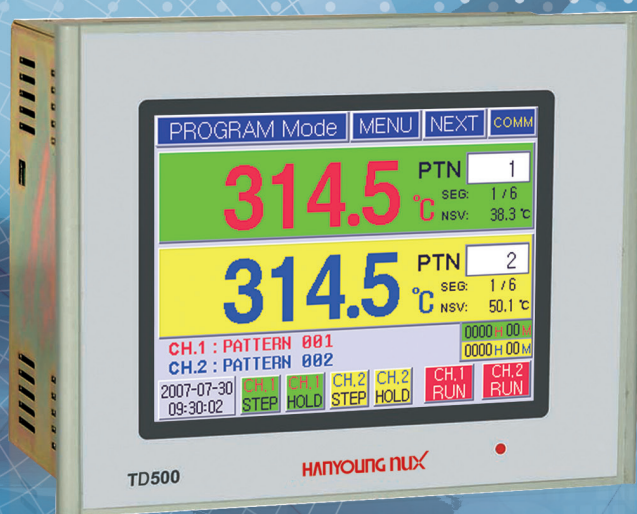


# TD500/TD300

2 Channel Programmable Temperature Controller

MANUAL



# Notice

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Thank you for the purchase of HANYOUNG 2 Loop Temperature Controller (Model : TD500/TD300). 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

\* Information in this manual may changed without prior notification.

\* If you have any question or find error in this manual, please contact us

\* Copying or reprinting this manual without notifying us is prohibited.

## ■ Service(A/S)

\* Please send product to the nearest distributor, agency or head quarter for A/S.

\* When willing to have an on-site A/S, please call our A/S center and make an appointment.

\* Before making an appointment for A/S, please check out our web and search for the same problem in our FAQ.

## **HANYOUNG NUX**

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E-mail. [overseas@hynux.com](mailto:overseas@hynux.com)

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## 1 Before starting

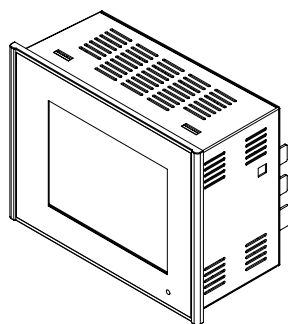
Thank you for the purchase of HANYOUNG 2 Loop Temperature Controller (Model : TD500/TD300). This manual contains the function of product, install method, caution information and the way of using this controller. So please read this manual before using it. And also please make this manual to be delivered 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 product

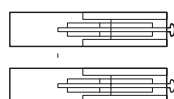
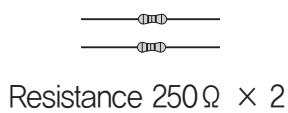
After purchasing our product, please check if it is correct item you want. Also please check breakage on exterior and omission parts.

If it is a different controller which you want or you find omission parts, please contact our sales office.

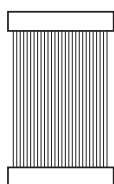
### 1.1.1 TD500



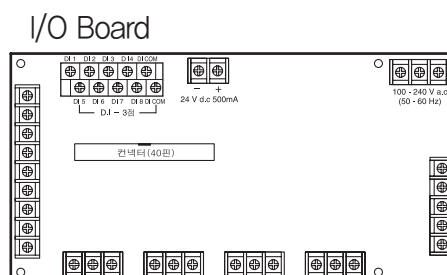
Unit body



### Fixing bracket

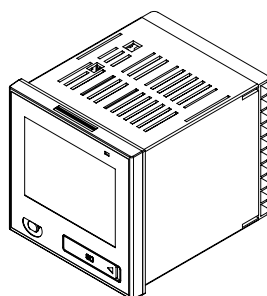


I/O Connecting cable

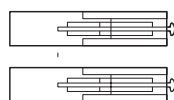


Manual

### 1.1.2 TD300



Unit body



### Fixing bracket



Manual



## **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.
- When installing the product, you must install a switch or circuit breaker to disconnect it from mains.

### **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 method

This is information for installation place and method of TD500/TD300 (2 loop temperature controller).  
So please read 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

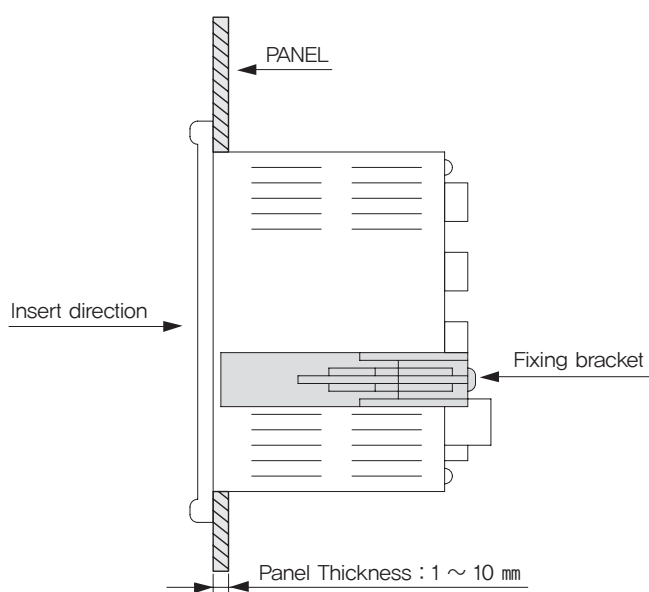
### 2.1.2 Caution

- The case of this controller is chrome–zinc plating and Bezel is made by ABS/PC anti–combustion material but please 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 warm–up when you operate it under 10 °C temperature.
- Please install it on horizontally
- When you wire it, please cut out all of electric power.
- This controller is operating in 100 – 240 V a.c., 50 – 60 Hz without additional change.  
If you use other voltage, it may cause 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.

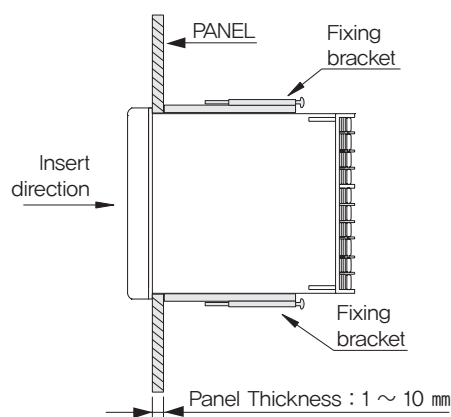
- The grade of over voltage is Catalogue II and using environment is Degree II
- The external circuit connected to the external terminals (sensor input terminal, communication terminal, control output terminal) of this product can be connected only to circuits separated from dangerous voltage section by at least reinforced insulation.
- The I/O Board must be installed inside the protective enclosure to prevent electric shock from user access.
- The switch for disconnecting from the mains should be installed in a place that is easily accessible by the user

## 2.2 Installation method

- (1) Please use 1 mm ~ 10 mm thickness of a steel sheet for panel.
- (2) In front of panel, please push into TD500/TD300 temperature controller
- (3) Using fixing bracket, please adhere controller to the panel
- (4) If you tighten it up by fixing iron to panel, it can be cause break of case or fixing bracket.



[TD500]



[TD300]



**CAUTION**

- To prevent electric shock, please check 'turn off power
- Before turn on power, please connect over the third class grounding.
- During retransmission, it may cause electric shock so please do not touch terminal.
- Please wire it after turn off main power
- Install a switch to disconnect the TD500 / TD300 from the main power supply.
- Please contact around 2A fuse to main electronic power line.

## 2.3 Suffix code

### 2.3.1 TD500 body

Model	Code		Information
TD500	<input type="checkbox"/>	<input type="checkbox"/>	Programmable Temperature Controller
Types	N		None (Only when need the I/O (Input/Output board))
	1		Communication (RS485/422 Communication, USB)
	2		Communication (RS232 Communication, USB)
Input-Output board	3		Contact input (DI) 8 contacts Contact output (DO) 8 contacts Transistor output (DO) 8 contacts
	4		Non (Only necessary standard body)
Language	N		Korean/English (Standard type)
	1		English/Chinese (Simplified Chinese character)

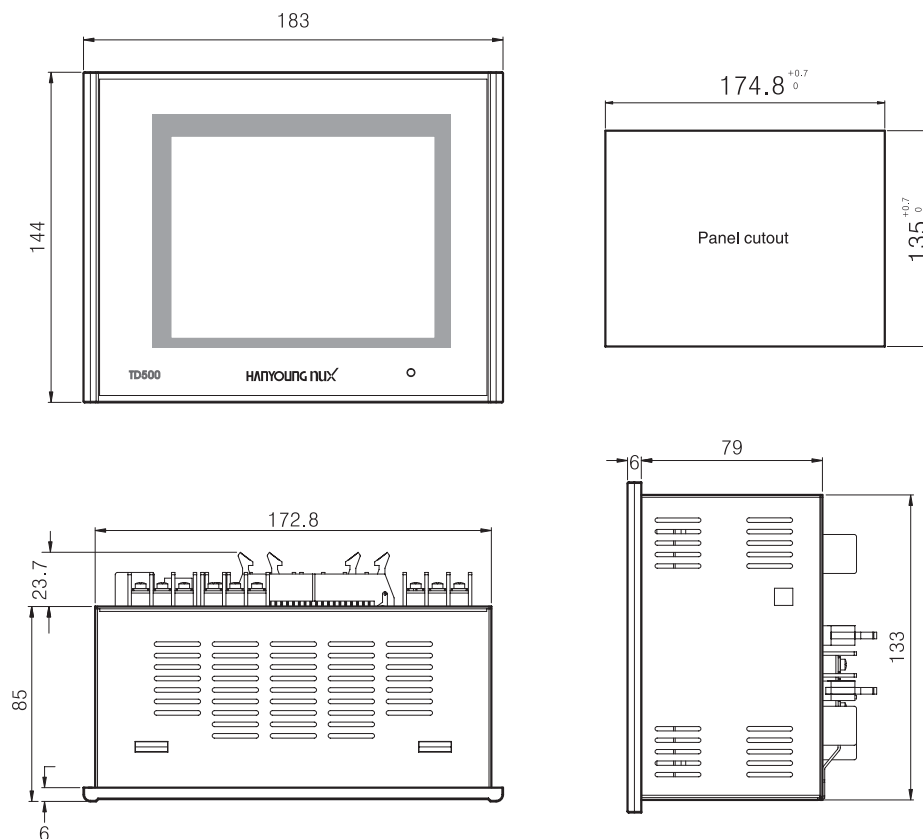
### 2.3.2 TD300 body

Model	Code		Information
TD300	<input type="checkbox"/>	<input type="checkbox"/>	Programmable Temperature Controller (DIN 96 × 96)
Communication	1		RS485/422 communication
	2		RS232C communication
Language	1		Korean and English (Standard type)
	2		English and Chinese (Simplified Chinese Characters)

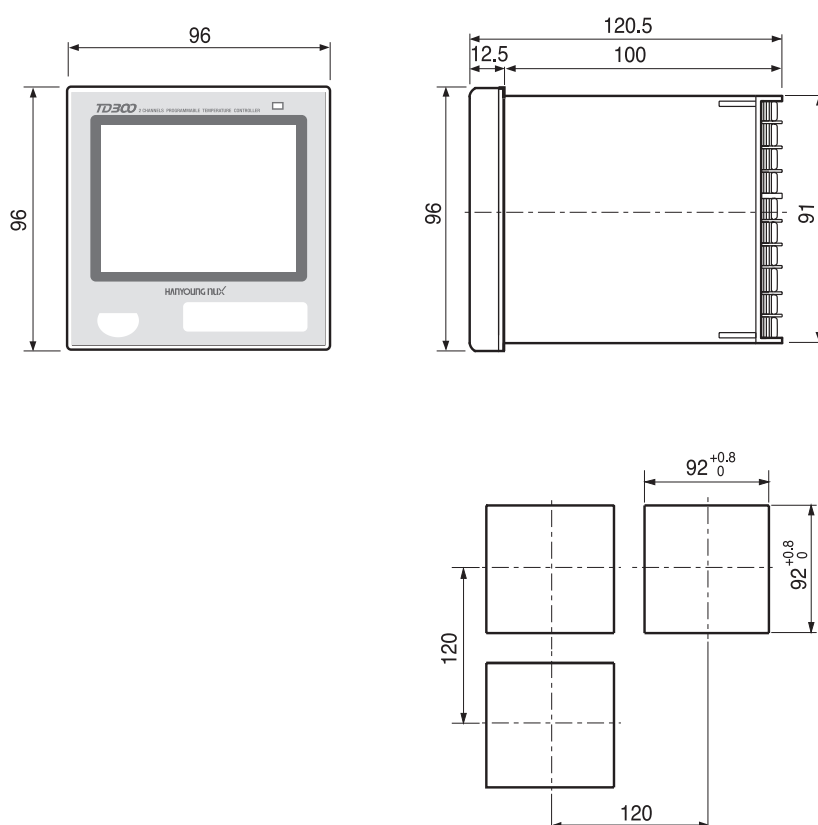
## 2.4 Dimensions / Panel cutout and Terminal arrangement

[unit : mm]

### 2.4.1. TD500 Unit body



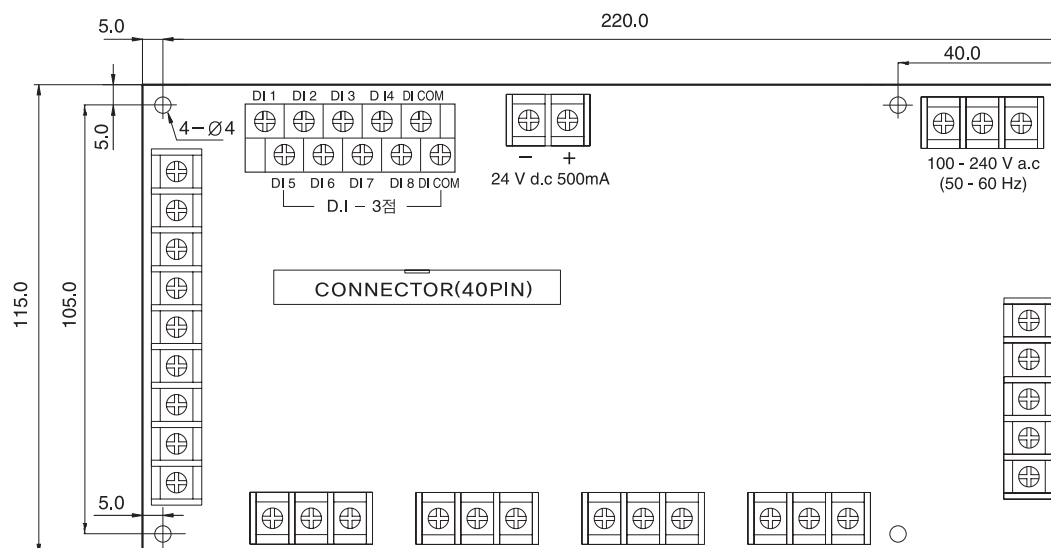
### 2.4.2. TD300 Unit body





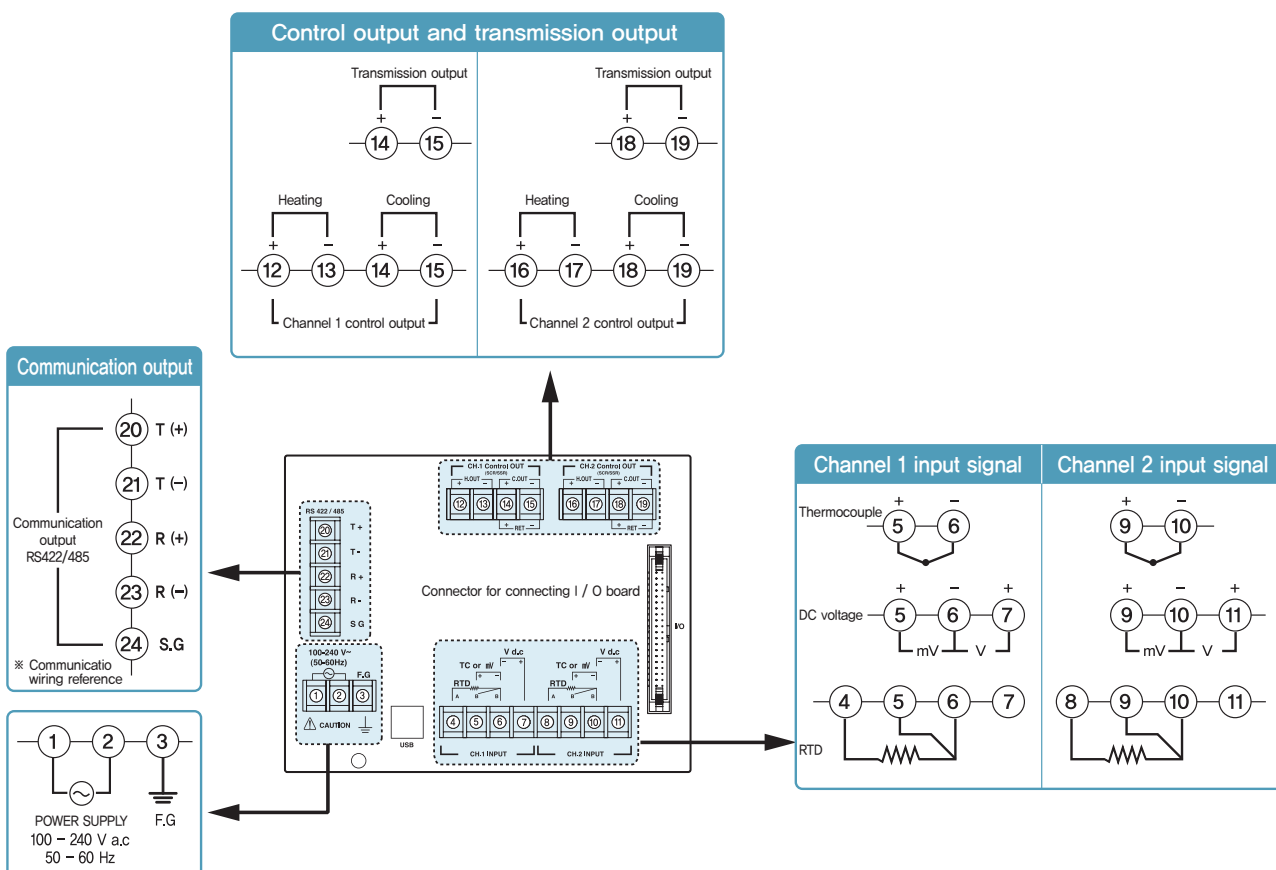
## 2.4.3 TD500 I/O board

[unit : mm]

