Honeywell

IPC1000

PROGRAMMABLE TEMPERATURE & HUMIDITY CONTROLLER

Installation Manual

To our valuable customers

Thank you for purchasing our IPC1000(Programmable Temperature & Humidity Controller). This manual explains suitable effective way of using and installing this product.

Please read carefully to apply IPC1000 to controller of temperature and humidity chamber or others.

Special attention to the manual

1. Keep the manual for the last user who can get easy access to the manual.
2. Make sure you read and understand the content of the manual then operate the product.
3. This manual only explains detail information on how to use the product effectively. Honeywell disclaims the implied warranties for particular purpose.
4. Our company, Honeywell Korea is not responsible for any damages caused by the user with careless.
5. This manual is not to be duplicated, re-edited or rent without permission given by Honeywell Korea. It is subject to change without notice.
6. If you have any queries or thought about this manual, please do not hesitate to contact Honeywell Korea. We' ll try our best to get you an answer.

For the safety

- Description on indicator diagram

  Following diagrams indicate potential dangers that may damaged the product and harm your body. Please make sure you read and understand meaning of following symbols before you read this manual.

- Example of indicator

	It indicates " Handle with care" which designed to avoid any dangers that may risk one' s life and harm the machine.
	It is a Frame Ground which means protection earth terminal. Provided for connection of the protective earth.
	(1) Indicates " Operating with care" Learn and understand before operating. (2) Indicates " Operating warning" It may damage software or hardware. System down may happen.

Indicator that used in the manual

The manual contains following indicators.

	Indicates " set-up is not available" It explains about learning method before actual operating and also explains how to be able to set up the condition
	(1) Indicates " Additional description" It explains techinical part which may be refered when set up. (2) Indicates "Referential Description" It explains referential part that the user can refer when set up

Checks when Unpacking

IPC1000 series consists of the units on the table below.

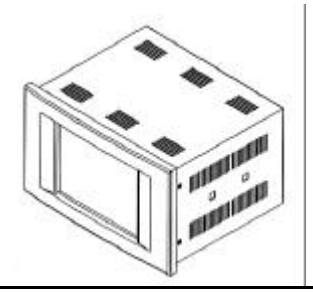
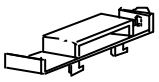
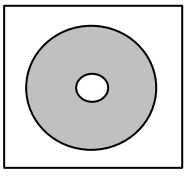
When unpacking the product, check the following :

1. Model and parts numbers to ensure that you have received the product you ordered.
2. Unit appearance for damage.
3. That all accessories are included.

Caution on installation

After unpacking, store any unused accessories in a safe to avoid loss or damage.

If any of the accessories listed in the table below are missing, or the product has been damaged during in shipping, immediately contact your Honeywell sales/service office or the dealer from whom you purchased the equipment.

Model and parts	Model and Parts No.	Qt'y	Remarks
IPC1000 	Basic Model No. : IPC1000-R LonWorks option Model No. : IPC1000-L	1	
Metal fitting 		2	
Communication Software CD 		1	RS-232 Communication Software IPC1000 User Manual IPC1000 Installation Manual

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1. Product Summary

1.1 Name of Model : IPC1000

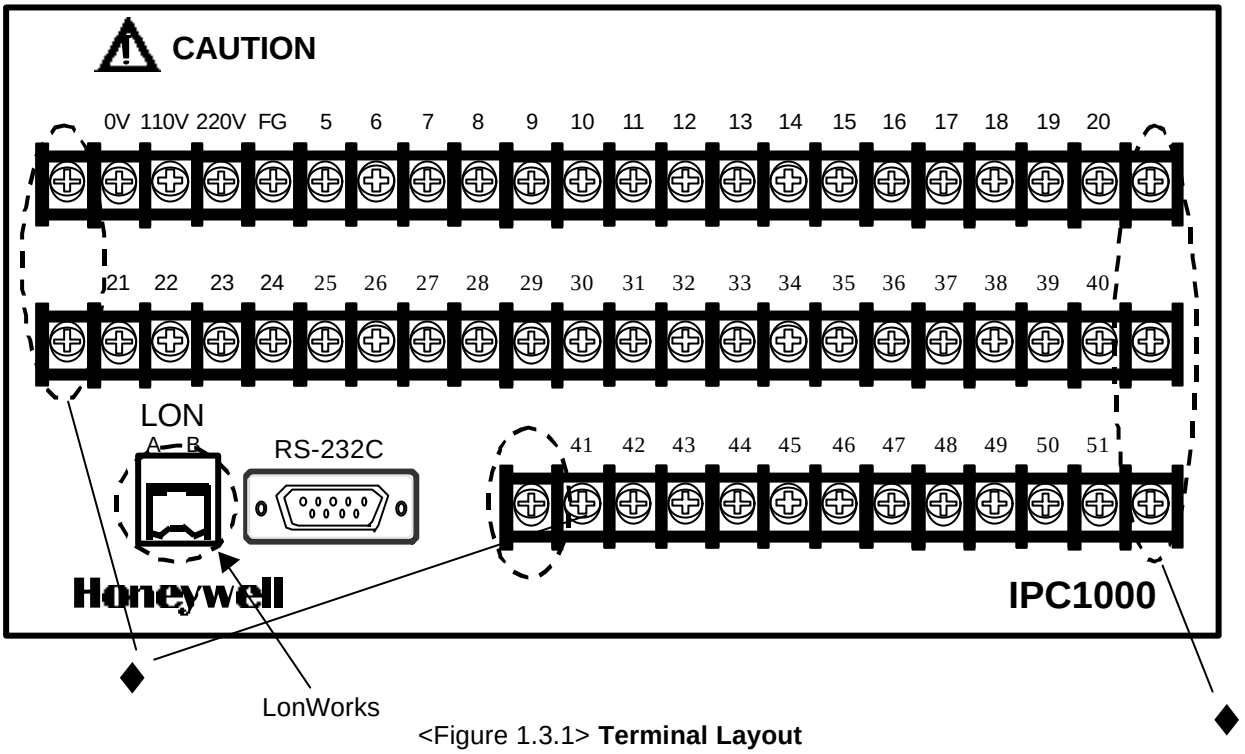
1.2 Terminal Layout Chart

No	Name		No	Name			No	Name	
1 2 3 4	AC 0V AC 110V AC 220V FG	Power	21 22 23	A B B	Dry-bulb temperature Pt100Ω/ JPt100Ω	Analog Input	41 42 43 44 45 46 47 48 49 50 51	COM RUN/STOP trouble, signal 1 trouble, signal 2 trouble, signal 3 trouble, signal 4 trouble, signal 5 trouble, signal 6 trouble, signal 7 trouble, signal 8 trouble, signal 9	Digital Input
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	COM NC NC RUN END Humidity RUN DOWN TROUBLE INNER SIGNAL1 INNER SIGNAL2 INNER SIGNAL3 INNER SIGNAL4 TIME SIGNAL 1 TIME SIGNAL 2 TIME SIGNAL 3 TIME SIGNAL 4	Digital Output (SSR)	24 25 26	A B B	Wet-bulb temperature Pt100Ω/ JPt100Ω				
			27 28	+ -	Humidity input DC4~20 mA		signal input specification		
			29 30 31 32	NC COMMON Temperature Control Output SSR Humidity Control Output SSR		Digital Control Output	Signal 1 Signal 2 Signal 3 Signal 4 Signal 5 Signal 6 Signal 7 Signal 8 Signal 9	Invert BLOWER OVER TEMP DRY TEMP WET TEMP freezer 1 freezer 2 No Water No Water Pressure	
			33 34	+ -	Temperature Control Output	Analog Output (4 ~ 20mA)			
			35 36	+ -	Humidity Control Output				
			37 38	+ -	Temperature Current Value Output				
			39 40	+ -	Humidity Current Value Output				

Additional Description

If you choose I.S. in SIGNAL SELECT item in the CONTROL SET display (Figure 3.2.1), TIME SIGNALS 1, 2, 3, 4 are utilized as INNER SIGNAL 5, 6, 7, 8 (Terminal number 17, 18, 19, 20).

1.3 Backside Terminal Layout



<Figure 1.3.1> **Terminal Layout**

Additional Description:
LonWorks in Figure 1.3.1 is optional. LonWorks part does not operate for models that do not have LonWorks option.

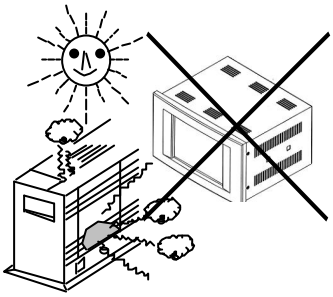
Installation Warning:
¨ in Figure 1.3.1 is a part that is to fix the terminal stand and is not a part of connection. In case you connect to the part of ¨, such abnormal operation as system damage or malfunction may occur. Please be cautious.

2. Installation and Connection

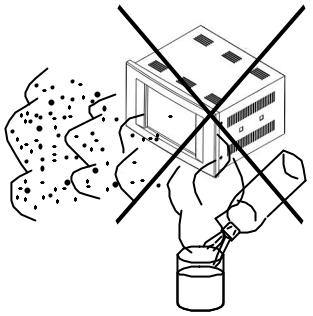
2.1 Installation Environment

Caution

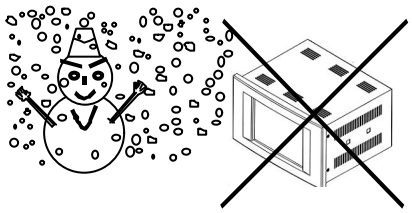
To enhance reliability of the system and for IPC1000's smooth functioning, please do not install it in and under the following locations and conditions.



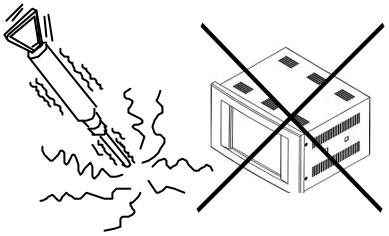
—Where the surrounding temperature is higher than 50°C
—Where there are direct rays of light
—Outdoors



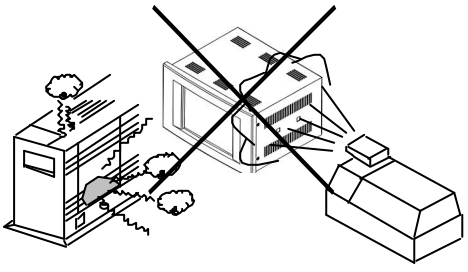
—Where corrosive or combustible gas exists
—Where there are conductible materials such as lots of dust, salt and steel scraps, and organic solvents



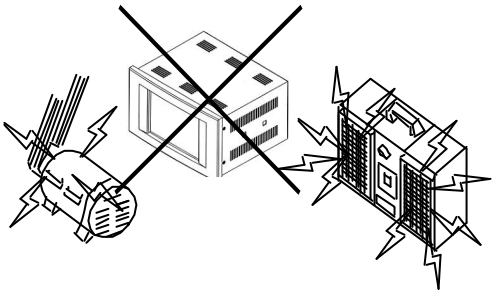
—Where the temperature is below 0°C



—Conditions that would expose it to vibration and shocks



—Where humidity is over 85%
—Where due is generated due to rapid change of temperature
—Where water, oil or chemical materials exist



—Where a strong electromagnetic field exists

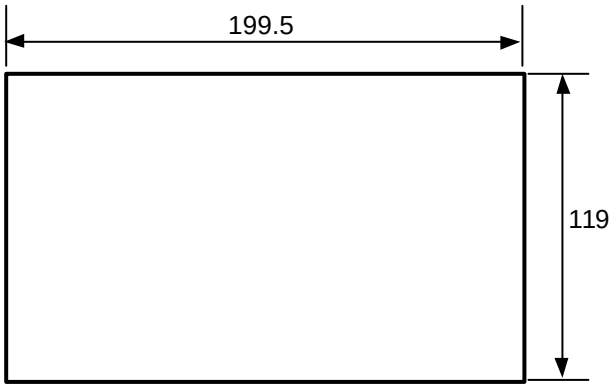
2.2 Installation Suggestions

Here, items to be cautioned at the time of installation of IPC1000 (temperature and humidity controller) to panel are explained. Protection from the environment and convenience of operation needs to be considered.

1) Allow sufficient distance for ventilation.
2) Do not install it right above of equipment (transformer, large capacity resistor, etc.) that generates a lot of heat in the panel.
3) Install it as far as possible from high voltage equipment and power-driven machinery or wiring. Otherwise, install it in a different panel.
4) To reduce and prevent noise, please use special purpose grounding. If wiring to the point of grounding is far, please use heavy insulation wire as a special purpose grounding cable and ground it through a conduit tube.
5) For IPC1000's communication cable and data lines, do not tie it up together with those that cause noise such as the power supply wiring of a power-driven machine. In case it is wired to the same duct, connect shield wire to FG terminal of the main frame.
6) When installing panel, use a flat panel that is not curved.
7) To prevent product damage, fasten screws just once when bracket does not move back and forth.
8) The Cooling method of IPC1000 is based on vertical installation which needs natural air cooling. In case it is installed horizontally or on a slant, range of operating temperature is somewhat limited.
9) If you want to use it after keeping it under 0°C, you need to warm it up for two hours at room temperature before plugging it in. Otherwise, it may not function normally and the product may be damaged.

