segment should be inserted or deleted and then the next Segment will be moved.

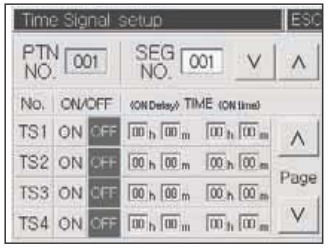
↗ Waiting/Pattern signal selection

Select Waiting, Pattern signal item of Program pattern setting display to execute contents set in Waiting Operation Setting display & Pattern Alarm Setting display (If you press WAIT/ALARM S.SV SETUP button in Program setting display, Waiting Operation Setting display will be indicated.)

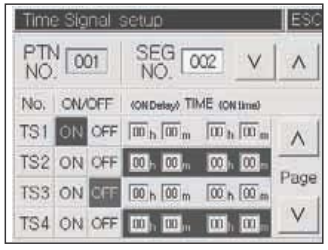

(Fig.47)Pattern Alarm selecting screen

### 5.2.2 Time Signal Set up

Pressing Time Signal(T.S.) in (Fig.45)Program Pattern Setting display, (Fig.48)Time Signal set up display will be shown.




(Fig.48)Time Signal Set up Display

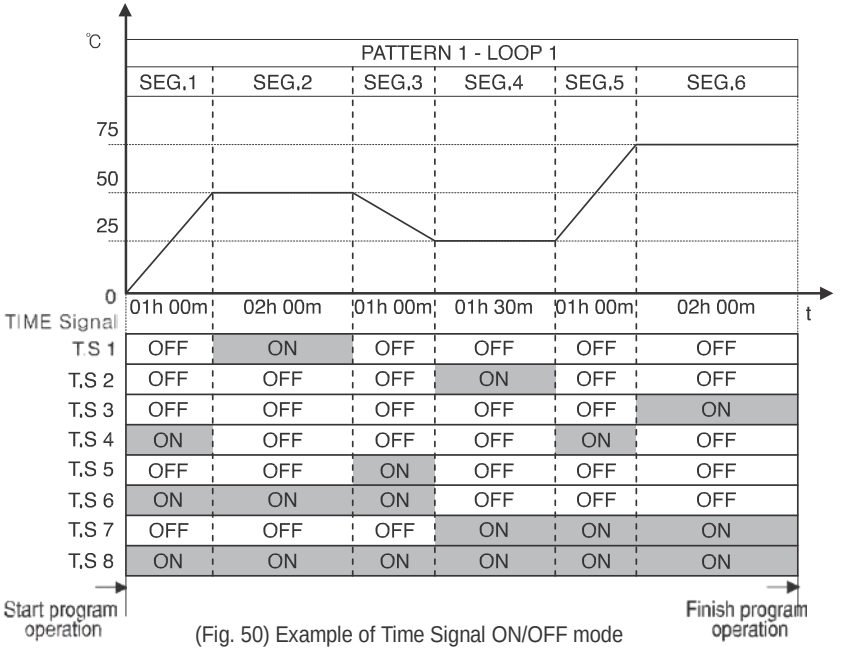



(Fig.49)Example of Time Signal Set up

Time Signal Set up Mode is divided into 2 types according to mode: SEG On/Off Mode and Time Set up Mode. Time Signal can be set to 8 points per each Segment.



| Setting Mode | Function | Setting Range |
|---|---|---|
| SEG On/Off Mode | Set the Time Signal in ON, while segment is operating | Each segment |
| Time | Set the Time Signal in ON, after setting time is delayed from the beginning of segment. | 0 ~ 99 hour 59 min |
| (Time Setting Mode) | Set the Time Signal in ON, during setting time from segment in ON. | 0~ 99 hour 59 min |

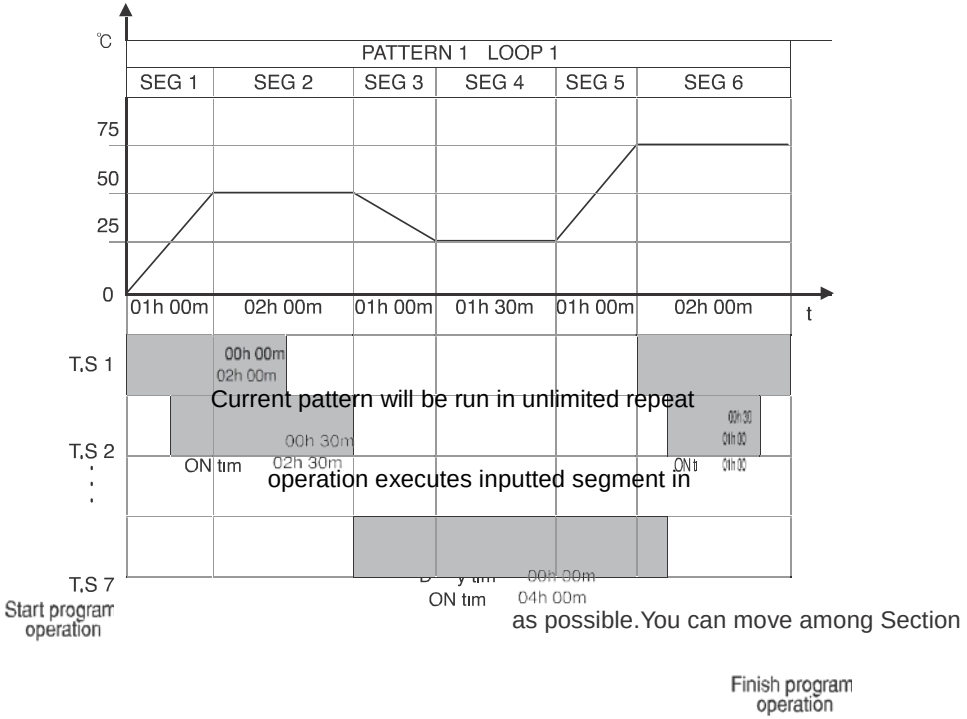



(Fig. 50) Example of Time Signal ON/OFF mode

| Time Signal(T.S) | Description |
|---|---|
| T.S 1 | SEG. 2 ON under 50℃ soak status |
| T.S 2 | SEG. 4 ON under 25℃ soak status |
| T.S 3 | SEG. 6 ON under 75℃ soak status |
| T.S 4 | SEG. 1 and SEG.5 ON under Up section |
| T.S 5 | SEG. 3 ON under Down section |
| T.S 6 | SEG. 1 to SEG. 3 ON |
| T.S 7 | SEG. 4 to SEG. 6 ON |
| T.S 8 | SEG. 1 to SEG. 6 ON under program control running |

(Fig.48) shows an example of using the T/S in ON/OFF mode. It performs turning on and off the T/S in the desired segment with the name of ON/OFF mode. The ON and OFF buttons are composed separately like (Fig.46). Select by pressing ON or OFF button, according to the desired Time Signal Operation.

● Example of Setting the Time Signal in TIME Set up mode




Current pattern will be run in unlimited repeat operation executes inputted segment in as possible.You can move among Section

| Time Signal | Description |
|---|---|
| T.S 1 | When starting the SEG.1, it has T/S ON without a delay and OFF in two hours (On Time). When starting the SEG.6, T/S ON without a delay and OFF due to program ending though On Time is two hours. |
| T.S 2 | When starting the SEG.1, it has T/S ON after delay (30 minutes) and OFF in two and a half hour (On Time). When starting the SEG.6, it has T/S ON after delay (30 minutes) and OFF in one hour (On Time). |

(Fig.51)Example of Setting the Time Signal in TIME Set up mode

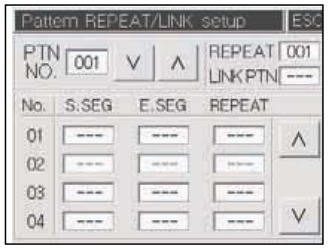


| Time Signal | Description |
|---|---|
| T.S 1 | When starting the SEG.3, it has T/S ON without delay and OFF in four hour (On Time). |
| T.S 2 | In case of SEG.2, SEG.4 and SEG.6, it is T/S ON without delay and OFF after On Time. |

**Caution** Time Signal will be OFF once the program ends regardless of setting modes.

### 5.2.3 Pattern repeat/Connect setting

Pressing PROGRAM SETUP, Pattern REPEAT/LINK setup button in (Fig.43) Main menu screen, (Fig.52)Pattern repeat/link set up is shown. If you set Current Pattern repeat count to Pattern repeat on the right side of the top and Current Pattern number to connect Pattern, according to Segment Operation. Program




(Fig.52) Pattern repeat/Link set up

sequence basically, but it comes occasionally that the case of set segment contents in pattern should be repeated & executed. Using Section repeat in that time, reduce Program input as much as possible. You can move among Section repeat setting pages by using the ∧ ∨ buttons on the right side in the order ranging from 1 to 20 in total.

| Name | Function | Range |
|---|---|---|
| Pattern NO. | Enter the pattern number to set or select it by pressing the Up/Down button. | 1~300 Pattern |
| Pattern Repeat | 1 ~ 300 pattern Pattern Repeat Enter the count of entered pattern number to repeat. When you want to have the pattern repeated unlimitedly, you should enter a current pattern number into the next pattern number below. | 1 ~ 9,999 time |
| Pattern Link | After finishing pattern working, set a connect-working Pattern number. If you set to 0, Working will be completed without connect-Working. | 0~300 pattern |
| NO | It indicates the serial numbers that users are unable to set. It offers total 20 Section repeats per pattern, and it executes them sequentially in the order ranging from 1 to 20 number. | 1~20 number |

| Name | Function | Range |
|---|---|---|
| Initial SEG. | Set the initial segment number of Section repeat. If it is set to 0, it executes to the next Section repeat number. | 0 ~ 100 SEG |
| Final SEG. | Set the final segment number of Section repeat. If it is set to 0, it executes to the next Section repeat number. | 0 ~ 100 SEG |
| Section repeat | Set the count of current Section repeat. If it is set to 0, it executes to the next Section repeatnumber. | 0 ~ 255 time |



● The Segment operation sequence by Section repeat setting

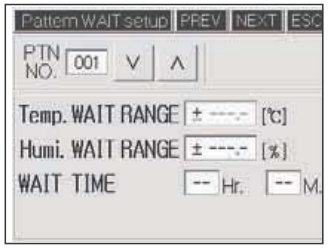
If segment in pattern is set from 1 to 8, it operates like below according to Section repeat Setting.

| | Section repeat serial number | Section repeat setting | | | Segment operation sequence |
|---|---|---|---|---|---|
| | | Start | End | Repeat | |
| 1 | 1~20 | 0 | 0 | 0 | ① → ② → ③ → ④ → ⑤ → ⑥ → ⑦ |
| 2 | 1 | 3 | 6 | 2 | ① → ② → ❸ → ❹ → ❺ → ❻<br>❸ → ❹ → ❺ → ❻ → ⑦ → |
| 3 | 1 | 3 | 6 | 2 | ① → ② → ❸ → ❹ → ❺ → ❻<br>❸ → ❹ → ❺ → ❻ |
| | 2 | 4 | 5 | 2 | ❹ →<br>❺ |
| 4 | 1 | 2 | 3 | 2 | ① → ❷ → ❸<br>❷ → ❸ |
| | 2 | 1 | 4 | 2 | ❶ → ❷ → ❸ → ❹<br>❶ → ❷ → ❸ → ❹ → ⑤ → ⑥ → ⑦ |
| 5 | 1 | 2 | 3 | 2 | ① → ❷ → ❸<br>❷ → ❸ |
| | 2 | 6 | 7 | 2 | ❻ → ❼<br>❻ → ❼ → ⑧ |
| 6 | 1 | 5 | 7 | 2 | ① → ② → ③ → ④ → ❺ → ❻ → ❼ |
| | 2 | 2 | 3 | 2 | ❺ → ❻ → ❼<br>❷ → ❸ |
| 7 | 1 | 6 | 7 | 2 | ① → ② → ③ → ④ → ⑤ → ❻ → ❼ |
| | 2 | 2 | 3 | 2 | ❻ → ❼<br>❷ → ❸ |
| 8 | 1 | 1 | 8 | 1 | ❶ → ❷ → ❸ → ❹ → ❺ → ❻ → ❼ |
| | 2 | 2 | 7 | 1 | → ❽ |
| | 3 | 3 | 6 | 1 | ❷ → ❸ → ❹ → ❺ → ❻ → ❼ |
| | 4 | 4 | 5 | 1 | |
| | 5 | 5 | 5 | 2 | ❸ → ❹ → ❺ → ❻<br>❹ → |
| | 6 | 1 | 8 | 2 | ❺<br>❺ |
| | 7 | 7 | 7 | 2 | ❺<br>❶ → ❷ → ❸ → ❹ → ❺ → ❻ → ❼ |

* 20 times of section repeats are available for one pattern.