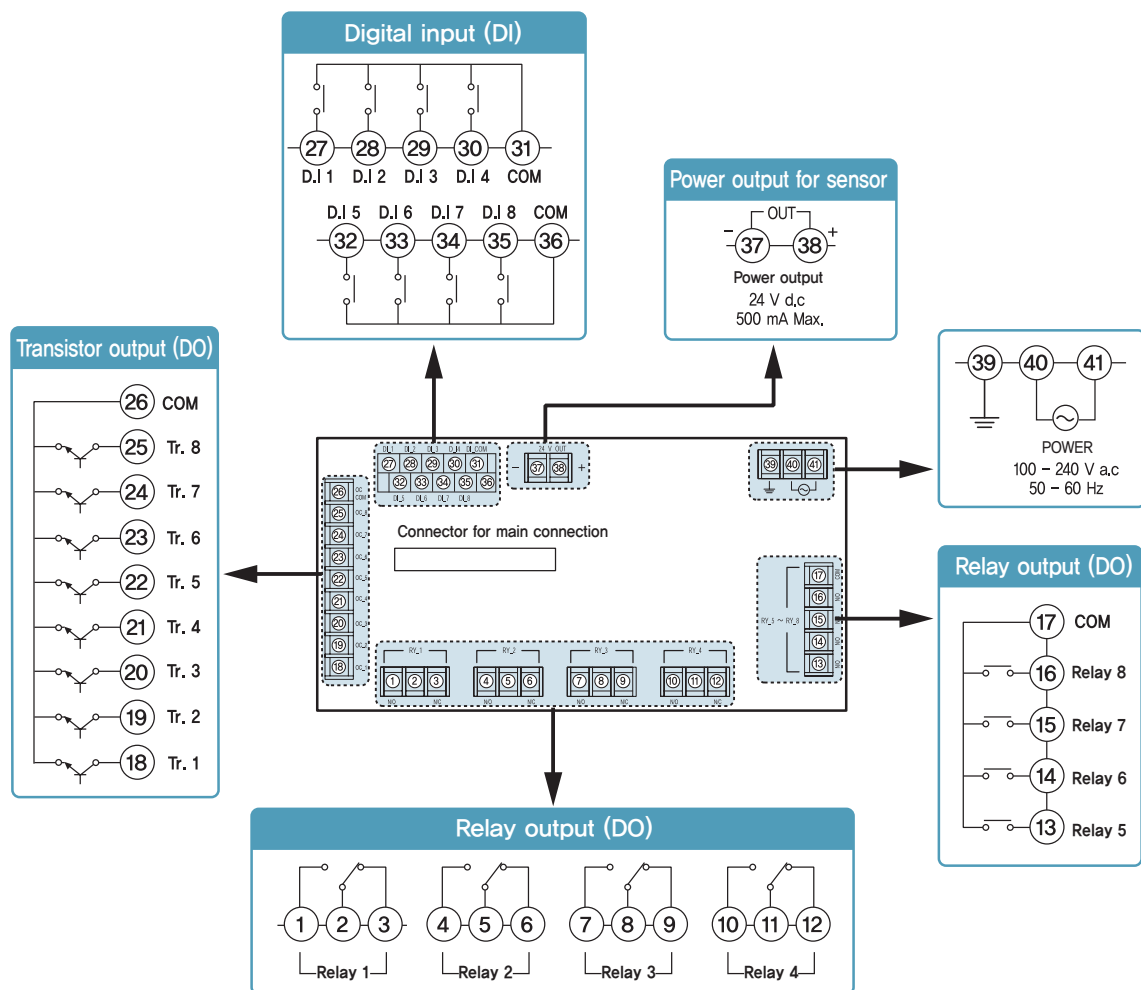


## 2.5 Terminal arrangement method

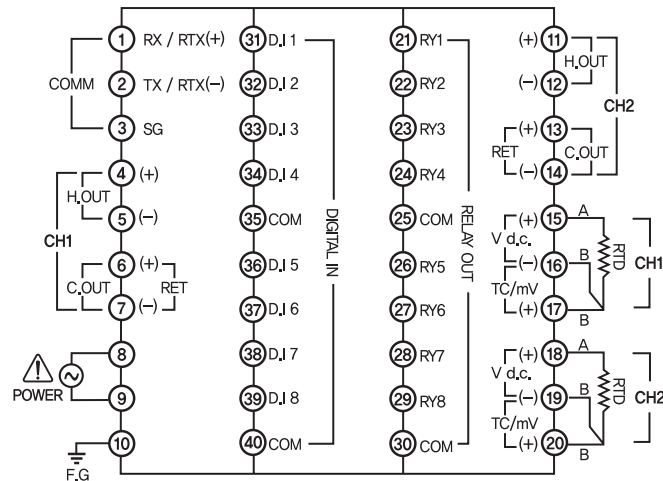
### 2.5.1 TD500 Unit connection diagram



## 2.5.2 TD500 Input / Output board (I/O) diagram



## 2.5.3 TD300 Dimension

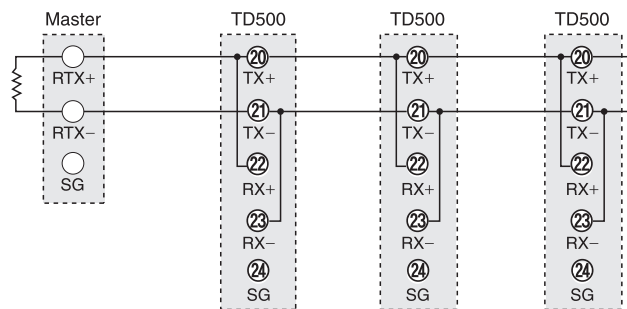


## 2.5.4 Communication arrangement

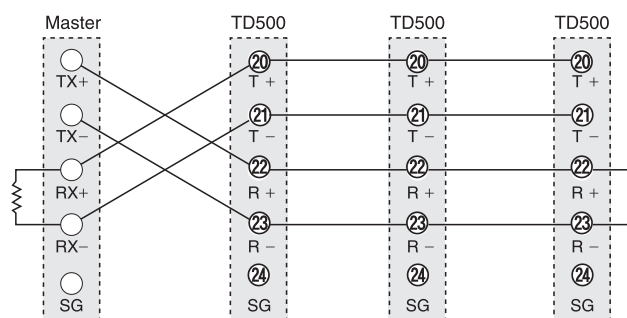
### • RS422/485 arrangement

TD500/TD300 can contact maximum 256 machines.

Please contact Terminating Resistance (100 ~ 200 Ω 1/2 W) to the both of ends for communication lines.

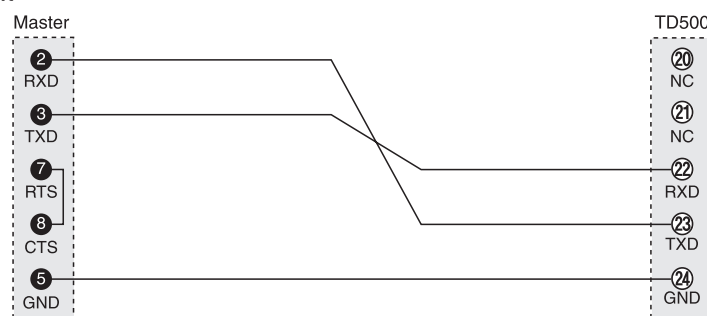


RS485 Connection (2 Wires)



RS422 Connection (4 Wires)

### • RS232 arrangement



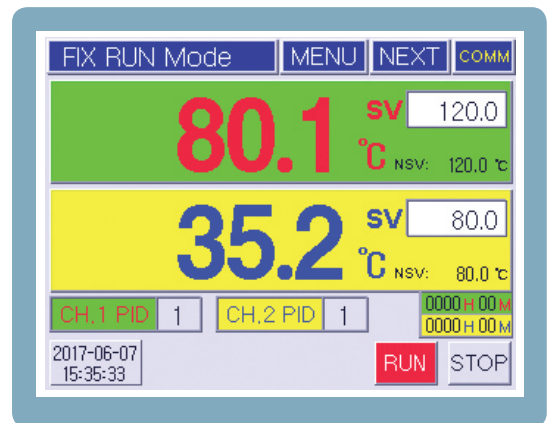
# 3 Setting and Operation

## 3.1 Initial screen

When the power is turned on after installation, the logo screen is indicated for 3 seconds, after which the first operation screen is shown. (Logo screen can be changed by the user through communication functionality.)






[Figure 1] Logo screen



[Figure 2] 1st operation screen

## 3.2 Basic input method

[Table 1]

Category of Buttons	Name	Function
	Selection Button	Button selected by the need of the users. When pressed, the button is reversed, and the corresponding operation is selected while the button is being released.
	Activation Input Box	Window to set various settings needed by the users. When pressed, the corresponding range of numbers or characters input window appears, and the needed value is to be pressed.
	Deactivation Input Box	Although it's an input window, depending on the current condition or status, this window is deactivated. When the condition is met, it is converted to an activated input window.

### 3.2.1 Numerical Input Window

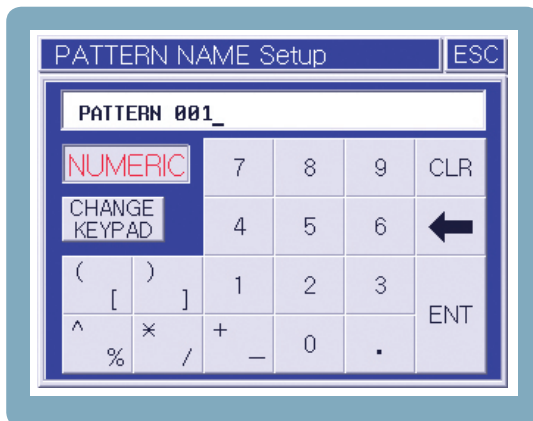
Positive and real numbers can be inputted at the basic number input window. On the top left, the 'input area' and 'max/min value' are indicated, and the current input value is indicated on the number board's indication box. The input number is inputted when the **ENT** button is pressed, and if **ESC** is pressed beforehand, the current input is cancelled.



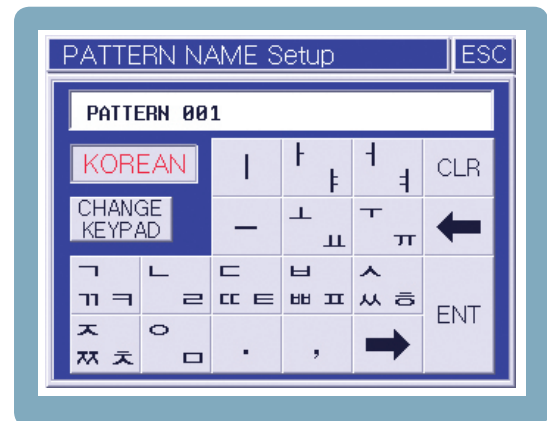
[Figure 3] Numerical input screen

### 3.2.2 Character Input Window (Korean/English/Numeric Character)

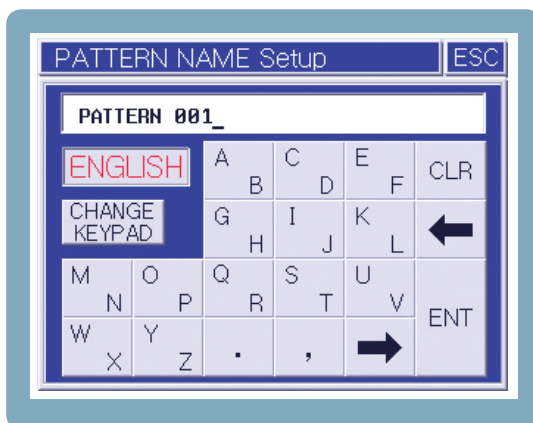
Character input is possible. It is shown when setting the pattern name, contact input (DI) name and etc. Korean/English/Numeric Character conversion is possible by using the keyboard conversion button.



[Figure 4] Numerical input screen



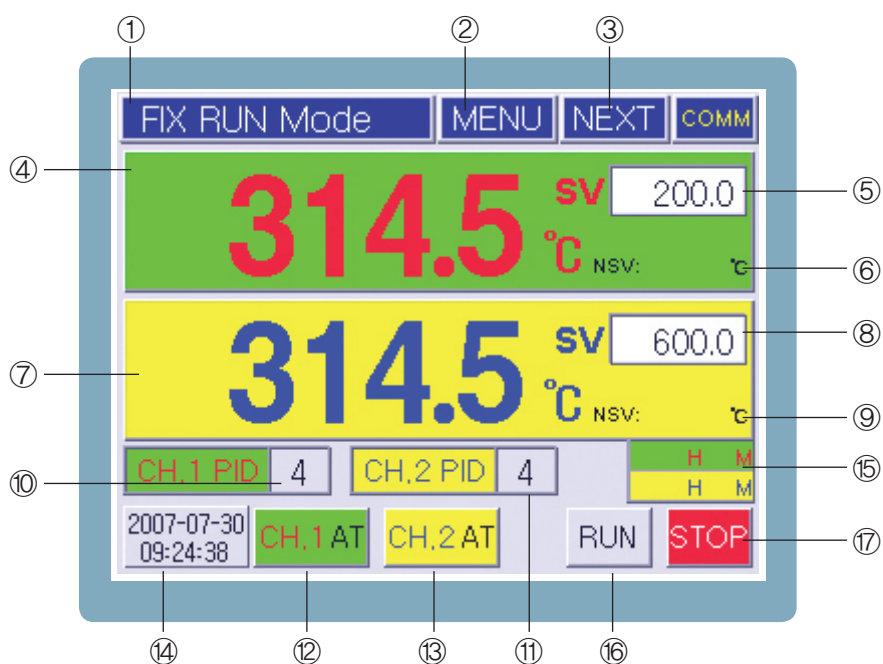
[Figure 5] Korean input screen



[Picture 6] English input screen

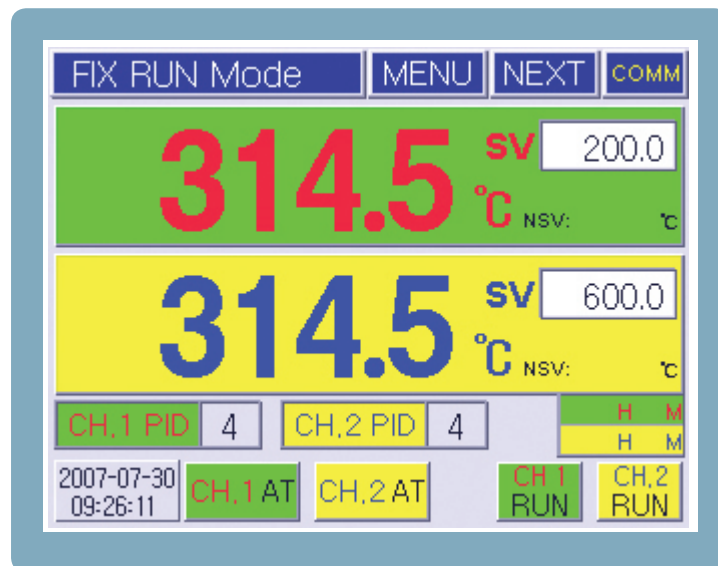


### 3.3 Name of operation screen

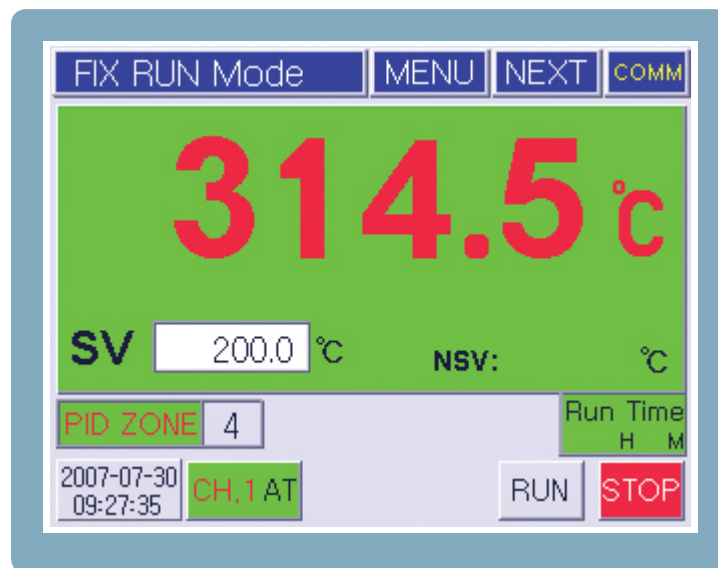


[Figure 7] 1st Screen for Fixed Control Operation (2 channel simultaneous operation mode)