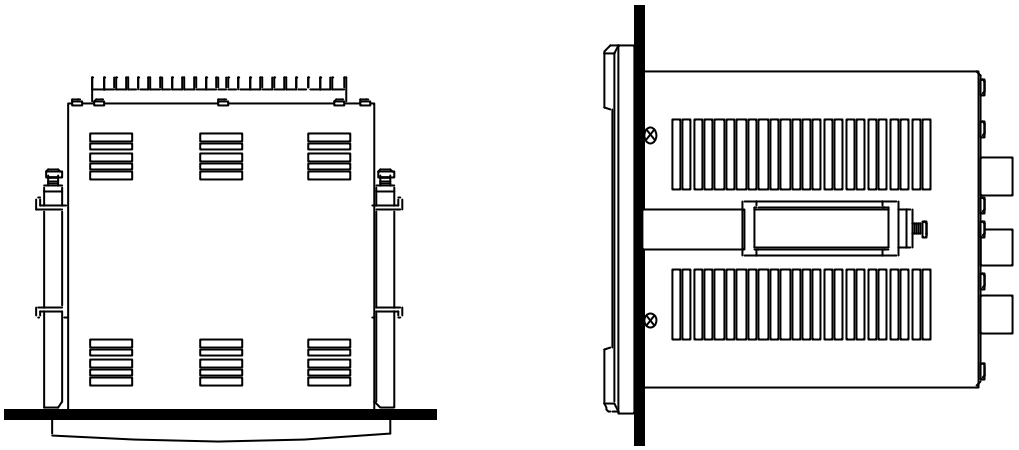
2.3 Panel Cut Dimensions

Unit: mm



<Figure 2.3.1>

2.4 Installation of fixed Bracket



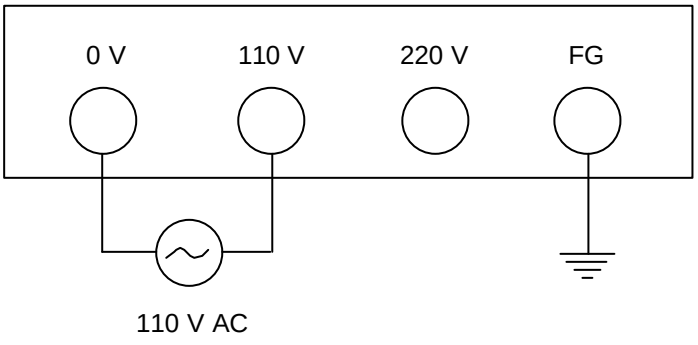
<Figure 2.4.1>

> **Caution at the time of connection:**
> **Before connecting IPC1000, please be sure that the power supply is shut off. Otherwise, there might be electric shock. Please be cautious.**

2.5 Terminal Connection Chart

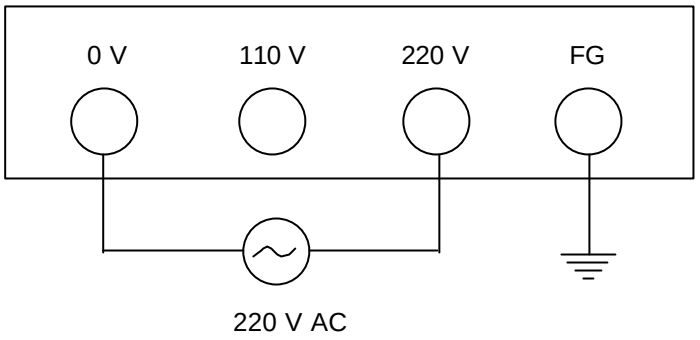
1) Connection chart of power supply input terminal

- For use in 110V 50Hz/60Hz power source



<Figure 2.5.1>

• For use in 220V 50Hz/60Hz power source



<Figure 2.5.2>

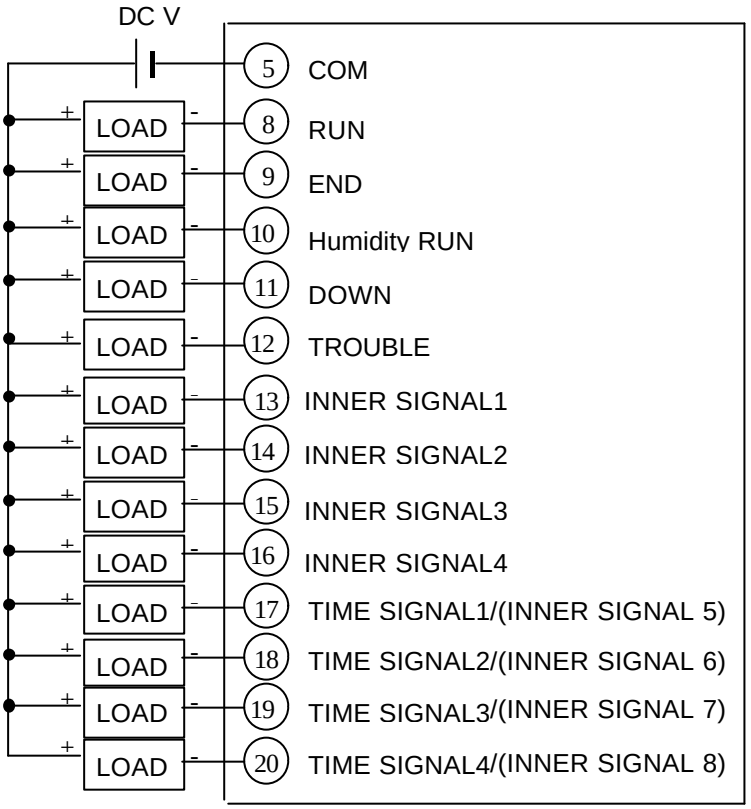
Warning:

This product is based on a terminal insulation method for a power source switch. It has separate terminals for 110V and 220V and needs to be connected separately depending upon user' s voltage. When connecting terminals, therefore, please be sure to connect according to Figure 2.5.1 or Figure 2.5.2. Please do not connect to 110V and 220V at the same time. In case it is not connected according to the above, the product can be damaged. Please be sure to connect it with caution.

Installation Warning:

Please be sure to ground Frame Ground (FG) in Figure 2.5.1 and Figure 2.5.2. Otherwise, an abnormal operation might occur.

2) Connection chart of digital input (SSR) terminal



Caution

The open collector output of IPC1000 is specified in MAX 30 VDC, MAX 50mA, internal resistance 47Ω. When the load is relay, please use a 24VDC relay.

<Figure 2.5.3>

Explanation for Reference

1. RUN output

—Terminal number: 8

—Content : Output is ON, when it is being operated.
In case operating mode is "STOP", "END", "READY", "BREAK", or "TROUBLE" mode, output is OFF;
in case operating mode is "RUN", "HOLD", "WAIT", "COLD", "HOT" mode, output is ON.

2. END output

—Terminal number : 9

—Content: Output is ON, if program control operation is completed; otherwise, it is OFF.

3. Humidity RUN output

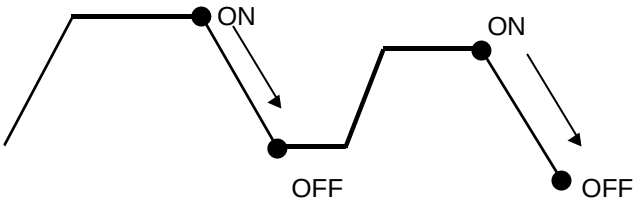
—Terminal number : 10

—Content: Output is ON, if humidity control operation is executed; output is OFF if humidity control operation is not executed.

4. DOWN output

—Terminal number : 11

—Content: While the pattern control is operated, output is ON if the set temperature point decreases as in Figure 2.5.4. Output is maintained as ON until WAIT is over and becomes OFF when WAIT is over. If it is operated by a fixed command control , it is OFF.



<Figure 2.5.4> DOWN SSR output ON-OFF

5. TROUBLE output

—Terminal number : 12

—Content :

If any of the digital ALARM input (1~9) (terminal number 43,44,45, 46, 47, 48, 49, 50, 51) is ON, TROUBLE output is ON. To make TROUBLE output OFF, you need to make ALARM input OFF and press the "Clear" key in the troubleshooting display screen. At the time when TROUBLE output occurs, all output except auxiliary (Present value) output becomes OFF.

6. Output of 4 different types of Inner signals and Time signals

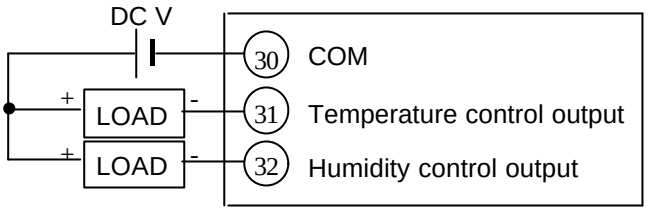
—Terminal Number:

INNER SIGNAL 1 ® terminal 13	**TIME SIGNAL 1 ® terminal 17**
INNER SIGNAL 2 ® terminal 14	**TIME SIGNAL 2 ® terminal 18**
INNER SIGNAL 3 ® terminal 15	**TIME SIGNAL 3 ® terminal 19**
INNER SIGNAL 4 ® terminal 16	**TIME SIGNAL 4 ® terminal 20**

—Content:

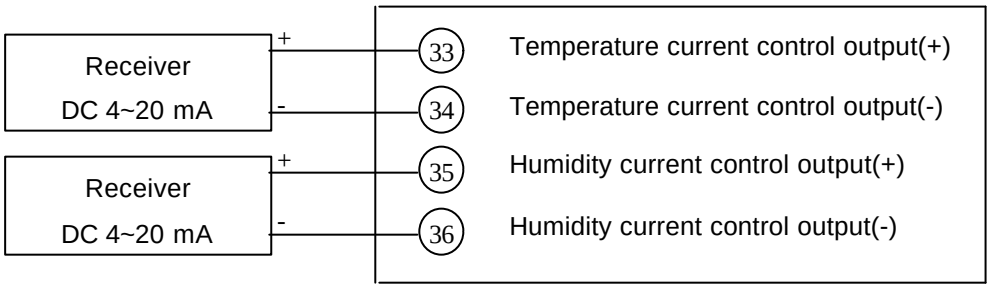
See reference explanation of Inner signal from pages 19 to 25
See reference explanation of Time signal from pages 28 to 30 in "User Manual"

3) Digital control main output (SSR) terminal connection chart (PID control output)



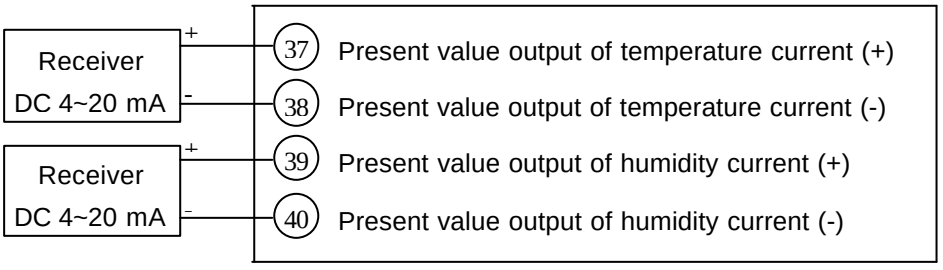
<Figure 2.5.5>

4) Analog current control main output terminal connection chart (PID control output)



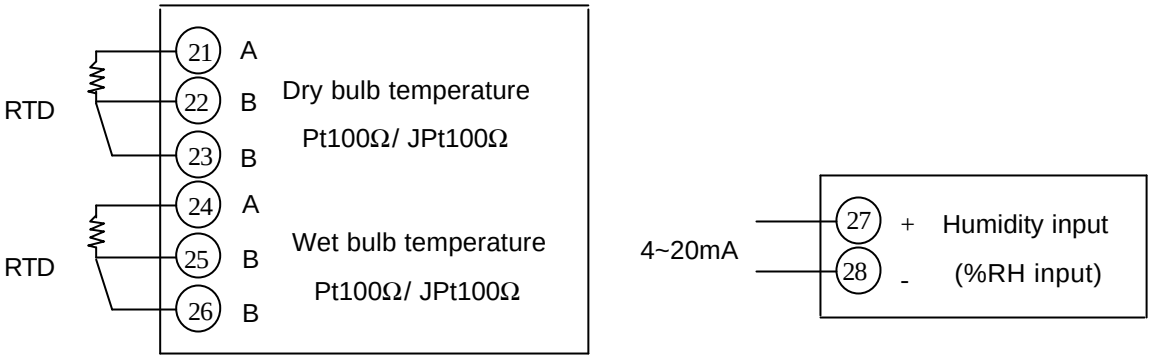
<Figure 2.5.6>

5) Analog current auxiliary output terminal connection chart



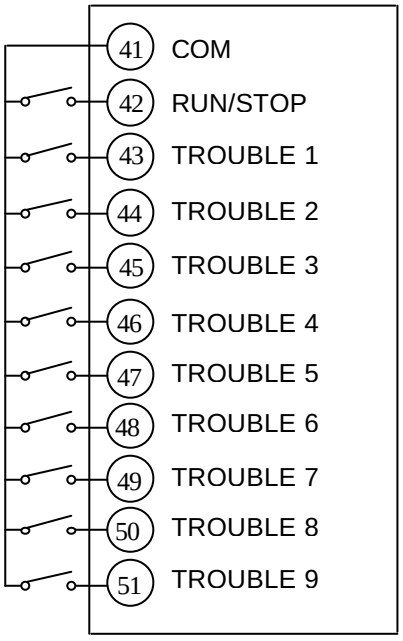
<Figure 2.5.7>

6) Analog input terminal connection chart



<Figure 2.5.8>

7) Digital input terminal connection chart



<Figure 2.5.9>

Installation Warning:

At the time of connection, please be sure to connect to the correct polarity. If there is an error in the polarity connection, operation of ON/OFF and current input and output may not be normal.