### 5.2.4 Waiting/Alarm start mode setting

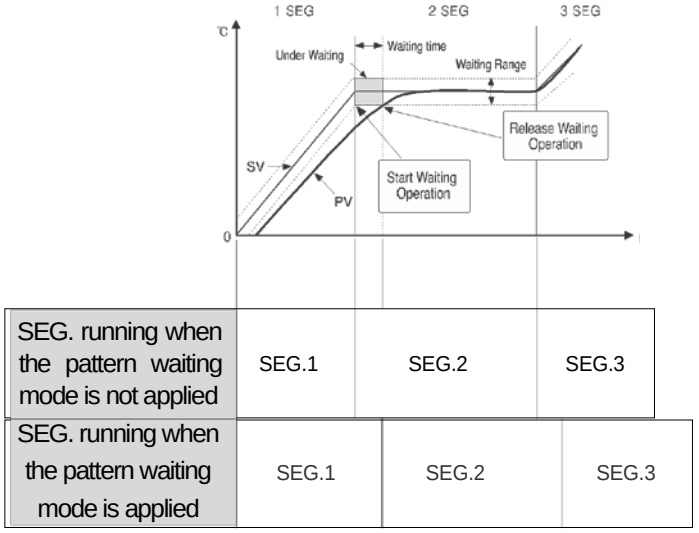
Press PROGRAM SETUP WAIT/ALARM S.SV SETUP button in Main Menu to move Pattern wait Set up screen. Waiting operation can be set by each segment of proper pattern. In case that Waiting operation of Measurement value(MV) comes or fails to come within Waiting range of Set value(SV), wait process of segment during setting Waiting operation time and then go to next segment.( Only if Waiting operation is set to ¡ ″0 ¡ »Waiting operation will not work).




(Fig.53) Pattern wait set up

| Name | Function | Range |
|---|---|---|
| Pattern No. | Enter a pattern number to be set or select it by pressing ∧ ∨ button. | 1 ~ 300 pattern |
| Temp. Wait range | Enter a temperature range (absolute value) necessary for waiting temperature range. If you enter 0, the temperature waiting will be OFF. | 0.0 ~ ¡ 300.0 [¡ ] |
| Humi. Wait range | Enter a humidity range (absolute value) necessary for waiting humidity range. If you enter 0, the humidity waiting will be OFF. | 0.0 ~ ¡ 100.0% |
| Waiting time | Enter the maximum range of waiting time. If you enter 0 hour0 minute, it will be set to the unlimited waiting time. If you set both temperature and humidity waiting ranges, the system will run under the AND condition. In other words, the waiting mode will be released, only when both ranges come within the waiting range. | 0.0 ~ 99 hour 59 minute |

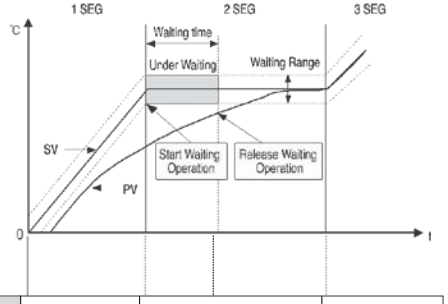





| | | | |
|---|---|---|---|
| SEG. running when the pattern waiting mode is not applied | SEG.1 | SEG.2 | SEG.3 |
| SEG. running when the pattern waiting mode is applied | SEG.1 | SEG.2 | SEG.3 |

(Fig.54) Common waiting operation

(Fig.54) It shows common waiting mode operation. If the PV fails to enter into the waiting range at the point when the SEG.1 to SEG. 2, the system will wait for the PV to enter into the waiting range during the waiting time. According to the (Fig. 15), even if the PV fails to enter into the waiting range, the system will execute SEG. 2 unconditionally (Fig.55)

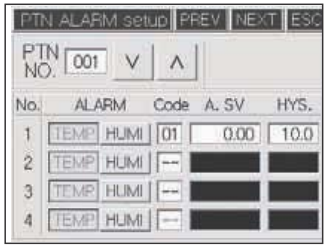



| | | | |
|---|---|---|---|
| SEG. running when the pattern waiting mode is not applied | SEG.1 | SEG.2 | SEG.3 |
| SEG. running when the pattern waiting mode is applied | SEG.1 | SEG.2 | SEG.3 |

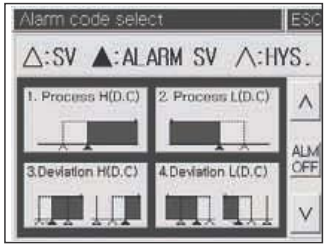
(Fig.55) Waiting operation release due to the excess of waiting time

### 5.2.5 Pattern Alarm Setting

After you press [PROGRAM SETUP] [WAIT/ALARM S.SV SETUP] button in Main Menu to go to (Fig.43) Wait/Alarm S.SV set up display, pressing [NEXT] button to enter into (Fig.56) Pattern alarm set up display.




(Fig.56) Pattern alarm set up screen

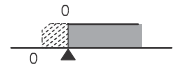
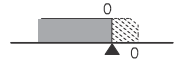
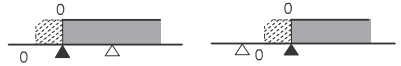
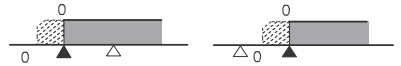
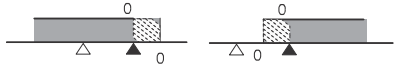
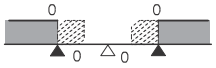
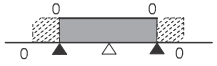
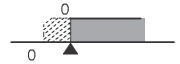
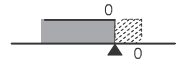



(Fig.57) Alarm code selection screen

(Fig.56) is the display of alarm to use from 1 to 4 in pattern. You can select the alarm value set in this display separately, according to Pattern alarm from 1 to 4 per segment in (Fig.45) Program pattern setting display. If you press the alarm code input box to set the alarm sources of temperature or humidity and input your desired code, the alarm code window will appear as shown in the right screen (Fig.57). If you select the alarm button by pressing the [∧] [∨] buttons, it will be entered into the code box of (Fig.56) automatically. To release the set code, you should press the [ALM OFF] button on the right center of (Fig.57).



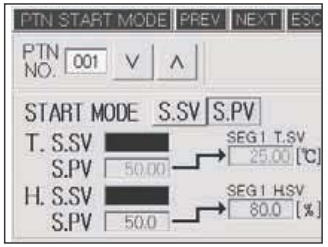
§ Alarm Type & Code

| Code | Alarm Type | Code | Alarm Type | Operation View |
|---|---|---|---|---|
| 1 | Upper limit absolute (Tangent) | 11 | Upper limit absolute (Tangent, Hold) |  |
| 2 | Lower limit absolute (Tangent) | 12 | Lower limit absolute (Tangent, Hold) |  |
| 3 | Upper limit deviation (Tangent) | 13 | Upper limit deviation (Tangent, Hold) |  |
| 4 | Lower limit deviation (Tangent) | 14 | Lower limit deviation (Tangent, Hold) |  |
| 5 | Upper limit deviation(Reciprocal) | 15 | Upper limit deviation (Reciprocal, Hold) |  |
| 6 | Lower limit deviation (Reciprocal) | 16 | Lower limit deviation (Reciprocal, Hold) |  |
| 7 | Upper & lower limit deviation | 17 | Upper & lower limit deviation (Hold) |  |
| 8 | Within the range of upper & lower limit deviations | 18 | Within the range of upper & lower limit deviations (Hold) |  |
| 9 | Upper limit absolute (Reciprocal) | 19 | Upper limit absolute (Reciprocal, Hold) |  |
| 10 | Lower limit absolute (Reciprocal) | 20 | Lower limit absolute (Reciprocal, Hold) |  |

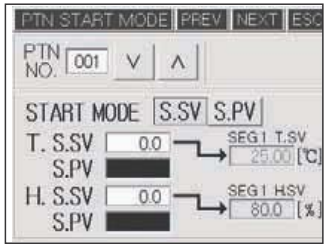
¡ : SV ¡ª: Alarm SV

### 5.2.6 Operation start condition setting

The initial setting value is necessary to ascent or descent by the setting value of 1st segment when you start to work with Program control. Select this the initial setting value between Start setting value(S.SV) and Current measurement value(S.PV). Pressing [WAIT/ALARM S.SV SETUP], [NEXT] buttons in Program setting menu display, Pattern alarm setting display will be shown. Pressing [NEXT] button again In this display, it will be shown to (Fig.58) S.PV Working start setting display.

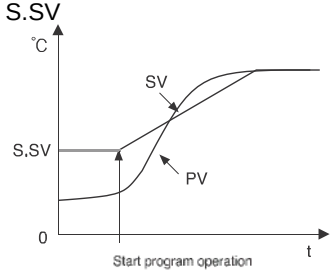



(Fig.58) S.PV Operaiton start setting display

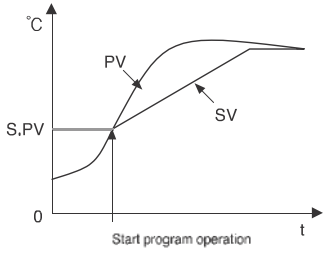



(Fig.59) S.SV Operation start setting display

| Name | | Function | Range |
|---|---|---|---|
| Pattern No. | | Enter the pattern number to set or select it by pressing the [∧] [∨] button. | 1~ 300 pattern |
| Start mode | S.SV | Start the operation based on the SV set in the temperature & humidity S.SV below. | |
| | S.SV | Start the operation based on the current | |
| T. | | Set to the start SV upon temperature program running. | -100.0 ~ 200.0 [℃] |
| S.SV H. | | Set to the start SV upon humidity program running. | 0.0 ~ 100.0 [℃] |



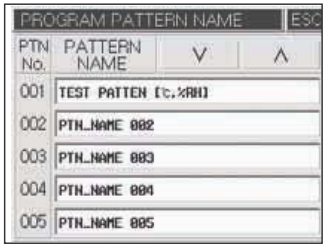

(Fig.60) S.SV Operation start mode



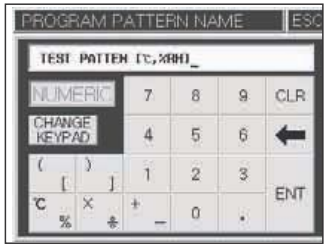

(Fig.61) S.PV Operation start mode



### 5.2.7 Program pattern menu setup




(Fig.62) Program pattern name

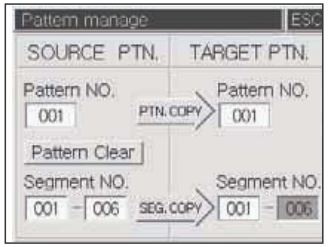



(Fig.63) Number input screen

(Fig.62) is the display to enter with selecting Working name in current inputted pattern. Pressing [PROGRAM SETUP], [PATTERN NAME] buttons in Main Menu go to (Fig.63) Program pattern name set up display. Entering Program title of the desired pattern number by pressing the [∧] [∨] button on the right top side, the input display of (Fig.63) will be shown. Enter the desired pattern number with changing Keyboard by pressing [CHANGE KEYPAD] button.