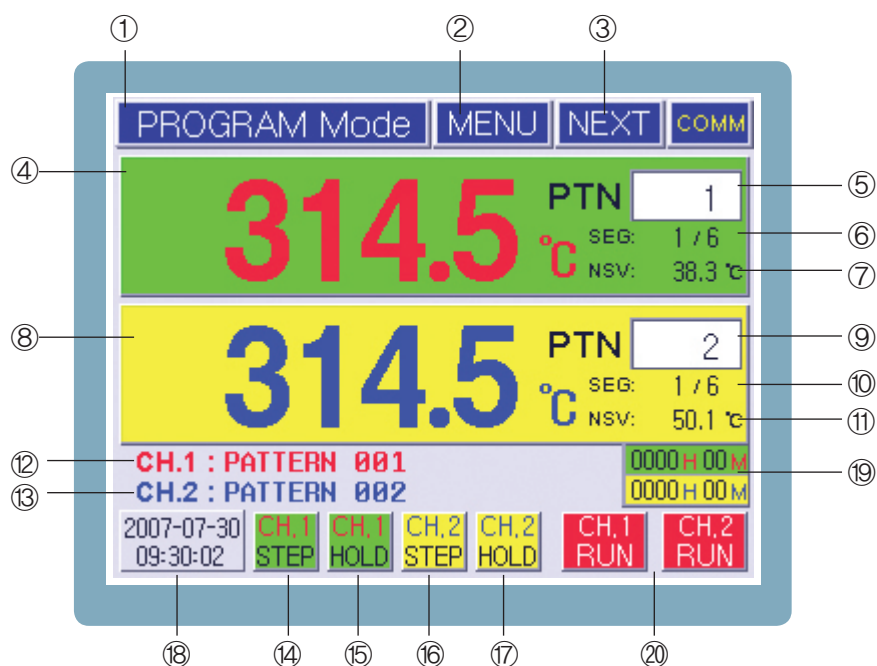
No.	Name	No.	Name
①	Current screen information	⑩	CH,1 PID zone input box
②	Menu button for function setting	⑪	CH,2 PID zone input box
③	Conversion button to next screen	⑫	CH,1 A,T button
④	CH,1 Process Value(PV) display	⑬	CH,2 A,T button
⑤	CH,1 Target Set Value(TSV) input box	⑭	Current Date / Time display
⑥	CH,1 Current target set value display	⑮	Operation progress time
⑦	CH,2 Process Value(PV) display	⑯	Operation Start button
⑧	CH,2 Target Set Value(TSV) input box	⑰	Operation Stop button
⑨	CH,2 Current target set value display		



[Figure 8] 1st Screen for Fixed Control Operation (2 channel separate operation mode)

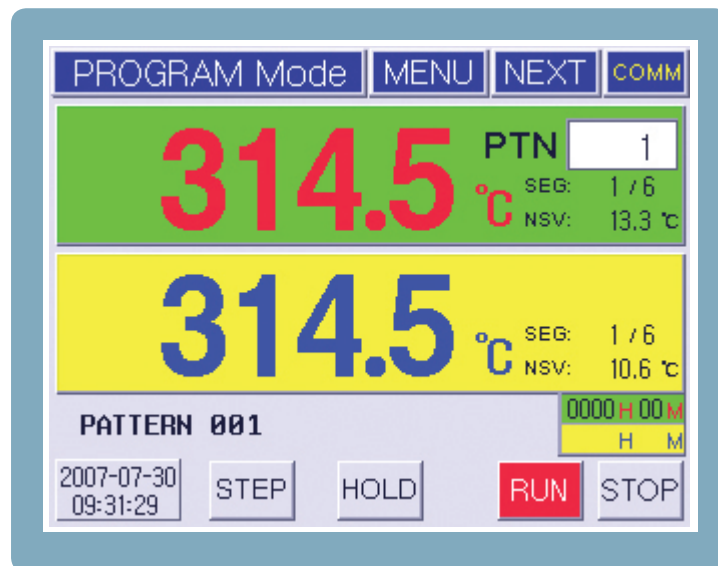


[Figure 9] 1st Screen for Fixed Control Operation (1 channel operation mode)

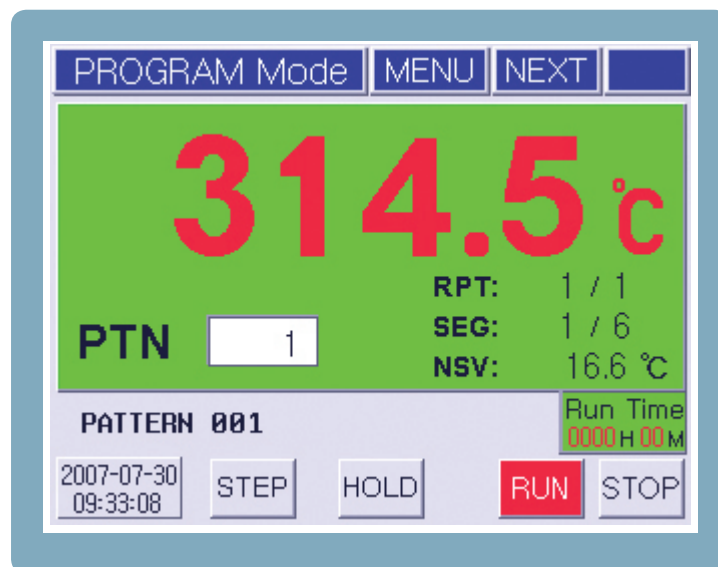


[Figure 10] 1st Screen for Program Operation (2 channel separate operation mode)

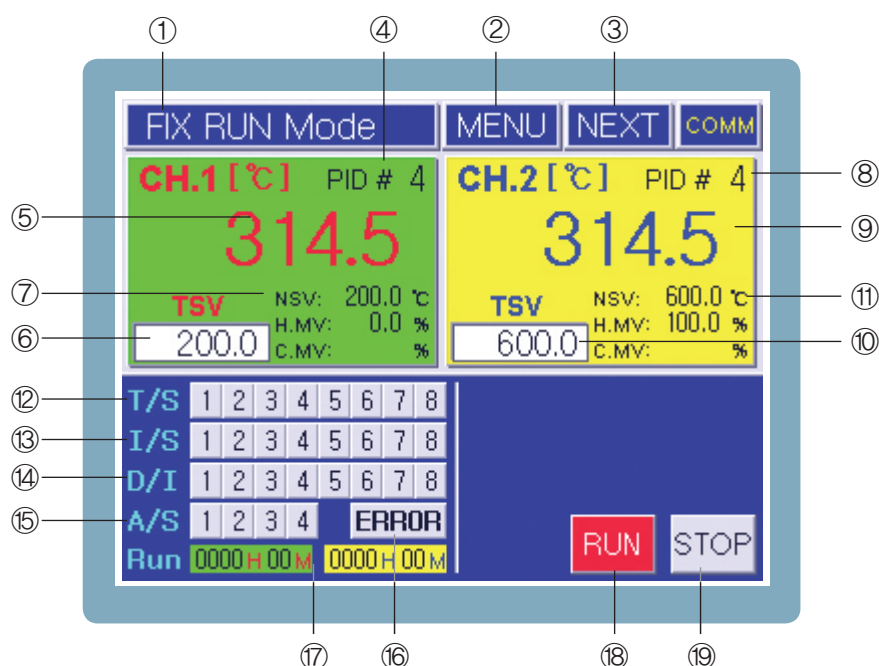
No.	Name	No.	Name
①	Current screen information	⑪	CH.2 Current target set value display
②	Menu button for function setting	⑫	CH.1 Operation pattern name
③	Conversion button to next screen (Move to 2nd operation screen)	⑬	CH.2 Operation pattern name
④	CH.1 Process Value(PV) display	⑭	CH.1 Step button
⑤	CH.1 Operation Pattern input box	⑮	CH.1 Hold button
⑥	CH.1 Operation Pattern Segment information (Current segment number / Total segment number of pattern)	⑯	CH.2 Step button
⑦	CH.1 Current target set value display	⑰	CH.2 Hold button
⑧	CH.2 Process Value(PV) display	⑱	Current Date / Time display
⑨	CH.2 Operation Pattern input box	⑲	Operation progress time
⑩	CH.1 Operation Pattern Segment information (Current segment number / Total segment number of pattern)	⑳	CH.1, CH.2 Operation button



[Figure 11] 1st Screen for Program Operation (2 channel simultaneous operation mode)



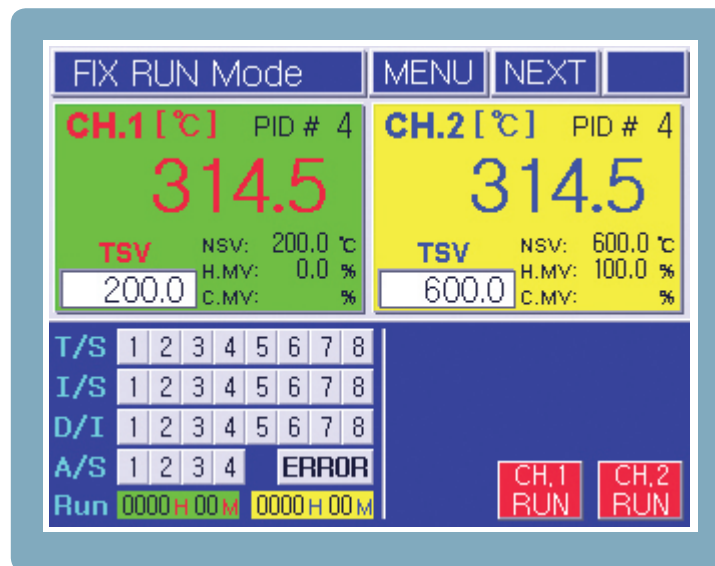
[Figure 12] 1st Screen for Program Operation (1 channel operation mode)



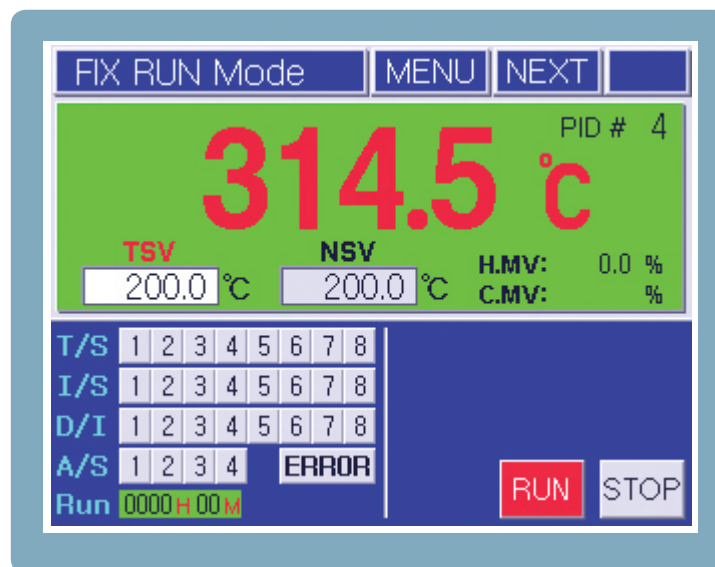
[Figure 13] 2nd Screen for Fixed Control Operation (2 channel simultaneous operation mode)

No.	Name	No.	Name
①	Current screen information	⑪	CH.2 Current target set value display and Control output value (H.MV, C.MV)
②	Menu button for function setting	⑫	Time signal status display
③	Conversion button to next screen (Move to 3rd operation screen)	⑬	Inner signal status display
④	CH.1 PID zone display	⑭	Contact input status display
⑤	CH.1 Process Value(PV) display	⑮	Alarm status display
⑥	CH.1 Target Set Value(TSV) input box	⑯	Error status display / Confirmation button
⑦	CH.1 Current target set value display and Control output value (H.MV,C.MV)	⑰	Operation progress time display
⑧	CH.2 PID zone display	⑱	Operation Start button
⑨	CH.2 Process Value(PV) display		Operation Stop button
⑩	CH.2 Target Set Value(TSV) input box		

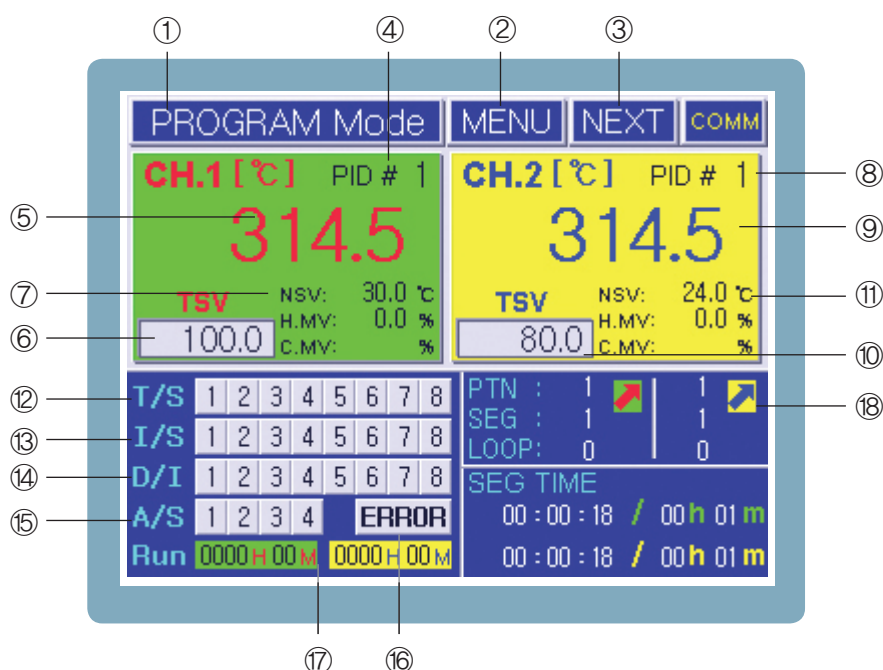




[Figure 14] 2nd Screen for Fixed Control Operation (2 channel separate operation mode)

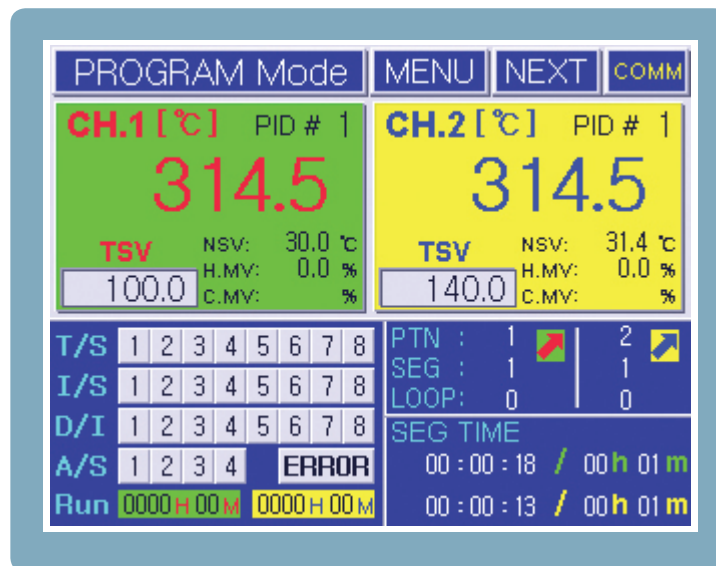


[Figure 15] 2nd Screen for Fixed Control Operation (1 channel operation mode)

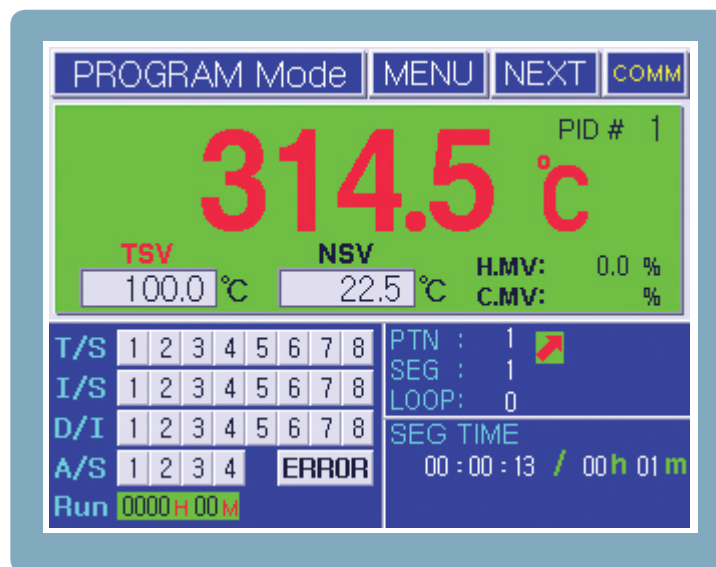


[Figure 16] 2nd Screen for Program Operation (2 channel simultaneous operation mode)

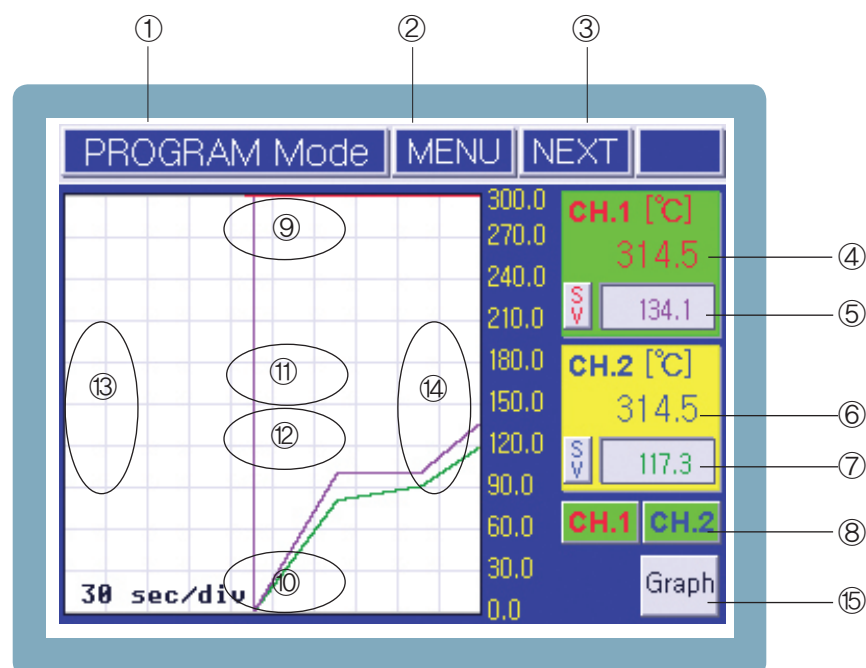
No.	Name	No.	Name
①	Current screen information	⑩	CH.2 Target Set Value(TSV) display
②	Menu button for function setting	⑪	CH.2 Current target set value display and Control output value (H.MV, C.MV)
③	Conversion button to next screen (Move to 3rd operation screen)	⑫	Time signal status display
④	CH.1 PID zone display	⑬	Inner signal status display
⑤	CH.1 Process Value(PV) display	⑭	Contact input status display
⑥	CH.1 Target Set Value(TSV) display	⑮	Alarm status display
⑦	CH.1 Current target set value display and Control output value (H.MV, C.MV)	⑯	Error status display / Confirmation button
⑧	CH.2 PID zone display	⑰	Operation progress time display
⑨	CH.2 Process Value(PV) display	⑱	Each channel program operation status display window (Pattern number, segment number, loop number, rising / holding / falling state, standby state, segment processing time)



