

**MICRO CONTROLLER H
Z SERIES**

TYPE: PYH

PREFACE

Congratulations on your purchase of Fuji Digital Temperature Controller (Type: PYH)

- Read this instruction manual carefully to ensure correct installation, operation and preparation.
Incorrect handling may lead to accident or injury.
- Specifications of this unit is subject to change without prior notice for improvement.
- Modification of this unit without permission is strictly prohibited.
Fuji will not bear any responsibility for a trouble caused by such a modification.
- This instruction manual should be kept by the person who is actually using the unit.
- After reading the manual, be sure to keep it at a place easy to access.
- This instruction manual should be delivered to the end user without fail.

Manufacturer : Fuji Electric Co., Ltd.
Type : Shown on nameplate of main frame
Date of manufacture : Shown on nameplate of main frame
Product nationality : Japan

The product conforms to the requirements of the Electromagnetic compatibility Directive 89/336/EEC as detailed within the technical construction file number TN510403. The applicable standards used to demonstrate compliance are:

**EN 50081-1 : 1992 Conducted and Radiated emissions
EN 50082-1 : 1992 Radiated immunity, ESD and FBT
(The unit meets Class A limits for conducted Emissions.)**

The unit also complies with the part of Immunity standards.

**IEC 1000-4-2 : 1995 level 3, IEC 1000-4-3 : 1995 level 3
IEC 1000-4-4 : 1995 level 3, IEC 1000-4-8 : 1993 level 4**

Request

- Transcription of a part or the whole of this manual without permission is prohibited.
- The contents of this manual are subject to change without prior notice.

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CAUTION ON SAFETY

First of all, read this “Caution on Safety” carefully, and then use the instrument in the correct way.

The cautionary descriptions listed here contain important information about safety, so they should always be observed. Those safety precautions are classified in 2 ranks, WARNING and CAUTION.

The following shows the meaning of WARNING and CAUTION.

 WARNING	Wrong handling may cause a dangerous situation, in which there is a possibility of death or heavy injury.
 CAUTION	Wrong handling may cause a dangerous situation, in which there is a possibility of injury or physical damage.

1. WARNING

1.1 Caution on wiring

- (1) For the safe operation of the controller, where the temperature probe is to be installed into an environment where voltage exceed 50V DC, it is essential that reinforced isolation or basic isolation and earth is maintained between all connections to the rear of the temperature controller, and that supplementary isolation is required for the alarm outputs.

The outputs from the controller are all less than 50V DC.

When wiring the power supply terminal, use vinyl insulated 600 volt cable or equivalent. A switch breaking both poles of the mains supply should be installed together with a fuse with a rating of 250 volt 1 Amp. The fuse should be installed between the mains switch and the controller.

The level of insulation provided by the temperature controller is:-

MAINS = BASIC
HEATER = BASIC
INPUTS = —

Prior to operation of the installed system the wiring should be checked to ensure that the required levels of insulation have been provided.

- (2) When a fault in the instrument is likely to lead to a serious trouble, use a suitable protective circuit on the outside for protection against trouble.
- (3) This unit is not provided with power switch, fuse, etc. These parts can be installed separately, if required (fuse rating; 250V, 1A).
- (4) Use of Fuji’s Z-Trap is recommended to protect the relay output from switching surge and to ensure a long life.

Type: ENC241D - 05A (power voltage; 100V)

ENC471D - 05A (power voltage; 200V)

Mounting position: Connected to relay control output terminals

1.2 Power source

- (1) Use a power source of rated voltage to prevent damage or trouble.
- (2) Do not turn ON the power until the wiring is completed to prevent shock hazard or trouble.

1.3 Prohibition of use in gas

The instrument is not an intrinsic safety explosion-proof type. Do not use it in a place exposed to combustible or explosive gas.

1.4 Contact to unit

- (1) This unit must not be disassembled, modified or repaired to prevent malfunction, shock hazard or fire accident.
- (2) When the power is ON, do not touch the terminals to prevent shock hazard or malfunction.

1.5 Caution on maintenance

- (1) Before mounting or removing the module or unit, turn OFF the power in advance to prevent shock hazard, malfunction or trouble.
- (2) Periodical maintenance is recommended to ensure continuous and safe operation of the instrument. Some parts of the instrument are limited in life or are subject to secular change.

2. CAUTION

2.1 Caution on handling

- (1) Do not install the unit in any of the following places.
 - A place where the ambient temperature exceeds the range of -10 to 50°C
 - A place where the ambient humidity exceeds the range of 45 to 85%RH
 - A place where temperature changes suddenly or dew condensation occurs
 - A place exposed to corrosive gases (sulfuric gas, ammonia, etc.) or combustible gases
 - A place where vibration or shock is likely to be directly transmitted to the body
 - A place exposed to water, oil, chemicals, vapor, steam, etc.
 - A place with much dust, salt or iron component
 - A place with much inductive disturbance, static electricity, magnetism or noise
 - A place exposed to direct sunlight
 - A place where heat such as radiant heat stays
- (2) Mounting

For mounting, attach the supplied mounting brackets (2 units) on top and bottom and tighten with a screwdriver. Tightening torque is about 147N·cm. (The case is made of plastic. Care should be taken not to tighten forcedly.)
- (3) When the unit is exposed to water, it may lead to a short-circuit or fire hazard. Contact your dealer for inspection.

2.2 Caution on cable connection

- (1) For thermocouple input, use a suitable compensating cable.
- (2) For resistance bulb input, use a cable with a small lead wire resistance and without resistance difference between 3 wires.
- (3) When external wiring has much noise, use the following step. When a conducted as load of digital output such as relay contact output or alarm output, connect a surge absorber to the conductor coil. (Example: ENC471D-05A for 200V AC)

- (4) When the power source has much noise, use an insulating transformer together with a noise filter. Noise filter should be mounted on a panel which has been earthed. The wiring between the noise filter output and the instrument power terminals should be as short as possible. Do not connect a fuse or switch to the noise filter output wiring, as it affects the performance of the filter.
- (5) Use of a twisted cable for the instrument power source provides better effects (short twist pitch is effective for noise).
- (6) When a heater burnout alarm is provided, the heater power and controller power should be connected using the same power line.
- (7) Time for preparation of contact output is required at power ON. When the output signal is used for an external interlock circuit, etc., connect a delay relay to the circuit.

2.3 Other

When cleaning the instrument, do not use organic solvents such as alcohol, benzine, etc. Use neutral detergent.

3. Caution on key operation/trouble

- (1) Alarm function should be set correctly. Otherwise, alarm output cannot be obtained at the time of occurrence of trouble. Be sure to check the function prior to operation.
- (2) Do not stop the device forcedly during auto-tuning, as it affects the control action. When it needs to stop forcedly, be sure to turn OFF the power in advance.
- (3) If the input cable is disconnected, the display shows UUUU or LLLL. When replacing the sensor, be sure to turn OFF the power.

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1. RATINGS

Item		Rating	Type	Fixed set point control type	Inverter control type (PYH9 only)	Position feedback control type	Dual control type
Power source voltage		85 to 264V AC, 50/60 Hz, free power source		○	○	○	○
Power consumption		About 20 VA (100V AC)/ About 30 VA (220V AC)		○	○	○	○
Input (measured value)		Thermocouple, resistance bulb, voltage, current, mV input (leak current=3μA typ.)		○	○	○	○
		With transmitter power 4 to 20 mA DC. (PYH9 only)		—	○	—	—
Control output 1	Relay contact	220V AC, 3A, 1c contact (resistive load)		○	—	—	○
	Current	4 to 20mA DC, load resistance, 600Ω or less		○	○	—	○
	SSR/SSC drive	10V to 27V DC at ON, 0.5V DC or less at OFF, max. current, 20mA DC.		○	—	—	○
	Motor-driven valve operation	220V AC, 3A, 1a contact × 2		—	—	○	—
Control output 2 (dual control type only)	Relay contact	220V AC, 3A, 1c contact		—	—	—	○
	Current	4 to 20mA DC, load resistance, 600Ω or less		—	—	—	○
	SSR/SSC drive	10V to 27V DC at ON, 0.5V DC or less at OFF, max. current, 20mA DC.		—	—	—	○
Auxiliary input	Analog	1 to 5V DC, input resistance, 1MΩ or more *1		○	○	○	○
	Heater current	1 to 50A AC.		○	—	—	○
	Opening	100 to 1000Ω, 3-wire system		—	—	○	—
	Digital 1	Contact, OFF at 24V DC, ON at 0V DC (15 mA)		○	○	○	○
	Digital 2	Ditto (PYH9 only)		○	○	○	○
	Digital 3	Ditto (PYH9 only) *2		○	○	○	○
Auxiliary output	PV/SV/MV transmission output	Analog *3	1 to 5V DC, input impedance of connected device, 500kΩ or more		○	○	○
		Digital 1	30V DC, 0.1A, 1a contact *4		○	○	○
	Auxiliary alarm output	Digital 2	Ditto		○	○	○
		Digital 3	Ditto (PYH9 only)		○	○	○
Main alarm output		220V AC, 1A, 1a contact × 2		○	○	○	○
Heater burnout alarm output		220V AC, 1A, 1a contact (PYH5: Open-collector (30V DC, 0.1A))		○	—	—	○
Fault output		30V DC, 0.1A, 1b contact		○	○	○	○

○ : Applicable — : Not applicable

*1: If "A" or "C" is not specified in the 11th digit of PILC, do not use the instrument because it will not operate normally.