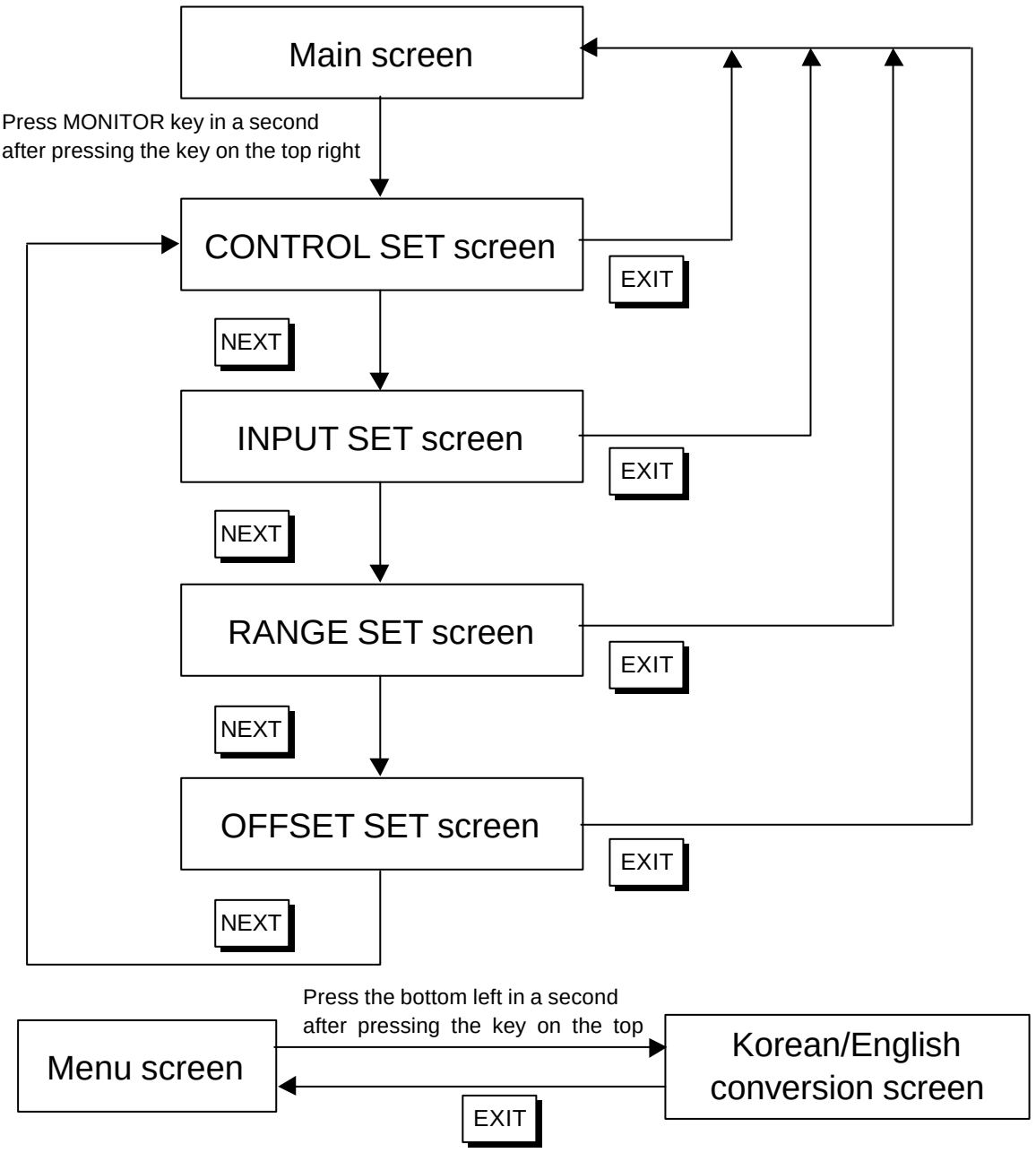
3. IPC1000 Setup

The initial setup should make it appropriate for the control of the function and capacity of the temperature and humidity chamber. It is composed and operated as shown in Figure 3.1.1.

3.1 Composition of the Display Screen

Composition of the display screen is based on ROTATION mode (Figure 3.1.1).

To enter into the initial display screen (Display to set CONTROL SET), touch the upper right in the main display screen and push the monitor key within one second.

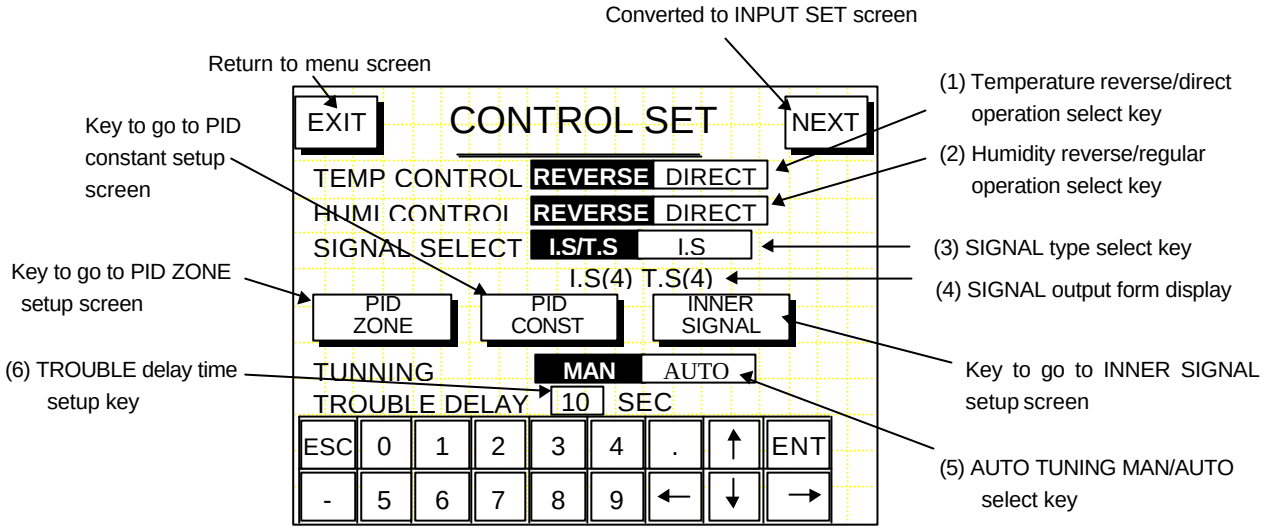


<Figure 3.1.1>

3.2 CONTROL SET display

This display screen is used to set up such items as the output mode of temperature and humidity

control, DIGITAL output, PID related items, and AUTO TUNING.



<Figure3.2.1>

Sequence of Operation

1. Setting up the temperature control output mode

   It allows you to choose to make the temperature control output mode either in direct or reverse motion.

   — To choose reverse motion

   Enter [REVERSE] key (1). If you choose the REVERSE key, the key is reversed from a white background with blue characters to a blue background with white characters.

   — To choose direct motion

   Enter [DIRECT] key (1). If you choose the DIRECT key, the key is reversed.

2. Setting up humidity control output mode

   — To choose direct motion

   Enter [REVERSE] key (2). If you choose the REVERSE key, the key is reversed.

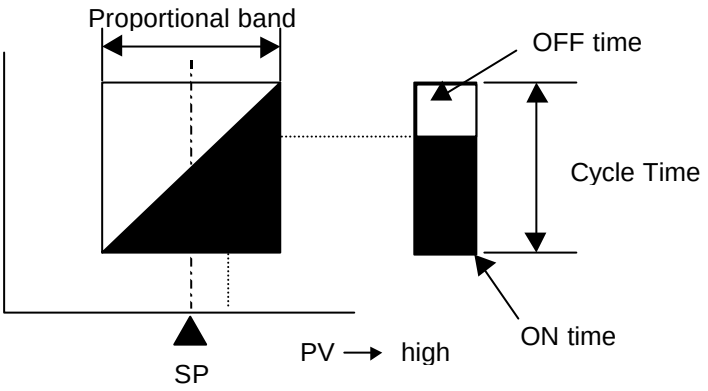
   — To choose normal motion

   Enter [DIRECT] key (2). If you choose the DIRECT key, the key is reversed.

Additional Description

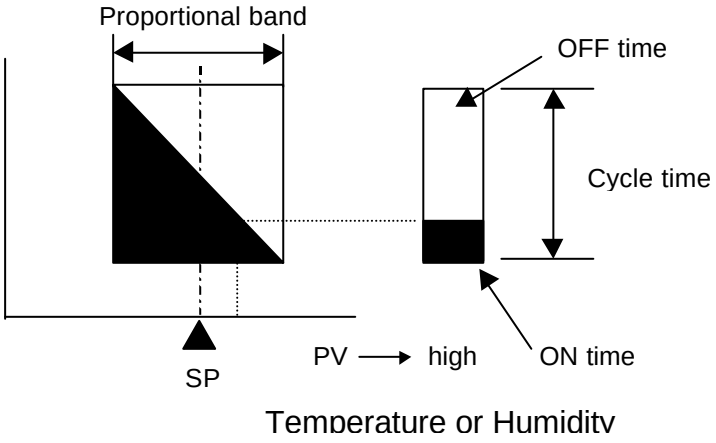
Direct operation/ reverse operation explanation

1. Direct operation: freezing, dehumidification



<Figure3.2.2> Temperature/Humidity Direct operation Output

2. Reverse operation: heating, humidifying



<Figure3.2.3> Temperature/Humidity Reverse operation Output

3. Setting up INNER(4)/TIME(4) SIGNAL or INNER(8) SIGNAL

Generally, IPC1000's outputs are 4 INNER SIGNALs and 4 TIME SIGNALs. However, you can use up to 8 INNER SIGNALs (but 4 TIME SIGNALS cannot be utilized if 8 INNER SIGNALs are used).

—Setting up outputs as 4 INNER SIGNALs and 4 TIME SIGNALs

Push [I.S/T.S] key (3) shown in Figure 3.2.1. If you choose I.S/T.S, the key is reversed and SIGNAL output mode indicator (4) is shown as "I.S(4) T.S(4)".

—Setting up output as 8 INNER SIGNALs

Push [I.S] key (3) shown in Figure 3.2.1. If you choose I.S, the key is reversed and SIGNAL output mode indicator (4) is shown as "I.S(8)."

Additional Description

Terminal numbers by selecting I.S/T.S	Terminal numbers by selecting I.S
INNER SIGNAL 1 → Terminal number : 13	INNER SIGNAL 1 → Terminal number : 13
INNER SIGNAL 2 → Terminal number : 14	INNER SIGNAL 2 → Terminal number : 14
INNER SIGNAL 3 → Terminal number : 15	INNER SIGNAL 3 → Terminal number : 15
INNER SIGNAL 4 → Terminal number : 16	INNER SIGNAL 4 → Terminal number : 16
TIME SIGNAL 1 → Terminal number : 17	INNER SIGNAL 5 → Terminal number : 17
TIME SIGNAL 2 → Terminal number : 18	INNER SIGNAL 6 → Terminal number : 18
TIME SIGNAL 3 → Terminal number : 19	INNER SIGNAL 7 → Terminal number : 19
TIME SIGNAL 4 → Terminal number : 20	INNER SIGNAL 8 → Terminal number : 20

4. Setting up AUTO TUNING MAN/AUTO

It allows you to set it up so that you can or cannot execute AUTO TUNING in the operating display.

—To select AUTO TUNING MAN

Push [MAN] key (5) in Figure 3.2.1. If you choose [MAN] key, the key is reversed.

When [MAN] key is selected, ([TEMP], [HUMI]) AUTO TUNING execution key does not appear in the monitor screen and you cannot execute AUTO TUNING.

—To select AUTO TUNING AUTO

Push AUTO key (5) in Figure 3.2.1. If you choose AUTO key, the key is reversed.

If [AUTO] key is set up, ([TEMP], [HUMI]) AUTO TUNING execution key appears in the monitor screen, which allows you to execute AUTO TUNING.