## 5.2.8 Pattern/Segment management

(Fig.64) is the display for managing patterns through pattern copy, segment copy and segment initializing. In the left side you should enter the source pattern or segment number used for pattern management. In the right side you should enter the target pattern number of segment number to be copied. After entering a desired value, you can copy it by pressing [PTN. COPY] [SEG. COPY] button in arrow. [Pattern Clear] button on the left center is used for initializing all the internal segments of the pattern entered into the input box above. Pressing [PTN. COPY], it will be copied to contents related with every segment in internal pattern. Pressing (Fig.64) Segment management [SEG. COPY] button, it will copy contents of the original start/End segment copy from a copy start segment. It is possible to copy segment into your desired position by inserting different segment numbers of the right copy when copying segment. (Example : the original 1~6 to the copy 7~12)



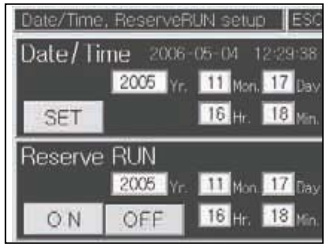

(Fig.64) Pattern/Segment management

**⚠ Caution**

Keep in mind that it is impossible to recover the original contents of the target after copying the pattern/segment. Once you press the button, [Pattern Clear] the original contents of the source cannot be recovered again. After copying pattern by using [PTN.COPY] button, you should make sure that the related parameter is proper setting. (Repeat, Connect, Waiting, Alarm, Start mode, ect)

## 5.3 Date/Time Reservation Setting

(Fig.65) is display of Date/Time Reservation Setting. After Input current Date/Time by pressing a window of Date/Time input, Press [SET] button.




(Fig.65) Reservation time setting screen

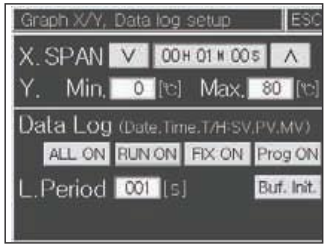

(Fig.66) The 1st running screen of Fix control

**⚠ Caution**

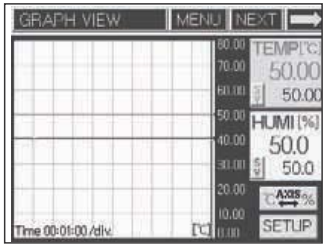
If you begin to work by pressing [RUN] button during reservation waiting, reservation waiting will be canceled automatically and the operation will start. Likewise, if you start the ¡ ′RUN/STOP ¡ » operation through Contact input(D.I), reservation waiting will be canceled automatically

## 5.4 Graph/Save Setting

In the Graph axis setting screen (Fig. 67), the time on the X axis means the time per division, and can be designated as 20 seconds to 24 hours according to its internal setting. The Y axis is designed for setting the upper and lower temperature limits from -20 ¡ to 200 ¡ , and its humidity is fixed as 0 to 100[%].




(Fig.67) Graph Setting screen




(Fig.68) Graph display screen



| | Division Setting Time (m/s) | Entire Screen Time (h/m/s) |
|---|---|---|
| 1 | 00 / 20 | 00 / 03 / 20 |
| 2 | 01 / 00 | 00 / 10 / 00 |
| 3 | 02 / 00 | 00 / 20 / 00 |
| 4 | 03 / 00 | 00 / 30 / 00 |
| 5 | 04 / 00 | 00 / 40 / 00 |
| 6 | 05 / 00 | 00 / 50 / 00 |
| 7 | 06 / 00 | 01 / 00 / 00 |
| 8 | 07 / 00 | 01 / 10 / 00 |
| 9 | 08 / 00 | 01 / 20 / 00 |
| 10 | 09 / 00 | 01 / 30 / 00 |
| 11 | 10 / 00 | 01 / 40 / 00 |
| 12 | 20 / 00 | 01 / 50 / 00 |

| | Division Setting Time (m/s) | Entire Screen Time (h/m/s) |
|---|---|---|
| 13 | 00 / 30 | 05 / 00 |
| 14 | 00 / 40 | 06 / 40 |
| 15 | 00 / 50 | 08 / 20 |
| 16 | 01 / 00 | 10 / 00 |
| 17 | 02 / 00 | 20v00 |
| 18 | 03v00 | 30 / 00 |
| 19 | 04 / 00 | 40 / 00 |
| 20 | 05 / 00 | 50 / 00 |
| 21 | 06 / 00 | 60 / 00 |
| 22 | 09 / 00 | 90 / 00 |
| 23 | 12 / 00 | 120 / 00 |
| 24 | 24 / 00 | 240 / 00 |

Table 3) Time per X axis DIV

As far as the saving operations are concerned, the total 86,400 pieces of information on temperature & humidity (Y/M/D, temperature & humidity SV/PV/MV) under current controlling will be recorded to the internal memory. The saving cycle can be designated as 1 to 360 seconds. Therefore, if the saving cycle is 1 second, it can save for one day. On the other hand, if the saving cycle is 30 seconds, it can save for 30 days.

The optional buttons for saving are shown in the following table.

| Button | Name | Function |
|---|---|---|
| ALL ON | ALWAYS ON | Save always |
| RUN ON | RUN ON | Save during controlling only.(Fix/Program) |
| FIX ON | FIX-RUN ON | Save during fixed-mode controlling only |
| Prog ON | Program-RUN ON | save during program mode controlling only |
| Buf.Init | Internal Buffer initialize | Delete/Initialize Saved Contents in internal memory |

TH500 present USB connection function to send saved data to PC. According to Save Sequence & Save Operation Mode set in (Fig.67) Graph Setting display, Data stored in internal memory become mass difficult to transfer with low-speedy connection (Max. 115,200BPS) interface like RS232, RS422/485. If you send by using USB connection in that time, it is possible to send to PC within a few second.

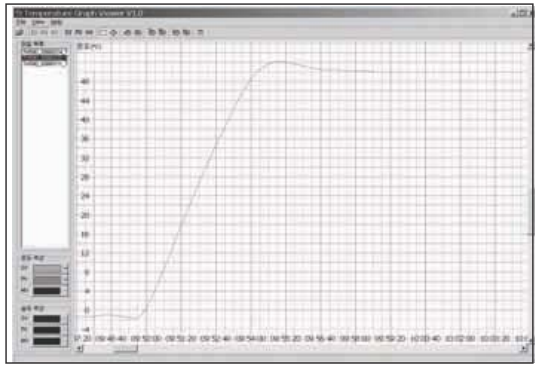
(Fig.69) is the display of USB Up-loader software presented by J-THERMO NUX CO., LTD. When USB connecter is connected, Device connecting status is indicated, ¡ Connected ¡ in blue and LOG DATA TRANSMIT TO USB. button is activated. Pressing Send button, you can receive every Measure/control value recorded in TH500 through USB.Transferred date is stored in the folder of ¡ C:\TH500_DATA ¡ – Because all saved Data file is in text mode, you can see the content of saved data file with any editor, word-processor or Excel. It is possible to see a graph by using Graph Viewer program presented.

**⚠ Caution 1.** If you turn off, all contents will be deleted because the value of saved measurement & control is saved in Volatile Memory(SDRAM).

**⚠ Caution 2.** When you connect USB, you must use USB A-B connector cable.

**⚠ Caution 3.** The USB Plug & Play function of some PCs may have errors upon PC booting. Therefore, it is necessary to connect USB connector after PC booting. After PC booting, you are free to connect USB connector.

(Fig.69) USB Up-loader Utility


(Fig.70) Graphic viewer

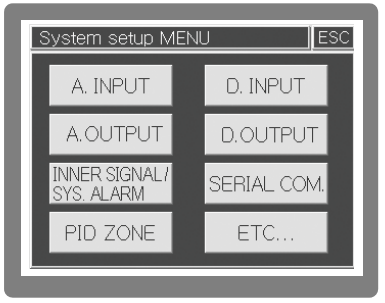


# 6. System Setting

**⚠ Caution** Caution : System set up is a pre-installed basic setting condition so you are requested attention when you change it.

If you push MENU on operation screen, Main menu screen will be displayed. And if you push “Main Menu”, password screen will be displayed (initial value: 0). and then you can enter system setting screen, after pushing ENT on screen.

(Fig.71) Main menu screen

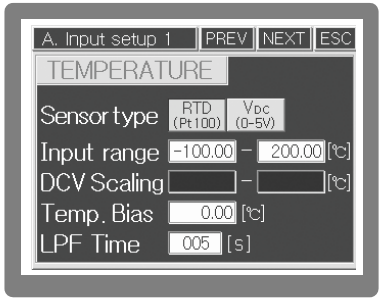


(Fig.72) System set up menu screen

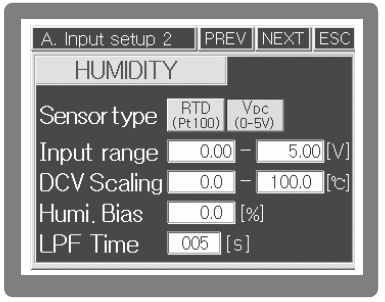
## 6.1 Sensor type setting

Our temperature and humidity controller (Model # TH500) support various outputs and inputs so you need to set output and input information before using this controller. On the operation screen, push screen as following,

MENU ¡ Main MENU



(Fig.73) Temperature sensor setting screen



(Fig.74) Humidity sensor setting screen

### Sensor type

Set up according to sensor type. If the sensor type is a DRY/WET bulb type and each is RTD (Resistance Temperature Detector - Pt100 Ω ), please select [RTD (Pt100)].

If you use electronic humidity sensor (Model # EE99), temperature sensor type will be [RTD (Pt100)] and humidity sensor type will be [Vdc (0-5V)] (But in case of S.C.R Out terminal will be 250 Ω and 1% resistance need to be contacted to sensor input terminal.

### Input range

Regarding sensor input range, you can use initial value. The initial setting for temperature value is -100...200 ¡ and humidity value is 0...100% R.H. If you use electronic humidity sensor (Model # EE99), please set up input range to 1-5V d.c and contact resistance (250 Ω 1% below) to the both of input terminals.

### Scale setting

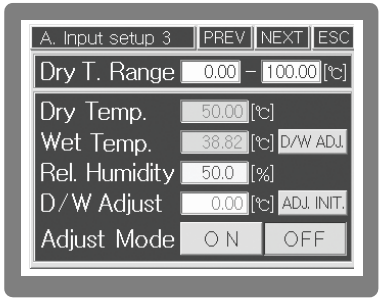
If you select DC voltage (V d.c), please enter proper scale value. If you enter 1-5 V d.c and display range is 0~100, please set up scale setting value from 0 to 100.