*2: Auxiliary digital input 3 can be used when it is the T-Link transmission specifications or on SV selection.

*3: If "B" or "C" is not specified in the 11th digit of PILC, do not use the instrument because it will not operate normally.

*4: Open collector in case of PYH5

1. RATINGS

Item	Rating
Setting method	Key switch (data continuous change method)
Indicating method	7 segments, LED 4 digits × 2, mode indication
Transmission function	RS-485, T-link (PYH9 only) *5
Operating ambient temperature	-10 to +50°C
Operating ambient humidity	90% RH or less (no condensation)
Storage temperature	-10 to +70°C
Enclosure case	Plastic housing
External dimensions (unit: mm)	PYH5: 96(H) × 48(W) × 150(D) PHY7: 72(H) × 72(W) × 150(D) PHY9: 96(H) × 96(W) × 150(D)
Mass	PYH5/PYH7, approx. 0.5kg, PYH9, approx. 0.8kg
Finish color	Munsel N1.5 (black)

*5: T-Link is a name of Fuji Electric information network.

*6: Built in the instrument (external resistor is not required.)

Wiring resistance of allowable input signal

Input signal	Allowable input signal wiring resistance
Thermocouple, mV	50Ω or less per wire
Resistance bulb	10Ω or less per wire
1 to 5V DC	10Ω or less

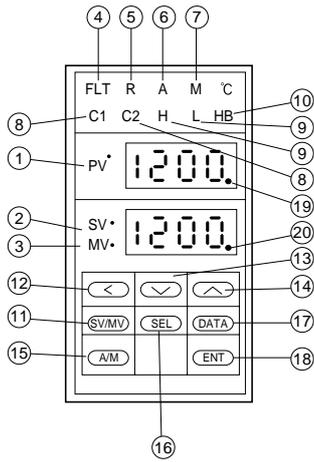
Input impedance

Input signal	Input impedance
Thermocouple	1MΩ
Resistance bulb	—
1 to 5V DC	1MΩ
4 to 20mA DC	250Ω *6

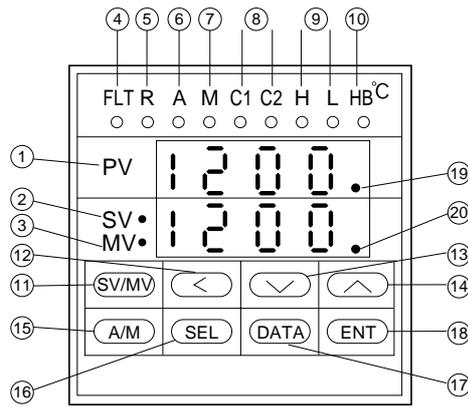
2. PERFORMANCE

Setting accuracy	±0.2% FS±1 digit	
Indication accuracy	±0.2% FS±1 digit, temperature compensation ±1°C Note) Refer to Table 1 (P.18).	
Remote setting input accuracy	±0.2% FS	
Proportional band (P)	0 to 3276% (with dead band ON-OFF operation at P = 0)	
Integrating time (I)	0 to 3276 s	
Derivative time (D)	0 to 900 s	
Main alarm setting range	Within full scale	
Sampling cycle	100 ms	
Control cycle	0.1 to 3276 s	
Time proportion cycle	1 to 255 s	
Insulation resistance	20MΩ or more (at 500V DC)	
Withstand voltage	1500V AC for 1min. Between power supply and relay contact output, power supply and the earth, and the earth and relay contact output 500V AC for 1 min. others	
Output relay life	Mechanical	10 ⁷ operations (100 ON-OFF operations/min.)
	Electrical	10 ⁵ operations (20 ON-OFF operations/min. at rated load)
Protective structure	Front panel, IEC standards, IP55 (dust-drip proofing) Terminal unit, IEC standards, IP00	
Current output accuracy	±2% FS	

3. OPERATING PARTS AND THEIR FUNCTIONS



PYH5



PYH 7, 9

Item	Function
① Measured value (PV) indication (red)	Measured value (PV) is indicated during operation. Abbreviation of parameter is indicated when setting parameter.
② Set value (SV) indication (green)	Set value (SV) is indicated during operation. Data of parameter is indicated when setting parameter.
③ Control output (MV) indication	Control output (MV) is indicated by selecting with (SV/MV) key.
④ Instrument fault lamp (red)	This lamp lights at instrument failure.
⑤ Remote operation lamp (green)	This lamp lights when operating with input of external set value (lamp is ON during remote operation).
⑥ Auto operation lamp (green)	This lamp lights when operating with SV value set by the front key (lamp ON during auto operation).
⑦ Manual operation lamp (green)	This lamp lights during manual operation.
⑧ Control output lamp (green)	C1: This lamp lights when control output 1 is given. (not light when current output is given) *1 C2: This lamp lights when control output 2 is given. (not light when current output is given) *1
⑨ Alarm lamp (red)	H: This lamp lights when higher limit main alarm is output. L: This lamp lights when lower limit main alarm is output.
⑩ Heater burnout alarm lamp (red)	This lamp lights when heater burnout alarm is output.
⑪ SV-MV select key	This key is used for selection between SV and MV indications. By pressing the key after setting parameter, operation mode is indicated.
⑫ Fast key	By pressing the (^) or (v) key, the data change is sent in fast-forward mode.
⑬ Down key	This key is used to decrease the value of data to be set.
⑭ Up key	This key is used to increase the value of data to be set.
⑮ Auto/manual select key	This key is used for selection between auto and manual operation.
⑯ Select key	This key is used to call parameters.
⑰ Data key	This key is used to change the data of parameters.
⑱ Entry key	This key is used to register the data in PYH after changing the data of parameters.

*1: PYH□□□□ lamp is set at OFF before shipment. When the ConF Ch <output terminal definition channel> is set with Do1=0F (motor value is open) and Do2=0E (motor valve is closed), the lamp is turned ON/OFF linked with output ON/OFF.

Indication		Contents
①9	PV 1200※	This lamp lights during auto-tuning.
②0	SV 1200※	This lamp lights during host transmission operation.

- When parameter is indicated or it is left as it is after setting, operation indication is indicated automatically about 13 minutes later.

4. PREPARATION FOR OPERATION, AND OPERATION

4.1 Preparation for operation

To ensure correct operation of the controller, it is necessary to set parameters before operating, according to the procedures shown in (3) Setting method of main alarm set values (AL1, AL2) of item "4.2 Operation". While setting parameters, be sure to stop the operation of the external system for the sake of safety.

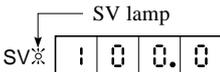
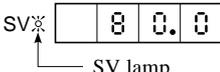
Kinds of parameters

Refer to "15. Parameter list" on page 35. Note that some parameters in "15. Parameter list" are not used depending on the type of PYH, which are not displayed by the indicator on the front of PYH.

4.2 Operation

- (1) When power turns ON, measured value (PV) and set value (SV) are indicated a few seconds later to start operating. The indication of measured value and set value is called the operation indication. Heat up time of PYH is two hours. Measuring and controlling of PYH should be operated after the heat up time.

- (2) Setting of set value (SV)

Contents of operation	Change of set value from 100.0°C to 80.0°C	
Key operation	Description	Indication
   	<ul style="list-style-type: none"> • Press the  key to light the SV lamp. (SV lamp should be kept lighting.) • Using the  key, set the set value (SV) to 80.0. <p>- Operation completed -</p>	 

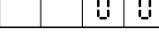
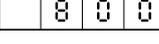
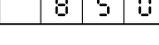
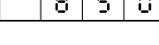
(Note) If the power for PYH is turned OFF within 10 seconds after changing the set value, it can result in misoperation. Be sure to turn OFF the power more than 10 seconds after the set value has been changed.

(3) Setting of main alarm set value (AL1, AL2)

Description

Set data prior to delivery from the factory are as follows.

- Main alarm 1 (AL1): Higher limit deviation alarm; set value is an industrial value of 50% full scale.
- Main alarm 2 (AL2): Lower limit deviation alarm with lower limit hold; set value is an industrial value of 50% full scale.

Contents of operation	Change of set value of main alarm 1 from 800°C to 850°C	
Key operation	Description	Indication
  3 times → 	<ul style="list-style-type: none"> • Press the  key for  of measured value indication. • Press the  key 3 times for  of measured value indication. Then press the  key. The indication of  flickers. 	PV  SV%  PV  SV% 
	<ul style="list-style-type: none"> • Press the  key to change the data of set value indication from 800 to 850. 	PV  SV% 
	<ul style="list-style-type: none"> • Press the  key for registration.  stops flickering. This completes the change of the main alarm 1. • To reset to the operation indication, press the  key. 	PV  SV% 

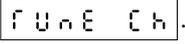
Remarks

The setting method for AL2 is the same as above. Indicate  referring to “15. parameter list” on page 35 and follow the above procedures.

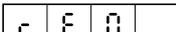
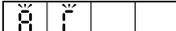
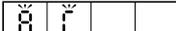
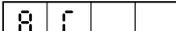
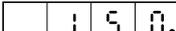
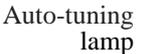
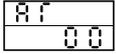
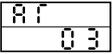
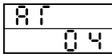
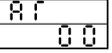
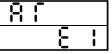
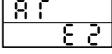
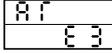
(4) Auto-tuning (AT) operation

Auto-tuning is a function to set up the parameter of PID automatically with PYH for operation.