5. Setting up TROUBLE input delay time

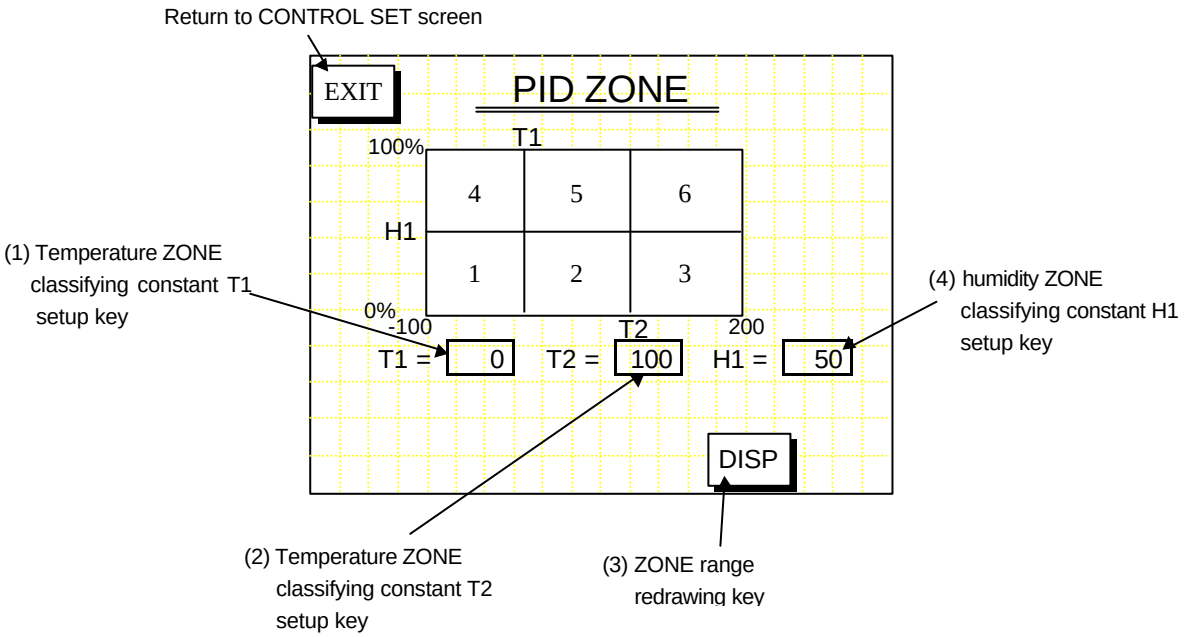
If there are TROUBLE inputs, TROUBLE output and message operate after set delay time.Range of delay time to be set is between 1 and 99 second(s).

— When [ ] key (6) is pressed, the numeric keyboard appears. If you enter delay time and hit ENT key, it is set up; if you enter ESC key, it is cancelled.

3.3 Display Screen for Setup of PID ZONE

There can be up to 6 ZONEs for the range of temperature and humidity PID constant and they are controlled by the PID constants in the ZONE field in which set points (SP) of temperature and humidity exist.

Initial setup at the time of product shipment is ZONE 5 fields and all fields are controlled by a single PID constant.



<Figure 3.3.1>

Sequence of Operation

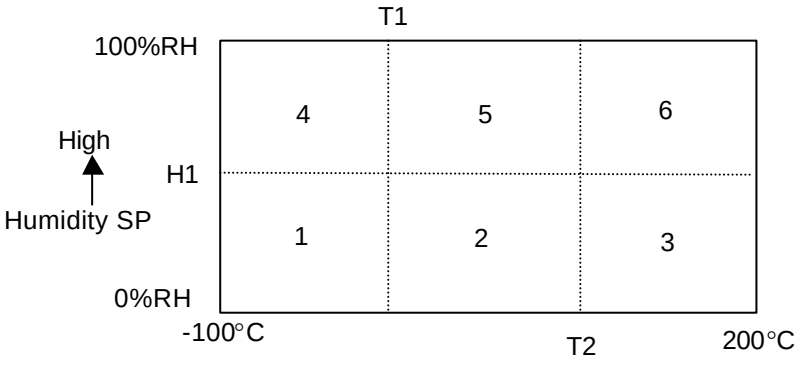
1. If each of T1 key (1), T2 key (2), H1 key (4) is entered, the numeric keyboard appears in the lower-hand side of the display. If you enter the temperature and humidity that you want to set and then hit the ENT key, it is set up; if you enter the ESC key, it is cancelled.
2. If you enter DISP (3) key after executing the sequence of operation 1, it draws a figure again that divides the field in Figure 3.3.1 according to the changed ZONE field.
3. Temperature range setup for T1 and T2 is between -100 and 200°C. Humidity setup range is between 0 and 100%RH

Additional Description

ZONE divisional setup screen

1. Case of maximum 6 Zones

Divided into 1 to 6 zones based upon the setup of H1,T1,T2, in the needs of 6 Zones.

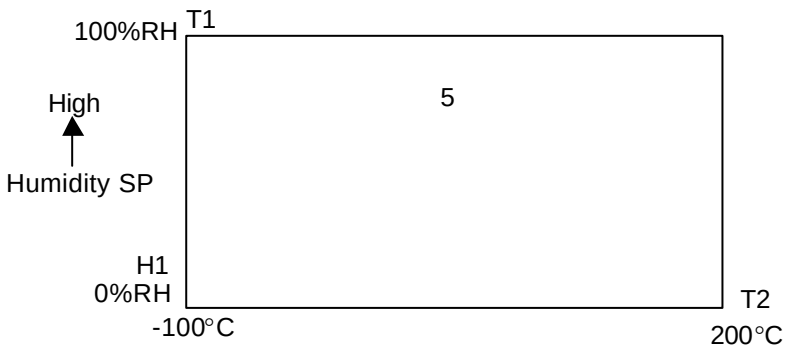


Divided into 6 zones and setup temperature and humidity in the H1,T1,T2.

Temperature SP → High

2. Case of 1 zone

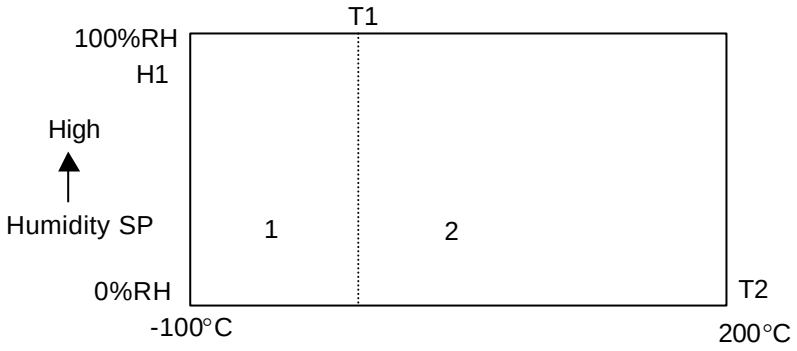
Setup: H1 = 0, T1 = -100, T2 = 200 (product prevalues)



Temperature SP → High

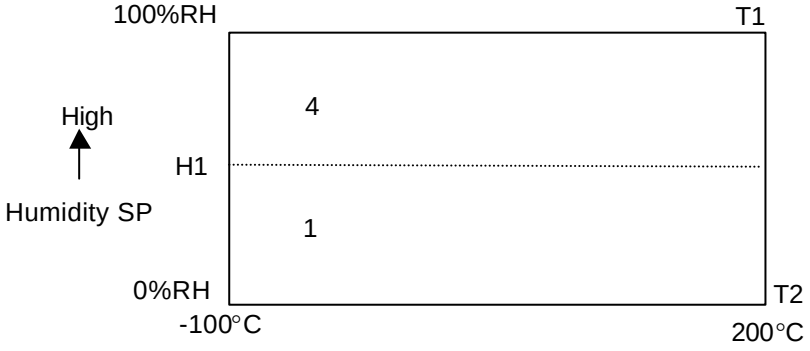
3. Case of temperature 2 ZONE

Set H1 = 100, T2 = 200 and T1will be the temperature at the setup which distinguishes zone.



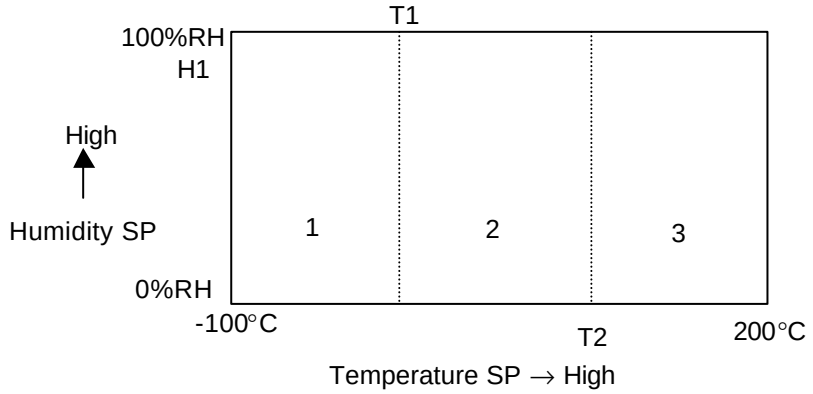
4. Case of humidity 2 ZONE

Set T1 = 200, T2 = 200 and H1 will be the humidity which distinguishes zone.



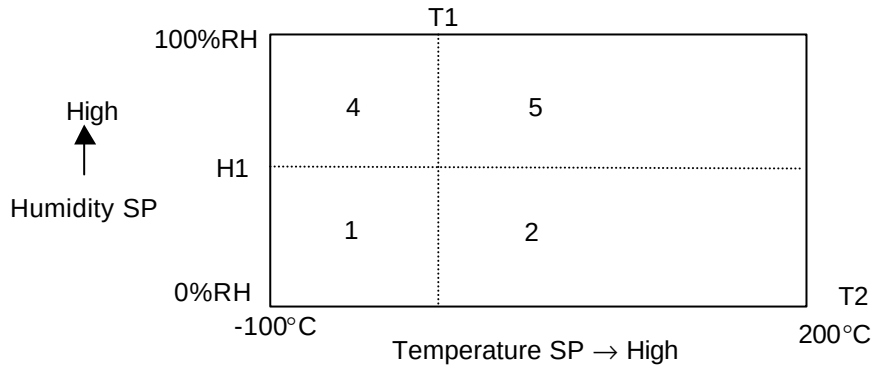
5. Case of 3 Zone

Set H1 = 100 and T1, T2 will be the temperature which distinguishes zone.



6. Case of 4 ZONE

Setup is T2 = 200. H1 and T1will be the humidity, temperature which distinguishes zone.

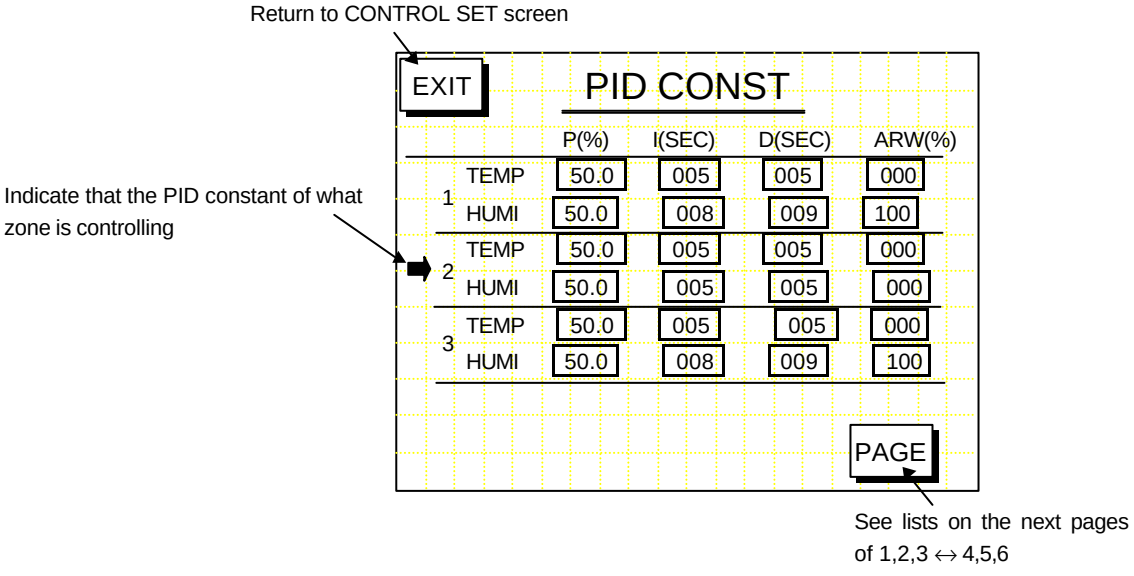


Invalid Setup:

At the time of setting up T1 and T2, T1 > T2 is invalid and cannot be entered. Please enter T1 after entering T2.

3.4 Display for Setup of PID CONSTANT

It sets up P, I, D, ARW constants in each ZONE field. The PID constant that results after completion of AUTO TUNING is applied to the appropriate ZONE field.