### Sensor Bias

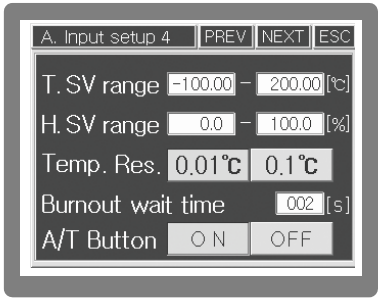
The sensor bias revises deviation that is caused by many reasons.

### LPF setting

LPF (Low Pass Filter) setting When process value is chattering due to inflow of noises through input sensor, user can input propertime.




(Fig.75) Dry Wet bulb sensor correction screen




(Fig.76) Range setting screen

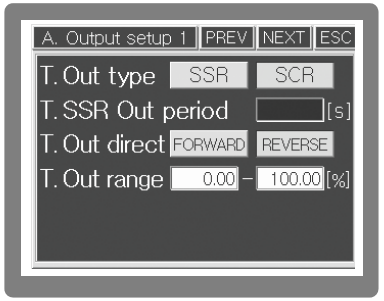
| | |
|---|---|
| Dry T. Range | Set up Dry / Web temperature range. |
| Dry Temp. | Displays Dry bulb temperature |
| Web Temp | Displays Wet bulb temperature (Gauze have to be removed) |
| Rel. Humidity | Displays relative humidity (% R.H.) |
| D / W Adjust. | Press Dry/Wet bulb ADJ and it shows the temperature difference between dir bulb and web bulb. It's very important to correct Dry/Web bulb because relative humidity measurement is based on the temperature difference between two sensors. |
| Adjust mode | If you push setting, correction will be started |

**⚠ Caution**

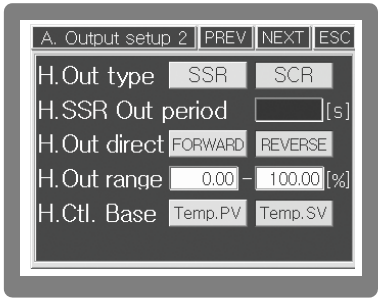
Please remove gauze in the web bulb sensor before correction. And also start correction after stabilization of the process value. Please recover gauze after correction.

| | |
|---|---|
| T. SV range | In order to prevent users mistake the Temperature SV range can be restrictive as much as wanted range. |
| H. SV range | In order to prevent users mistake the humidity SV range can be restrictive as much as wanted range. |
| Temp. Res | Temperature process vale and SV can select 0.01 ¡ or 0.1℃ |
| Burn out wait time | Set up delayed action time after detecting sensor loof brake. |
| A/T Button | It shows or hides Auto Tuning button in operation screen. |

## 6.2 Control output setting



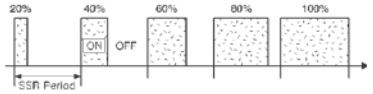

(Fig.77) Temperature control output setting




(Fig.78) Humidity control output setting

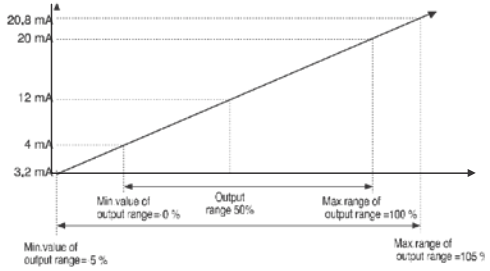
Control output for Temperature and Humidity needs to be set individually as following.

| | |
|---|---|
| T. out type | Select and use S.S.R or S.C.R (4-20mA d.c). Select according to the equipment (Initial value : S.S.R) |
| T. SSR out period | You can set up when you select S.S.R output. Output cycle means On/Off working time in the proportional band.(Initial Value : 2 seconds) |
| T. out direct | Select cooling control (direct movement) or heating control(inverse movement) (Initial Value : Inverse movement) |
| T. out range | You can control output and selection range is -5%(3.2 mA d.c) ··· 0.5 %(20.8 mA d.c) (Initial Value : 100 %) |




(Fig.79) S.S.R pulse output

It is an example for S.S.R output from 20% to 100% output range. Base on cycles of control output, MV (Manipulated Variable) is changed to Duty.

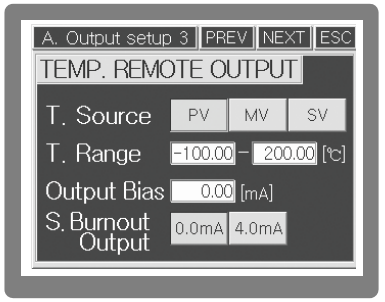



(Fig.80) S.C.R output

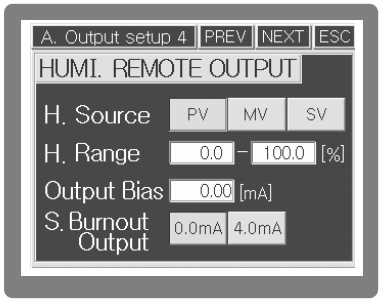
If you select S.C.R, it shows the relation between MV (Manipulated Variable) and output range.

## 6.3 Retransmission output setting

Retransmission output can be selected from output set up 3 and output set up 4.




(Fig.81) Temperature retransmission output setting screen.




(Fig.82) Humidity retransmission output setting screen.

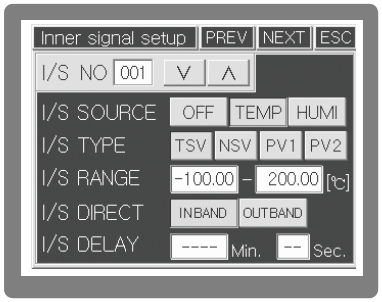
### Temperature retransmission output (Output setup 3)

| | |
|---|---|
| T. Source | Select type of RET (Retransmission output) for temperature. It is used for input in recorder etc. output signal is 4-20 mA dc and select one among PV (Process Value), MV (Manipulated Value), SV (Setting Value). |
| T. Range | Scale value against temperature output range will be selected 4-20 mA d.c. But if MV selected, output will be the percentage of setting value against 4-20 mA d.c. It means if you select 50 %, output will be 12 mA d.c. |
| Output Bias | In order to delete deviation value of retransmission output, input current offset. In case of sensor loof brake, select between retransmission output current |
| S.Burnout Output | Sensor loof break output. Select 0.0 mA dc. or 4.0 mA d.c |

### Humidity retransmission output setting (Output set up 4)

| | |
|---|---|
| H. Source | Select type of RET (Retransmission output) against Humidity. It is used for input in recorder etc. output signal is 4-20 mA dc and select one among PV (Process Value), MV (Manipulated Value), SV (Setting Value). |
| H. Range | Scale value against temperature output range will be selected 4 - 20 mA d.c. But if MV selected, output will be the percentage of setting value against 4 - 20 mA d.c. It means if you select 50 %, output will be 12 mA d.c. |
| Output Bias | In order to delete deviation value of retransmission output, input current offset. |
| S.Burnout Out | Sensor loof break output. Select 0.0 mA dc. or 4.0 mA d.c |

## 6.4 Inner Signal and Alarm setting

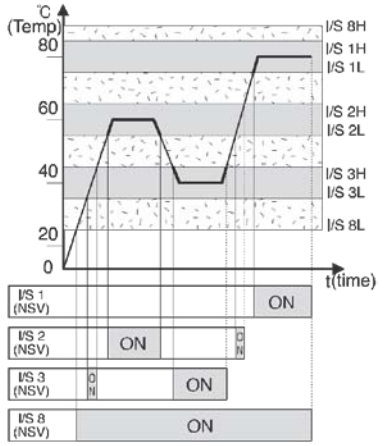



(Fig.83) Inner Signal setting screen

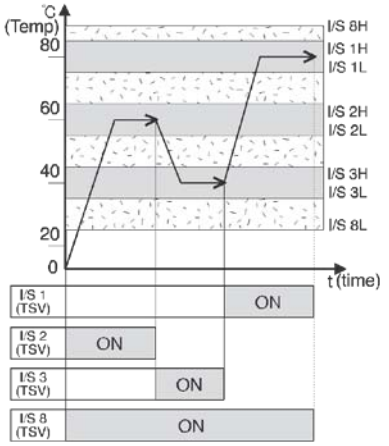
Time Signal is related with segment and Time but Inner Signal is used for signal output of temperature and humidity. So Inner Signal is not related with segment section.

| Setting item | Function | Initial setting |
|---|---|---|
| (I/S) Number | Directly input it by pushing Inner Signal number or select it by push button. | |
| (I/S) Item setting | Select Inner Signal item (Temperature or Humidity) | Temperature |
| (I/S) Type setting | TSV (Target Set Value): Operate base on target setting value<br>NSV (Now Set Value): Operate base on current setting value<br>P.V1: Operate base on process value of action range 'L' and 'H'.<br>P.V2: Operate base on process value that are related with setting value and deviation | TSV |
| (I/S)Operation range | setting value.<br>Setting temperature and humidity range of Inner Signal | -100...200℃ |
| (I/S) Range direction | Setting application range of Inner Signal | Internal range |
| (I/S) Delay time | Operate delay time of Inner Signal | - |



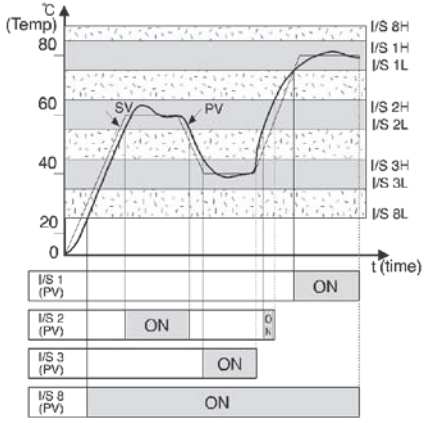



(Fig.84) Example of Inner Signal setting (NSV)

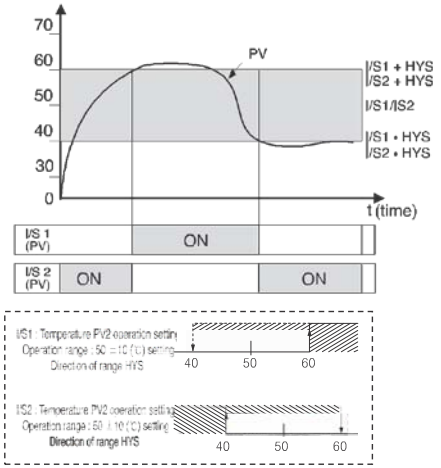



(Fig.85) Example of Inner Signal setting (TSV)

Fig. 84 is an example for Inner Signal setting (NSV). Setting Inner Signal 1~3 & 8 for temperature, internal range, NSV, -> According to change of Set value (SV), Inner Signal turn ON/OFF. Fig. 85 is an example for Inner Signal Setting (TSV) Setting Inner Signal 1~3 & 8 for temperature, Internal range, TSV -> Base on TSV (Target Set Value), Inner Signal turn ON/OFF Fig. 86 is an example for Inner Signal Setting (PV1)Setting Inner Signal 1~3 & 8 for temperature, PV1, Internal range
Fig. 87 is an example for Inner Signal setting (PV2) Setting Inner Signal 1~3 & 8 for temperature, PV2




(Fig.86) Example of Inner Signal setting (PV1)

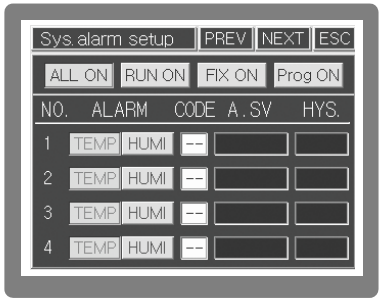



(Fig.87) Example of Inner Signal setting (PV2)

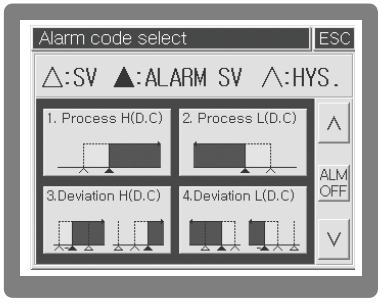
### ⁊ System alarm setting

This is a setting screen for Temperature and Humidity alarm.
If you push [System alarm setup] on the System set up menu screen, Inner signal set up screen will be displayed. And then, if you push [NEXT], System alarm set up screen will be displayed (Fig. 88).