- a) Auto-tuning should be performed after setting the set value (SV), main alarm 1 & 2, and proportional cycle (C1, C2 *1).
*1: With control output 2 produced
- b) Setting data for auto-tuning

The method of auto-tuning is set up to the standard type prior to delivery from the factory (see (4)- d)). Low PV type (overshoot suppression) can also be selected by setting 01 in  of . (Refer to “15. Parameter list” on page 35.)

c) Auto-tuning operation method

Contents of operation	Startup of auto-tuning	
Key operation	Description	Indication
<p>    14 times  →       </p>	<ul style="list-style-type: none"> • Press  key to indicate measured value indication . • Press the  key 14 times to indicate measured value indication , then press the  key. The indication  flickers. • When performing auto-tuning, press the  key and set the data of set value indication to . • By pressing the  key, the indication  stops flickering and auto-tuning is started. (The auto-tuning lamp will light in the measured value indication.) 	<p>            </p>
<ul style="list-style-type: none"> • During auto-tuning, the followings are indicated. When the auto-tuning time is long (about 13 min. or more), the indication is reset to operation indication automatically while auto-tuning continues. • The followings are indicated in order during auto-tuning, but it is completed normally at . <p>  at output ON  at output OFF  under calculation (Disappears almost momentarily) </p> <p>  completed normally </p> <ul style="list-style-type: none"> • After checking the completion of auto-tuning, the PID value calculated automatically needs to be registered. For registration, select PID parameter and follow the procedures in “(5) Setting of PID parameter” on page 9. At this time, the data indicated is a PID value which has been determined, so it need not be changed. * If this registration is not made, the controller operates with PID value prior to auto-tuning. • When auto-tuning is abnormal, the followings are indicated. <p>  time over  PV higher/lower limit check error (large process response)  change of SV during auto-tuning </p> <p>When these indications appear, auto-tuning is not possible. Set the PID value according to “(5) Setting of PID parameter”.</p> <p>During auto-tuning, the auto-tuning lamp lights and it goes off when auto-tuning is completed.</p> <p>(Note) Auto-tuning may require several 10 minutes depending on process response characteristic.</p>		

Note 1) During auto-tuning, vibration of process is observed. It is a phenomenon of auto-tuning, which is stabilized at the completion of auto-tuning.

Note 2) When operating conditions are changed, carry out auto-tuning once again.

Note 3) Do not use auto-tuning for the following processes.

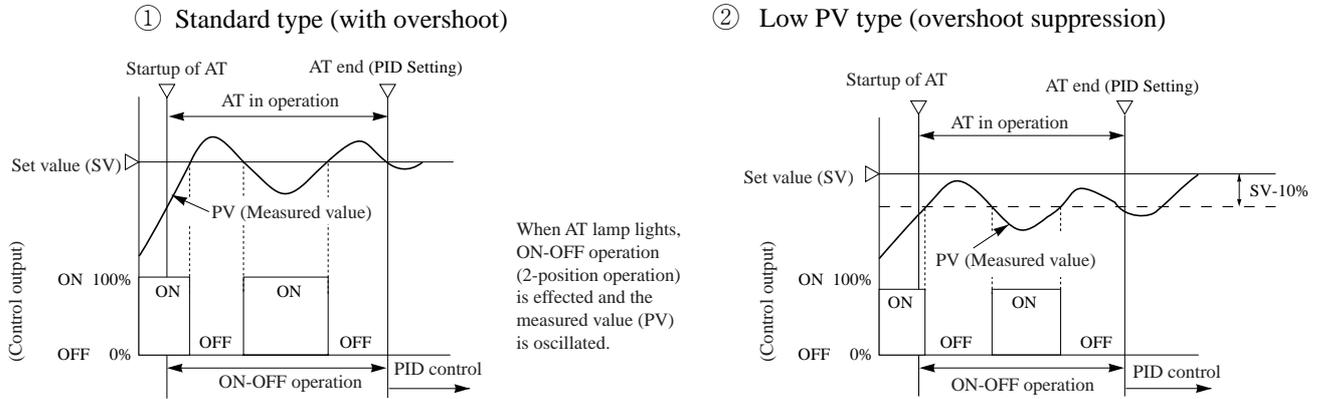
- Process disorder due to temporary ON-OFF control output from PYH is prohibited.
- Pressure or flow process having very quick response.

- d) Auto-tuning comes in two types; ① Standard type (with overshoot) and ② Low PV type (overshoot suppression).

The type ① is an overshoot where the measured value (PV) exceeds the set value (SV) during auto-tuning. Use this type when overshoot is allowed.

The type ② is for ON-OFF operation with a value lower than the set value (SV) by 10% / full scale.

Use this type when overshoot needs to be suppressed.



(5) Setting of PID parameter

Contents of operation	Setting of PID parameter. (Example: P=10, I=120, D=30)	
Key operation	Description	Indication
<p>SEL</p> <p>↓</p> <p>15 times ↓ DATA</p> <p>↑ or ↓</p> <p>ENT</p>	<ul style="list-style-type: none"> Press the SEL key to indicate measured value indication REM. Press the ↓ key 15 times to indicate measured value indication P, then press the DATA key. The indication P flickers. Press the ↑ or ↓ key to set the data of set value to 10. Press the ENT key. The indication P stops flickering. The value of P is set up. 	<p>PV: r E 0</p> <p>SV%: 0 0</p> <p>PV: P</p> <p>SV%: 1 0 0.0</p> <p>PV: P</p> <p>SV%: 1 0.0</p>
<p>↓ DATA</p> <p>2 times ↓</p> <p>↑ or ↓</p> <p>ENT</p>	<ul style="list-style-type: none"> Press the ↓ key to indicate measured value indication I. Press the DATA key. The indication I flickers. Press the ↑ or ↓ key to set the data of set value to 120. Press the ENT key and the indication I stops flickering. The value of I is now set. 	<p>PV: I</p> <p>SV%: 1 5 0.0</p> <p>PV: I</p> <p>SV%: 1 2 0.0</p> <p>PV: I</p> <p>SV%: 1 2 0.0</p>
<p>↓ DATA</p> <p>↓</p> <p>↑ or ↓</p> <p>ENT</p>	<ul style="list-style-type: none"> Press the ↓ key once to indicate the measured value indication D, then press the DATA key. The indication D flickers. Press the ↑ or ↓ key to set the data of set value to 30. Press the ENT key and the indication D stops flickering. The value of D is now set. 	<p>PV: D</p> <p>SV%: 5 0.0</p> <p>PV: D</p> <p>SV%: 3 0.0</p> <p>PV: D</p> <p>SV%: 3 0.0</p>

4.3 Selection of operation mode

(1) Selection of auto/manual operation

- By pressing the AM key when operation mode is indicated, the device is changed from auto operation to manual operation. By pressing the key once again, it is set in auto operation.

(This selection is balanceless/bumpless.)

- During manual operation, the manual operation lamp M will light. (During auto operation, the auto operation lamp A will light.)

- Control output operation during manual operation is made by pressing the SV/MV key to indicate control output and then pressing the ^ key or v and < keys. (When changing to control output indication, S is displayed on the manual operation indication. This is used only for remote operation, so the SV/MV key should be pressed until the manual operation lamp lights.)

Control output operation speed

Normal (^ or v key only): About 40 s/full scale

Fast-forward (^ and < keys, or v and < keys): About 8 s/full scale

- Operation of the ENT key for data registration is not required.

Caution

- When transmission function is provided, manual operation is possible from the host system. Setting to make manual operation invalid is also possible from the host system. In this case, the code 01 should be set using SCE in the item of parameter.
- Setting to make A/M mode change invalid is also possible. (Set the code 01 using MIH in the item of parameter.)

Caution

During remote operation, the indicating lamp R on the front panel lights. However, this lamp flickers when R-ACK signal DI1 (remote check signal) is OFF. If "A" or "C" is not specified in the 11th digit of PILC, the instrument will not operate normally. Since remote SV indication and so on may not be displayed correctly, don't use it.

(2) Selection of auto/remote operation

a) Selection of auto to remote operation

When the controller is to be changed from auto operation with the set value (SV) indicated on the front to remote operation with analog signal from the external device or set value (SV) for SV selection, the following procedures should be used.

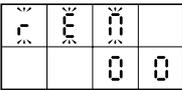
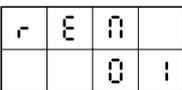
(This selection is balance/bumpless, so it should be carried out after the following operation.)

Contents of operation	SV balance prior to changing from auto to remote operation	
Key operation	Description	Indication
 	<ul style="list-style-type: none"> Press the  key to indicated  . 	PV  SV% 
 or  	<ul style="list-style-type: none"> Press the  or  key to set the value of  to 0. (Note 1) This operation is called the balance operation. 	PV  SV% 
 	<ul style="list-style-type: none"> Press the  key to reset to operation indication. 	PV  SV% 

-  is a value obtained by subtracting the SV value of cascade input from the SV value which has been set from the front of PYH.
- During auto operation, the auto operation lamp  on the front will light.

Note 1) In this case, don't manipulate the  +  or  +  keys. SV value changes suddenly and control may not be performed accurately.