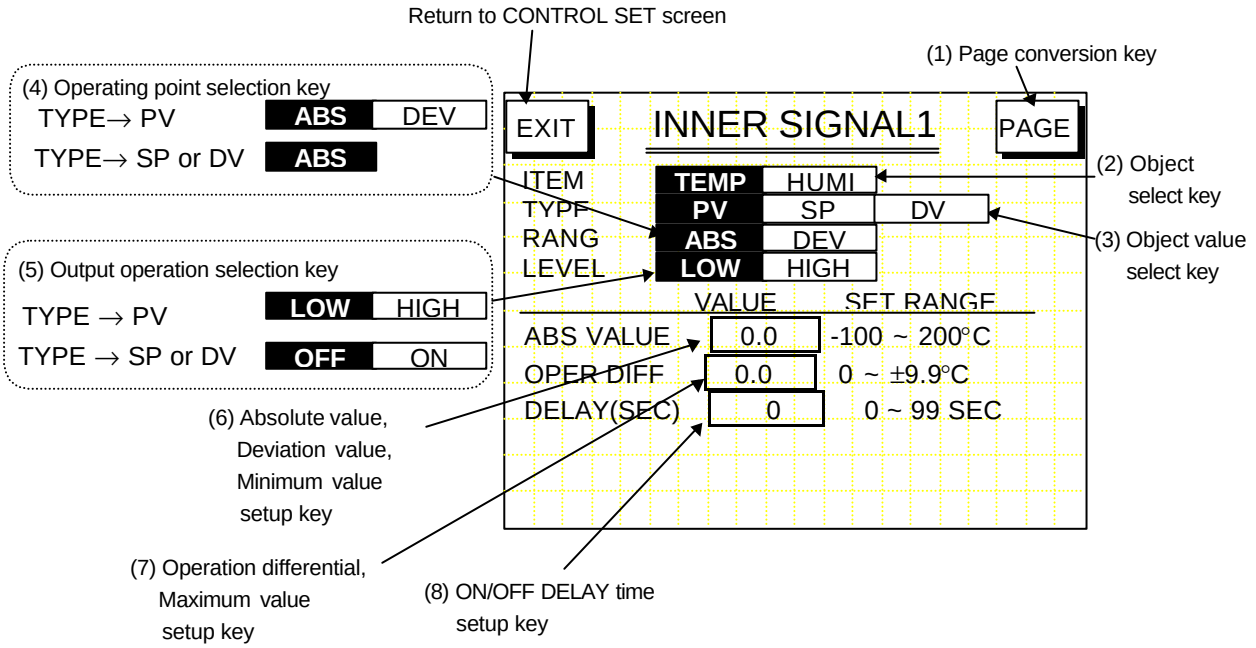
<Figure3.4.1>

Sequence of Operation

1. When you press any of [ ] keys, you will see a numeric keyboard in the screen below and when you will insert any of PID and ARW constants in the input and press the enter key, the setup will be all set, but if you press the ESC key the task will be cancelled.
2. Early PID and ARW constants of every zone are setup as below:
   P = 5.0 %, I = 120 seconds, D = 30 seconds, ARW = 100 %
3. constant setup boundary
   P (Proportional band) : 0.0 ~ 999.9 %
   I (Integral time) : 0 ~ 3600 seconds
   D (Derivative time) : 0 ~ 3600 seconds
   ARW : 0 ~ 100 %

3.5 INNER SIGNAL Setup Display Screen

This is a part which setups the INNER SIGNAL output items among DIGITAL outputs.



<Figure3.5.1>

Sequence of Operation

1. Setting up temperature(TEMP)/PV/ABS/HIGH, Absolute value (ABS VALUE), Operation Differential (OPER DIFF), and DELAY(SEC)
   - Press PV at object value selection key (3). The PV key is reversed.
   - Press ABS at operating point selection key (4). The ABS key is reversed.
   - Press HIGH at output operation selection key (5). The HIGH key is reversed.
   - Enter absolute value after pressing ABS VALUE setup key (6). Input of ABS VALUE is allowed only within SET RANGE on the right-hand side. (Set range : -100 ~ 200°C)
   - Enter operation differential after pressing OPER DIFF setup key (7). Input of OPER VALUE is allowed only within SET RANGE on the right-hand side. (Set range : 0 ~ ±9.9°C)
   - Enter delay time after pressing DELAY time setup key (8). Input of DELAY time is allowed only within SET RANGE on the right-hand side. (Set range : 0 ~ 99 SEC)

2. Setting up TEMP/PV/DEV/HIGH, deviation value (DEV VALUE), OPER DIFF, and DELAY(SEC)
   - Press TEMP at object selection key (2). The TEMP key is reversed.
   - Press PV at object value selection key (3). The PV key is reversed.
   - Press DEV at operating point selection key (4). The DEV key is reversed.
   - Enter HIGH at output operation selection key (5). The HIGH key is reversed.
   - Enter deviation value after pressing DEV VALUE setup key (6). Input of deviation value is allowed only within SET RANGE on the right-hand side. (Set range: -99.9 ~ 99.9°C)
   - Enter operation difference after pressing OPER DIFF setup key (7). Input of operation differential is allowed only within SET RANGE on the right-hand side. (Set range : 0 ~ ±9.9°C)
   - Enter delay time after pressing DELAY time setup key (8). Input of delay time input is allowed only within SET RANGE on the right-hand side. (0 ~ 99 SEC)

3. Setting up TEMP/SP/ABS/ON, minimum value (MIN VALUE), maximum value(MAX VALUE), and DELAY(SEC)
   - Press TEMP at object selection key (2). The TEMP key is reversed.
   - Press SP at object value selection key (3). The SP key is reversed.
   - If you choose SP, the ABS key is automatically selected.
   - Press ON at output operation selection key (5). The ON key is reversed.
   - Enter minimum value after pressing MIN VALUE setup key (6). Input of MIN

VALUE is allowed only within SET RANGE on the right-hand side.
(Set range : -100 ~ 200°C)

— Enter maximum value after pressing MAX VALUE setup key (7). Input of MAX VALUE is allowed only within SET RANGE on the right-hand side.
(Set range : -100 ~ 200°C)

— Enter delay time after pressing DELAY time setup key (8). Input of DELAY time is allowed only within SET RANGE on the right-hand side. (0 ~ 99 SEC)

4. Setting up TEMP/DV/ABS/ON, MIN VALUE, MAX VALUE, and DELAY(SEC)

— Press TEMP at object selection key (2). The TEMP key is reversed.

— Press DV at object value selection key (3). The DV key is reversed.

— If you choose DV, the ABS key is automatically selected.

— Press ON at output operation selection key (5). The ON key is reversed.

— Enter minimum value by pressing MIN VALUE setup key (6). Input of MIN VALUE is allowed only within SET RANGE on the right-hand side.
(Set range : -100 ~ 200°C)

— Enter maximum value by pressing MAX VALUE setup key (7). Input of MAX VALUE is allowed only within SET RANGE on the right-hand side.
(Set range : -100 ~ 200°C)

— Enter delay time by pressing DELAY time setup key (8). Input of DELAY time is allowed only within SET RANGE on the right-hand side. (0 ~ 99 SEC)

⊗ **Invalid Setup**

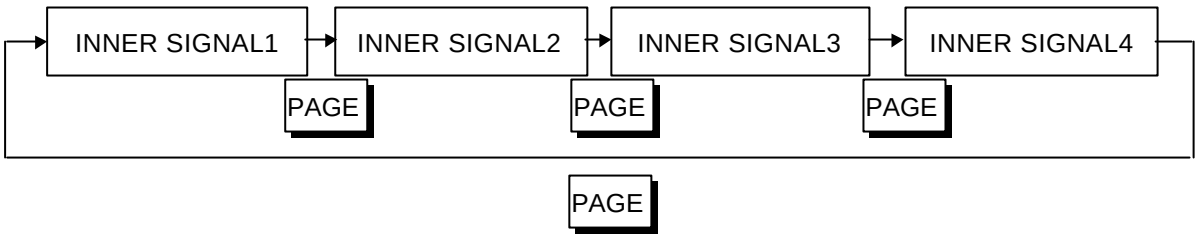
At the time of setting up MIN VALUE and MAX VALUE of SP and DV,
MIN VALUE > MAX VALUE is invalid and cannot be entered.
Please enter MIN VALUE after entering MAX VALUE.

5. Setting up if humidity is selected as the object

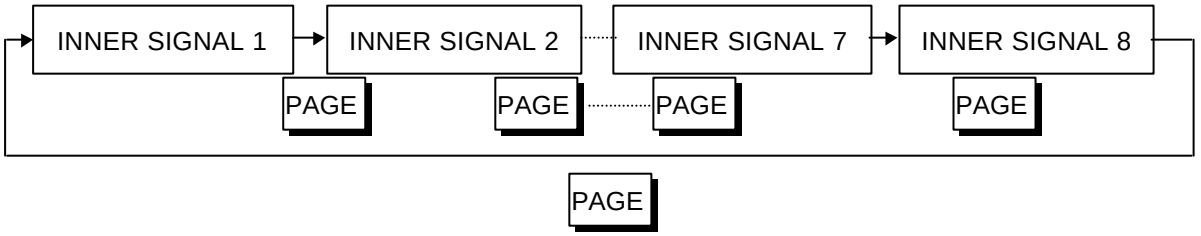
Humidity is selected as the object and other set values (operating point, operating differential, etc.) are set up in the same way in which temperature is selected as the object.

6. PAGE Conversion for INNER SIGNAL Setup Screen

In the first conversion screen, it is converted to the display in which INNER SIGNAL NO.1 is set up. To set up INNER SIGNALs of other numbers, you need to press PAGE key in Figure 3.5.1. Sequence of conversion at the time of key operation is shown in Figure 3.5.2 and Figure 3.5.3.



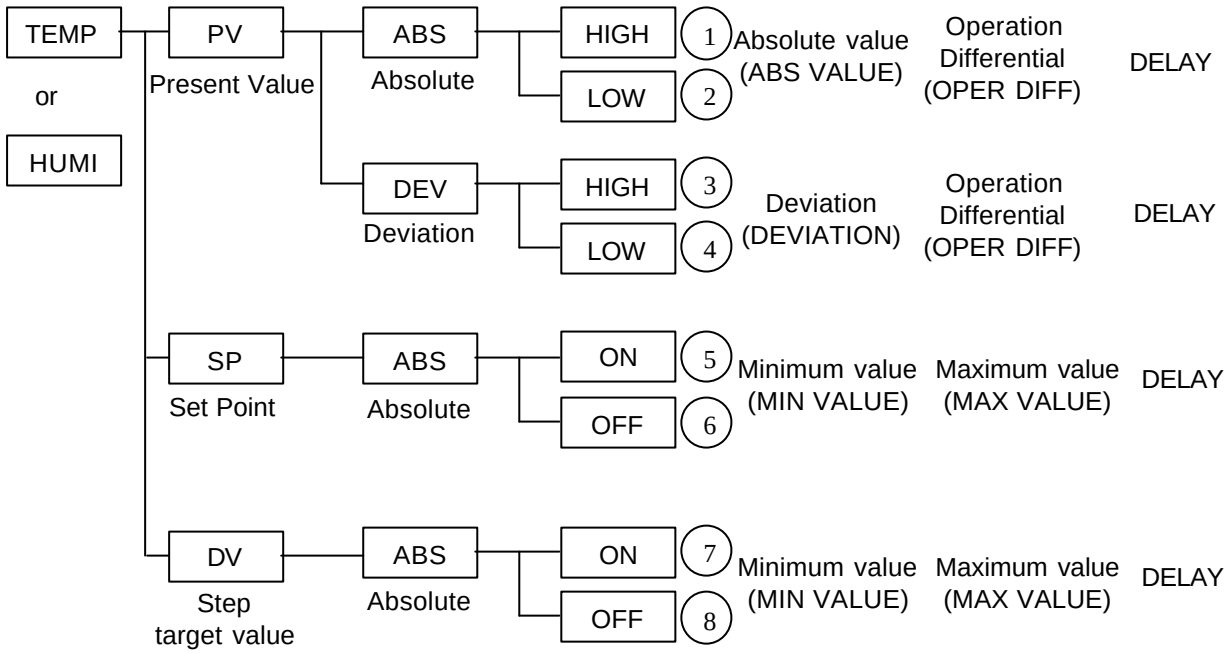
<Figure3.5.2> Screen conversion when selecting I.S/T.S



<Figure3.5.3> Screen conversion when selecting I.S

Additional Description

INNER SIGNAL Explanation



<Figure5.3.4> Block chart when selecting INNER SIGANL

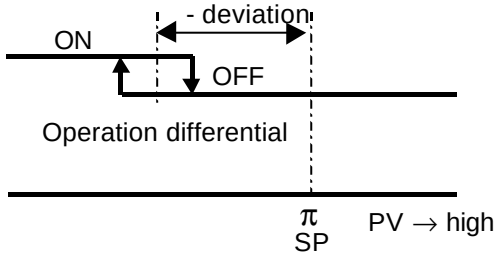
1. Contents
   - — ON / OFF open collector output × 4 or × 8
   - — Can be used optionally for cooling, dehumidification, and signal control output.
   - — Each output is independent and sets up temperature / humidity, present value/ set point / target value, absolute value / deviation, output operation (LOW / HIGH), and output operation (ON / OFF)
2. Setup of various operations: Various operations can be set up by combining items below.
   - — Object : TEMP / HUMI → It allows you to set up if the object of operation is temperature or humidity.
   - — Object value : PV / SP / DV → It allows you to set up at what point it is ON and OFF.
     PV : Present Value
     SP : Set Point (Target value that changes synchronously as the PROGRAM proceeds)
     DV : Step's target value (within a step, a fixed value is maintained)
   - — Operating point : ABS / DEV → sets up absolute value(ABS) and deviation(DEV). Only PV allows you to set up. When SP and DV are set, it is fixed as ABS.
   - — Output operation : ON / OFF → ON/OFF is set up for operating point in absolute value that is set up next in case object value is SP and DV.