1. Establish a standard for alarm setting value among Temperature and Humidity
2. If you push alarm code select button, System alarm code setting will be displayed as Fig. 89.
3. Push [∧] [∨] button and select proper alarm type as Fig. 88.
4. If you want to cancel selected code, please push [ALM OFF] on the left side.
5. And then set, alarm value and Hysteresis.



(Fig.88) System alarm setting screen



(Fig.89) System alarm code screen

4 Buttons on system alarm screen are for the operate condition of alarm setting.

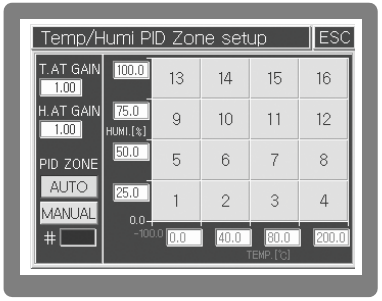
| Setting item | Description |
|---|---|
| ALL ON | All ways turn on alarm |
| RUN ON | Maintain alarm on operation |
| FIX ON | Maintain alarm on fixed control operation |
| Prog ON | Maintain alarm on program control operation |

## 6.5 P.I.D Setting

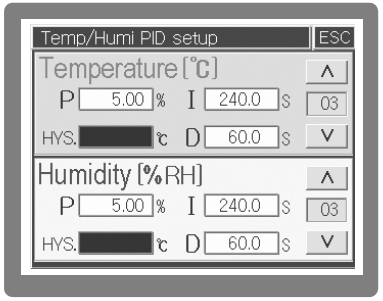
The TH500 has total 16 PID ZONEs. As tollowing four temperature zones and four humidity zones are combined with each other, so you can control temperature and humidity with the optimized PID value. User can change the zone boundary of temperature and humidity, freely.

| Temp.Zone / Humi.Zone | -100≤Temp.SV≤$TZ_1$ | $TZ_1$ <Temp.SV≤$TZ_2$ | $TZ_2$ <Temp.SV≤$TZ_3$ | $TZ_3$ <Temp.SV≤$TZ_4$ |
|---|---|---|---|---|
| 0≤Humi.SV≤$HZ_1$ | ZONE 1 | ZONE 2 | ZONE 3 | ZONE 4 |
| $HZ_1$<Humi.SV≤$HZ_2$ | ZONE 5 | ZONE 6 | ZONE 7 | ZONE 8 |
| $HZ_2$<Humi.SV≤$HZ_3$ | ZONE 9 | ZONE 10 | ZONE 11 | ZONE 12 |
| $HZ_3$<Humi.SV≤$HZ_4$ | ZONE 13 | ZONE 14 | ZONE 15 | ZONE 16 |

TZ : Temp.Zone, HZ : Humi.Zone

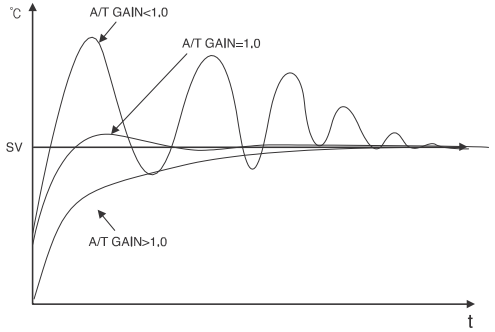


(Fig.90) Temp. & Humi P.I.D Zone Set up



(Fig.91) Temp. & Humi P.I.D Set up

The [AUTO] / [MANUAL] buttons on the left side of the PID set up screen (Fig. 90) are automatic & the manual setting. For example, If you push [AUTO] and start Auto-turning at 80 ¡ , Temp. PID value will be applied in the zone 3,7,11 & zone 15. And if you do auto-tuning of Humi. at 75%, Humi. P.I.D value will be applied in the zone 11. In case of Manual mode, Please refer to just SV in the zone set according to the manual.
When you check the value of P.I.D or input it manually, please push zone button which you want, And then move to 'Temp & Humi P.I.D Set up as like Fig. 91. If you want to use only ON/OFF control, you can put¡ A0 ¡ Bn the P.I.D values.
Temp. & Humi. A/T GAIN on the above in the left side is a constant value which is applied to the each item of P.I.D during P.I.D carries out on operation. The setting range is from 0.0 to 10.0 (Initial value : 1.00). It is used that optimize P.I.D numerical value automatically operated after P.I.D Auto-tuning more delicate manually. According to the variation of A/T GAIN value, the variation of Control feature is same with (Fig. 92).

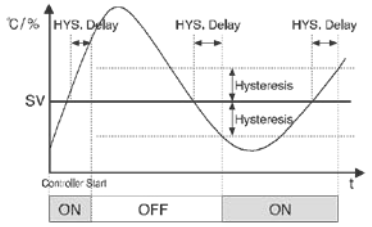



(Fig.92) Variation characteristic control by controlling Auto-tuning GAIN(PV)

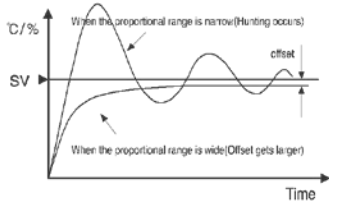
| Term | Description |
|---|---|
| GAIN < 1.0 | Totally Response speed is faster, but Hunting occurs time by operating Differentiation & Integration control which are stronger more than Auto-tuning PID value. |
| GAIN = 1.0 | Use Auto-tuning PID value as it stands.Totally Response speed is slower, but |
| GAIN > 1.0 | Overshoot is decreased time by operating Differentiation & Integration control which are smaller more than Auto-tuning PID value. It grows more stable situation. |

| Name | Description |
|---|---|
| P (Proportional) | ¡ ⁄Set a proportional value. Its unit is F/S vs. [%].<br>⁄If the P-Band is wide, the MV output becomes slow. Therefore, it takes longer for the PV to reach the SV. If the P-Band is narrow, the MV becomes sensitive. Therefore, the PV approaches the SV faster, but fails to converge due to continuous hunting. |
| I (Integral) | ¡ ⁄Set an integration time. Its unit is the hour [second].<br>¡ ⁄The P control only is not enough to make the PV and the SV consistent, generating a variation (offset). In this case, the integration reduces the |
| D (Derivative) | ¡ ⁄Deviation. If the integration time gets too longer, it will converge later. If the integration time gets shorter, it will hunt continuously or even diverge.<br>¡ ⁄Set a derivative time. Its unit is the hour [second].<br>¡ ⁄It restrains the drastic change in PV by calculating the PV variation every moment and producing the output of its proportional MV. |
| HYS.(Hysteresis) | ¡ ⁄Set Hysteresis value when Auto tuning or ON/OFF control. |

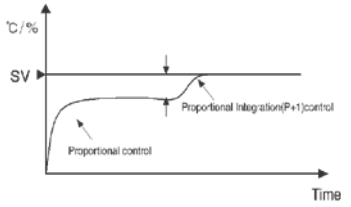




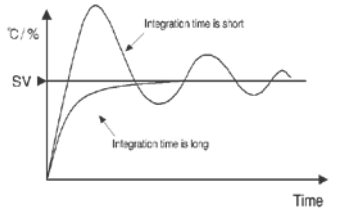

(Fig.93) On/Off control




(Fig.94) Proportional control (P control)




(Fig.95) Proportion (P) and Proportional Integration (P+I) control

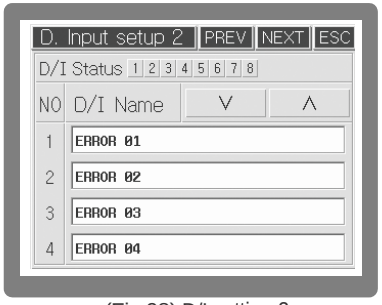



(Fig.96) Proportional Integration (P+I) control

## 6.6 D/I Configuration Setting

It offers the total 8 points for Digital Input (D/I), and receive external input(Active Low). Each D/I input you can enter your desired name based on the combination of Korean/English/Number/Sign (Fig. 98). As for D/I #1~8, you can assign the operation function to three types (RUN/STOP, STEP, HOLD) related to controller operation on the screen of (Fig. 97) D/I setting 1.


(Fig.97) D/I setting 1




(Fig.98) D/I setting 2

User can set up HIGH / LOW operation for these three types. As the LEVEL input, the RUN/STOP and HOLD input should maintain their levels continuously. As the EDGE input, the STEP operation runs once according to its setting once upon H->L or L->H. You should continuously enter H and L in order to keep on STEP operation.

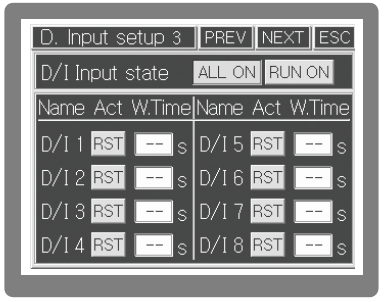
**⚠ Caution**

1. In case of RUN/STOP, STEP and HOLD operation input, it is impossible to assign the D/I number redundantly. In addition, if the STEP and HOLD input come in at the same time, it ignores the STEP input, but handles the HOLD input only.

2. External D. I always displays a screen & it is taken in the interior according to the situation of input irrespective of control action (Running or Stop).

| Name | Function |
|---|---|
| RUN/STOP (LEVEL Input) | Start or end the assigned D/I input signal according to the operation mode (H/L) set. |
| STEP (EDGE Input) | In case of running in program control mode, perform the STEP operation (go to the next SEG. by force) for the assigned D/I input signal according to the operation mode (H/L) set. |
| HOLD (LEVEL Input) | In case of running in program control mode, perform the HOLD operation (hold the current SEG. operation unlimitedly regardless of set time) for the assigned D/I input signal according to the operation mode (H/L) set. |

The D/I input often indicates external errors, so it is sometimes necessary to stop the system control not with normal RUN/STOP but with D/I input.
At that time, the D/I number assigned to operation out of D/I #1 to 8 turns into gray and does not run. As for the rest of D/I numbers except the assigned numbers, it is possible to set them in the D/I setting 3 screen (Fig. 99).