① Selection from auto to remote operation with keys on the front of the main unit

Contents of operation	Remote operation	
Key operation	Description	Indication
 →  	<ul style="list-style-type: none"> Press the  key to indicate the measured value indication  . Press the  key, and the indication  flickers. The indication of set value  means auto operation. 	FLT R A M C1 C2 H L HB ※ 
 →  	<ul style="list-style-type: none"> Press the  key to indicate the set value indication  , then press the  key for registration. The indication  means remote operation. The remote operation lamp  flickers. Apply an external signal to R-ACK (DI1) digital input signal. The remote operation lamp  stops flickering. This completes the selection of remote operation. Remote operation is started with the analog signal from the external device or the set value (SV) for SV selection. 	FLT R A M C1 C2 H L HB ※ 

- Note 1) Remote operation with external analog signal requires R-ACK signal (remote check DI signal). Use the external terminal DI1 (auxiliary input DI) for this signal (see 14. Connection diagram on page 34).**
- Note 2) When remote operation is selected with T-link transmission, DI1 and DI3 of the T-link channel should be set to 01 (see 15. Parameter list on page 35).**

② Selection from auto to remote operation with host transmission

This selection is made by instructions from the host system through transmission functions (RS-485, T-link). For details, refer to the technical instruction manual.

b) Selection from remote to auto operation

When changing the operation mode from remote operation with analog signal from external device or set value (SV) of SV selection to auto operation with set value (SV) indicated on the front of the controller, the following procedures should be used.

(This selection is balanceless/bumpless.)

① Selection from remote to auto operation by keys on the front of the main unit

Contents of operation	Clear the remote operation									
Key operation	Description	Indication								
 →   → 	<ul style="list-style-type: none"> Press the  key to indicate measured value indication to  , then press the  key. The indication  flickers. The set value indication  means remote operation. 	<p>FLT R A M C1 C2 H L HB</p> <p>※</p> <table border="1"> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>0</td> <td>1</td> </tr> </table>							0	1
										
		0	1							
 →   → 	<ul style="list-style-type: none"> Press the  key to set the set value indication to  . Then, press the  key. The set value indication  means auto operation. The auto operation lamp  lights. Now, the auto operation has been selected. * When changing the set value (SV), see item 4.2 (2). 	<p>FLT R A M C1 C2 H L HB</p> <p>※</p> <table border="1"> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>0</td> <td>0</td> </tr> </table>							0	0
										
		0	0							

Even when  is set in  , auto operation is effected if R-ACK signal is removed.

② Selection from remote to auto operation with host transmission

This selection is effected by instructions from the host system through transmission functions (RS-485, T-link).

5. FAULT INDICATION

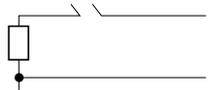
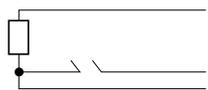
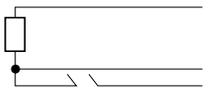
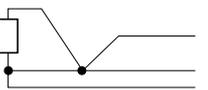
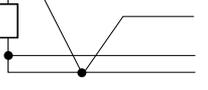
The controller has a fault indicating function so that the cause of fault can be removed quickly.

Indication	Cause	Manual operation	Remedy
FLT lamp $\text{≡}\text{O}\text{≡}$ is lit. The contents of FLT light can be indicated by using key according to FLT indication of input/output data channel. (Page 36)	Trouble with main unit	No	Replace the main unit.
	Error of DO output setting	Yes	Correct the DO output setting of input/output data channel.
	Measured value input (PV): Over, under, burnout	Yes	Check measured value input.
Measured value indication is LLLL or UUUU .	<ul style="list-style-type: none"> . Resistance bulb sensor is disconnected or shorted. . 1 to 5V DC, 4 to 20mA DC input wire is disconnected or shorted. . Polarity \oplus, \ominus of the input wire is reversed. . Thermocouple sensor is disconnected. 	Yes	Check the wiring of the measured value input.

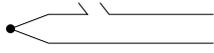
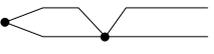
Note) In the event of a fault, perform manual operation as an emergency measure (see item 4.3 (1)).

If the measured value input is abnormal, it is indicated as shown in the table below where the control output corresponding to the measured value indication is output.

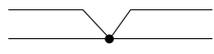
Resistance bulb input

Condition	Indication	Control output
Disconnection    Disconnection of 2 wires or 3 wires	UUUU	ON or more than 24mA, OFF or more than 0mA
	LLLL	OFF or more than 0mA, ON or more than 24mA
	UUUU	ON or more than 24mA, OFF or more than 0mA
	LLLL	OFF or more than 0mA, ON or more than 24mA
Short-circuit  	LLLL	OFF or more than 0mA, ON or more than 24mA

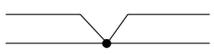
Thermocouple output

Condition		Indication	Control output
Disconnection		UUUU	ON or more than 24mA, OFF or 0mA
Short-circuit		Indication of temperature at shorted point	Control assuming input as temperature at shorted point

1 to 5V DC input

Condition		Indication	Control output
Short-circuit		LLLL	OFF or 0mA, ON or more than 24mA

4 to 20mA DC

Condition		Indication	Control output
Disconnection		LLLL	OFF or 0mA, ON or more than 24mA
Short-circuit			

Note) Control output changes its action by designating burnout direction. This is effected by setting a parameter in "brn" (designation of burnout direction) of specification change channel.

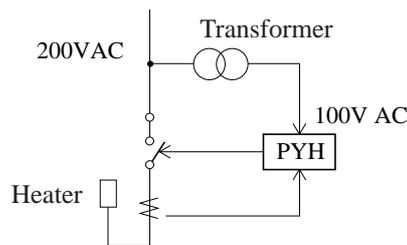
6. USE OF HEATER ALARM (OPTION)

- Heater burnout detect current and heater rated voltage need to be set according to the heater being used. These are factory set to 100V and 50A, respectively, prior to delivery.
- Alarm operating point should be set by heater alarm current (I_{b}) and heater rated voltage (V_{b}).
- Current detector (CT) comes in 2 types, 0 to 30A type (CTL-6-SF) and 20 to 50 A type (CTL-12-S36-8F). Use either one that is suited for the heater current being used.
- Setting of alarm set point

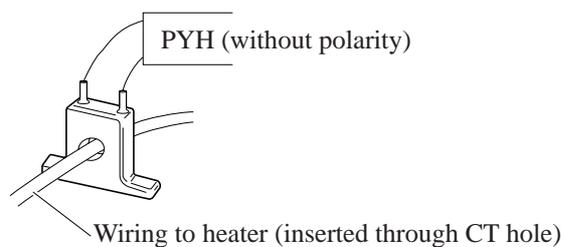
When 2 heaters of 2000W/115V are used in parallel and if one is disconnected, the rated current of 34.8A becomes 17.4A. Detection of disconnection should be set in the middle (26.1A) between the rated current and the disconnection current. (The set value of disconnection detection should be more than 15% of the rated current.)

When “N” number of heaters are connected together, the set value should be in the middle between “N” and “N-1”.

- When the heater power is also used for the instrument, the variation of alarm operating point due to power fluctuation can be minimized.
- This method cannot be used when heaters are controlled by the thyristor phase angle control method.
- In the following power system, heater rated voltage should be 100V AC used for the instrument.

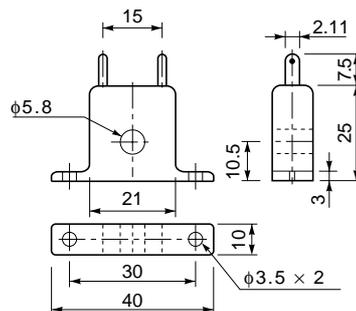


- Connection of heater current detecting CT

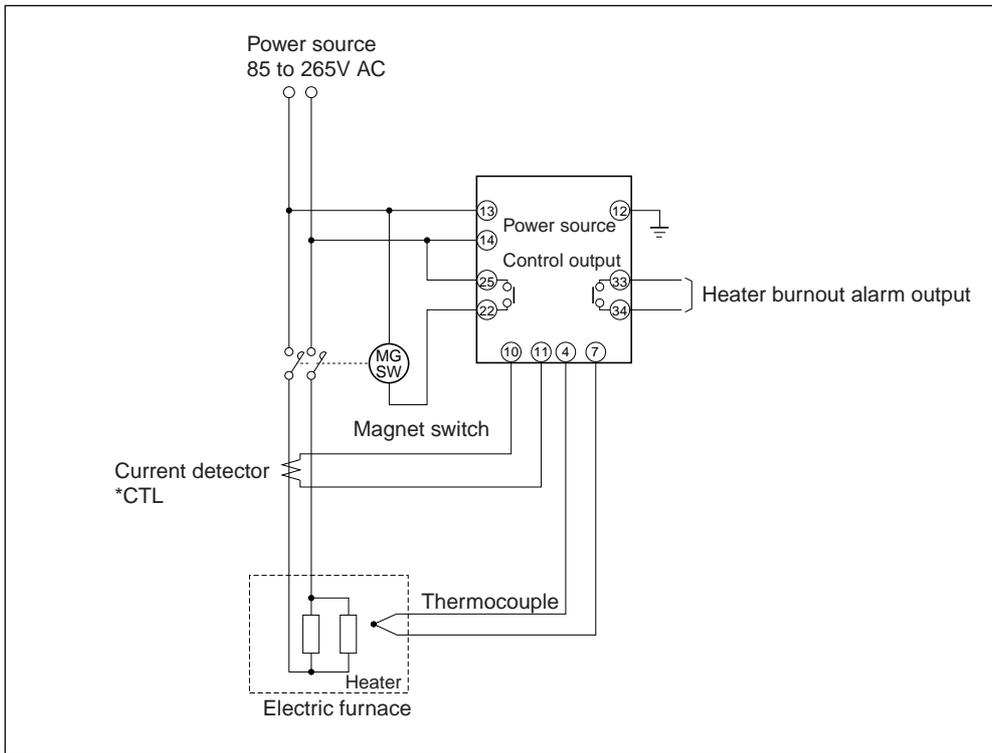


Current detector (CT) outline diagram

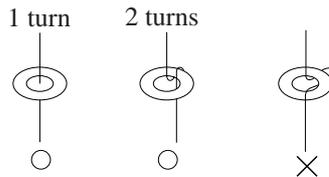
Type: *CTL-6-SF (1 to 30A)