[Figure 17] 2nd Screen for Program Operation (2 channel separate operation mode)

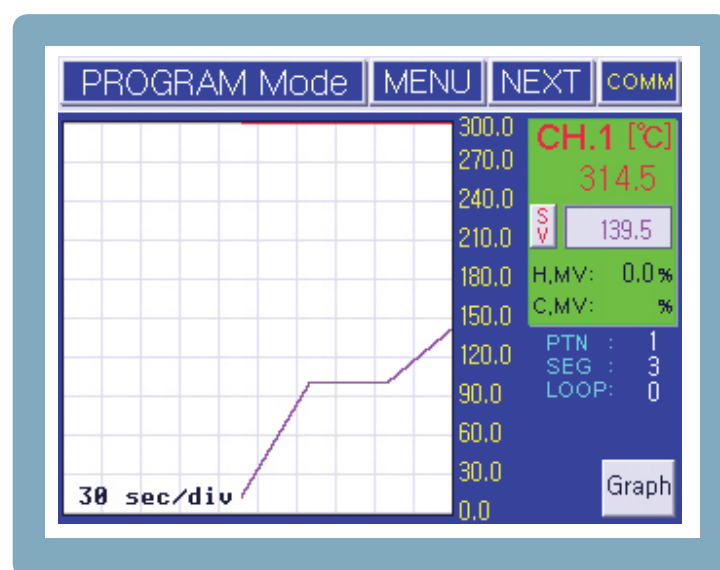


[Figure 18] 2nd Screen for Program Operation (1 channel operation mode)



[Figure 19] 3rd Screen for Program Operation (2 channels operation mode)

No.	Name	No.	Name
①	Current screen information	⑨	Hidden button for lifting screen
②	Menu button for function setting	⑩	Hidden button for descending screen
③	Conversion button to next screen (Move to 1st operation screen)	⑪	Hidden button for magnifying screen
④	CH.1 Process Value(PV) display	⑫	Hidden button for reducing screen
⑤	CH.1 Target Set Value(TSV) display	⑬	Hidden button for descending screen
⑥	CH.2 Process Value(PV) display	⑭	Hidden button for increasing time axis
⑦	CH.2 Target Set Value(TSV) display	⑮	Button for moving to graph setting menu
⑧	Channel selection button		

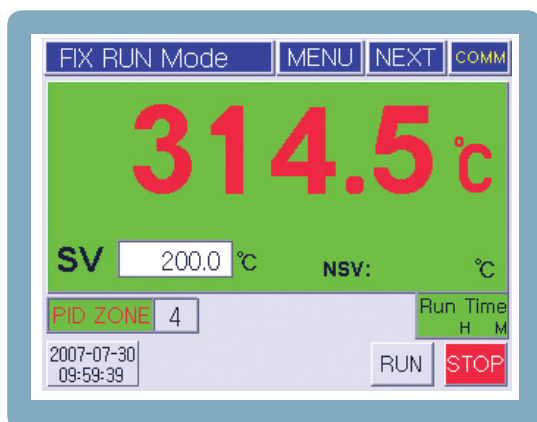


[Figure 20] 3rd Screen for Program Operation (1 channels operation mode)

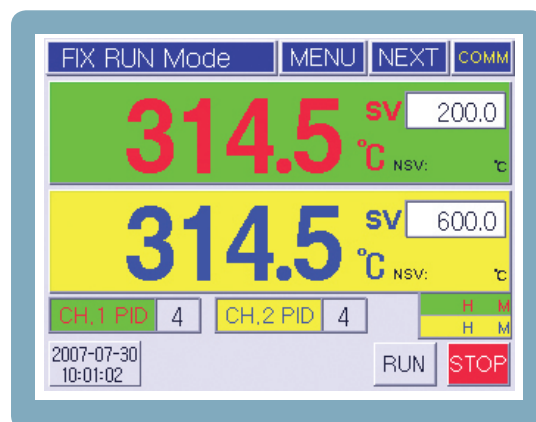
## 3.4 Fixed Control Operation

Fixed Control Operation controls the temperature at certain set value (SV).

### 3.4.1 Select Fixed Control Operation



[Figure 21] 2st Fixed Control Operation Screen



[Figure 22] 2st Fixed Control Operation Screen

- Start Operation : After inputting the set value (SV) for each channel at Fixed Control Operation Screen, when [RUN] is pressed, the operation commences after verification. LED light flashes to indicate that it's in operation at this time. (At the operation mode of each channel, the RUN button is in toggle form).
- Stop Operation : When [STOP] button is pressed during operation, the operation stops after verification.
- Start Operation : After inputting the set value (SV) for each channel at Fixed Control Operation Screen, when [RUN] is pressed, the operation commences after verification. LED light flashes to indicate that it's in operation at this time. (At the operation mode of each channel, the RUN button is in toggle form).
- Stop Operation : When [STOP] button is pressed during operation, the operation stops after verification.

When selecting the Fixed Control or the program, pressing the [MENU] button (in stop mode) displays the screen for function setup menu.

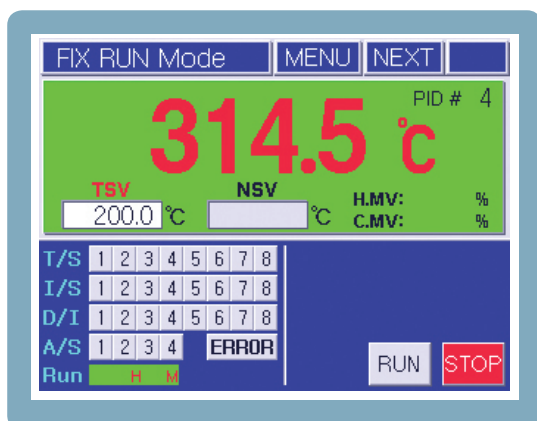
Press [RUN SETTIN] button on this screen to move to RUN SETUP1 screen, then make selection in RUN METHOD.

During fixed control operation, if the set value (SV) is altered, the applied PID GAIN is automatically adjusted according to the set value. At automatic selection setting, if a certain PID GAIN value needs to be used, after setting the PID ZONE selection to manual, input the PID ZONE numbers directly. (When setting up this product for the first time, the PID GAIN must be set for each zone, and in order to do this, the auto tuning procedure must be performed. At this time, the PID menu must be set, for A/T button to appear on the screen. Also, the auto tuning is possible only at fixed control operation mode. When auto tuning is finished for each zone, it is advisable to make adjustment, so A/T button is not displayed on the operation screen).

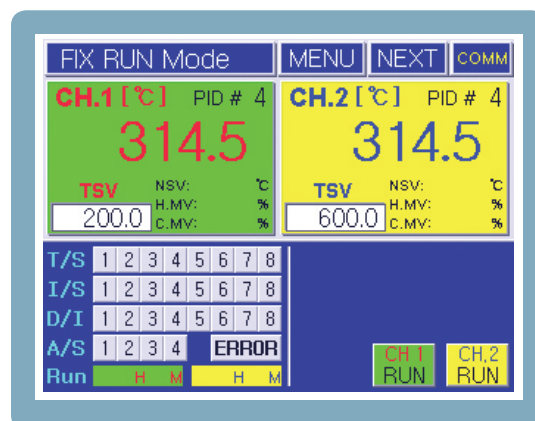


### 3.4.2 Screen 2 for Fixed Control Operation

The status for each signal is shown on screen 2 of fixed control operation.



[Figure23] 2nd control screen of the control system  
(1 channel only mode)



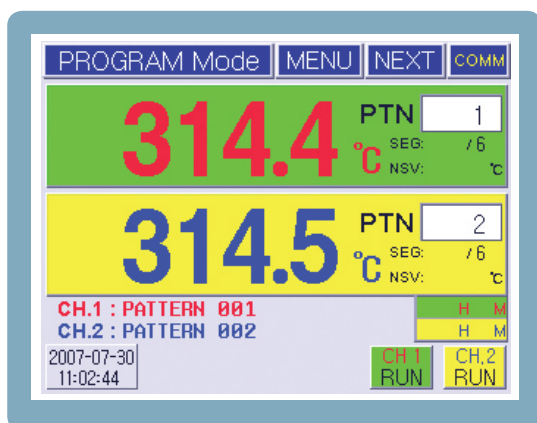
[Fig.24] 2nd control screen of the control system  
(2-channel individual operation mode)

## 3.5 Program Control Operation

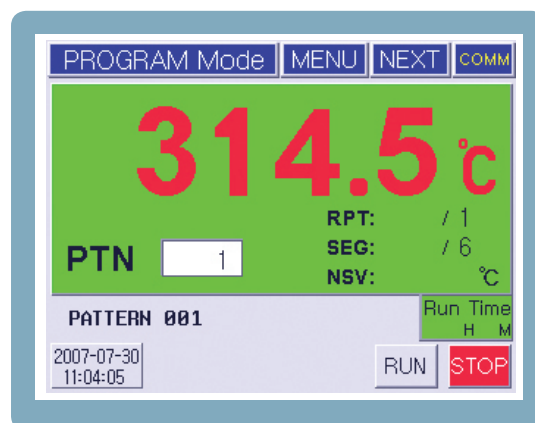
The program control operation is the operation that changes the intended value (SV) with time and achieving the wanted pattern of operation. The user pre-programs the wanted operation pattern, and when running, the pattern number is selected, and starts to run at program mode.

### 3.5.1 Select Program Control Operation

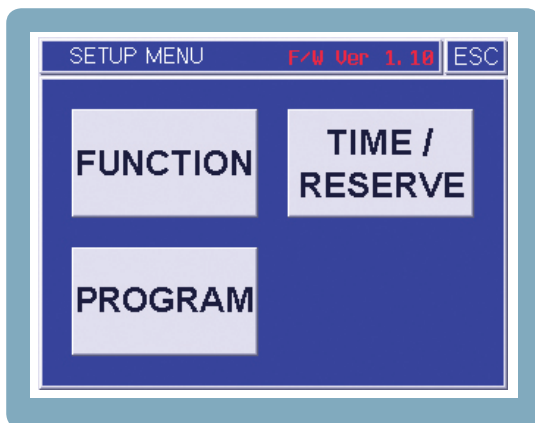
In order to run on program control, press [MENU] on the operation screen (while stopped) to enter the MENU screen. Then press [RUN MODE] to enter the operation selection screen, and select the operation to [PROGRAM].



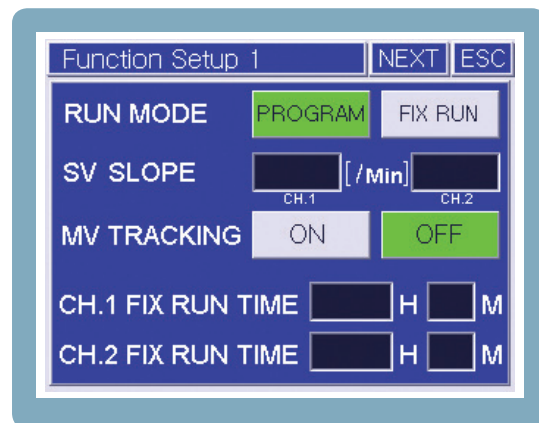
[Figure 25] Program control 1st operation screen  
(2-channel individual operation)



[Figure 26] Program control 1st operation screen  
(1 channel only mode)

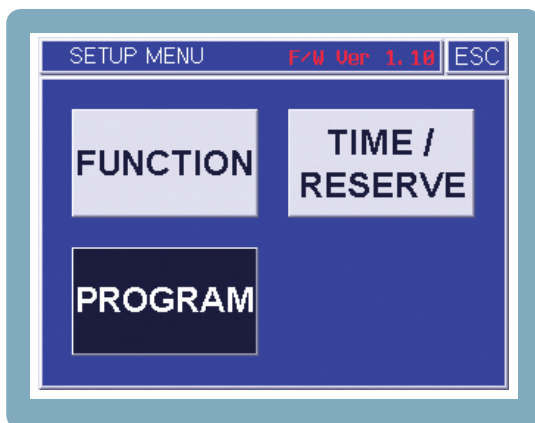


[Figure 27] Function setting menu screen

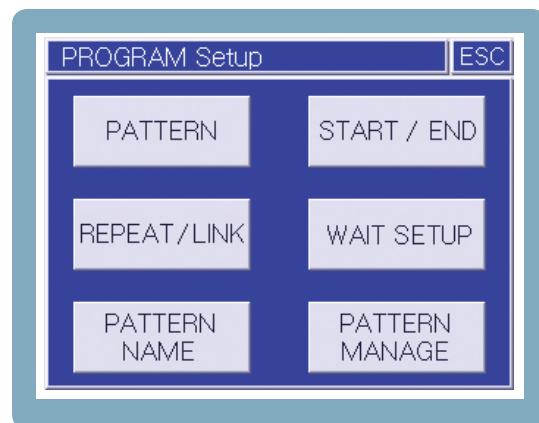


[Fig.28] Operation Setup 1st Screen

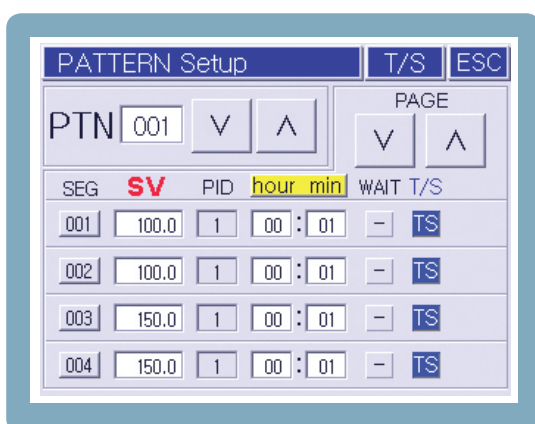
### 3.5.2 Program Setup



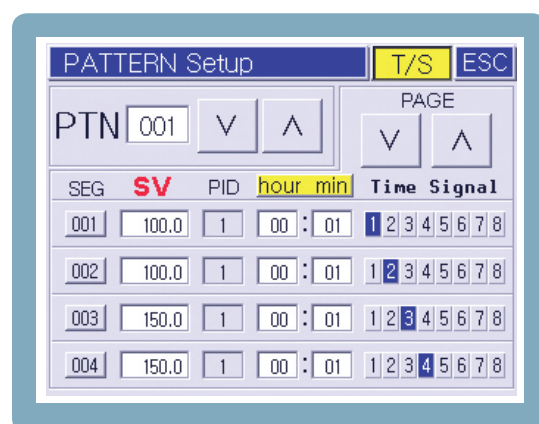
[Figure 29] Function setting menu screen



[Figure 30] Program setting menu screen



[Figure 31] Pattern setting screen  
(2-channel individual operation)



[Figure 32] Pattern setting screen  
(1 channel only mode)

SEG	SV 1	SV 2	hour	min	WAIT	T/S
001	100.0	80.0	00	01	-	TS
002	100.0	90.0	00	01	-	TS
003	150.0	130.0	00	01	-	TS
004	150.0	140.0	00	01	-	TS

[Figure 33] Pattern setting screen  
(2ch simultaneous operation)

SEG	SV 1	SV 2	hour	min	WAIT	T/S	Time Signal
001	100.0	80.0	00	01	-	TS	1 2 3 4 5 6 7 8
002	100.0	90.0	00	01	-	TS	1 2 3 4 5 6 7 8
003	150.0	130.0	00	01	-	TS	1 2 3 4 5 6 7 8
004	150.0	140.0	00	01	-	TS	1 2 3 4 5 6 7 8

[Figure 34] Pattern setting screen  
(2ch simultaneous operation mode)

Press [PATTERN SETUP] button at program setup menu to move to program pattern setup screen. Pattern consists of 'segments'. With each segment, various specific settings are carried out. The maximum number of segments for each pattern is limited to 100, and the maximum number of loops contained in one pattern is limited to 20. (These limits can be extended by pattern repeats and repeated operation).

LOOP	Start SEG	End SEG	REPEAT
01	001	002	002
02	003	004	010
03			
04			

[Figure 35] Pattern repeat and partial repeat  
loop setting screen

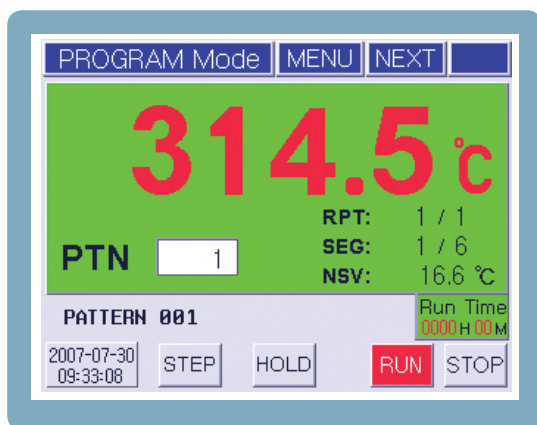
WAIT RANGE ± 1.0 [°C]

MAX WAIT TIME --- hour --- min

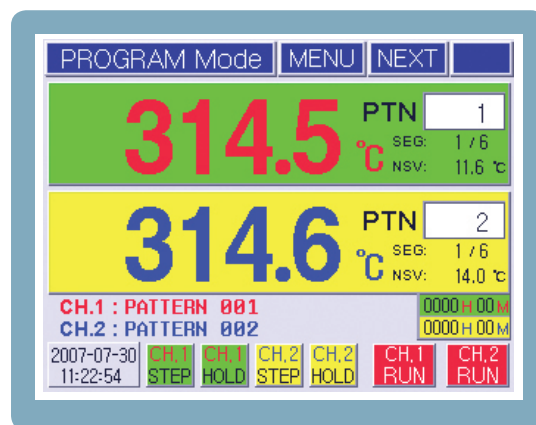
[Figure 36] Standby mode setting screen

The start of the operation in program mode starts from the PV at the time of the start (when PV2 is set). If wanting to start at particular SV, set the start mode to SSV, input the start value, then run. PV1 is the start for mostly with slope. That is the number 1 segment time can decrease, based on the slope between the SSV and the number 1 intended segment value.