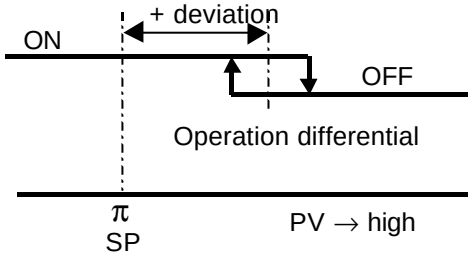
LOW / HIGH → If object value is PV, direction in which it is turned ON is set up for the point that is set up next.

- LOW : Output is OFF when the reverse operation (heating)(humidifying) PV is at a high temperature (high humidity) output OFF.
- HIGH : Output is On when the direct operation (freezing)(dehumidification) PV is at a high temperature (high humidity) output ON.

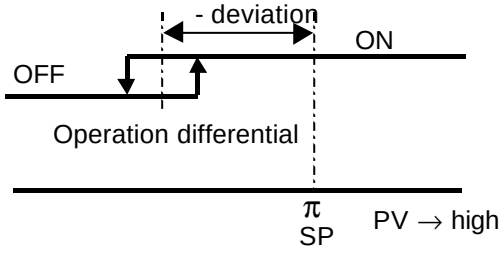
3. Operation range : Setup items vary depending on the operation types.
   - — Case of PV / ABS (Setup : LOW or HIGH range)
     Absolute value (operating point) , Operation differential, DELAY time.
   - — Case of PV / DEV (Setup: LOW or HIGH range)
     Deviation, Operation differential, DELAY time.
   - — Case of SP and DV (Setup: ON or OFF range)
     Maximum value, Minimum value, DELAY time.
   - — DELAY time : The delay time of setup is over-lapsed until it becomes ON or OFF condition setup, the output comes out. Within DELAY time, if the conditions are cancelled, there will be no output.

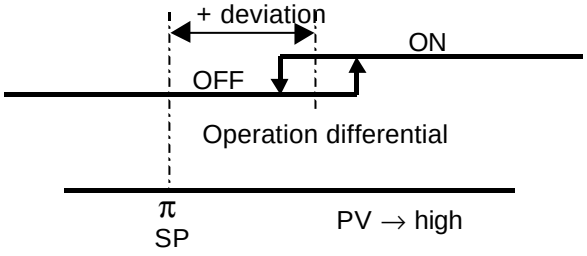
4. Example case of PV, DEV selection
   - — Operation direction = LOW





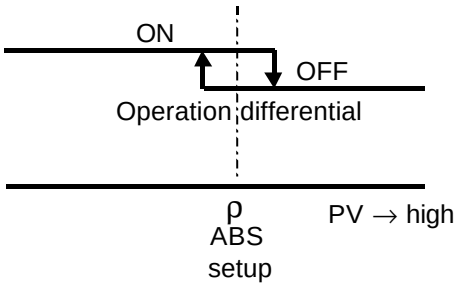
   - — Operation direction = HIGH



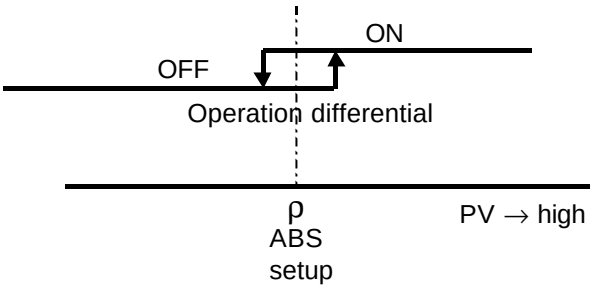


5. Example in Case of PV, ABS selection

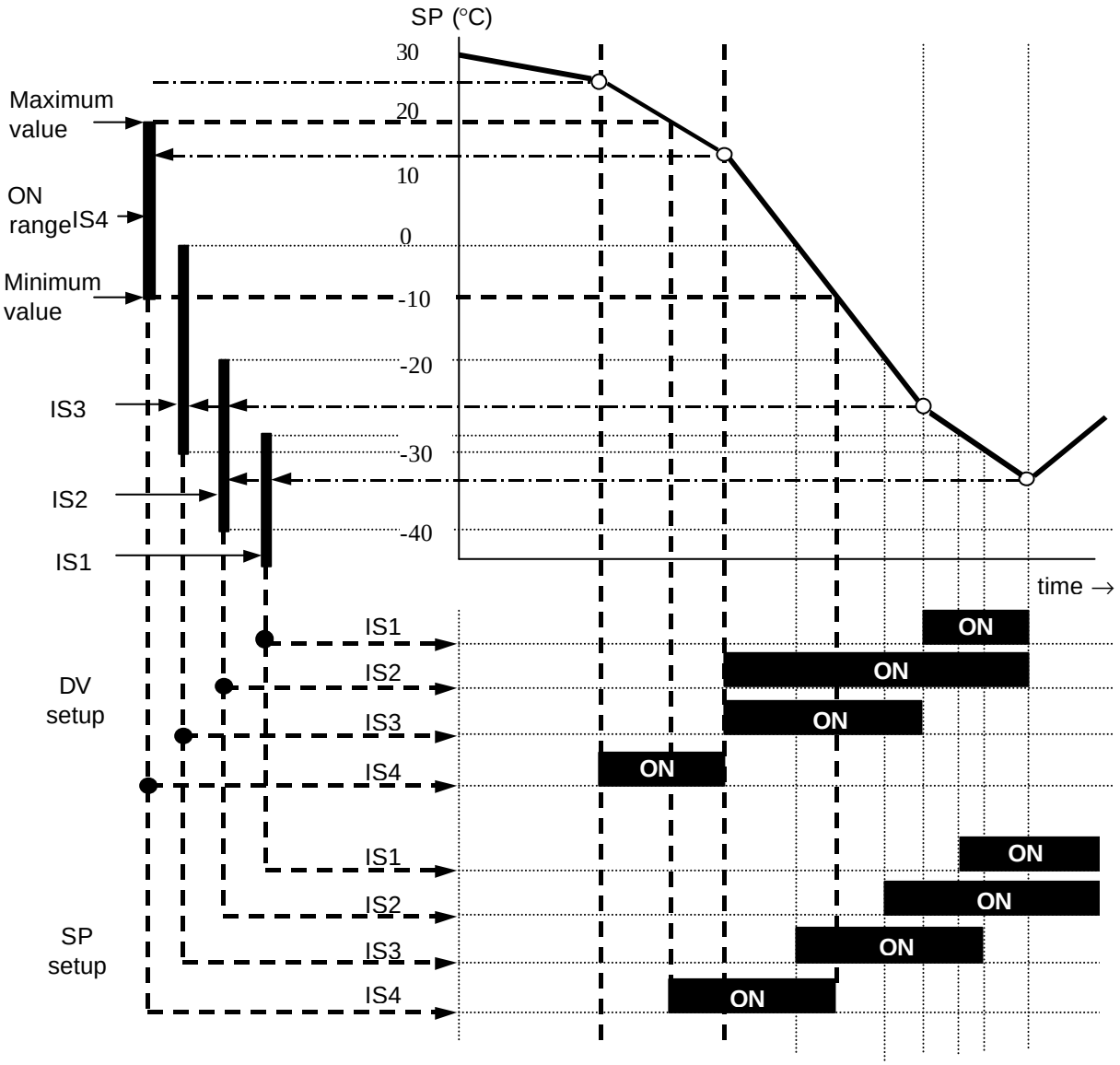
— Operation direction = LOW



— Operation direction = HIGH

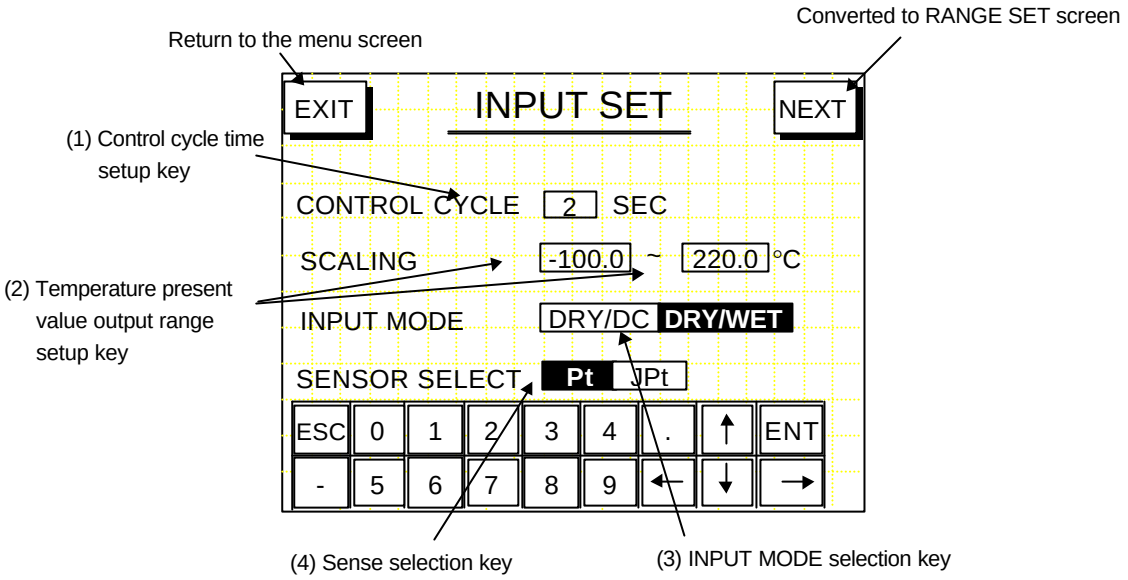


6. Example in case of SP and DV selection



3.6 INPUT SET Display

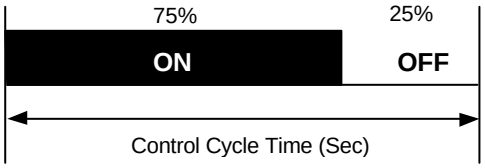
It is the display in which the cycle time of the control output, output range of current temperature value, input mode, sensor selection are setup.



<Figure 3.6.1>

Sequence of Operation

1. Setting up control cycle
   — Numeric keyboard appears, if you press control cycle time setup key (1). It is set up if you enter control cycle and push ENT key; it is cancelled if you enter ESC key. Control cycle time is shown in Figure 3.6.2.



<Figure 3.6.2> MV = 75% out

2. Setting up output range of current temperature value
   — Numeric keyboard appears, if you press the left-hand side button of the current temperature value output range setup key (2). Please enter minimum value of scale which is 4mA.

— Numeric keyboard appears, if you press the right-hand side key of key (2). Please enter maximum value which is 20mA.

— The range of SCALING setup is between 4 and 20mA and output of temperature current value depends upon current temperature(PV).

Example) When SCALING setup range is between 0°C and 90°C, output of current temperature value is 4mA if current temperature is below 0°C; output of current temperature value it is 20mA if the current temperature is above 90°C; if the current temperature is between 0°C and 90°C, output of current temperature value is between 4mA and 20mA. (Initial SCALING setup at the time of product shipment is between -100.0°C and 220.0°C)

— Output of current humidity value (output of current humidity value is between 4mA and 20mA and fixed as current humidity between 0 and 100%RH)

3. Selecting Input Mode

— If you press INPUT MODE SELECTION (3) key [DRY/WET], the DRY/WET key is reversed. Selection of DRY/WET means input of temperature of a dry bulb temperature(Ω) and that of a web bulb temperature (Ω). For the input of temperature, temperature of a dry bulb is utilized and the input of humidity is indicated by using relative humidity table in which difference between temperature of a dry bulb and that of a web bulb are calculated.

— If you press INPUT MODE selection key (3) [DRY/DC], the DRY/DC key is reversed.

Selection of DRY/DC means the input of the temperature of a dry bulb thermometer (Ω) and input of humidity (4~20mA). For the input of temperature, the temperature of a dry bulb thermometer is utilized and humidity input is indicated through the input of humidity sensor that is between 4 and 20mA.

4. Selecting Sensor Input

It allows you to select if you want to input a dry bulb /a wet bulb temperature either as Pt100 or JPt100

— Selecting Pt100

If you press [Pt] key (4), the Pt key is reversed.

— Selecting JPt100

If you press [JPt] key (4), the JPt key is reversed.