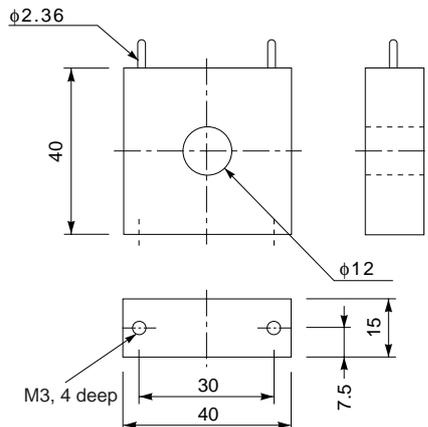
● Connection of heater burnout alarm (for Type PYH9)



- When the heater capacity is too small and the detector error is large, the sensitivity can be improved by winding the heater wire twice on the current detector (CT) to make the apparent current two times as large.
- When winding the current detector (CT) with many turns, be sure to wind it in the same direction. (See the figure below.)
- When the current detector (CT) is wound with many turns, the sensitivity will increase so the setting of disconnection detecting current needs to be changed (disconnection detection setting = heater rated current × number of turns).



Type: *CTL-12-S36-8F (20 to 50A)



7. CHANGING OF FUNCTIONS

Indications shown in the following pages are required for changing the specification of PYH.

The specifications (functions) of this PYH can be changed by the user, if desired.

To change the functions, refer to “15. Parameter list” on page 35 and “12. Parameter set value list” on page 27, to ensure correct setting.

CAUTION

PYH’s product type cannot be changed. Never change TYPE CH. on page 36.

After the functions have been changed, the parameters which were set before changing the functions become invalid or new parameters need to be set. So, the user is requested to understand the functions thoroughly before changing the functions.

After the functions have been changed, be sure to reset the controller. The method for resetting the controller is shown in the example of change.

When pressing the (ENT) key with the parameter “r ξ ξ” = 01, all LEDs light for a moment and the output is ON. But, this is not an error.

7.1 Method of changing specifications

The following shows the types of measured value input, input range and the types of alarm as examples for change of specifications.

(1) Selection of input specification (The unit is replaceable only with one of the same type.)

Contents of operation	Change of input from J thermocouple to K thermocouple																
Key operation	Description	Indication															
<p>(SEL)</p> <p>↓</p> <p>(V)</p> <p>↓</p> <p>⋮</p> <p>(SEL)</p>	<ul style="list-style-type: none"> Press the (SEL) key to indicate measured value to [REM]. 	<table border="1"> <tr><td>PV</td><td>r</td><td>ξ</td><td>η</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>0</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	r	ξ	η		SV			0	0	MV				
PV	r	ξ	η														
SV			0	0													
MV																	
<p>(V)</p> <p>↓</p> <p>⋮</p> <p>(SEL)</p>	<ul style="list-style-type: none"> Press the (V) key to indicate [SYS CH]. 	<table border="1"> <tr><td>PV</td><td>S</td><td>Y</td><td>S</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>C</td><td>h</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	S	Y	S		SV			C	h	MV				
PV	S	Y	S														
SV			C	h													
MV																	
<p>(SEL)</p>	<ul style="list-style-type: none"> Press the (SEL) key to indicate [PVF]. 	<table border="1"> <tr><td>PV</td><td>P</td><td>U</td><td>F</td><td></td></tr> <tr><td>SV</td><td>1</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	P	U	F		SV	1	0	0	0	MV				
PV	P	U	F														
SV	1	0	0	0													
MV																	
<p>(V) → (DATA)</p> <p>3 times ↓</p>	<ul style="list-style-type: none"> Press the (V) key 3 times to indicate [PVT], then press the (DATA) key. The indication [PVT] flickers. (The present input code 05 means J thermocouple.) 	<table border="1"> <tr><td>PV</td><td>P</td><td>U</td><td>T</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>5</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	P	U	T		SV			0	5	MV				
PV	P	U	T														
SV			0	5													
MV																	
<p>(^)</p> <p>↓</p>	<ul style="list-style-type: none"> Press the (^) key to change [05] to [06]. (06 means K thermocouple. For the type of input, refer to the input code table (Table 1)). 	<table border="1"> <tr><td>PV</td><td>P</td><td>U</td><td>T</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>6</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	P	U	T		SV			0	6	MV				
PV	P	U	T														
SV			0	6													
MV																	
<p>(ENT)</p> <p>↓</p>	<ul style="list-style-type: none"> Press the (ENT) key for registration. The indication stops flickering. This completes the change of the type of input. 	<table border="1"> <tr><td>PV</td><td>P</td><td>U</td><td>T</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>6</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	P	U	T		SV			0	6	MV				
PV	P	U	T														
SV			0	6													
MV																	
<p>(V) At the same time (<)</p> <p>↓</p>	<ul style="list-style-type: none"> Press the (V) key and the (<) key at the same time to indicate [RES]. Then press the (DATA) key. The indication [RES] flickers. 	<table border="1"> <tr><td>PV</td><td>r</td><td>ξ</td><td>ξ</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>0</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	r	ξ	ξ		SV			0	0	MV				
PV	r	ξ	ξ														
SV			0	0													
MV																	
<p>(DATA)</p> <p>↓</p>																	
<p>(^)</p> <p>→</p> <p>(ENT)</p> <p>↓</p>	<ul style="list-style-type: none"> Press the (^) key once to indicate [01], then press the (ENT) key to reset the controller. The display returns to operation indication. 	<table border="1"> <tr><td>PV</td><td>r</td><td>ξ</td><td>S</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>1</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	r	ξ	S		SV			0	1	MV				
PV	r	ξ	S														
SV			0	1													
MV																	

Table 1 Input code table

Type of input	Type of input		Code	°C	
				Measurable range	Minimum span *2
A	Resistance bulb	JPt100 (old JIS)	01	-150 to 400°C	50°C
		Pt100 (IEC)	02	-150 to 400°C	50°C
	Thermocouple	J	05	0 to 1000°C	200°C
		K	06	0 to 1200°C	200°C
		R *3	07	0 to 1600°C	1000°C
		B *3	08	0 to 1800°C	1500°C
		T	09	-200 to 400°C	200°C
		E	0A	0 to 750°C	200°C
		S *3	0B	0 to 1600°C	1000°C
	PR40/20 *3	0C	0 to 1800°C	1800°C	
	Tungsten-rhenium (WRe5-26) *3	0D	0 to 2400°C	2400°C	
Voltage	0 to 10mV DC	10	-999 to 9999 (Scaling range)		
	0 to 50mV DC	11			
B	Voltage	0 to 50mV DC	0F		
	Current	4 to 20mA DC *4			
C	Current	With transmitter power supply, 4 to 20mA DC (inverter control type only)	0E		

• Range width can be set within the range shown above (Programmable range).
 Up to the first decimal place can be indicated *1. (To be used with the span of 1000°C or less.)
 • “°C” is based on IEC standards.
 • Accuracy
 B: 0 to 400°C, ± 5%
 R: 0 to 500°C, ± 1%
 PR40/20: Less than 1000°C; not guaranteed, more than 1000°C ; ±1%
 *1: Voltage/current input is indicated up to the third decimal place.
 *2: Range setting below minimum span is out of accuracy assurance.
 *3: Inhibit the minus temperature input
 *4: 250Ω resistor is built in, and external resistor is not required.

Note) The input range of this table means the range that PYH can measure the input.

This means overrange and underrange should be included in this range. You should set your range including overrange and underrange within the table range.

(2) Change of input (measurement) range

Description

The lower limit (minimum range) and upper limit (maximum range) of measuring range should be set up.

Caution

Measuring range and the type of input are factory-set prior to delivery. When changing the measuring range and the type of input, other parameters need to be changed.