The program mode operation is carried out from number 1 segment in order. When the end segment is set, after corresponding segment is executed, it is forced to exit. The exit mode for program operation can be selected with the RST or the HOLD.



[Figure 37] Program control 1st operation screen  
(1 channel only mode)



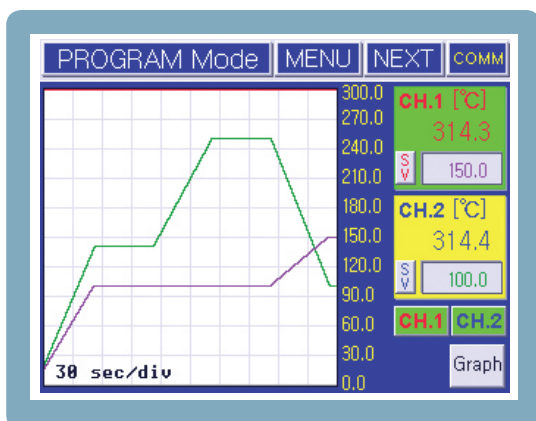
[Figure 38] Program control 1st operation screen  
(2-channel individual operation mode)

When the program controlled operation starts, the **STEP** **HOLD** buttons are indicated as the above figure, and it controls the segment processing for each channel.

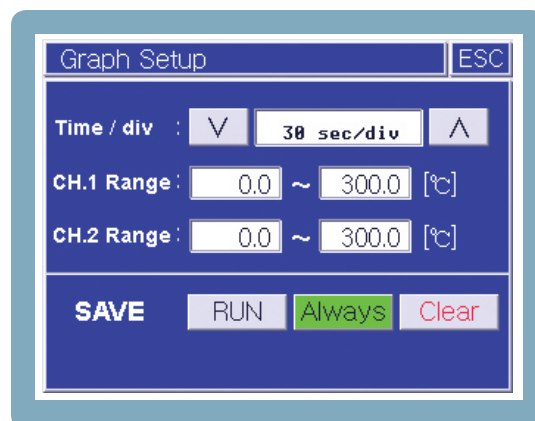
	Function
<b>STEP</b>	Stop the current segment processing and move onto the next segment. If in wait/hold status, cancels the corresponding operation, and move one to the next segment.
<b>HOLD</b>	Stop the segment processing (time stop) and maintain the current status.

## 3.6 Graph indication and Setup

The graph indicator screen displays the set value (SV) and process value (PV) on graph.  
The X-axis is the time and the Y-axis is the temperature range.



[Figure 39] Graph display screen

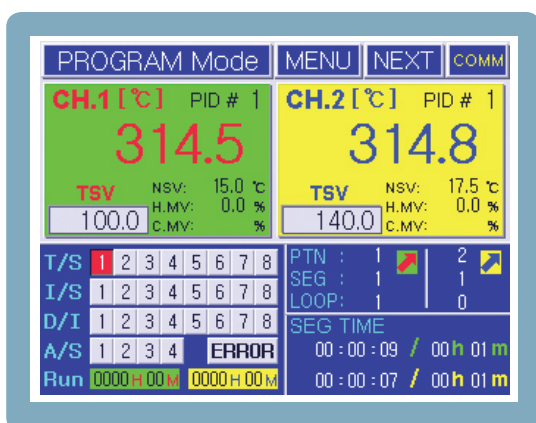


[Figure 40] Graph setting screen

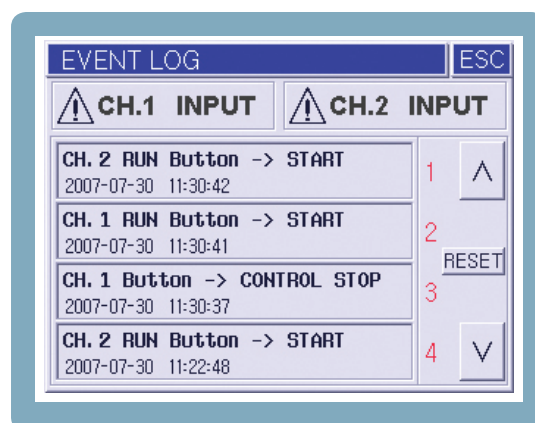
If you press **Graph** button at the bottom right of the screen, detailed graph setting is possible.  
In the graph setting, set time from X-axis and set the maximum and minimum ranges from the Y-axis and set the storage operation status (running, always, initialized) and save cycle (seconds).

## 3.7 Errors and Indicators for Various Events

The program and fixed control operation screen 2 indicates the specific operation status.



[Figure 41] Program control 2nd operation screenscreen



[Fig.42] Event history display screen

The error caused by sensor disconnection or through input (DI) on external connection point, can be checked by pressing the [ERROR] button on the bottom of the operation screen 2 (in case of errors, automatically goes to this screen). Operations start/end, power input and other events can be also checked. (Up to 40 events are automatically stored).

# 4 Screen Layouts

The whole screen layout is composed of two parts, the Operation screen and the setup screen.

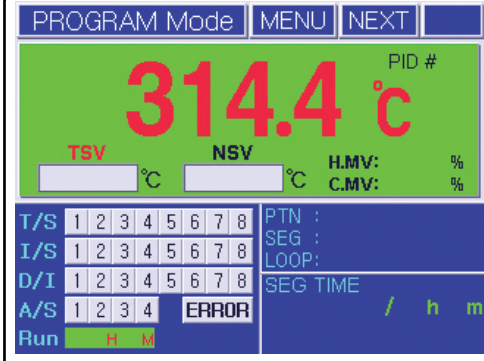
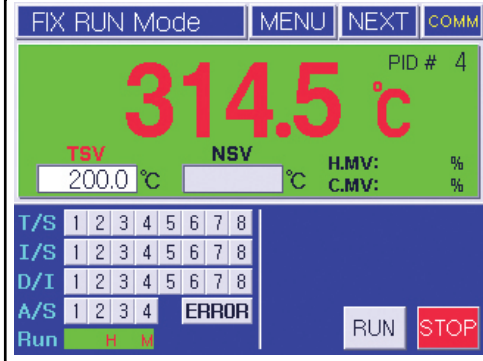
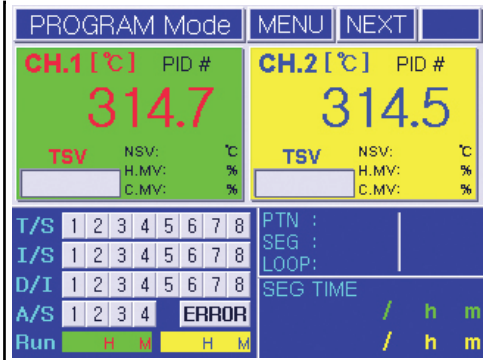
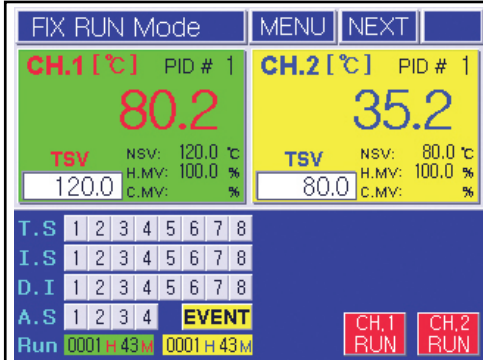
## 4.1 Operation Screen

– 1st driving screen

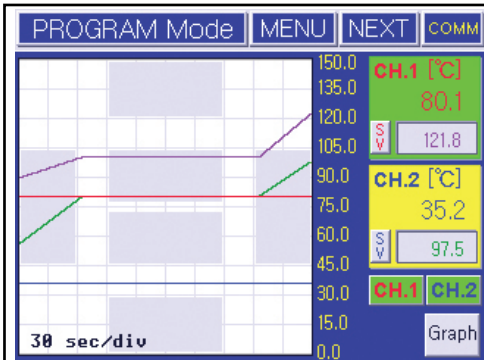
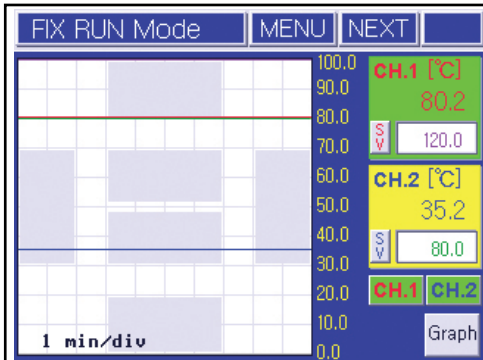
Channel	Program Mode	Fix Run Mode
1 channel only		
2 channels simultaneous operation		
2-Channel Individual Operation		



– 2nd operation screen (status display screen)

Channel	Program Mode	Fix Run Mode
1 channel only		
2-Channel Individual Operation		

– 3rd operation screen (graph display screen)

Channel	Program Mode	Fix Run Mode
2 channel operation		

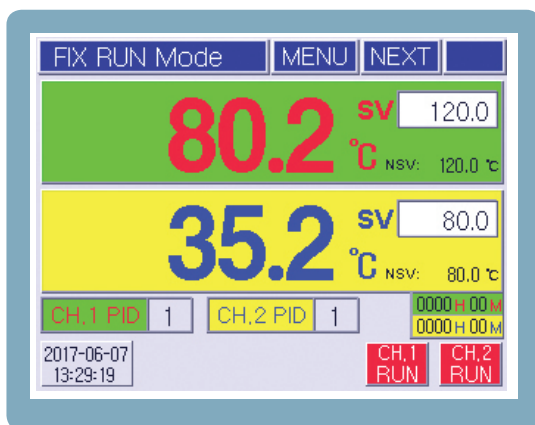
When the power is turned on, the logo screen is displayed briefly and then the operation screen is displayed.

If you press the button on the bottom right of the 3rd / 4th operation screen, the graph setting screen appears, and you can set the time axis value, temperature range, data storage time, and whether to use external storage device. (Only the model with RS232 communication port is enabled in the menu of using external storage device.)

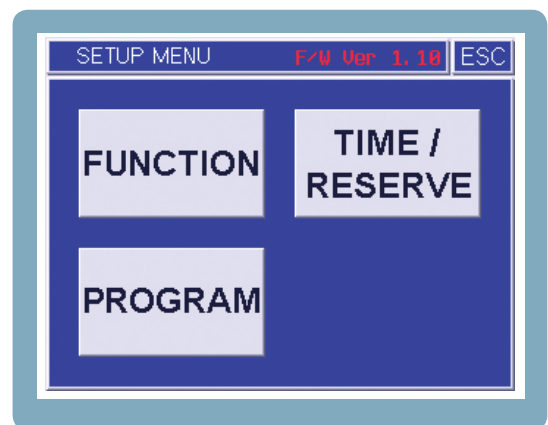
The operation screen shows the current PV, operation SV, control output (MV), operation time, input / output status of various signals, operation pattern number, segment number, segment time, / SV graph, etc. are displayed, The run / stop button, step / hold button, and A.T button will appear. In addition, various status such as communication mark and USB memory recognition mark (when EM100 / EM300 is connected) are displayed.

## 4.2 Setup Screen

When the [MENU] button on the operation screen (at fixed control, and program 1, 2, 3) is pressed, the setup menu screen is displayed.



[Fig.43] Fixed control 1st operation screen  
(Individual operation mode)

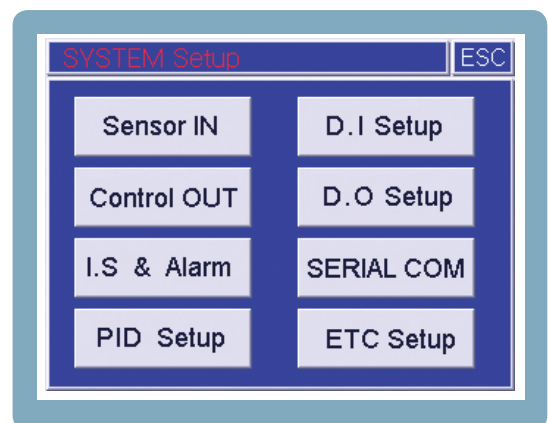


[Figure 44] System menu screen



[Setup menu screen] [Figure 44] You can set basic information.

If you press SETUP MENU on the upper part, you will go through the password check process and go to the System Setup menu screen [Fig. 45]. On the System setup menu screen, the system installer sets the basic information of the system, which may cause serious damage to the machine.



[Figure 45] System setup screen

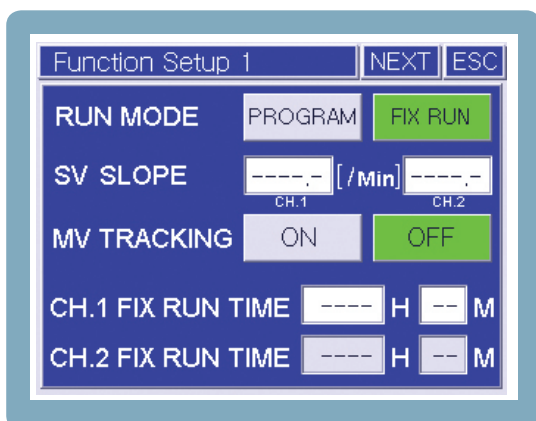


# 5 Function Setup

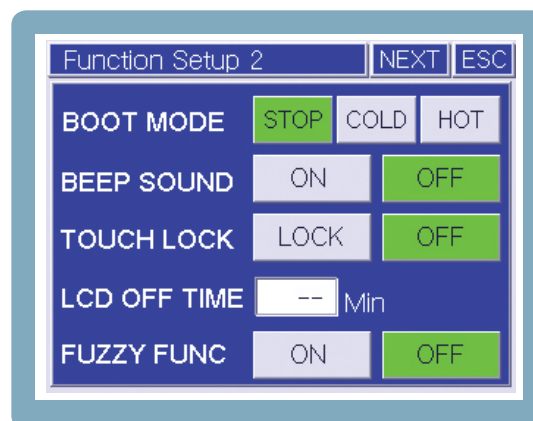
Pressing [MENU] button on the operation screen gets into setup menu where various parameters can be set.

## 5.1 Operation Setup

When [OPERATION SETUP] button is pressed on the function setup screen, the operation setup screen is displayed.

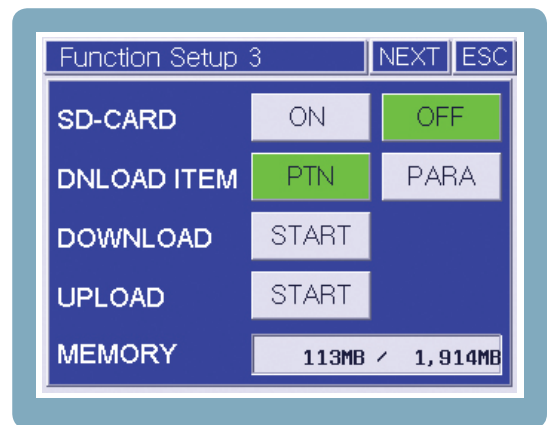
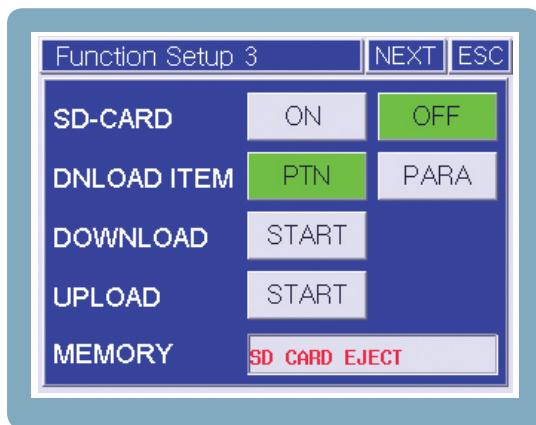


[Figure 46] Function Setup 1st Screen



[Figure 47] Function Setup 2nd Screen

- **Operation Type** : Program control or fixed control
- **Limit SV change rate** : used to prevent rapid SV changes during fixed control operation.
- **Limit MV change rate** :  
Setup when concerned about problems caused by rapid changes in controlled output. When it is set, the output rate is limited to 10 % per second (5 % per 0.5 sec).
- **Fixed operation time** : if this time is set, when the time expires during fixed control operation, the operation stops automatically.
- **Power-out Handling** : If power goes down and recovers, the type of operation is set.  
STOP → Operation stopped state, COLD → Control from beginning, HOT → control from the stopped point
- **Buzzer Setup** : Touch sound, ON/OFF
- **Touch Input Lock** : When set, only [MENU] and [NEXT] respond. Prevents mistakes.
- **Automatic Screen Power Down** : To preserve lifespan of LCD and BACK LIGHT, when there are no inputs for certain period of time, the screen powers down automatically. (Does not affect the operation)
- **Purging** : Suppresses over shoot.  
(Time taken to reach the intended value delays)



[Figure 48] Function Setting Screen 3 (TD300 only)

#### – Save SD card

When the SD card storage parameter is selected, the data (PV, SV) is saved to the SD card in real time during operation. The save cycle is operated according to the saving cycle of graph and save setting screen.

#### – Downloads

You can back up patterns or parameters on the SD card.

#### – Download

When you click Run, the information selected in the Downloads section (Pattern or parameter) The file is saved on the SD card. When the operation is in progress, the Execute button lights up in green.

#### – Upload

Click Start to display a list of files in the SD card, depending on the settings (pattern or parameters) selected in the download item.