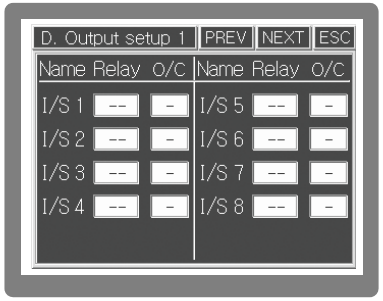

(Fig.99) System reset setting

| Name | Function |
|---|---|
| RST | In case of D/I input, it is the button for setting the system RESET (End). Only if you press this button, the waiting time becomes valid. |
| Waiting time (sec) | It resets (end) the system in a waiting time while the system RESET button is pressed. |

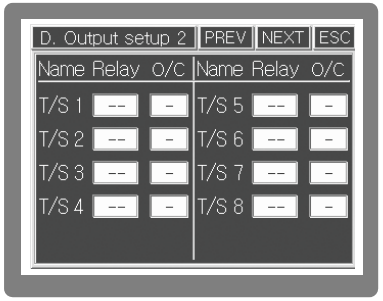


## 6.7 D/O Configuration Setting

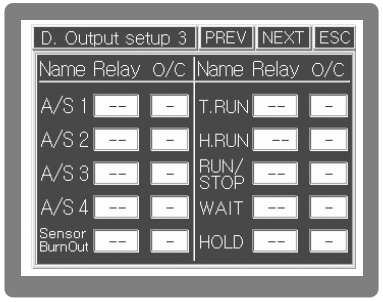
The D/O configuration setting refers to the screen for assigning the various signals within the system to RELAY output and O/D output. Here, the signals assigned and connected are displayed through the actual terminal. The D/O assignment is allowed to be redundant except special cases, so it is necessary to assign and enter the RELAY and O/C carefully. The D/O configuration setting 1, 2 (Fig. 100, 101) refers to the screen that assigns Inner Signal and Time Signal to RELAY output and O/C output respectively.



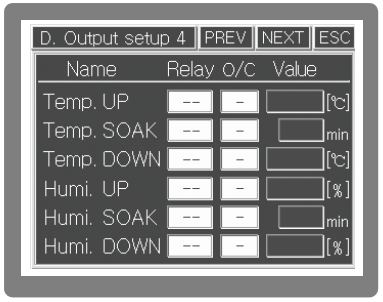

(Fig.100) DO Configuration Setting 1(Inner Signal)




(Fig.101) DO Configuration Setting 2(Time Signal)




(Fig.102) DO Configuration Setting 3

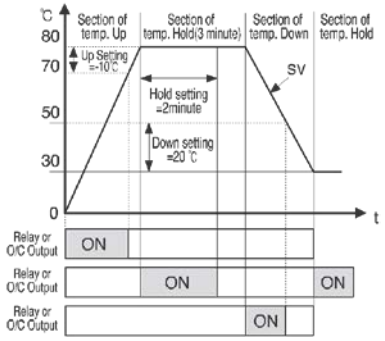



(Fig.103) DO Configuration Setting 4

The D/O configuration setting 3 [Fig. 102] refers to the screen for assigning the screen-displayed functions to RELAY output and O/C output. In the alarm #1 to 4,both system and pattern alarms are used together. (System alarm #n and pattern alarm #n run in logical OR.)

| Name | Function |
|---|---|
| Alarm (#1~#4) | System and pattern alarms. Assign the #1~#4 output |
| Sensor Disconnection | Output assignment upon sensor disconnection |
| T.RUN | Output assignment upon temperature control |
| H.RUN | Output assignment upon humidity control |
| RUN/STOP | Output assignment under RUN |
| WAIT | Output assignment for WAIT operation |
| HOLD | Output assignment for HOLD operation |

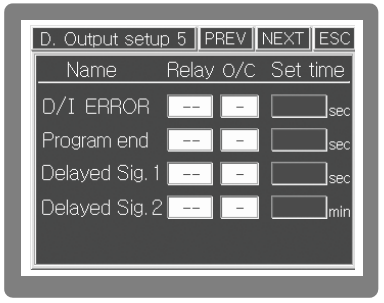
DO Configuration Setting 4(Fig.103) is used when each setting value(SV) of Temp. & Humi. In the section of temperature & humidity Up/Hold/Down. Each setting input value of Set Item operates like (Fig. 104).




(Fig.104) Output by temperature Up/Hold/Down setting

| Setting Item | Description |
|---|---|
| Temp. & Humi. Up section | Input the minus value of Temp. & Humi. in the target of setting value |
| Temp. & Humi. Down section | Input the plus value of Temp. & Humi. in the target of setting value |
| Temp. & Humi. Hold section | Input the holding time of Relay or O/C output with in segment time |

(Fig.104) shows an example of displaying either Relay or O/C output corresponding to the temperature Up/Hold/Down setting of temperature and humidity SV in the program control mode. In case of adjusting the Up setting temperature, Hold setting temperature and Down setting temperature to -10 ¡ , 2 minute and 20 ¡ respectively, it indicates the timing ON with the assigned Relay or O/C output.

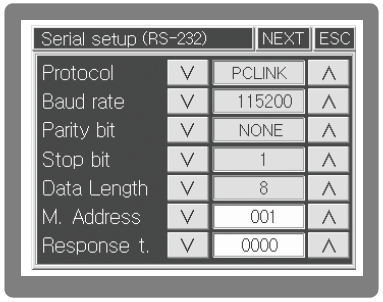



(Fig.105) DO Configuration Setting 5

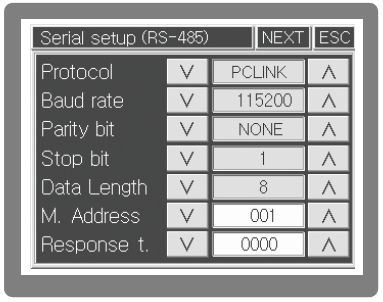


| Item | Description |
|---|---|
| D/I ERROR [Min] | In case of D/I input, its output becomes ON for a setting time. If the RUN/STOP, STEP and HOLD function input is set, its D/I will be excluded. |
| PROG. End [Min] | Once the program control ends, its output becomes ON for a setting time. |
| Delay signal 1 [sec] | After the I/S #1 is displayed, its output becomes ON after a delay [second] for a setting time. |
| Delay signal 2 [sec] | After the I/S #1 is displayed, its output becomes ON after a delay [minute] for a setting time. (However, the delay signal 2 is displayed only if the delay signal 1 becomes ON.) |

## 6.8 Communication Setting




(Fig.106) Communication Parameter Setting (RS232)




(Fig.107) Communication Protocol (RS422/485)

The communication setting refers to the screen for setting either RS232 or RS422/485 parameters to communicate with the device that supports PC or other serials. You can change it with the Up/Down arrow buttons, and can enter the local device number and response time by selecting the input box on your own. Because RS232C/485 communication supports 4 lines (RX+, RX-, TX+. TX-) in hardware and the type of Half-Duplex in software, if you want high speed communication, you should connect into 4 lines. In other case, if you want a simple connection, you can use 2 lines by connecting RX+ with TX+ & do RX- with TX-. If you want a simple connection by connecting 4 lines, you can use 2 lines by connecting RX+ with TX+ & doing RX- with TX-.

| Name | Function | Range |
|---|---|---|
| Communication protocol | Set the communication protocol. The protocol runs according to the HANYOUNG NUX-designed format. | PCLINK / PCLINK+CRC |
| Communication speed (BPS) | Set the communication speed (BPS). You can select one out of 600/1200/2400/4800/9600/19200/38400 /57600/115200. | 1,200 ~ 115,200 |
| Parity bit | Set the parity bit. | NONE / EVEN / ODD |
| Stop bit | Set the stop bit. | 1 / 2 |
| Date length | Set the data length. | 5 / 6 / 7 / 8 |
| Local device No. | Set the device number to be used in the system. It is used as its own device number when forming the serial network. | 1 ~ 999 |
| Response time [ms] | Select the inter-Byte delay time when sending data. Used when the target equipment to receive runs at a low speed. | 0 ~ 1,000 (100 us) |

## 6.9 Other Setting


(Fig.108) Other Setting

| Name | Function |
|---|---|
| Language | Select system language. It supports Korean and English. |
| Password change | Change system password. You should enter your password in the unit of four numbers and do so twice for confirmation. |
| User information | Enter the user information to indicate upon the initial system activation. You can enter 29 letters of English/Number/Sign or 14 letters of Korean on one line. |

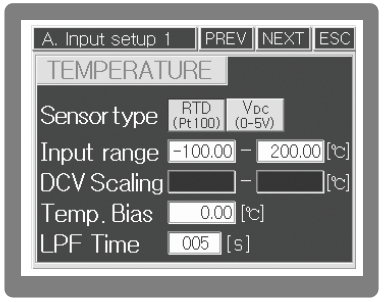


# 7. Simple Example

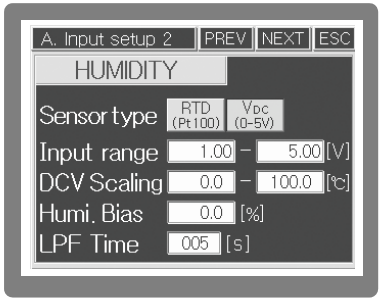
J-THERMO NUXís Temperature Humidity Controller (Model: TH500) is consisted of Operation screen, Operation Setting screen, System Setting screen. You can select structural elements in the System Setting.

System installation company such as environment test chamber manufacturer etc already finished the system setting when they taking itís product out of warehouse. So users do not have to do system setting additionally. Users can set up humidity-temperature simply through Operation Setting.

## 7.1 Input / Output Setting



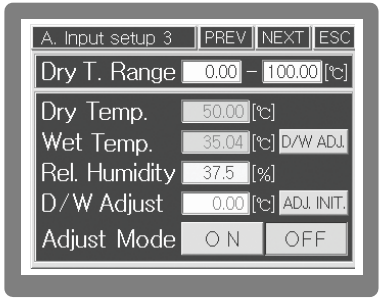

(Fig.109) Temperature sensor setting screen



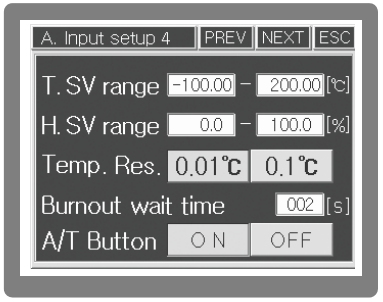

(Fig.110) Humidity sensor setting screen

### 7.1.1 Sensor Input Setting

| Setting Item | Explanation |
|---|---|
| Sensor Type | Set up according to input sensor type. If sensor type is a dry or web bulb respectively and RTD (Pt 100 ¡ ) type, select RTD. If you use electronic humidity sensor (Our Model EE99), you should set up temperature sensor as R.T.D and humidity sensor as V d.c |
| Input Range | Set up input range of the sensor(s), Generally you can use initial value and initial value of temperature is -100...200 ¡ , humidity is 0...100% R.H. If you use electronic humidity sensor (Our model EE99), after setting up input range as 1-5V, connect resistance (250 ¡ below 1%) into two humidity sensor input terminals. |
| Scaling Setting | When selecting V d.c, set up suitable scale. In case of 1~5V input and display range: 0~100, set up scaling setting as 0~100. |
| Sensor Deviation | Sensor deviation corrects the deviation of sensor which is caused by several reasons. |
| LPF | Low Pass Filter selects suitable time when processed value is chattering due to inflowing of noise through input sensor line. |




(Fig.111) Dry ƒUWet bulb sensor correction screen




(Fig.112) Range setting screen

### 7.1.2 Correct Dry/Web bulb sensor

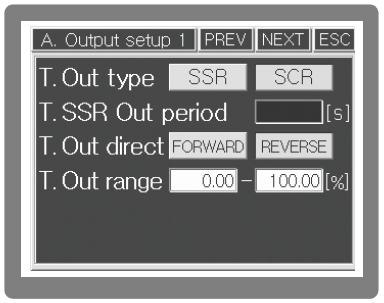
| Setting | Explanation |
|---|---|
| Dry Bulb Temp. Range | Set up dry/web bulb temperature range. |
| Dry Bulb Temp. | Displays temperature of dry bulb temp. |
| Wet Bulb Temp. | Displays temperature of wet bulb temp.(removal gauze) |
| Relative humidity | Displays relative humidity (% R.H.) |
| Correction of Dry/Wet Bulb | Press Dry/Wet Bulb ADJ and it shows the temperature difference between dry bulb & wet bulb. It's very important to correct Dry/Wet Bulb because relative humidity measurement is based on the temp. difference between two sensors. |
| Correction Mode | Correction will be performed when pressing it. |

**⚠ Caution** Before correction, please remove gauze in the wet bulb sensor and put into correction mode when measurement value of dry/wet bulb is stabilized.