⊗ **Invalid Setup**

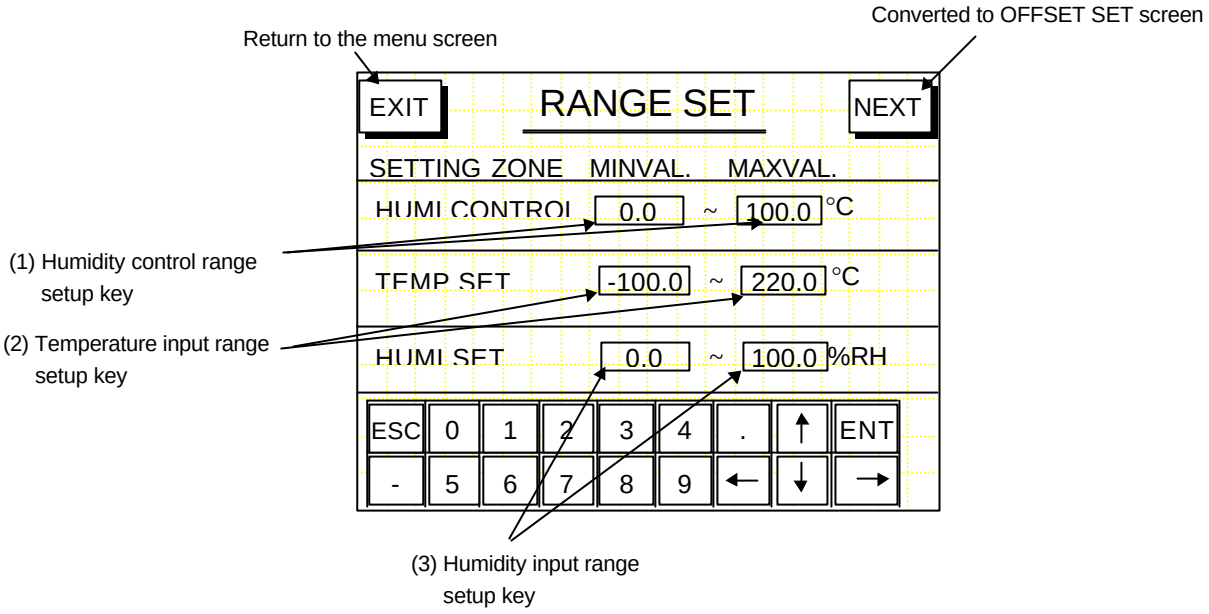
At the time of setting up MIN VALUE and MAX VALUE,

[MIN VALUE > MAX VALUE] is invalid and cannot be entered.

Please enter MIN VALUE after entering MAX VALUE.

3.7 RANGE SET Screen

It allows you to set up input range of temperature/humidity and humidity control field.



<Figure 3.7.1>

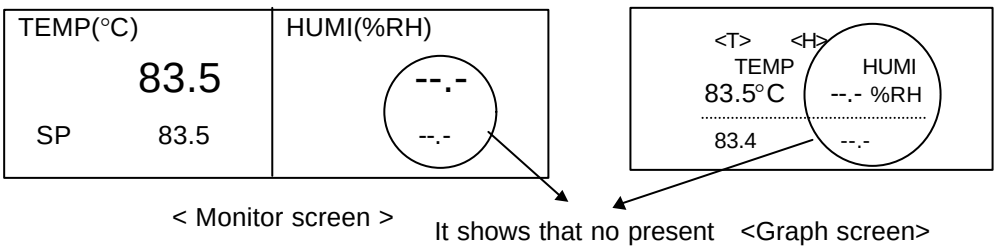
Sequence of Operation

1. Setting up humidity control field

It allows you not to control humidity in case Set Point is out of the range of the humidity control field. If humidity is not controlled, " ---.-" is indicated in the monitor screen and graph screen as shown in Figure 3.7.2.

— If you press the left-hand side button of humidity control field setup key (1), the numeric keyboard appears. Please enter minimum value of control field.

— If you press the right-hand side button of humidity control field setup key (1), the numeric keyboard appears. Please enter maximum value of control field.



< Monitor screen >

It shows that no present humidity control is allowed.

<Graph screen>

<Figure 3.7.2>

2. Setting up the range of temperature input

It allows you to limit the range of Set Point for fix control and program control. If the user enters SP that is out of the range of input field, an OVER RANGE message appears and indicates that it cannot be set up.

— If you press the left-hand side key of temperature input range setup key (2), the numeric keyboard appears. Please enter the minimum value of the input limit field.

— If you press the right-hand side key of temperature input range setup key (2), the numeric keyboard appears. Please enter the maximum value of the input limit field.

3. Setting up the range of humidity input

It limits the range of humidity SP input for fix control and program control. If the user enters SP that is out of the input range field, an OVER RANGE message appears and indicates that it cannot be set up.

— If you press the left-hand side key of humidity input range setup key (3), the numeric keyboard appears. Please enter the minimum value of input limit field.

— If you press the right-hand side key of humidity input range setup key (3), the numeric keyboard appears. Please enter the maximum value of input limit field.

Invalid Setup

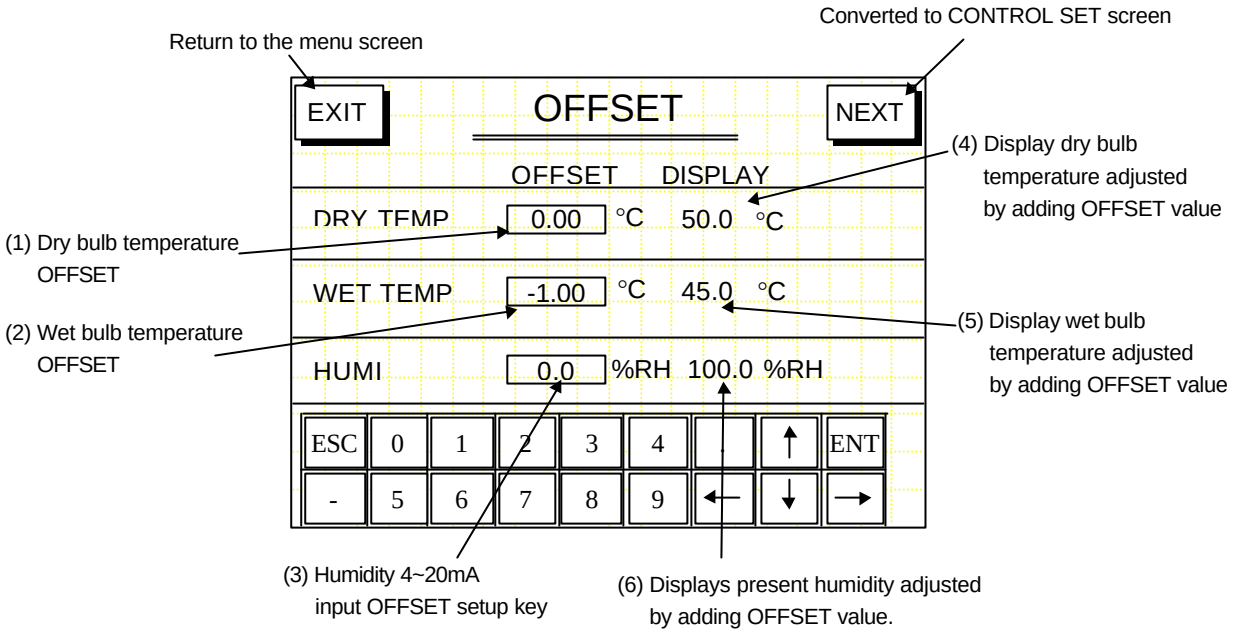
At the time of setting up MIN VALUE and MAX VALUE,

MIN VALUE > MAX VALUE is invalid and cannot be entered.

Please enter MIN VALUE after entering MAX VALUE.

3.8 OFFSET Setup Display Screen

The part is adjusting the dry bulb temperature, wet bulb temperature, and humidity input (4~20mA) OFFSET.



<Figure 3.8.1>

Sequence of Operation

1. Adjusting temperature OFFSET of a dry bulb temperature
   - If you press dry bulb temperature OFFSET setup key (1), the numeric keyboard appears. Please enter OFFSET value of a dry bulb temperature.
   - If input mode is DRY/DC or DRY/WET mode, both are valid.

     Example) Let's say that the actual input is 50.0°C. If OFFSET value is set up as +1.00°C, the current value PV becomes 51.00°C and is adjusted upward for the +1°C.

     If OFFSET is set up as -1.00°C, it becomes 49.00°C and is adjusted downward for the -1°C. Adjusted PV value is indicated as adjusted current value of dry bulb temperature key (4).
   - Input range : -9.99 ~ +9.99°C

2. Adjusting temperature OFFSET of a wet bulb temperature
   - If you press wet bulb temperature OFFSET setup key (2), the numeric keyboard appears. Please enter OFFSET value of a wet bulb temperature.
   - Only DRY/WET input mode is valid. .

Example) Let us say that actual input is 50.0°C. If OFFSET value is set up as +1.00°C, the current value PV become 51.00°C and is adjusted upward for the +1°C. If OFFSET is set up as -1.00°C, it becomes 49.00°C and is adjusted downward for the -1°C. Adjusted PV value is indicated as adjusted current value of wet bulb temperature (5).

— Input range : -9.99 ~ +9.99°C

3. Adjusting OFFSET of humidity 4~20mA input

— If you press humidity 4~20mA input OFFSET setup key (3), the numeric keyboard appear. Please enter humidity OFFSET value.

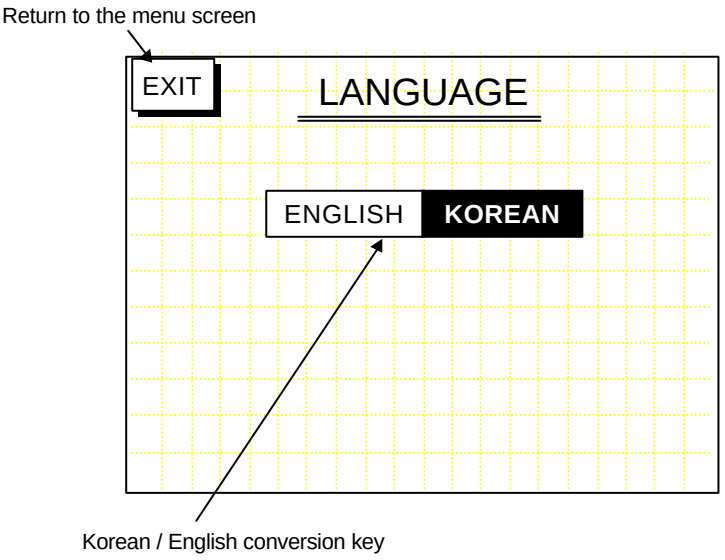
— Only DRY/DC input mode is valid.

Example) Let us say that actual input is 50.0%RH. If OFFSET value is set up as +1.0%RH, current value PV become 51.0%RH and is adjusted upward for the +1%RH. If OFFSET is set up as -1.0%RH, it becomes 49.0%RH and is adjusted downward for the -1%RH. Adjusted PV value is indicated as adjusted current value of humidity (6).

— Input range : -9.9 ~ +9.9 %RH

3.9 LANGUAGE Setup Display

It is a display that enables you to switch between English and Korean.



<Figure 3.9.1>

4. SPECIFICATIONS

4.1 General Specifications

Item		Specifications
Temperature input range		-100.0~220.0°C
Humidity input range		0.0~100.0%RH
Humidity processing range		Relative humidity processing range is within 0.00~99.99°C (wet bulb /dry bulb temperature)
Display device	Indicator	Dot matrix LCD module
	Display screen	86.37(H)X115.17(W)mm
	Number of dots	240(H)X320(W) dot
	Back light	CCFL cathode type fluorescent lamp (Brightness : 100 cd/m^2)
	Display size	40 lines X 30 lines (case of 8X8 dot characters)
	Display color	Blue characters on a white ground
Setup method		Touch key method
A/D conversion		Dual integral method 15bit (0.01 resolution with 300°C span)
Indication	temperature	± 0.1%FS ± 1digit
	humidity	± 1%RH FS ± 1digit
Measure display		0.01°C / 0.1°C display switch available
Input sampling cycle		1 second
Clock accuracy		± 10 PPM(25°C standard), temperature specificity -10~70°C:+10/-120 PPM)
Backup		Program data, control stated number : nickel manganese secondary battery Data is preserved for 5 years after break-off of power supply (provided that Full Charge is preceded)
Initial set value		EEPROM storage, more than ten years
Power voltage Power frequency		AC110V / AC220V according to terminal 50/60Hz line filter installed
Isolation resistance		50MΩ min. between case and terminals using a 500V DC Mega
Withstand voltage		AC1500V, 1 min, between case and power terminals
Ambient temperature		0 ~ 50°C
Exterior		Case: steel painting (ivory), front panel : plastic
Mounting		Panel-mount
Exterior size		210mm(H)X130mm(W)X188mm(D)
Panel cut		199.5mm(H)X119mm(W)