If you select the appropriate file, it is uploaded files to the product.

If the upload is in progress, the Start button turns green.

#### – Memory

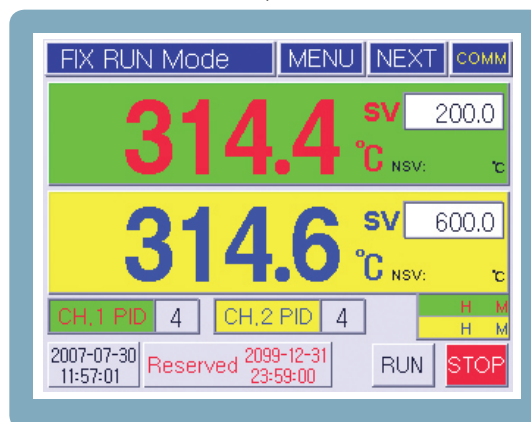
Displays the capacity of the SD card (used capacity / total capacity).

## 5.2 Time/ Timer Setup

Setup system date and time. When the timer is set for operation, the [TIMER SET] light comes on (this light goes off during operation). If stopped when the timer is activated at the set time, the operation automatically starts. (This does not mean it does self-power. Power must be on).



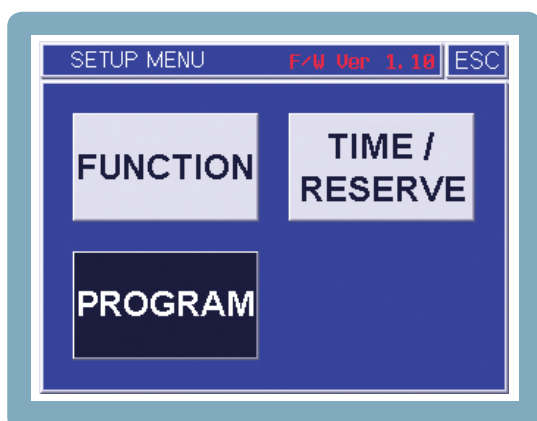
[Figure 48] Time setting menu screen



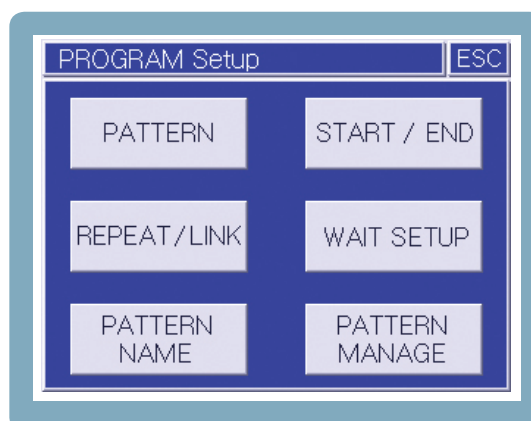
[Figure 49] 1st control screen of the control system  
(2-channel simultaneous operation mode)

## 5.3 Program Setup

Press [PROGRAM] button on the setup menu screen to enter program setup screen.



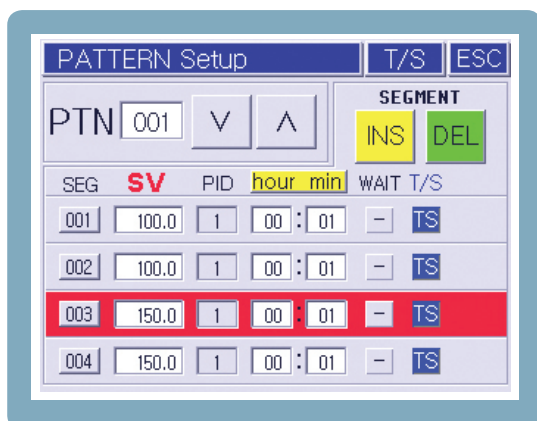
[Figure 50] Function setting menu screen



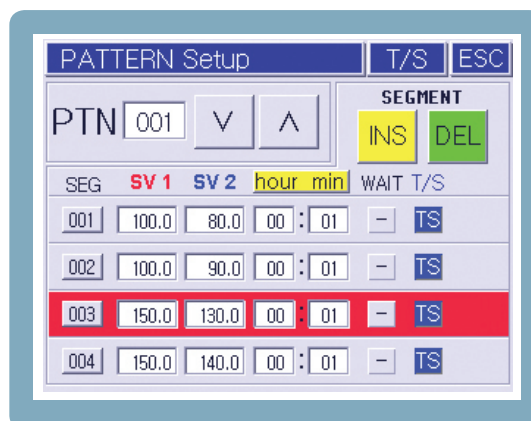
[Figure 51] Program setting menu screen

### 5.3.1 Pattern Setup

Press [PATTERN SETUP] button on the program setup screen to enter the detailed segment setup screen (segments compose the pattern). The program control is performed in accordance to the content and the order of segment settings made here.



[Figure 52] Segment information setting screen in pattern

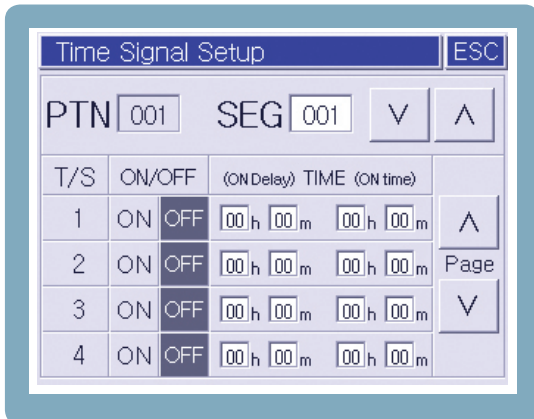


[Figure 53] Program setting screen  
(In 2-channel simultaneous operation mode)

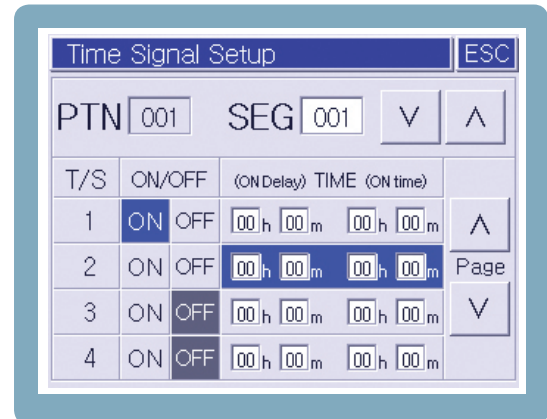
(In 2-channel independent operation or 1-channel dedicated mode)

- Additional segments are generated when empty space is pressed.
- To insert/delete segments, press segment number, it activates the segment and allows insert/delete.
- Press [T/S] button to display time signal setting in detail for each segment.
- Press WAIT box for each segment to activate/deactivate the standby.
- Press T/S box for each segment to enter the time signal setup screen for the corresponding segment.

## –Time signal setup



[Figure 54] Time signal setting screen

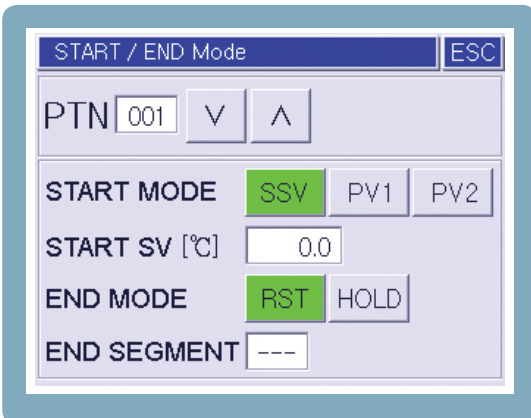


[Figure 55] Time signal setting screen

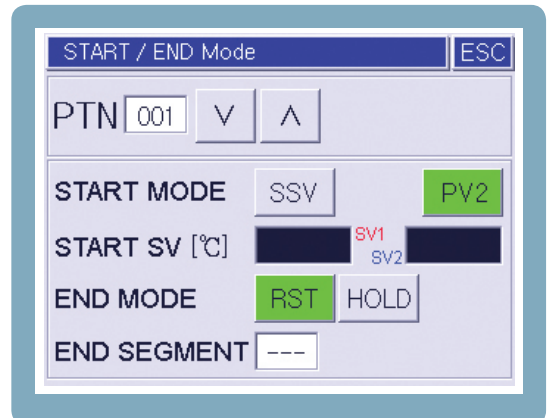
- The operation mode of the time signal is divided into two types, "segment ON / OFF mode" and "time operation mode"

Time signal (T.S) signal output in the time operation mode is limited within the segment time.

## 5.3.2 START/END Setup



[Figure 56] 2-Channel Individual Operation  
or 1 channel only mode



[Figure 57] 2-channel simultaneous operation mode

Setting item		Contents
pattern	<input type="text" value="001"/>	<input type="text" value="001"/> Press the window directly, <input type="button" value="v"/> or <input type="button" value="^"/> use the buttons to select a pattern
Start mode	<input type="text" value="SSV"/>	Regardless of the indicated value, operation of segment 1 starts from the unconditionally set start SV.
	<input type="text" value="PV1"/>	Slope priority. Begin with the current PV (PV) by default. – If the indicated value is below the starting SV, start from the starting SV. – If the indication position is between the starting SV and the TSV of the 1st segment, the 1st segment operating time is automatically reduced to maintain the slope corresponding to the starting SV and TSV of the 1st segment, Start. – If the indicated value position is above the starting SV and the TSV of the 1st segment, abort the 1st segment operation and start the 2nd segment operation immediately. (It starts from the TSV of the 1st segment.)
	<input type="text" value="PV2"/>	Time first. Operates during the operating time of segment 1 set by the user from TSV of segment 1 to the indication value (PV) at the start of program operation and goes to segment 2.
Start SV	<input type="text" value="RST"/>	Setting value at SSV or PV1 start
End mode	<input type="text" value="HOLD"/>	RST (operation stop at program end), HOLD (automatic transition to hold status at the end of program)
End Segment	<input type="text" value="---"/>	The last segment number to be driven (0 means the last segment is set)

### 5.3.3 Repeat Pattern/Connection Setup

Press [REPEAT/CONNECT] button on the program setup screen to enter the REPEAT/CONNECT setup screen.

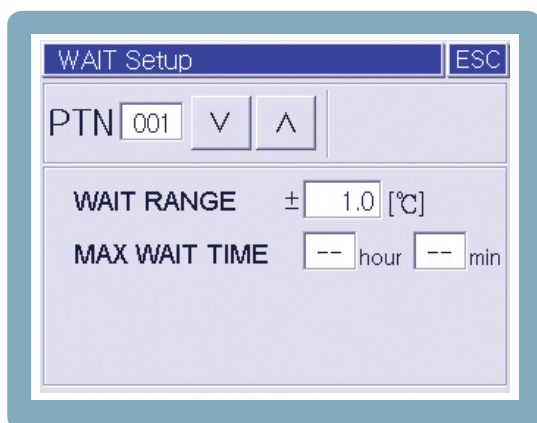
LOOP	Start SEG	End SEG	REPEAT
01	001	002	002
02	003	004	010
03			
04			

- Pattern Repeat : Setup number of pattern repeats. Default : 1
- Connect Pattern : Number for the pattern for connection. (If 0, no connect operation)

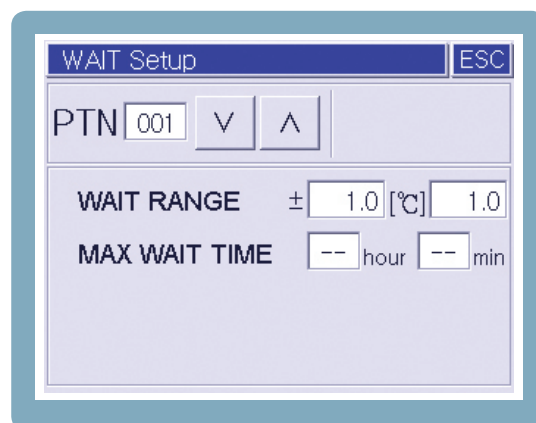
Basically, although the program executes the segments in the corresponding pattern sequentially, at times the particular segments are set in the pattern repeatedly. At these times, if the part-repeat functionality is used, the program input can be minimized. The part-repeat loop in the pattern can be set at maximum, 20. If part repeat is not set, the segments inputted in the patterns are sequentially executed, and if the loop is set, then the execution starts at segment 1, until the segment number for the first loop is encountered, the loop is executed. Afterwards, when the last loop is complete, the program is executed from the next segment number until the last segment of the pattern.

### 5.3.4 Standby Mode Setup

Press [STANDBY MODE] in the program setup screen to enter the standby setup screen.



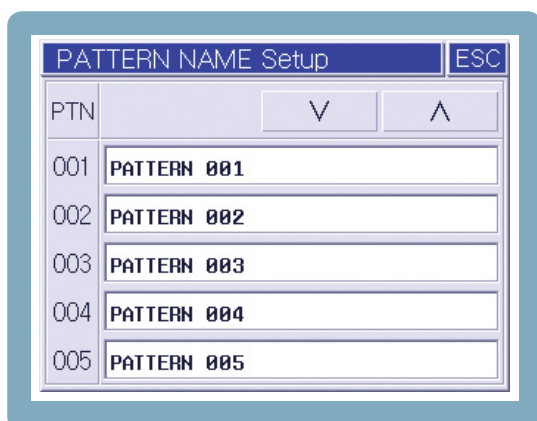
[Figure 59] 2-Channel Individual Operation  
or 1 channel only mode



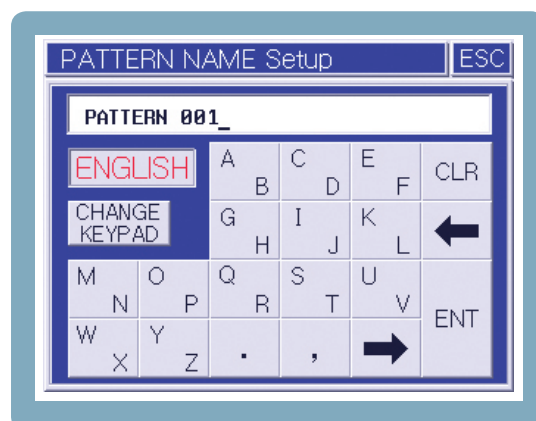
[Figure 60] 2-Channel simultaneous  
operation mode

When the 'standby' mode is activated, check whether PV had come into the 'standby' range at the time of segment change, and if the 'standby' range is not entered, it'll wait until the maximum time for 'standby' is expired. When the maximum 'standby' time is expired, it goes over to the next segment by force. (When 0 is set, 'standby' without time limit).

### 5.3.5 Pattern name setting

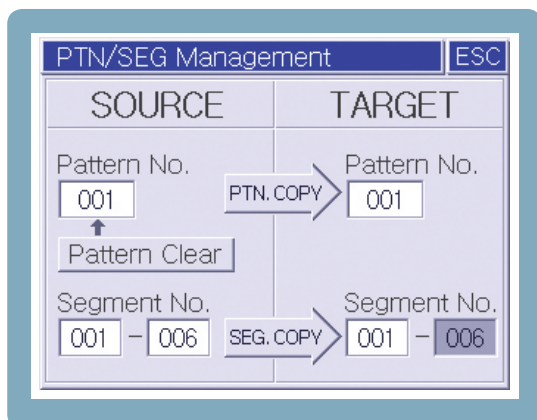


[Figure 61] Pattern name setting screen



[Figure 62] Character input screen

### 5.3.6 Pattern management



[Figure 63] Pattern / Segment management screen

When entering similar operation patterns, you can shorten the time by entering one pattern and then enter the remaining patterns by copying and editing.

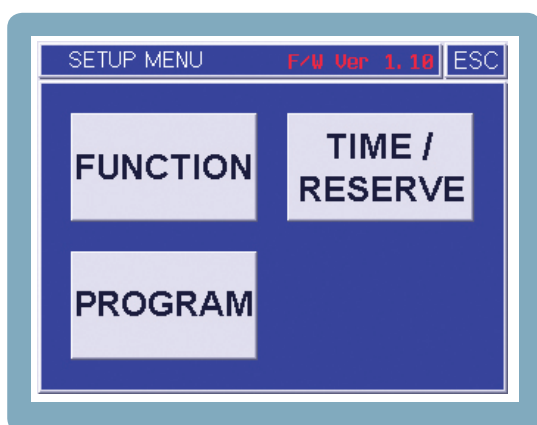


# 6 System Setup

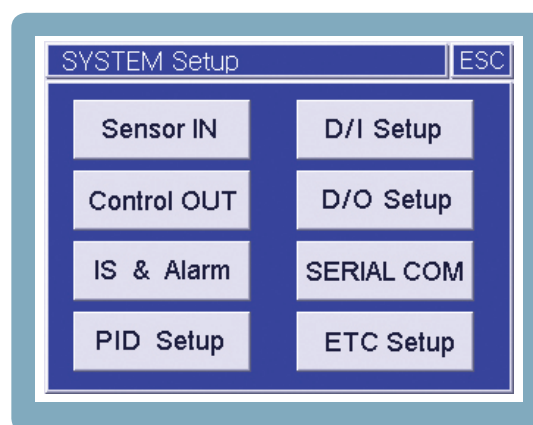


Care must be taken when changing system setup. System setup is pre-set by the system installer, it is the basic condition of this instrument.