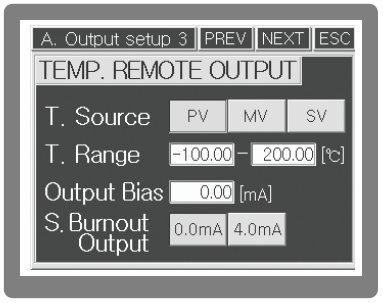
### 7.1.3 Range Setting

| | |
|---|---|
| Temp. SV Range<br>Humidity SV Range | In order to prevent user's input setting mistake, Input temp.range when restricting temp. SV within its desired range. |
| Temp. resolution | In order to prevent user's input setting mistake, Input humidity range when restricting humidity. SV within its desired range. |
| Waiting time | Select Temp. process value and SV as 0.01 ¡ or 0.1 ¡ . |
| in Loof Brake | Set up delayed action time after detecting sensor loof brake. |
| Display A/T button | It shows or hides Auto Tuning button in Operation Screen. |

## 7.2 Output Setting




(Fig.113) Control output setting




(Fig.114) Retransmission output setting

### 7.2.1 Control Output Setting

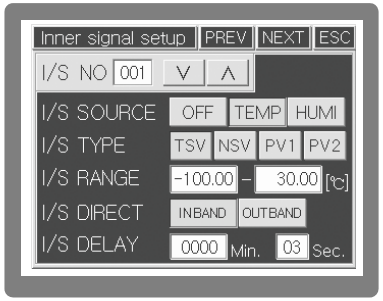
| | |
|---|---|
| Type of Temp. Output | Output Select and use S.S.R or S.C.R (4-20mA d.c). Select according to equipment. ( Initial Value : S.S.R) |
| Output cycle of Temp.S.S.R | RYou can set up when you select S.S.R output. Output cycle means On/Off working time in the proportional band.(Initial Value : 2 seconds) |
| Direction of Temp.output | Select cooling control (direct movement) or heating control(inverse movement) (Initial Value : Inverse movement) |
| Range of Temp. output | You can control output and selection range : -5%(3.2mA d.c) ··· 0.5%(20.8mA d.c) (Initial Value : 100%) |
| Temp. output A/T GAIN | It is a Constant Value applied to each performance when P.I.D computed. Selection range is 0.0~10.0 (Initial Value : 1.00) |

### 7.2.2 Retransmission Output Setting

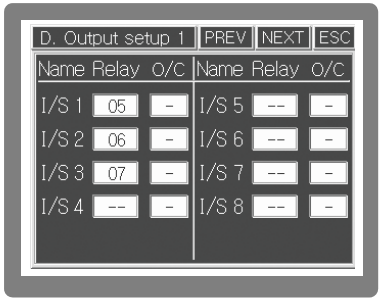
| | |
|---|---|
| Temp. output Type | Select type of RET(Retransmission output) against temperature. It is used as input in the recorder etc. output signal is 4-20mA dc and select one among PV(Process Value), MV(Manipulated Value), SV(Setting Value). |
| Temp. output Range | Scale value against temp. output range will be selected 4-20mA d.c. But if MV selected, output will be the percentage of setting value against 4-20mA d.c. It means if you select 50%, output will be 12mA d.c. |
| Temp. output Deviation | In order to delete deviation value of retransmission |
| Sensor Loof Brake Output | output, input current offset.In case of sensor loof brake, select between retransmission output current between 0.0mA d.c and 4.0mA d.c |

¡ Humidity setting method is the same as temperature setting method

## 7.3 Inner Signal Setting




(Fig.115) Inner signal setting screen




(Fig.116) DO Configuration Allocation screen

When controlling refrigerator and dehumidifier separately by external switch, it can be used generally with input-output setting only. But in case it needs to control (On/Off) refrigerator & dehumidifier under desired temperature and humidity, it's convenient to use Inner Signal. Please refer to the below example, select setting and use it.

(Example 1) Control refrigerator & dehumidifier automatically

| Inner Signal No. | Signal Subject : | Signal Type & Range | Delayed Time | Output Allocation(D.O) |
|---|---|---|---|---|
| I/S No.1 | Temperature Range : -100~30 ¡ | Type : TSV Direction : Within Range | 1 minute | Connect refrigerator to 5th Relay |
| I/S No.2 | Subject : Humidity Range : 0~70% | Type : TSV Direction : Within Range | 10 seconds | Connect dehumidifier to 6th Relay |

(Example 2) Control refrigerator 1,2 & dehumidifier automatically ( Use I/S 1~3 )

| Inner Signal No. | Signal Subject : | Signal Type & Range | Delayed Time | Output Allocation(D.O) |
|---|---|---|---|---|
| I/S No.1 | Temperature Range : -100~30 ¡ | Type : TSV Direction : Within Range | 1 minute | Connect 1st refrigerator to 5th Relay |
| I/S No.2 | Subject : humidity Range : 0~70% | Type : TSV Direction : Within Range | 10 seconds | Connect dehumidifier to 6th Relay |
| I/S No.2 | Subject : Temperature Range : -100~50 ¡ | Type : TSV Direction : Within Range | 5 seconds | Connect 2nd refrigerator to 7th Relay |

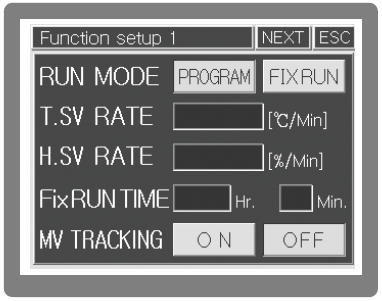
**⚠ Caution** You have to select temperature range of refrigerator according to its specification. If you set up too high temperature, it may cause malfunction of refrigerator.

## 7.4 Fix Control

### 7.4.1 Select how to operate

In order to operate Fix Control, firstly select operating method as fix control.
Press MENU button on the operation screen and move to main menu screen.
Press Function set up and it moves to Function Set up 1 screen.
On this screen, press FIXRUN button and select fix control. And then, press ESC button two times and move to operation screen 1 in the fix control.

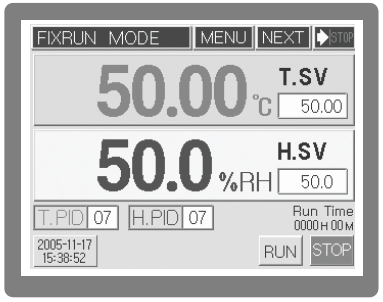

(Fig.117) Function Set up menu screen



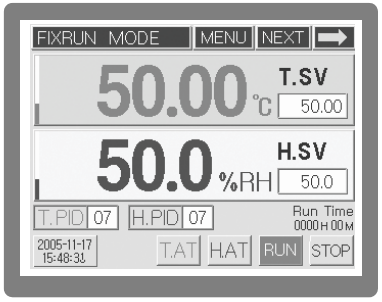

(Fig.118) Function Set up 1 screen

### 7.4.2. Temperature & Humidity Control Value Setting

Press temp. & humidity setting and set up desired setting value. (After set up number, please press ENT button in order to finish setting finally.) Press ESC button and it will be back to the 1st Operation Stop Screen of Fix Control (Fig.119)




(Fig.119) The 1st running screen of Fix control (stop screen)




(Fig.120) The 1st running screen of Fix control (run screen)

### 7.4.3 Operate and STOP of Fix Control

In the 1st running screen of Fix control(stop screen) (Fig.119), you can check its operation by pressing RUN button. Press YES button leads it to start operation. If you press STOP button in the (Fig. 120), operation will be stopped when pressing YES button in the displayed processing verification screen.



### 7.4.4 Start Auto Tuning

Although it starts fix control operation according to usersí setting value, if you do not perform Auto Tuning, P.I.D control will be applied in accordance with its initial value at the delivery of goods. Therefore it will be better to perform Auto Tuning in order to get good control performance. To star Auto Tuning, press Auto Tuning button T.AT at the bottom of (Fig. 120). When T.AT button flickering, it shows that Auto Tuning is being performed. After Auto Tuning finished, Auto Tuning values will be set up automatically and it stops flickering. Same as temperature Auto Tuning T.AT, perform auto tuning of humidity by pressing H.AT button.

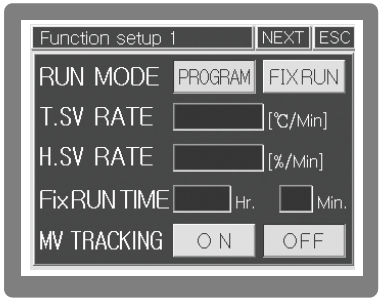
## 7.5 Program Control

### 7.5.1 Selection of Program Control

Firstly select operation method as a program control in order to perform program control. Press MENU button under the status of operation screen and move to Main Menu screen. After pressing FUNCTION SETUP button, it moves to Function set up 1 screen. On this screen, press PROGRAM button and select program control. And then, press ESC button one time and move to Main Menu screen.

In the function setting main screen (Fig. 121), press PROGRAM SETUP and it shows PROGRAM set up menu screen like (Fig. 123) and it is consisted of 5 buttons. Press each button and select setting respectively.

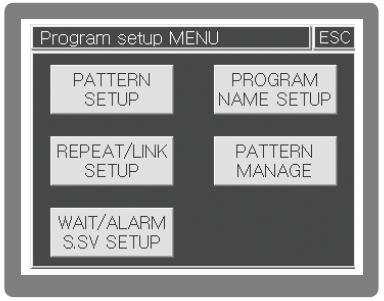

(Fig.121) Main Menu screen



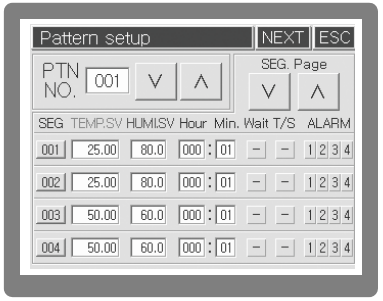

(Fig.122) Function Set up 1 screen

### 7. 5. 2 Pattern Setting

Press PATTERN SETUP button in the program setting menu screen, it displays program pattern setting scree (Fig.124). Under this screen, select number 1 pattern by pressing pattern number setting window. Press window of temp.setting value, humidity setting value, operating time and then set up relevant segments.