① Change of upper/lower limit of measuring range

Contents of operation	Change of measuring range from -50 to 100°C to 0 to 200°C	
Key operation	Description	Indication
<p>(SEL) → ↓</p> <p>(▽) ↓ ⋮</p> <p>(SEL) → (DATA) ↓ ↓</p> <p>(^) Press at the (←) same time to obtain 200. ↓ ↓</p> <p>(ENT) ↓</p> <p>(▽) → (DATA) ↓ ↓</p> <p>(^) ↓ Press to obtain 0.</p> <p>(ENT) ↓</p> <p>(▽) At the (←) same time ↓ ↓ (DATA) ↓</p> <p>(^) → (ENT) ↓ ↓</p>	<ul style="list-style-type: none"> Press the (SEL) key to indicate measured value to [REM]. Press the (▽) key to indicate [SYS CH]. Press the (SEL) key once to indicate [PVF], then press the (DATA) key. The indication PVF flickers. [PVF] is the upper limit of the measuring range. Press the (^) key and (←) key at the same time to change 100 to 200. Press the (ENT) key for registration. The indication stops flickering. This completes the setting of the upper limit of the measuring range. Press the (▽) key once to indicate [PVB], then press the (DATA) key. The indication [PVB] flickers. [PVB] is the lower limit of the measuring range. Press the (^) key to change -50 to 0. Press the (ENT) key for registration. The indication stops flickering. This completes the setting of the lower limit of the measuring range. Press the (▽) key and the (←) key at the same time to indicate [RES], then press the (DATA) key. The indication [RES] flickers. Press the (^) key once to indicate [01], then press the (ENT) key to reset the controller. The indication returns to operation indication. 	<p>PV [r] [E] [n] [] SV [] [] [0] [0] MV [] [] [0] [0]</p> <p>PV [S] [Y] [S] [] SV [] [] [C] [h] MV [] [] [] []</p> <p>PV [P] [V] [F] [] SV [] [] [1] [0] [0] MV [] [] [] []</p> <p>PV [P] [V] [F] [] SV [] [] [2] [0] [0] MV [] [] [] []</p> <p>PV [P] [V] [F] [] SV [] [] [2] [0] [0] MV [] [] [] []</p> <p>PV [P] [V] [B] [] SV [] [] [-] [5] [0] MV [] [] [] []</p> <p>PV [P] [V] [B] [] SV [] [] [] [] [0] MV [] [] [] []</p> <p>PV [P] [V] [B] [] SV [] [] [] [] [0] MV [] [] [] []</p> <p>PV [r] [E] [S] [] SV [] [] [0] [0] MV [] [] [] []</p> <p>PV [r] [E] [S] [] SV [] [] [0] [1] MV [] [] [] []</p>

② Measured value full scale (PVF) – measured value base scale (PVb) must be larger than the minimum range width (deviation alarm setting cannot be performed accurately.)

(3) Change of alarm operation

Description

The type of main alarm is factory-set prior to delivery as shown below.

Main alarm 1: Upper limit deviation alarm (code 02)

Main alarm 2: Lower limit deviation alarm (code 04) with lower limit hold

Setting of absolute alarm (upper limit) to main alarm 1 and absolute alarm (lower limit) to main alarm 2.

Contents of operation	Change of main alarm 1 code 02 to 01 and main alarm 2 code 04 to 08																
Key operation	Description	Indication															
<p>(SEL) </p>	<ul style="list-style-type: none"> Press the (SEL) key to indicate measured value to [REM]. 	<table border="1"> <tr><td>PV</td><td>r</td><td>E</td><td>n</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>0</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	r	E	n		SV			0	0	MV				
PV	r	E	n														
SV			0	0													
MV																	
<p>(v) </p> <p>⋮</p>	<ul style="list-style-type: none"> Press the (v) key to indicate [SYS CH]. 	<table border="1"> <tr><td>PV</td><td>S</td><td>Y</td><td>S</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>C</td><td>H</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	S	Y	S		SV			C	H	MV				
PV	S	Y	S														
SV			C	H													
MV																	
<p>(SEL) → (v) </p> <p>7 times</p>	<ul style="list-style-type: none"> Press the (SEL) key to indicate [PVF], then press the (v) key 7 times. When [1TP] is indicated, press the (DATA) key. The indication [1TP] flickers. (The present main alarm 1 code 02 is indicated.) 	<table border="1"> <tr><td>PV</td><td>1</td><td>r</td><td>P</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>2</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	1	r	P		SV			0	2	MV				
PV	1	r	P														
SV			0	2													
MV																	
<p>(DATA) </p>	<ul style="list-style-type: none"> Press the (v) key to change main alarm 1 code [02] to [01]. (Main alarm 1 code is set as shown in the main alarm code table (see Table 2).) 	<table border="1"> <tr><td>PV</td><td>1</td><td>r</td><td>P</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>1</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	1	r	P		SV			0	1	MV				
PV	1	r	P														
SV			0	1													
MV																	
<p>(v) </p>	<ul style="list-style-type: none"> Press the (ENT) key. The indication stops flickering and the setting of main alarm 1 is completed. 	<table border="1"> <tr><td>PV</td><td>1</td><td>r</td><td>P</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>1</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	1	r	P		SV			0	1	MV				
PV	1	r	P														
SV			0	1													
MV																	
<p>(ENT) </p>	<p>Next, set main alarm 2.</p> <ul style="list-style-type: none"> Press the (v) key to indicate [2TP], then press the (DATA) key. The indication [2TP] flickers. (The present main alarm 2 code 4 is indicated.) 	<table border="1"> <tr><td>PV</td><td>2</td><td>r</td><td>P</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>4</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	2	r	P		SV			0	4	MV				
PV	2	r	P														
SV			0	4													
MV																	
<p>(v) </p>	<ul style="list-style-type: none"> Press the (v) key to change main alarm 2 code [04] to [08]. (Main alarm 2 code is set as shown in the main alarm code table (see Table 2).) 	<table border="1"> <tr><td>PV</td><td>2</td><td>r</td><td>P</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>8</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	2	r	P		SV			0	8	MV				
PV	2	r	P														
SV			0	8													
MV																	
<p>(ENT) </p>	<ul style="list-style-type: none"> Press the (ENT) key. The indication stops flickering and setting of main alarm 2 is completed. 	<table border="1"> <tr><td>PV</td><td>2</td><td>r</td><td>P</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>8</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	2	r	P		SV			0	8	MV				
PV	2	r	P														
SV			0	8													
MV																	
<p>(v) At the same time (<) </p>	<ul style="list-style-type: none"> Press the (v) key and the (<) key at the same time to indicate [RES], then press the (DATA) key. The indication [RES] flickers. 	<table border="1"> <tr><td>PV</td><td>r</td><td>E</td><td>S</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>0</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	r	E	S		SV			0	0	MV				
PV	r	E	S														
SV			0	0													
MV																	
<p>(^) → (ENT) </p>	<ul style="list-style-type: none"> Press the (^) key once to indicate [01], then press the (ENT) key to reset the controller. The indication returns to operation indication. 	<table border="1"> <tr><td>PV</td><td>r</td><td>E</td><td>S</td><td></td></tr> <tr><td>SV</td><td></td><td></td><td>0</td><td>1</td></tr> <tr><td>MV</td><td></td><td></td><td></td><td></td></tr> </table>	PV	r	E	S		SV			0	1	MV				
PV	r	E	S														
SV			0	1													
MV																	

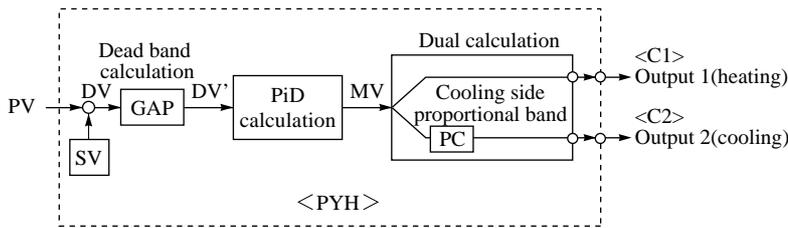
Table 2 : Type of main alarm code table

Type of main alarm	Code	Main alarm output
		Operation chart
Without alarm	00	
Absolute alarm (upper limit) (Set by absolute value without regard to main setting.)	01	
Absolute alarm (lower limit) (Set by absolute value without regard to main setting.)	08	
Upper limit deviation alarm (Set by deviation value of output from main setting.)	02	
Lower limit deviation alarm (Set by deviation value of output from main setting.)	03	
With lower limit hold* Lower limit deviation alarm	04	
Upper/lower limit deviation alarm (non-discriminate) (The value of lower limit and upper limit deviations are the same.)	05	
With lower limit hold Upper/lower limit deviation alarm (non-discriminate) (The values of lower limit and upper limit deviations are the same.)	06	
Upper/lower limit alarm (The values of lower limit and upper limit deviations are the same.)	07	
Absolute alarm (with lower limit hold) (Set by absolute value without regard to main setting.)	09	

* Lower limit hold is an action not to emit output until the alarm exceeds the lower limit after power is ON.

8. DUAL OUTPUT CONTROL TYPE

< PYH dual output control >



When the process tends to generate heat of itself, cooling control is required in addition to heating control. Dual output control is used to control the temperature of such a process. As another example, it is used in the PH control process.

For the dual output control type, the following settings are required.

- ① MV 2 proportional cycle (to be set according to the type of cooling side terminal device)

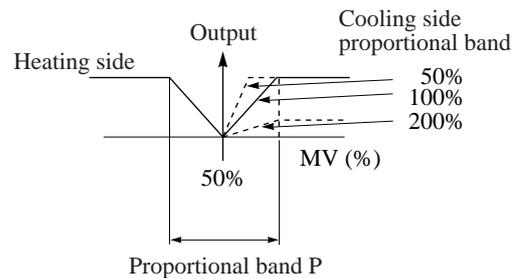
Setting range: 1 to 255 s (factory-set prior to delivery; contact output 30 s, SSR/SSC 2 s, not indicated at DC 4 to 20 mA)

Set to [2] of operating condition change channel (P R r n [h).