Press [MENU] on operation screen, and menu screen is displayed. Press <Function Setup> at the top on the text. It performs the password verification process and the setup menu is displayed



[Figure 64] Function setting menu screen

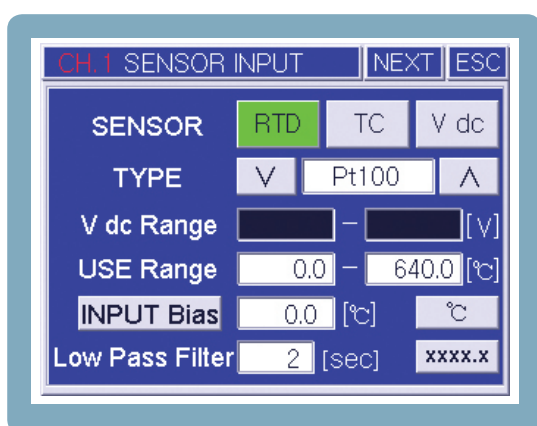


[Figure 65] System setting menu screen

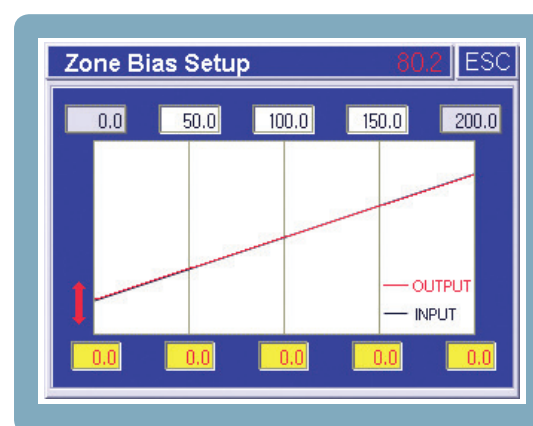
## 6.1 Sensor Input Setup

This product (TD500/TD300) supports variety of input types. Therefore, in order to use this instrument, the input setting must be performed. (Set by the system installer).

Press [SENSOR INPUT SETUP] button in system setup screen to enter sensor input setup screen.



[Figure 66] Sensor input setting screen

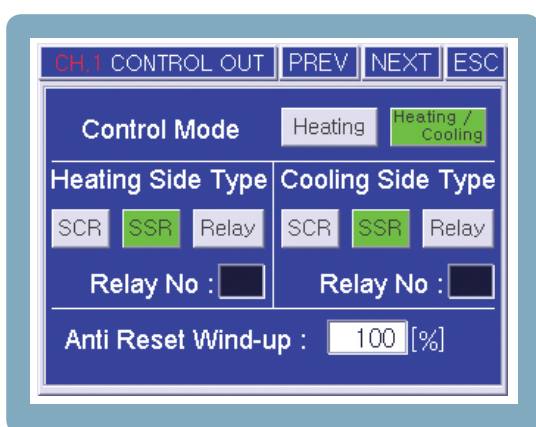


[Figure 67] Compensation screen for each section

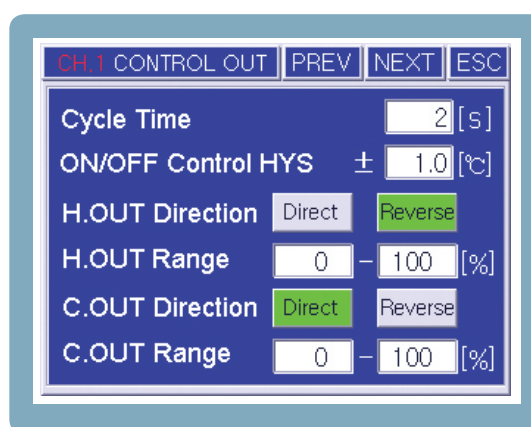
- Sensor type : Select signal input type.
- Specific type : Select specific type for each input type.
- V dc input range : When inputting voltage signal, setup affective range that will be used.  
(Restrict to 0 – 10 V ranges)

- Usage Range : Setup temperature range, used during signal input. (SV setup is restricted)
- Input Compensation : When the product is shipped, it is adjusted to precision with error margin within 0.1 %. However, in case of imprecision during simultaneous use with other instruments, the input temperature can be increased/decreased by force within the range of  $\pm 100$  °C.
- Filter Setup : If severe noise is present in the sensor signal system, and measured values are inconsistent, then suitable filtering time should be set.  
(Higher this value, the prompt control become difficult).

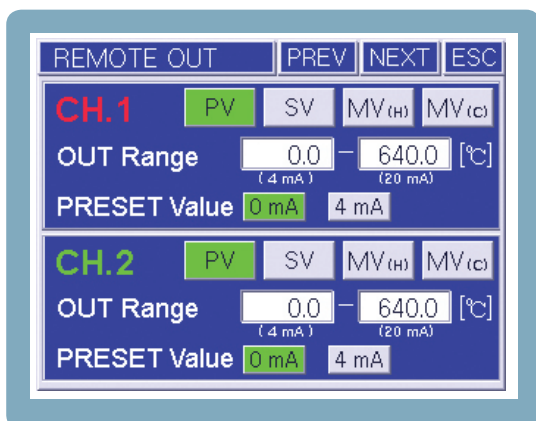
## 6.2 Control/Transmission Setup



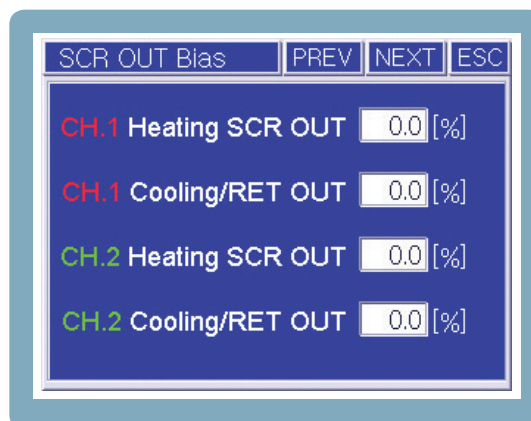
[Figure 68] Control output setting screen 1



[Figure 69] Control output setting screen 2



[Figure 70] Transmission output setting screen



[Figure 71] Current Output Bias Setting Screen

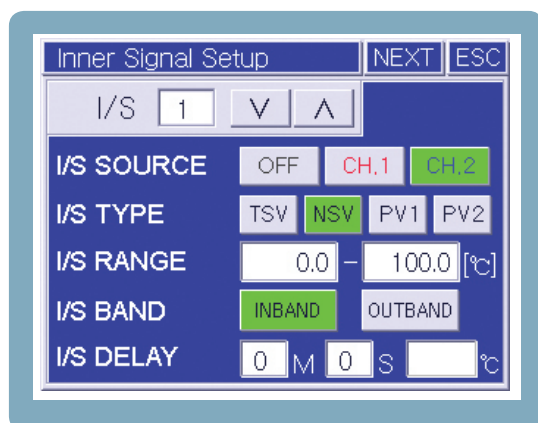
- Control Mode : Heating control, heating/cooling control selection
- Control output type : SCR, SSR, RELAY Selection.  
(When relay is selected, relay number selection box is activated).
- Anti Reset Wind-up : Range setup to prevent overloading.  
(Setup in P-BAND Percentage)
- Output Frequency : If control output type is SSR or RELAY (PID Control), PID control will be carried out in time ratio. Setup output frequency at this time.  
(Shorter the frequency, control performance is better, but can stress relay etc. Recommend SSR usage)



- ON/OFF Control Irresponsiveness : At ON/OFF control, setup output switch Irresponsiveness. If irresponsiveness is high, the control performance degrades, low irresponsiveness stresses the relay etc through frequent ON/OFF switching, and therefore a suitable value must be set.  
(If PID GAIN P-BAND value is 0, it operates in ON/OFF control mode).
- Heated Side Output Direction : Setup basic output direction. The heating side is by default, opposite direction, the cooling side is by default, right direction. If heat control is done by cooler etc, it could be necessary to change the output direction.
- Heated Side Output Range : Setup the limit for minimum output, maximum range.  
(The control output is automatically scaled to this range)
- Cooling side output direction : Opposite to the heated side output.
- Cooling side output range : Setup the limit for minimum output, maximum range.  
(The control output is automatically scaled to this range)
- Transmission Output Type : Setup transmission type for each channel. (PV, SV, H.MV, C.M.V)
- Temperature Output Range for Transmission Output : When outputting 4 – 20 mA of power, setup corresponding temperature range.
- Sensor Disconnection Output Setting : Setup transmission output value when sensor is disconnected. {Select 0 mA or 4 mA}.
- Fix Power Output : When the product is shipped, the power output of 4 – 20 mA is set with precision, however, in case of imprecision during simultaneous use with other instruments, the power output can adjusted within the range of  $\pm 5\%$ .

## 6.3 Inner Signal Setup

Time signal is used when certain signal generation is desired in relation to time during program mode operation. In contrast, inner signal is used when output signal accordance with the PV and SV values during operation, is desired. Mostly, in constant temperature and humidity, it is used mainly to control cooler, according to the range setting.

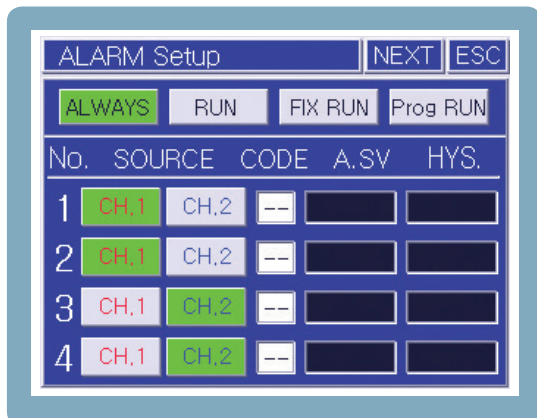


- Target I/S Setup : Select I/S signal originator.
- I/S type setup : Select I/S signal source.
- I/S operation range : Select range for signal generation
- I/S range direction : Select inclusive range and exclusive range.
- I/S Delay Time : Set I/S signal generation delay.  
If PV2 is the source, irresponsiveness value at I/S signal OFF.  
(Prevents frequent ON/OFF in coolers etc).

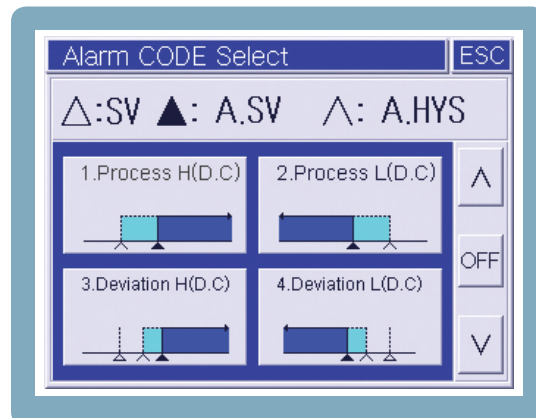
[Figure 72] Inner signal setting screen

## 6.4 Alarm Setup

Press [VS, ALARM SETUP] button on the system setup menu, and press [NEXT] button. Then the alarm setup screen is displayed.



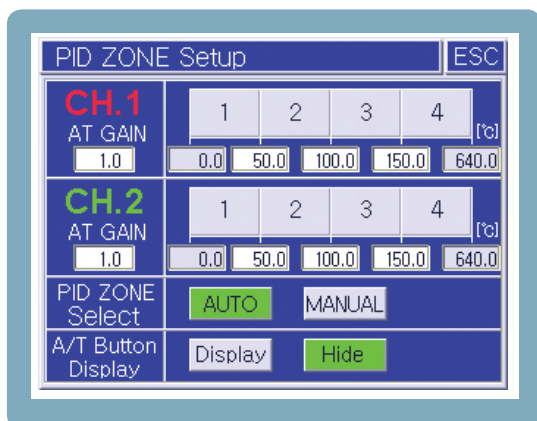
[Figure 73] Alarm setting screen



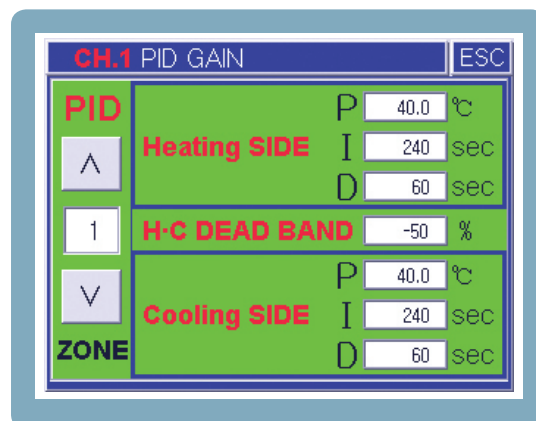
[Figure 74] Function code selection screen

- Select inspect on alarm condition : Select either always inspect or inspect during operation.
- Select alarm occurrence source : Select sources that trigger alarm.
- Select alarm code : Press box to display the screen for selecting alarm code (1 – 20).
- Alarm SV : Setup alarm setting. (Absolute or varied)
- Alarm irresponsiveness : Setup irresponsive alarm setting. Alarm OFF.

## 6.5 PID Setup



[Figure 75] PID setting screen

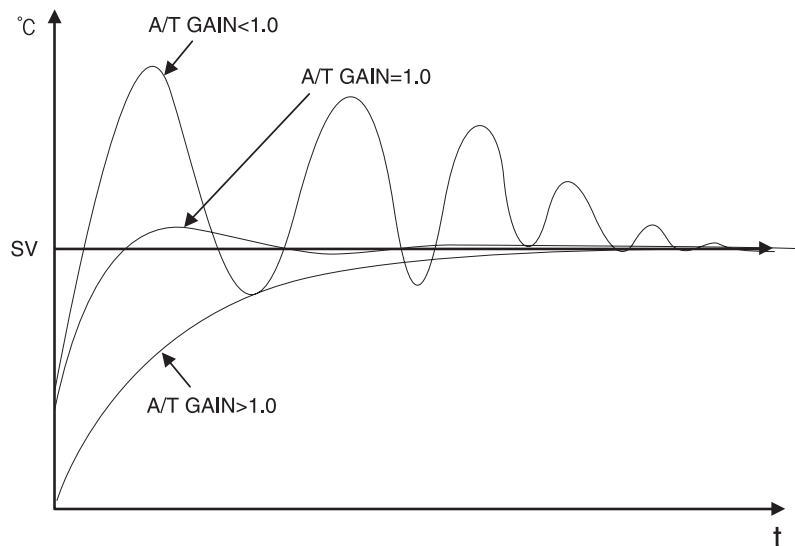


[Figure 76] PID Gain setting screen

The PID GAIN for this instrument is divided into 4 areas for each channel. For each area, setup limit is 3, so the optimal PID GAIN can be applied for control. (Is able to select either automatic or manual). PID GAIN of each area has setup values of P-BAND, I-TIME, and D-TIME. When controlling heating/cooling, the cooling side attains the above values separately. Also, when controlling heating/cooling in the setting DEAD BAND, more precise control is possible. When installing the system, divide the areas that will be in used, and perform auto tuning based on the mid point of each area.

The indication of A/T button is installed only during initial installation. When tuning is complete, to prevent end user errors, it is not displayed on the operation screen. Recommend auto select even for PD ZONE.

- **P-BAND** : If compared ratio is large, the control output for deviation is small, therefore the time taken to reach the set value is delayed. If compared ratio is narrow, then the control output is large, so the set value is reached faster, but the overshoot increases.
- **I-TIME** : Shows the integral time. Cannot prevent generation of deviation only by ratio control. To remedy this, the deviation is reduced by integral operation. If integral time is too long, the reflected ratio gets too small, and if integral time is short, the hunting generation increases.
- **D-TIME** : Shows the integral time. This is counter action against rapid change. Adjusts in accordance to the rate of change. Greater the differential time, stronger the adjustments.
- **DEAD BAND** : During heating/cooling control, setup the size of the output on the intersection of heating side and the cooling side. In order to improve controllability, it is recommended to setup so the heating and cooling are slightly overlapped. (Minus)
- **A/T GAIN** : When controlling using PD GAN value that is auto tuned, according to the user's preference (whether faster following is wanted, or slight overshoot is wanted in place of speed), adjust reflection ratio for differential/integral time. If less than 1, then response gets faster but overshoot increases and hunting gets worse. If greater than 1, the response is slower, but the overshoot and hunting reduces.



[Figure 77] A. Change of control characteristics according to T GAIN control (PV)

## 6.6 Inputs at Point of Contact (DI) Setup

8 point of contact input are provided, when error occurs, by default, operation stops. Also, each point of contact input has RUN/STOP and STEP, and HOLD functionalities, and each input can set operation stop, delay time.

D/I ACTION Setup			NEXT	ESC	
No.	ACT	WAIT	No.	ACT	WAIT
D/I 1	NO	-	D/I 5	NO	-
D/I 2	NO	-	D/I 6	NO	-
D/I 3	NO	-	D/I 7	NO	-
D/I 4	NO	-	D/I 8	NO	-

ERROR Input Active    RUN    Always

[Figure 78] Main screen

D/I ACTION Setup			NEXT	ESC	
No.	ACT	WAIT	No.	ACT	WAIT
D/I 1	RST	0	D/I 5	RST	0
D/I 2	RST	0	D/I 6	RST	0
D/I 3	RST	0	D/I 7	RST	0
D/I 4	RST	0	D/I 8	RST	0

ERROR Input Active    RUN    Always

[Figure 79] RST input setting

D/I ACTION Setup			NEXT	ESC	
No.	ACT	WAIT	No.	ACT	WAIT
D/I 1	RUN	-	D/I 5	STEP	-
D/I 2	RST	0	D/I 6	HOLD	-
D/I 3	RST	0	D/I 7	HOLD ON	-
D/I 4	RST	0	D/I 8	HOLD OFF	-

ERROR Input Active    RUN    Always

[Figure 80] 2 channel simultaneous operation mode

D/I ACTION Setup			NEXT	ESC	
No.	ACT	WAIT	No.	ACT	WAIT
D/I 1	CH.1 RUN	-	D/I 5	CH.1 STEP	-
D/I 2	CH.2 RUN	-	D/I 6	CH.1 HOLD	-
D/I 3	CH.1 RST	0	D/I 7	CH.2 STEP	-
D/I 4	CH.2 RST	0	D/I 8	CH.2 HOLD	-

ERROR Input Active    RUN    Always

[Figure 81] 2-Channel Individual Operation Mode

D/I NAME Setup		NEXT	ESC
D/I 1	D/I_1 ERROR		
D/I 2	D/I_2 ERROR		
D/I 3	D/I_3 ERROR		
D/I 4	D/I_4 ERROR		
D/I 5	D/I_5 ERROR		
D/I 6	D/I_6 ERROR		
D/I 7	D/I_7 ERROR		
D/I 8	D/I_8 ERROR		

[Figure 82] Input name setting screen

- The signal direction of RUN/STOP operation can be setup.
- The name of D/I should be set intuitively.
- To prevent incorrect operation stop due to noise, able to set time for operation stop grace period.