4.2 Input/Output specifications

<table>
<tr><th colspan="2">Item</th><th>Specifications</th></tr>
<tr><td colspan="2">PV input</td><td>Dry and Wet(Pt100 or JPt100 x 2)
Pt100 or JPt100 + DC 4~20mA</td></tr>
<tr><td colspan="2">RUN/STOP input</td><td>Contact input X 1 (Program RUN/STOP external signal)</td></tr>
<tr><td colspan="2">Trouble signal</td><td>Contact input X 9 (Display 9 items per screen)
Control output all OFF with Trouble signal input
Individual measure message, maximum 9screens</td></tr>
<tr><td rowspan="5">Control output</td><td>Temperature PID</td><td>Open collector output X 1</td></tr>
<tr><td>Humidity PID</td><td>Open collector output X 1</td></tr>
<tr><td>Temperature PID</td><td>DC 4~20mA output X 1(Within load resistance 500Ω)</td></tr>
<tr><td>Humidity PID</td><td>DC 4~20mA output X 1(Within load resistance 500Ω)</td></tr>
<tr><td colspan="2">Note 1) Operation direction direct operation(freezing) / reverse operation(heating) changeable
Note 2) Open collector /DC4~20mA simultaneous output</td></tr>
<tr><td colspan="2">INNER SIGNAL</td><td>ON / OFF open collector out X 4 or X 8
Inner signals can be used at the freezing, dehumidification, and Alarm Control
Each output is independently temperature / humidity, PV / SP / DV, Absolute value / Deviation, Output operation LOW / HIGH, Output operation ON / OFF, expansion of output X4 or out X8 when selecting output (In use of INNER SIGNAL 8 kind TIME SIGNAL can be out of use)</td></tr>
<tr><td colspan="2">RUN output</td><td>Open collector output X 1</td></tr>
<tr><td colspan="2">END output</td><td>Open collector output X 1</td></tr>
<tr><td colspan="2">TIME SIGNAL</td><td>Open collector output X 4</td></tr>
<tr><td colspan="2">DOWN output</td><td>Open collector output X 1</td></tr>
<tr><td colspan="2">TROUBLE output</td><td>Open collector output X 1</td></tr>
<tr><td colspan="2">Transmission output
(Auxiliary output)</td><td>Temperature : 4~20mA -100~220°C(range changeable)
Humidity : 4~20mA 0~100%RH (range fixed)</td></tr>
<tr><td colspan="2">Communication</td><td>RS232(standard), LonWorks(OPTION)</td></tr>
<tr><td colspan="3">Open collector out MAX DC30V, MAX50mA/1ch internal resistance 47Ω</td></tr>
</table>

4.3 program specifications

Item	Specifications
Step registration number	1~800step (maximum 800steps)
Step times	Maximum 99 hours and 59 minutes per step
Pattern registration number	1~30 (Maximum 30pattern)
Program link	Maximum 6 patterns
Link program registration	Maximum 10 links
Pattern REPEAT	1pattern all repeat X 1(Maximum repeat is 999 cycle) Part repeat X 5(Maximum repeat is 999 cycle)
HOLD	Stops program operation, if HOLD key in the front panel is pressed (Time counter stops and FIX control begins from that position) Starts program operation, when HOLD key is pressed again. (Time counter begins)
WAIT (Temperature, Humidity)	1) Rear Wait Time may exceed set time of the particular step. In this case, remaining time is set as 0 and pending, if both temperature and humidity that were measured do not reach target value ± WAIT set point. It proceeds to the next step after it is confirmed that temperature and humidity reach the range of set point (target value ± WAIT) 2) Front Wait Proceeding of program is pending if both temperature and humidity that were measured do not reach the range of target value ± WAIT set point. Setup range : ± 0 ~ 9.9°C / 0 ~ 99 %RH
ADVANCE	If you press ADVANCE key in the display, the remaining time of the step is set as 0 and moves to the next STEP. Note) Operation of Advance while waiting 1) Proceeds to the next step in the case of Rear Wait 2) Time is set as 0 and set point (SP) is equal to target value in the case of Front Wait.
PROGRAM RUN	1) Operates with RUN key in the display 2) Starts external signal : Input RUN/STOP,ON / 1 pulse 3) Starts time : It is possible to reserve time, day, and month Note 1) Control output is ON with program RUN. Note 2) Time begins is effective after operation of RUN in 1) or 2)
Program STOP	1) Operates with STOP key in the display 2) Input STOP for external signal : RUN/STOP ON / 1 pulse (Note) If it is STOP, program stops and control output of the total is OFF

Item		Specifications
POWER FAILURE		Controls right away after recovery of power failure, if the power failure lasts less than 4 seconds. For power failure that lasts longer than 4 seconds, setup modes below will be followed. BREAK : Stops program HOT START : Controls at the state just before power failure COLD START : It starts again at the beginning of program (Note) It is HOT START for fix control
TIME SIGNAL	Output	Open collector output X 4
	SIGNAL MODE	3 kinds of mode setup available (according to numerical inputs of 0-9) 1) ON-OFF mode 2) time mode 3) step mode : 0 setup OFF (out is OFF at this step) : 1 setup ON (out is ON at this step) : Random time signal setup of 2-9 available (8 kinds)
	TIME MODE	Setup of ON-DELAY time (ON time due to delay) Setup of CUT-BACK time (beforehand OFF time)
	STEP MODE	Setup of ON-DELAY time (ON time due to delay)

4.4 control output specifications

Item		Specifications
Temperature	PID control	PID time partition open collector output X 1 PID DC 4~20mA(load resistance 500Ω)X1
	ON/OFF control	Open collector output(Maximum ON/OFF X 9) - INNER SIGNAL
Humidity	PID control	PID time partition open collector output X 1 PID DC 4~20mA(load resistance 500Ω) X 1
	ON/OFF control	Open collector output(Maximum ON/OFF X 9)-INNER SIGNAL
Humidity RUN		Open collector output ON/OFF X 1(On in case of SP value humidity control range, OFF when humidity setup is 0.0%RH)
PID Constants	Proportion (P)	0.0~999.9 %
	Integral time (I)	0~3600 seconds
	Derivative time (D)	0~3600 seconds
	Cycle time	1~99 seconds
	ARW	0~100 %

Item	Specifications
PID ZONE Setup	Up to six zones are classified for the field of temperature and humidity and input of PID constant can be setup in each field (While program is being executed, PID constant of the field is used automatically, if SP exists in the field). Note 1) 3 temperature fields X 2 humidity fields = 6 fields
RUN Output	Open collector output ON/OFF X 1 "ON" when program is RUN; "OFF" when program is END
END Output	Open collector output ON/OFF X 1 "ON" when program is END; "OFF" when program is ON
TIME SIGNAL	Open collector output ON/OFF X 4 It is possible to set up to 10 ON/OFF times
Others	In the program mode, control operation starts for program start (Control output of the total of the previous is OFF) For those other than transmitted output (Power failure, Alarm, stop), output of the total is OFF when the program stops.

4.5 Control output specifications (INNER Signal)

Item		Specifications		
Output points		Open collector output ON/OFF X 6 (MAX DC30V MAX 50mA / 1ch internal resistance 47Ω)		
Setup item	Object	Temperature(TEMP) / Humidity(HUMI)		
	Object value	Set Point (SP) / Present value (PV) / Target value (DV)		
	Operating point	Absolute value (ABS) / Deviation (DEV)		
	Output operation	ZONE ON/OFF / Operation direction (LOW/HIGH)		
	Operation range		Temperature	Humidity
		Absolute value	-100.0 ~ 200.0 °C	0 ~ 100.0 %RH
		Deviation value	-99.9 ~ +99.9 °C	-99.9 ~ +99.9 %RH
		Action differential	± 0.0 ~ ±9.9 °C	± 0.0 ~ ± 9.9 %RH
	ON delay time	0 ~ 99 seconds		

Item		Specifications
Setup item content	Object TEMP/HUMI	INNER SIGNAL output is to be setup either at temperature output or at humidity output
	Object value PV/SP/DV	Setup of which value determines the ON/OFF. PV: Present value, SP: Set point interlocked with program operation DV: target value of step (fixed value within step, Destination value)
	Output operation LOW/HIGH	Setup for ABS or DEV
	Output operation ON/OFF	In case of a setup by selecting object value as SP or DV, and then range setup and operation direction (ON/OFF) setup are to be done. range setup : Temperature 2 points MIN~MAX -100.0~200.0℃ Humidity 2 units MIN~MAX 0.0~100.0%RH ON/OFF setup : Output On: when ON mode set point is within setup range Output Off: when ON mode set point is out of setup range Output On: OFF mode set point is within setup range Output Off: OFF mode set point is out of setup range

4.6 Control mode and setup

Item			Specifications
Control mode	Control mode		1) FIX control mode
			2) Program control mode
	Mode selection		Selection available at the operation setup screen
Control mode setup	FIX control mode	Temperature setup	-100.0 ~ 200.0℃
		Humidity setup	0 ~ 100%RH (Possible setup at 0.0 ~ 99.9℃)
		Slope setup	0 ~ 9.9 °C/min, 0 ~ 9.9 %RH/min,
		Auto tuning	Auto tuning of PID constant
	Program control mode	Temperature setup	-100.0 ~ 200.0℃
		Humidity setup	0 ~ 100%RH (Possible setup at 0.0 ~ 99.9℃)

4.7 Other specifications

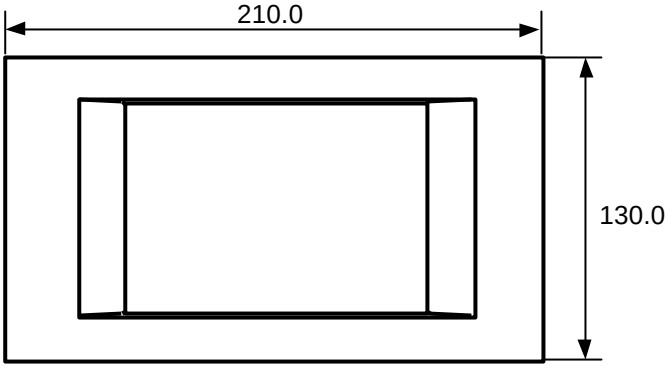
Item		Specifications
Display language		Korean or English (Conversion to Korean/English selection screen at the Menu screen)
Graph screen	Temperature	-100~200, -50~150, 0~200, -80~120°C of variability
	Humidity	0~100%RH
	Hours	4, 12, 24, 48, 96 hours, 8 days of variability
	Operation	Identification of program setup with a graph SP curve is possible. PV value display, SP value display, total time display (color of graph is to be inverted) in operation
Month, date, time correct		Month, date, time correctable (year 2000 display is possible)
Humidity control range		Setup available within temperature 0~100°C Setup available within humidity 0~100%RH
Humidity setup value mode		Humidity control output when setup value of humidity is at 0.0% RH : OFF and various humidity related outputs are OFF humidity display: "- - - . - "
LCD brightness		LCD brightness adjustable
Accumulation of operation time (TOTAL TIME)		Accumulated time at the beginning of program RUN or control (FIX control) Recounting from END at the maximum of 9,999hours and 59mins Counting from ' 0 at the program or regular control start
Back light		ON/TIMER OFF conversion available (0~99min) When back light is OFF and you press any part of the screen, backlight will be turned on.
Run lock		RUN/STOP key display is locked
Test name registration		Test name registration is up to 10 patterns

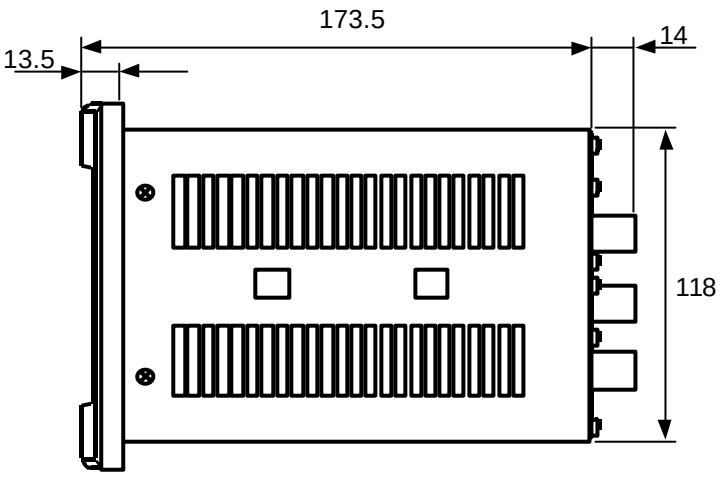
4.8 Trouble Monitor

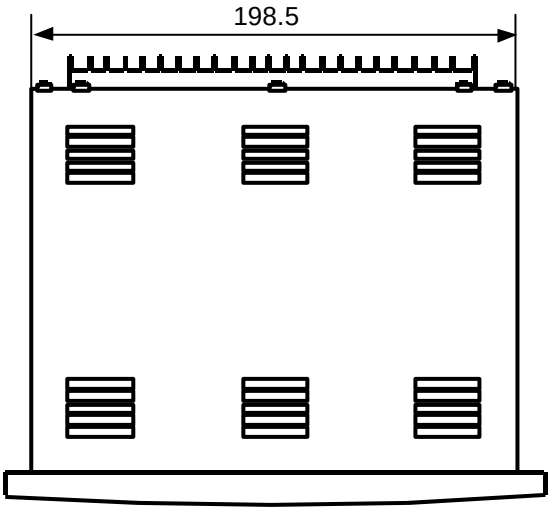
Item	Specifications
Trouble input	ON / OFF contact point input X 9 (In case of operation when the trouble input is ON) 1) Automatic conversion from operation screen to trouble monitor 2) Control output and ON/OFF output are all to be OFF exclusive of whole humidity present value output
Trouble monitor	Display of maximum 9 of trouble items
Trouble message	Trouble countermeasure message screen (9 screens)
Reset handling	CLEAR handling performs when removing the causes of trouble.

4.9 External Dimensions

unit : mm







Honeywell

Honeywell Co., Ltd.
S&C Control Product

06F, Hanil Group Building 191,
Hangangro-2ga, Yongsan-gu,
Seoul, 140-702, Korea
Tel: 82-2-799-6176 Fax : 82-2-792-9013

http://www.honeywell.co.kr
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