- ② Cooling side proportional band (setting of the proportional band on the cooling side)

Setting range: 0.0 to 3276.0 (factory-set prior to delivery; 100.0)

Set to P [of normal operation channel.

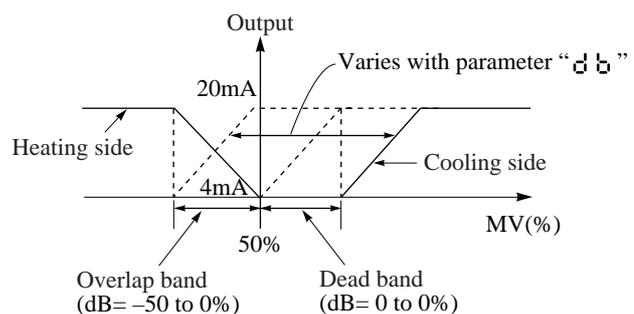


- ③ Dead band (used to overlap the heating side proportional band and the cooling side proportional band, or separate (dead) them from each other.)

Setting range: -50.0 to +50.0% (factory set prior to delivery; 0.1%)

Set to d b of normal operation channel.

- Set value of DB is a percentage (%) of MV full scale.



*4mA and 20mA are output current. Output denotes both output 1 and output2.

- ④ Limiter function

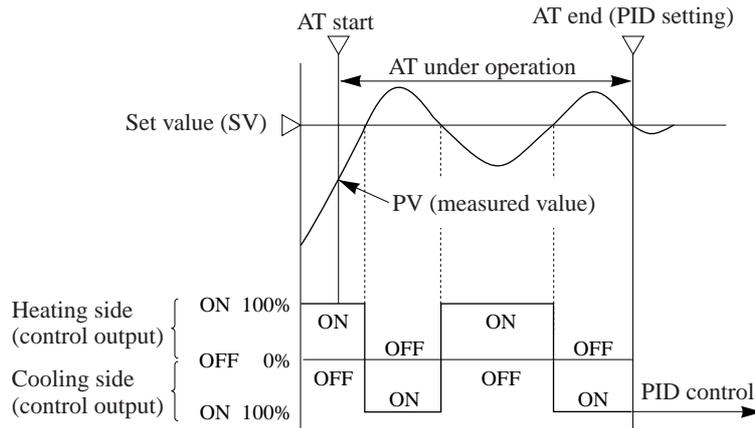
- Heating manipulated value upper limit (h n h)
- Heating manipulated value lower limit (h n L)
- Cooling manipulated value upper limit ([n h)
- Cooling manipulated value lower limit ([n L)

Set to h n h, h n L, [n h, [n L of auxiliary alarm channel (R L n [h).

■ Auto-tuning

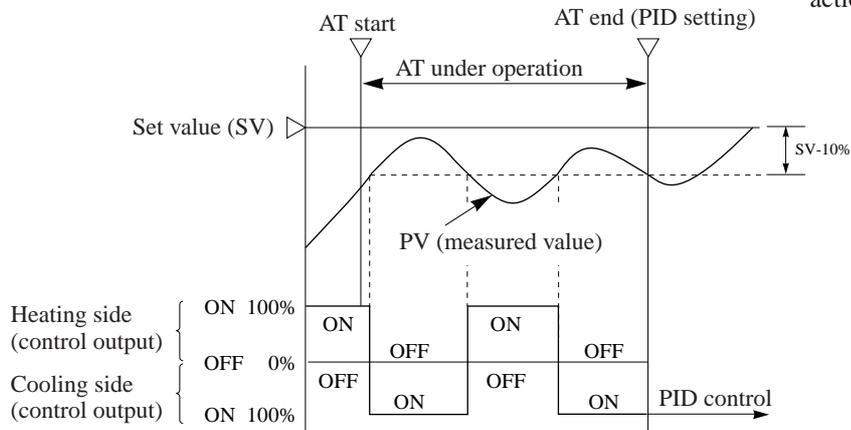
- For operation, refer to "Auto-tuning operation" on page 7.
- During auto-tuning, the cooling side output is ON-OFF controlled as shown in the diagram below, to obtain optimum PID and cooling side proportional band (PC).
(Values of I and D are the same for heating/cooling.)
- At the completion of auto-tuning, register the values of PID and PC referring to page 9.

① Standard type (with overshoot)



While AT lamp is lights, measured value (PV) is oscillated by ON-OFF action (2-position action).

② Low PV type (overshoot suppression)



9. SV SELECTION

This function is used to control set values (SV) of 1 to 7 types set by the keys on the front of the controller using external contact input (DI).

Note) The number of set values (SV) varies with the type of PYH.

- For setting the set values (SV1 to SV7), use $\text{S} \bar{\text{C}} \text{1}$ to $\text{S} \bar{\text{C}} \text{7}$ of normal operation channel.

Auxiliary input			Set value
Digital 1	Digital 2	Digital 3	
OFF	OFF	OFF	SV0 (Auto-operation is effected.)
ON	OFF	OFF	SV1
OFF	ON	OFF	SV2
ON	ON	OFF	SV3
OFF	OFF	ON	SV4
ON	OFF	ON	SV5
OFF	ON	ON	SV6
ON	ON	ON	SV7

Note) All can be used by PYH9 type. Only the item shown in  can be used by PYH7, PYH5 and inverter control types.

Note) When operating PYH with any set value of SV1 to SV7, remote operation is effected. When digital 1, 2 and 3 are at OFF, PYH is set in auto-operation mode using the set value obtained from the front of PYH. When changing the operation (remote operation) with set values of SV1 to SV7 to auto-operation, the set values of the remote operation is still valid so they need to be changed.

10. POSITION FEEDBACK CONTROL TYPE

Position feedback control is a function to control by feeding back valve opening signal with a motor-driven valve connected to a terminal device.

- To adjust zero and span of valve opening signal (potentiometer), call the specification change channel (SYS CH.) to select the item of **POT** and use the following procedures.

Note) Valve opening indication
 Accuracy: $\pm 0.2\%$ FS
 Resolution: max. $\pm 1.0\%$ FS

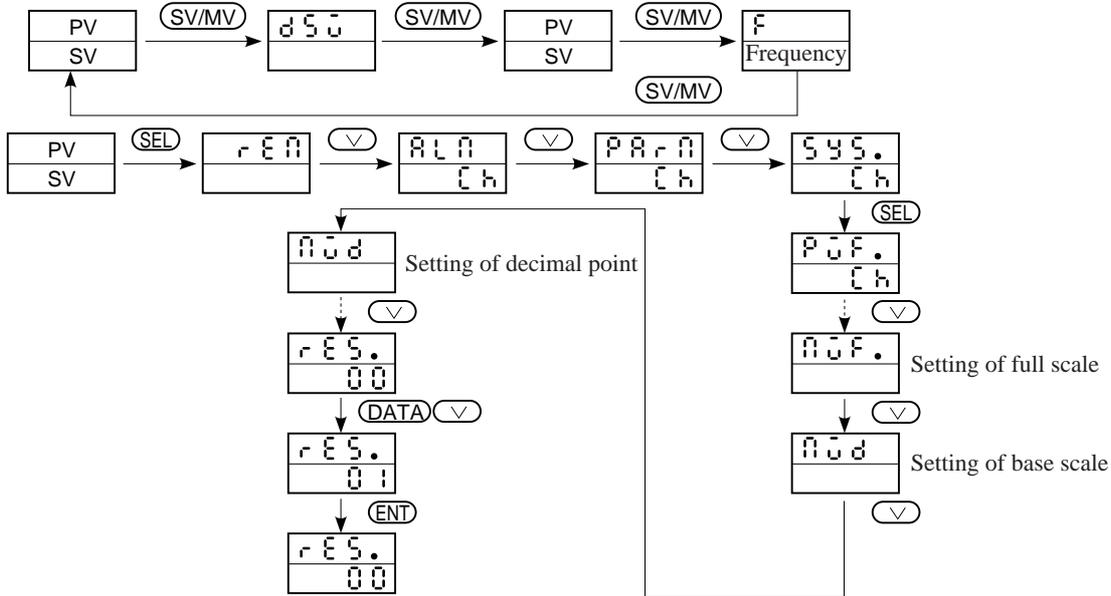
Contents of operation	Description	Indication												
<p>DATA → (^)  → </p>	<ul style="list-style-type: none"> Set the valve opening to 0%, then set 01 to the data. 	PV <table border="1"><tr><td>P</td><td>0</td><td>r</td><td></td></tr></table> SV <table border="1"><tr><td></td><td></td><td>0</td><td>1</td></tr></table> MV <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> (Example of tuning of 0% point)	P	0	r				0	1				
P	0	r												
		0	1											
<p>ENT </p>	<ul style="list-style-type: none"> Press the ENT key. When the indication is changed from 01 to 00, zero point has been adjusted. 	PV <table border="1"><tr><td>P</td><td>0</td><td>r</td><td></td></tr></table> SV <table border="1"><tr><td></td><td></td><td>0</td><td>1</td></tr></table> MV <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>	P	0	r				0	1				
P	0	r												
		0	1											
<p>DATA → (^)  → </p>	<ul style="list-style-type: none"> Next, set the valve opening to 100%, then set 02 to the data. 	PV <table border="1"><tr><td>P</td><td>0</td><td>r</td><td></td></tr></table> SV <table border="1"><tr><td></td><td></td><td>0</td><td>2</td></tr></table> MV <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> (Example of tuning of 100% point)	P	0	r				0	2				
P	0	r												
		0	2											
<p>ENT </p>	<ul style="list-style-type: none"> Press the ENT key and when the indication is changed from 02 to 00, adjustment at 100% point is completed. 	PV <table border="1"><tr><td>P</td><td>0</td><td>r</td><td></td></tr></table> SV <table border="1"><tr><td></td><td></td><td>0</td><td>2</td></tr></table> MV <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>	P	0	r				0	2				
P	0	r												
		0	2											
<p>(v) → DATA  → </p>	<ul style="list-style-type: none"> Next, press the (v) key once to indicate FIX, then press the DATA key. 	PV <table border="1"><tr><td>F</td><td>I</td><td>X</td><td></td></tr></table> SV <table border="1"><tr><td></td><td></td><td>0</td><td>0</td></tr></table> MV <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>	F	I	X				0	0				
F	I	X												
		0	0											
<p>(^) → ENT  → </p>	<ul style="list-style-type: none"> Press the (^) key once to indicate 01. Then, press the ENT key and when the indication is changed from 01 to 00, registration is completed. 	PV <table border="1"><tr><td>F</td><td>I</td><td>X</td><td></td></tr></table> SV <table border="1"><tr><td></td><td></td><td>0</td><td>1</td></tr></table> MV <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>	F	I	X				0	1				
F	I	X												
		0	1											
<p>(v) → DATA  → </p>	<ul style="list-style-type: none"> Finally, press the (v) key to indicate RES, then press the DATA key to indicate 01. Press the ENT key to reset the controller. 	PV <table border="1"><tr><td>r</td><td>E</td><td>S</td><td></td></tr></table> SV <table border="1"><tr><td></td><td></td><td>0</td><td>1</td></tr></table> MV <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>	r	E	S				0	1				
r	E	S												
		0	1											
<p>ENT </p>	<ul style="list-style-type: none"> The indication returns to operation indication. 													