## 6.7 Point of Contact Output (DO) Setup

Setup for point of contact output is the setup for real relay or the transistor output for various signals in the system. Only the signals assigned here are outputted through the terminal. The point of contact assignment can overlap (except for certain special cases), therefore, care must be taken for input.

D/O Setup 1			PREV	NEXT	ESC
Relay		O/C			
I/S 1	<input type="checkbox"/>	<input type="checkbox"/>	I/S 5	<input type="checkbox"/>	<input type="checkbox"/>
I/S 2	<input type="checkbox"/>	<input type="checkbox"/>	I/S 6	<input type="checkbox"/>	<input type="checkbox"/>
I/S 3	<input type="checkbox"/>	<input type="checkbox"/>	I/S 7	<input type="checkbox"/>	<input type="checkbox"/>
I/S 4	<input type="checkbox"/>	<input type="checkbox"/>	I/S 8	<input type="checkbox"/>	<input type="checkbox"/>

[Figure 83] Inner signal output setting

D/O Setup 2			PREV	NEXT	ESC
Relay		O/C			
T/S 1	<input type="checkbox"/>	<input type="checkbox"/>	T/S 5	<input type="checkbox"/>	<input type="checkbox"/>
T/S 2	<input type="checkbox"/>	<input type="checkbox"/>	T/S 6	<input type="checkbox"/>	<input type="checkbox"/>
T/S 3	<input type="checkbox"/>	<input type="checkbox"/>	T/S 7	<input type="checkbox"/>	<input type="checkbox"/>
T/S 4	<input type="checkbox"/>	<input type="checkbox"/>	T/S 8	<input type="checkbox"/>	<input type="checkbox"/>

[Figure 84] Time signal output setting

D/O Setup 3			PREV	NEXT	ESC
Relay		O/C			
Alarm 1	<input type="checkbox"/>	<input type="checkbox"/>			
Alarm 2	<input type="checkbox"/>	<input type="checkbox"/>			
Alarm 3	<input type="checkbox"/>	<input type="checkbox"/>			
Alarm 4	<input type="checkbox"/>	<input type="checkbox"/>			

[Figure 85] Alarm (alarm) output setting

D/O Setup 4			PREV	NEXT	ESC
Relay		O/C			
CH.1 SEN	<input type="checkbox"/>	<input type="checkbox"/>	CH.2 SEN	<input type="checkbox"/>	<input type="checkbox"/>
BURN	<input type="checkbox"/>	<input type="checkbox"/>	BURN	<input type="checkbox"/>	<input type="checkbox"/>
CH.1 RUN	<input type="checkbox"/>	<input type="checkbox"/>	CH.2 RUN	<input type="checkbox"/>	<input type="checkbox"/>
CH.1 WAIT	<input type="checkbox"/>	<input type="checkbox"/>	CH.2 WAIT	<input type="checkbox"/>	<input type="checkbox"/>
CH.1 HOLD	<input type="checkbox"/>	<input type="checkbox"/>	CH.2 HOLD	<input type="checkbox"/>	<input type="checkbox"/>

[Figure 86] Disconnection / Run / Standby / Hold Output Setting

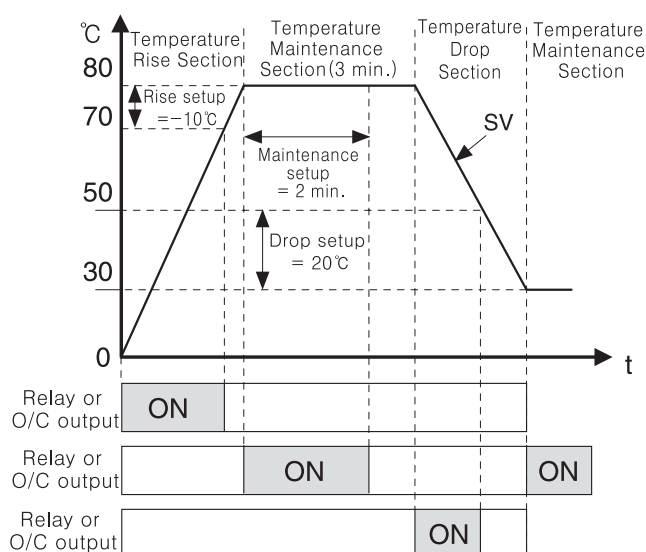
D/O Setup 5			PREV	NEXT	ESC
	Relay	O/C	Value		
CH.1 UP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> [°C]		
CH.1 SOAK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> M		
CH.1 DOWN	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> [°C]		
CH.2 UP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> [°C]		
CH.2 SOAK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> M		
CH.2 DOWN	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> [°C]		

[Figure 87] Set up / hold / fall output

D/O Setup 6			PREV	NEXT	ESC
	Relay	O/C	Time		
D/I ERROR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> S		
CH.1 PROG.END	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> S		
CH.2 PROG.END	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> S		
AND Signal 1 (I/S_1 & I/S_x)	<input type="checkbox"/>	<input type="checkbox"/>	I/S_ <input type="text"/>		
AND Signal 2 (I/S_2 & I/S_x)	<input type="checkbox"/>	<input type="checkbox"/>	I/S_ <input type="text"/>		

[Figure 88] Error / End / Composite signal output setting

- I/S 1 ~ 8 : Inner Signal Output Setup (Select from Relay 1 ~ 8, O/C 1 ~ 8)
- T/S 1 ~ 8 : Time Signal Output Setup (Select from Relay 1 ~ 8, O/C 1 ~ 8)
- Alarm 1 ~ 4 : System Alarm Output Setup (Select from Relay 1 ~ 8, O/C 1 ~ 8)
- CH1 & CH2 Sensor Disconnection : Output Setup during Sensor Disconnection  
(Select from Relay 1 ~ 8, O/C 1 ~ 8)
- CH1 & CH2 Operation : Output Setup for signal during operation  
(Select from Relay 1 ~ 8, O/C 1 ~ 8)
- CH1 & CH2 Standby : Output Setup for signal during standby mode  
(Select from Relay 1 ~ 8, O/C 1 ~ 8)
- CH1 & CH2 Hold : Output Setup for signal during hold mode  
(Select from Relay 1 ~ 8, O/C 1 ~ 8)
- CH1 & CH2 Rise Section : Output Setup for signal when inclining (Select from Relay 1 ~ 8, O/C 1 ~ 8) Select range for output signal ( $\pm$ ,  $^{\circ}\text{C}$ )
- CH1 & CH2 Maintenance Section : Output Setup for signal for maintaining section (Select from Relay 1 ~ 8, O/C 1 ~ 8) Setup time for signal output (minutes).
- CH1 & CH2 Drop Section : Output Setup for signal when declining (Select from Relay 1 ~ 8, O/C 1 ~ 8) Select range for output signal ( $\pm$ ,  $^{\circ}\text{C}$ )
- D/I Error : Setup output for D/O error input (Select from Relay 1 ~ 8, O/C 1 ~ 8). Setup maximum time to maintain output. (Second) (When set with maximum, maintain D/O even when there is touch input).
- CH1 & CH2 Stop program execution : Output Setup for when program execution is stopped  
(Select from Relay 1 ~ 8, O/C 1 ~ 8) Setup maximum time to maintain output. (Second).
- Composite Signal 1 : Output composite signal 1 (Select from Relay 1 ~ 8, O/C 1 ~ 8) Used in composite conditions for I/S number setup cooler operation checked by I/S\_1 and AND condition has lower SV by certain amount and lower PV by certain amount.
- Composite Signal 2 : Output composite signal 1 (Select from Relay 1 ~ 8, O/C 1 ~ 8) Setup I/S number that will be checked by I/S\_2 and AND condition.



( Example of Rise / Maintenance / Drop signal output)



## 6.8 Communication Setup

Serial COM Port Setup				ESC
PROTOCOL	▼	PC-Link	▲	
BAUD RATE	▼	115200	▲	
PARITY bit	▼	NONE	▲	
STOP bit	▼	1	▲	
DATA bit	▼	8	▲	
MAC Address	▼	1	▲	
Response Delay (msec)	▼	10	▲	

[Figure 90] PC-LINK

Serial COM Port Setup				ESC
PROTOCOL	▼	MODBUS	▲	
BAUD RATE	▼	38400	▲	
PARITY bit	▼	even	▲	
STOP bit	▼	1	▲	
DATA bit	▼	7	▲	
MAC Address	▼	1	▲	
Response Delay (msec)	▼	0	▲	

[Figure 91] MODBUS

Communication Setup screen is for setting up communication parameters when communicating with instruments that supports interfaces to the PC or other serial devices. Up/down arrows are used to change the values. The response delay setup (0 ~ 250 msec) with local device number (1 ~ 255) can be set by directly selecting the box. When communicating in 2-wire with RS422/485 model, the product terminal T+ is connected with R+, T- with R-.

The SG pin of the terminal is used when communication performance deteriorates due to the problem of potential difference. As for response delay, it is used when a converter is used that automatically controls the communication from the other device by using timing delay. It is a functionality that waits few msec to prevent data crash. (When 2-wire communication is used).

## 6.9 Other Setup

ETC Setup 1		NEXT	ESC
MENU Language	한글 (KOR)   ENGLISH (영문)		
CH.1	Control   Monitor		
CH.2	Control   Monitor   Disable		
PASSWORD	0		
	Same time Control   Separate Control		
	Each Channel		

[Figure 92] Other settings 1 screen

ETC Setup 2		NEXT	ESC
USER Information			
HANYOUNG NUX TD500			
2 LOOP CONTROLLER			
www.hynux.com			
Product Information			
TD500, H/W Ver 1.1, F/W Ver 1.10			

[Figure 93] Other setting 2 screen

- Displayed Language : Select language for the menus. (Currently provides Korean and English)
- Setup for usage of each channel : Select channels that are used.
  - Control ➡ use control actions
  - Observe ➡ indicate only the instructed value (no control actions)
  - Not used ➡ the channel is not used (when channel 2 is disabled, the operation screen changes to single channel mode).
- Setup password : Password setup for authority to change system setup.
- Setup for simultaneous control mode for each channel, or separate control mode :
  - When 2 channels are used, setup for simultaneous operation of channels.

# 7 Specification

## 7.1 Input Specification

Input (2 channels)	Pt100 (IEC751)	-200 ~ 640 °C, $\pm 0.1$ % of FS
	TC_K	-200 ~ 1370 °C, $\pm 0.1$ % of FS
	TC_J	-200 ~ 1200 °C, $\pm 0.1$ % of FS
	TC_E	-200 ~ 1000 °C, $\pm 0.1$ % of FS
	TC_T	-200 ~ 400 °C, $\pm 0.1$ % of FS
	TC_R	0 ~ 1700 °C, $\pm 0.15$ % of FS
	TC_S	0 ~ 1700 °C, $\pm 0.15$ % of FS
	mV	0 ~ 100 mV or -10 ~ 20 mV (-999.9 ~ 9999.9), $\pm 0.1$ % of FS
	VDC	0 ~ 10 V (Signal Input Range setup is available, -999.9 ~ 9999.9), $\pm 0.1$ % of FS
	4 – 20 mA	Use 250 $\Omega$ external resistance, VDC Use after setup of 1 – 5 V d.c.
Input Resolution		24 bit
Accuracy of indication		0.1 °C
Sampling cycle		Each channel 500 msec
Input Resistance		More than 1 M $\Omega$
Maximum allowable resistance of line		Less than 50 $\Omega$ / Line (Resistance of lines is a same condition)
RJC		$\pm 1.5$ °C

※ RJC error added when TC sensor is used

## 7.2 Output Specification

Control Output	SCR		4 – 20 mA d.c.(Resistive load : less than 600 Ω) Output Resolution : 16 bit Accuracy of Output : ±0.1 % of FS Output Ripple : 0.2 % of FS
	SSR		24 V d.c. Pulse (Resistive load : More than 600 Ω) Min. Pulse Range : 10 ms Cycle Time : Available to select 1 – 1000 s
	Relay Output	TD500	Internal relay or External relay using TR output (Max 24 V, 100mA) Internal relay specification : NO → 250 V a.c 5 A / 30 V d.c 5 A NC → 250 V a.c 2 A / 30 V d.c 1 A
		TD300	Internal relay specification : NO → 250 V a.c 5 A / 30 V d.c 5 A
Transmission Output (4 – 20 mA)			Available to select PV / SV / H.MV / C.MV of each channel Output Accuracy : ±0.1 % of FS In case of heating/cooling control, if control output of heating is SCR or SSR, this channel can not use transmission output.
Transmission Output Period of outputrenewal			500 ms



## 7.3 Functions

Screen	TD500	5.7 Inch Color LCD and Interface with Touch Panel
	TD300	3.5 Inch Color LCD and Interface with Touch Panel
Pattern		Max 100 , Available to operate each channel's pattern
Segment		Max 2,400 ( Max 100 per segment)
Waiting Mode		Setup per pattern and setup of using or not using per segment
Repetition & Connection		Available to use Pattern Repetition and Section Repeat Loop Setup (Max, 20) Free connecting operation among patterns is available
PID Group		Each channel 4 Zones, Selectable between manual or automatic
Control Method		Heating control or Heating/Cooling control in each channel, PID or ON/OFF control
Auto Tuning		Optimal PID GAIN is automatically calculated according to Set Value. It could be operated by each channel
Proportional Band		0.0 ~ 1000.0 °C ( If "0" = On/Off control, Not "0" = PID control)
Integral Time		0 ~ 6000 sec ( "0" = No Integral Calculation)
Differential Time		0 ~ 6000 sec ( "0" = No Differential Calculation)
ON/OFF control		Available to select Dead zone 0.1 ~ 1000.0 °C
Event Log		Max 40 Event Logs could be saved depend on various situations
LCD protection		Back light will be off according to designated time of not using touch panel
Password		Password is available to prevent other people from changing system setup
Protection of Over-Integral and Differential		ARW Zone setup ( 50 ~ 200 % of proportional band)
Fuzzy Function		Control overshoot
RAMP		Available to select SV changing ratio in case of fixing operation
Restrict MV changing ratio		Function to control sudden change of MV
Alarm Setup		4 points, High, Low, Deviation etc. 20 kinds
Inner Signal		8 points, object, range and delayed time setup are available
Time Signal		8 points when program mode operation
Graph Function		PV, SV of each channel could be display by graph
Fixing Operation Hour		Available to set fixing operation hour up
Reservation Operation Fuction		Available to use reservation operation time by using built in timer.
User Logo Display		User logo could be shown for 3 sec after power on. Download through communication port
Screen Capture		Upload is available through communication port
Language		Korean and English
Contact Input		RUN/STOP, STEP, HOLD and Error Input (Stop operation, Delayed/ setup is available)
Contact Output		Output of various signals
Storage in Power Failure		Various setting and operation information memory
Return from Power Failure		STOP / COLD / HOT return when power failure is restored

## 7.4 Communication

Applied Standard	EIA-RS232C, EIA-RS422/485, USB		
Max.Connection Number	RS232	1 : 1	
	RS422/485	1 : 256	
Communication Method	RS232	Full Duplex	
	RS422/485	4 wired Half Duplex, 2 wired Half Duplex	
Synchronous Method	RS232 RS422/485	asynchronous	
Communication Distance	RS232	Within approximately 10 m	
	RS422/485	Within approximately 1.2 Km	
Communication Speed	RS232	TD500	9600 ~ 115200 bps
	RS422/485	TD300	9600 ~ 38400 bps
Length of Data	RS232 RS422/485	8 bits	
Parity Bit	RS232 RS422/485	NONE	
Stop Bit	RS232 RS422/485	1 bit(s)	
Communication Protocol	RS232 RS422/485	PCLINK + CHECK SUM	
Delayed Response Time	RS232 RS422/485	1 + (0 ~ 250) ms	

## 7.5 Ratings

Rated Voltage		100 – 240 V a.c, Variable Voltage Ratio : $\pm 10\%$	
Frequency		50 – 60 Hz	
Power Consumption	TD500	Main Body : Max. 16 W (With I/O board : Max. 45 W)	
	TD300	Max. 10 W	
Insulation resistance	TD500	Between 1st & 2nd Terminal	More than 20 M $\Omega$ / 500 V d.c.
	TD300	1st/2nd and Earth Terminal	More than 10 M $\Omega$ / 500V d.c.
Dielectric strength		Between 1st & 2nd Terminal 1st/2nd and Earth Terminal	2500 V a.c. 50 / 60 Hz, 1 min.
Power output		24 V d.c, 1A Max. (Only for TD500)	

## 7.6 Operation Environment

Installation	Continuous Vibration	Vibration Wide : Bleow 1,2 mm (5 – 14 Hz) Below 4,9 ㎖ (4 – 150 Hz)
	Short time Vibration	Below 14,7 ㎖ 15 sec(Each 3 directions)
	Shock	Below 147 ㎖ 11 msec (Each 6 directions, 3 times)
Normal Operation Condition	Surrounding Temperature	0 ~ 50 °C
	Surrounding Humidity	20 ~ 90 % RH (No Condensation)
	Magnetic Effect	Less than 400 AT/m
	Preheating	More than 10 minute
Effectof surrounding temperature	Voltage/TC Input	$\pm 1 \mu V / ^\circ C$ or $\pm 0.01 \% \text{ of FS } / ^\circ C$
	RTD Input	Less than $\pm 0.05 ^\circ C / ^\circ C$
	Analog Output	Less than $\pm 0.05 \% \text{ of FS } / ^\circ C$

## 7.7 Condition of Transport and Storage

Temperature	-25 ~ 70 °C
Humidity	5 ~ 95 % RH (No condensation)
Shock	Less than 1 m when dropping the packed product



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