(Fig.123) Program Set up menu screen




(Fig.124) Program pattern Set up screen

Explanation of Program Pattern Setting Screen

| Operating Seg. | Contents of setting | Remark |
|---|---|---|
| SEG.No.001 | Under the Temp 25 ¡ , Humidity 80% set up temp. & humidity segment for one minute. | Consider connected pattern as ne and repeat it infinitely |
| SEG.No.002 | Under the Temp 25 ¡ , Humidity 80% set up temp. & humidity maintenance segment for one minute. | |
| SEG.No.003 | Under the Temp 50 ¡ , Humidity 60%, temp. rise & humidity fall for one minute. | |
| SEG.No.004 | Under the Temp 50 ¡ , Humidity 60%, temp. rise & humidity fall for one minute. | |
| SEG.No.005 | Under the Temp 75 ¡ , Humidity 40% set up temp rise & humidity fall segment for one minute. | |
| SEG.No.006 | Under the Temp 75 ¡ , Humidity 40% set up temp. & humidity maintenance segment for one minute. | |

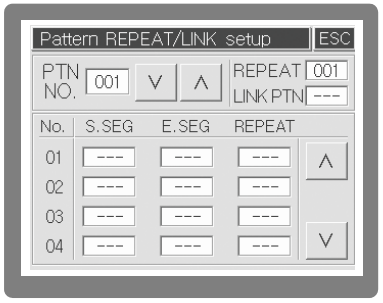


Explanation of Program Pattern Setting Screen

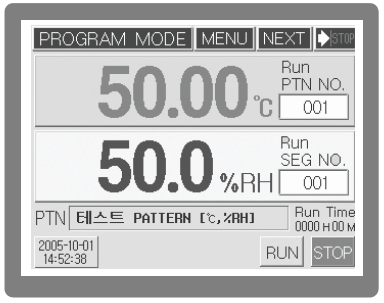
| Setting | Explanation | Range |
|---|---|---|
| Pattern No. | Input pattern no. directly or select it by using V Λ button | 1...300 pattern |
| SEG.page | Press Segment Page Shifting button( V Λ )and it moves to 4 segment per each shifting | |
| Temp. SV | Press setting screen and set up setting value of temperature of the segment. | -100...200 ¡ |
| Humidity SV | Press setting screen and set up setting value of humidity of the segment. | 0...1000 % |
| Time | Set up operation time of the segment | 0...255hours and 59minutes |
| Standby | Select function of Standby Operation which was set up in the Standby Operation Setting Screen. | ON/OFF |
| T.S | Select Time Signal which works at the segment | |
| Pattern Alarm | Among 4 Alarms which was set up in the Patter Alarm Setting Screen, select operation respectively. Pattern Alarm Selection Screen (Fig. 47) | 1...4 respectively ON/OFF |

### 7.5.3. Pattern Setting

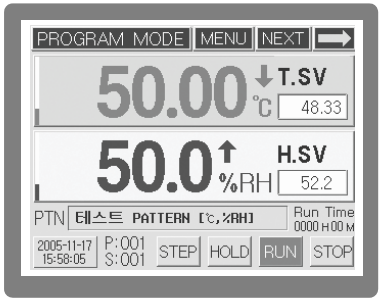
In the picture of Pattern Repeat/Connection Setting screen (Fig. 125), set up connection pattern as 1 (its own number). In the Program Control 1st Operation Stop screen (Fig. 126), please input pattern no. & segment no. respectively into the Program Start Pattern & Start Segment Setting Screen in the pattern. After pressing RUN button, it starts operation of program control. In order to stop Program Control, press STOP button on the right-bottom side of Program Control 1st Operation Stop screen. (Fig. 127). In addition, operation screens of Program Control are as follows: (Fig. 127), (Fig. 128), (Fig. 129).



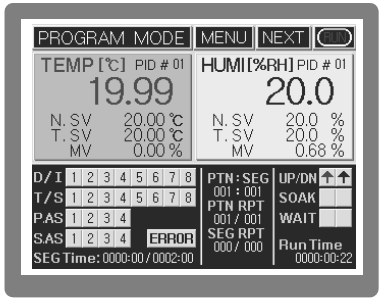

(Fig.125) Pattern repeat / Link Set up screen



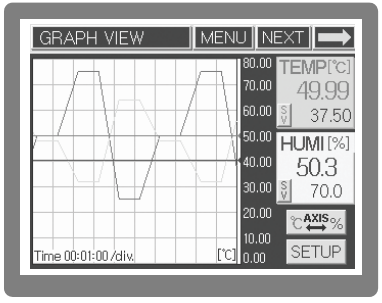

(Fig.126) The 1st running screen of program control(stop screen)




(Fig.127) The 1st running screen of program control(run screen)




(Fig.128) The 2nd running screen of program control




(Fig.129) Graph display screen



# 8. Specification

## 8.1 Input

| | | |
|---|---|---|
| Input | Dry ¡Humidity sensor | RTD (resistance temperature detector (Pt 100 § , DIN 43760) |
| | Digital Temperature ¡Humidity sensor (EE99) | Temperature sensor: RTD (Pt 100 § )<br>Humidity sensor: Director current (4 - 20 mA d.c)<br>Input resister around 1 § |
| | Sampling cycle | 500 mm |
| Range | Temperature | -100,00 ~ 200.00 ¡ |
| | Humidity | 0.0 ~ 100.0 % R.H |
| Accuracy | Temperature | ± 0.1 % of Full Scale |
| | Humidity | ± 1 % of Full Scale |
| Contact input | 1a 4point x 2 (total 8 point) maximum 8 V d.c 10 mA d.c | |

## 8.2 Output

| | | |
|---|---|---|
| Control Output | SSR | ON : 24 V d.c Pulse voltage (Over 800 ¡ load resistance)<br>OFF: Below 0.1 V d.c |
| | | cycle time : 1 ~ 1000 second |
| | S.C.R | 4-20 mA d.c or 1-5 V d.c (Below 800 ¡ load resistance) |
| | | Output limit: -5.0 ~ 105.0% |
| Retransmission Output | Temperature | 4 - 20 mA d.c (Below 800 ¡ load resistance) |
| | Humidity | PV/MV/SV (Internal selection) |
| | Accuracy | 0.025 % of Full Scale (resolution: Around 4,000) |
| | Renewal Time | 5000 ms |
| Digital Output | Contact output | N.O: 30 V d.c, 5 A, 250 V d.c : 5 A |
| | | N.O: 30 V d.c, 1 A, 250 V d.c : 5 A |
| | Open collector output | 24 V d.c 300 mA d.c Max. |

## 8.3 Communication type

| | | |
|---|---|---|
| Apply range | USB V1.1, EIA-RS232C, EIA-RS485/422 | |
| Number of devices (Max.) | EIA-RS232C | 1:1 |
| | EIA-RS485/422 | 1:32 (Address 1~999) |
| Communication type | EIA-RS232C | Full duplex mode |
| | EIA-RS485/422 | 4 ways half duplex mode |
| Synchronization | EIA-RS232C<br>EIA-RS485/422 | Asynchronous mode |
| Communication distance | USB V1.1 | Around 100 m |
| | EIA-RS232C | Around 100 m |
| | EIA-RS485/422 | Around 1.2 km |
| Communication speed | USB V1.1 | Around 1M bps |
| | EIA-RS232C | 1200/2400/4800/9600/19200/38400/57600/115200 |
| | EIA-RS485/422 | 1200/2400/4800/9600 |
| Data length | EIA-RS232C<br>EIA-RS485/422 | 7/8 bits |
| Parity bit | EIA-RS232C<br>EIA-RS485/422 | NONE/EVEN/ODD |
| Stop bit | EIA-RS232C<br>EIA-RS485/422 | 1/2 bit(s) |
| Communication protocol | USB V1.1 | Bulk MODE |
| | EIA-RS232C | PC LINK / PC LINK + CRC |
| | EIA-RS485/422 | PC LINK / PC LINK + CRC |
| Communication respond time | EIA-RS232C<br>EIA-RS485/422 | 0-999 ms |

## 8.4 Power supply

| | | |
|---|---|---|
| Power Supply Voltage | 100 ~ 200 V a.c (Change rate of voltage ¡ 10 %) | |
| Frequency | 50 ~ 60 Hz | |
| Power Consumption | Max. 20 W below | |
| Insulation Resistance | Between primary terminal and secondary terminal | 500 V d.c / 20 § |
| | Between Primary , Secondary terminal and ground | |
| Dielectric Strength | Between primary terminal and secondary terminal | 2500 V a.c 50 ~ 60 Hz for 1 minute |
| | Between Primary , Secondary terminal and ground | |
| Power supply for Sensor | 24 V d.c 10 W Max. | |



## 8.5 Function

| | | |
|---|---|---|
| Screen | | 5.7 Inch Color STN-LCD Touch screen |
| Bias | | Temperature: -100.00 ~ 100.00 ( ¡ )<br>Humidity: -100.0 ~ 100.0 (% R.H.) |
| Scaling | | When turn on power, free scaling set up |
| LPF | | 2 ~ 180 sec. |
| Pattern | | 300 patterns |
| Segment | | 6,000 segments (100 segments are available in each pattern) |
| PID Group | | Temperature 16 zone + Humidity 16 zone |
| Auto Tuning Proportional Band (P) | | According to SV, AT is operating<br>0.00 ~ 100.00(%) (When proportional band is 0.00, ON/OFF control) |
| Integral Time (I) | | 0.0 ~ 6,000 sec (0.00 OFF, I.D Time 0.00 -> P control) |
| Derivative Time | | 0.0 ~ 6,000 sec (0.00 OFF, I.D Time 0.00 -> P control) |
| ON/OFF Control | | Proportional Band (P) is 0 |
| Direct/Reverse action | | Select Direct or Reverse action in control output |
| ON/OFF Hystersis | | 0.1 ~ 300.0 ( ¡ ) (In case of Humidity, Temperature of Humidity or conversion value) |
| Fuzzy | | Select ON/OFF |
| Retransmission output | | 4-20 mA d.c 2 points (Temperature, Humidity) |
| | | Select PV/MV/SV |
| Alarm | | System alarm 8 points, 8 points for each pattern |
| Alarm type | | High-Low / Low deviation alarm etc 20 types of alarms |
| Alarm setting | Process alarm | Temperature:-100.00 ~ 200.00 ( ¡ ), Humidity: 0.0 ~ 100.0 (%) |
| | Deviation alarm | Temperature:-300.00 ~ 300.00 ( ¡ ), Humidity: -100.0 ~ 100.0 (%) |
| Hysteresis | | 0.1 ~ 100.0(%) |
| Memory for interruption of electric power | | Internal Flash or SDRAM memory, Temperature-Humidity each |
| | Memory type | 86,400 point |
| | Memory function | Program information & SV backup and restoration, Temperature-Humidity setting, PV save |

## 8.6 Operation Environment

| | | |
|---|---|---|
| Setting surroundings | Consecutive Vibration | Vibration width : Below 1.2 mm (5 ~ 14 Hz) |
| | Consecutive Vibration | Below 4.9 m/ s² (4 ~ 150 Hz) |
| | Short time Vibration | Below 14.7 m/ s² 15 sec. (each 3 direction) |
| | Impact | Below 147 m/ s² 11 ms (each 6 direction and 3 times) |
| Conditions for Normal | Temperature | 0 ~ 50 ¡ |
| | Humidity | 20~90 % R.H (No icing) |
| | Magnetic Range | Below 400 AT/m |
| | Warming-up Time | More than 10 minutes |
| Effect of Temperature in | R.T.D | Below ± 0.02 ¡ / ¡ |
| | Analogue Output | Below ± 0.02% / F.S / ¡ |

## 8.7 Transportation and Storage conditions

| | |
|---|---|
| Temperature | -25 ~ 70 ¡ |
| Humidity | 5 ~ 95 % R.H (No icing) |
| Impact | After packing, fall from less than 1m |