11. INVERTER CONTROL TYPE

Inverter control is a control system with inverter used for terminal device. In the inverter control type, transmitter power supply built in PYH is also available.

This controller is able to select frequency indication in addition to normal operation indication (PV/SV indication).

1. Selection of frequency indication



Note) MV output is not stabilized for the time (FLT output) until it is raised a few seconds after power for PYH is closed.

2. On the scale value setting of frequency indication, the following is factory-set prior to delivery.

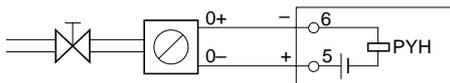
- Full scale (MVF) : 600
- Base scale (MVB) : 0
- Decimal point (MVD) : 01

When changing, use procedures as shown above.

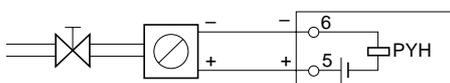
Note) Frequency is indicated down to MV = -25%, so it may be indicated in negative value.

3. Connection to pressure transmitter

- Connection to FC series pressure transmitter (FBC)



- Connection to FCX pressure transmitter (FHG) or small type pressure sensor (FCP)



12. PARAMETER SET VALUE TABLE

(Note) *  can be set in industrial values.

Setting range is shown in industrial value %. Example) For 0 to 400°C range, 0 is 0°C and 100 is 400°C.

Channel	Indication	Name/item	Setting range	Preset value	Entry column	Remarks	
Normal operation channel	REM	Remote mode	00: Auto-operation 01: Remote operation	00			
	SCE	SCC operation	00: Inhibit 01: Acceptable	00		⑳ on page 4 lights with "01".	
	LOC	Setting lock	00: Parameter setting possible 01: Parameter setting not possible 02: Setting other than SV not possible	00			
	AL1	AL1	Main alarm 1 setting *	 -25.0 to 125.0	50		Upper limit deviation (preset)
	AL2	AL2	Main alarm 2 setting *	 -25.0 to 125.0	50		Lower limit deviation with hold (preset)
	HBA	HBA	Heater burnout setting	0 to 50A	50A		Indicated only for heater burnout alarm type.
	HBV	HBV	Heater rated voltage	0 to 300V	100V		Indicated only for heater burnout alarm type.
	SV1	SV1	SV select type SV setting 1 *	 -25.0 to 125.0	0		1) Used for SV select type.
	SV2	SV2	SV select type SV setting 2 *	 -25.0 to 125.0	0		2) Indicated only for SV select type.
	SV3	SV3	SV select type SV setting 3 *	 -25.0 to 125.0	0		3) SV1 to SV7 setting possible for PYH9 type
	SV4	SV4	SV select type SV setting 4 *	 -25.0 to 125.0	0		4) SV1 to SV3 setting possible for PYH5/7 type
	SV5	SV5	SV select type SV setting 5 *	 -25.0 to 125.0	0		
	SV6	SV6	SV select type SV setting 6 *	 -25.0 to 125.0	0		
	SV7	SV7	SV select type SV setting 7 *	 -25.0 to 125.0	0		
	AT	AT	Auto-tuning start	00: None 01: Start	00		
	P	P	Proportional band	0.0 to 3276%	0.5%		0.0 for ON/OFF control
	PC	PC	Cooling side proportional band	0.0 to 3276%	0.5%		Indicated only for dual output type.
	I	I	Integral time	0.0 to 3276 s	3276 s		00 not integrated (2-position type or P action)
	D	D	Derivative time	0.0 to 900.0 s	0.0 s		
	GAP	GAP	Dead band *	 0.0 to 100.0	0.0		
	PGP	PGP	Position feedback dead band	0.0 to 100.0%	3.0%		Indicated only for position feedback type.
	DB	DB	Dead band	-50.0 to 50.0%	0.1%		Indicated only for dual output type.
	PAS	PAS	Pass board	0000 to FFFF	0000		
PSS	PSS	Pass code	0000 to FFFF	0000			

12. PARAMETER SET VALUE TABLE

Channel	Indication		Name/item	Setting range	Preset value	Entry column	Remarks
ALARM CHANNEL	dh	DH	Deviation (+) alarm *	0.0 to 100.0	100.0		
	dhs	DHS	Deviation (+) alarm hysteresis *	0.0 to 100.0	0.0		
	dl	DL	Deviation (-) alarm *	0.0 to 100.0	100.0		
	dls	DLS	Deviation (-) alarm hysteresis *	0.0 to 100.0	0.0		
	sh	SH	Set value upper limit *	-25.0 to 125.0	100.0		
	sl	SL	Set value lower limit *	-25.0 to 125.0	0.0		
	ph	PH	Measured value upper limit alarm *	-25.0 to 125.0	100.0		Set PL < PH. If PL>PH, the device is not operated properly.
	phs	PHS	Measured value upper limit alarm hysteresis *	0.0 to 100.0	0.0		
	pl	PL	Measured value lower limit alarm *	-25.0 to 125.0	0.0		Set PL < PH. If PL>PH, the device is not operated properly.
	pls	PLS	Measured value lower limit alarm hysteresis *	0.0 to 100.0	0.0		
	phh	PHH	Measured value upper-upper limit alarm *	-25.0 to 125.0	125.0		
	hhs	HHS	Measured value upper-upper limit alarm hysteresis *	0.0 to 100.0	0.0		
	pll	PLL	Measured value lower-lower limit alarm *	-25.0 to 125.0	-25.0		
	lls	LLS	Measured value lower-lower limit alarm hysteresis *	0.0 to 100.0	0.0		
	mh	MH	Manipulated value (MV) upper limit	-25.0 to 125.0%	125.0%		
	ml	ML	Manipulated value (MV) lower limit	-25.0 to 125.0%	-25.0%		
	hmh	HMH	Heating manipulated value lower limit	-25.0 to 125.0%	125.0%		
	hml	HML	Heating manipulated value lower limit	-25.0 to 125.0%	-25.0%		
	cmh	CMH	Cooling manipulated value upper limit	-25.0 to 125.0%	125.0%		} Indicated only for dual output type.
	cmh	CML	Cooling manipulated value lower limit	-25.0 to 125.0%	-25.0 %		
	mha	MHA	Manipulated value (MV) upper limit alarm	-25.0 to 125.0%	125.0%		
	mhs	MHS	Manipulated value upper limit alarm hysteresis	0.0 to 100.0 %	0.0%		
	mla	MLA	Manipulated value lower limit alarm	-25.0 to 125.0%	-25.0 %		
	mls	MLS	Manipulated value lower limit alarm hysteresis	0.0 to 100.0%	0.0%		
	dpv	DPV	Measured value variation rate alarm *	0.0 to 100.0	100.0		
	dmv	DMV	Manipulated value variation rate alarm	0.0 to 100.0%	100.0%		

Auxiliary alarm channel

Channel	Indication		Name/item	Setting range	Preset value	Entry column	Remarks
Operating condition change channel	TF	TF	Measured value filter time constant	10.0 to 900.0 s	10 s		
	KNL	KNL	Non-linear gain	0.0 to 327.7%	0.0%		
	CUT	CUT	Router cut point	-25.0 to 125.0%	-0.01%		When the router is unused, set PV to -0.01%. When input is made from resistance bulb or thermocouple, be sure to set PV to -0.01%.
	DT	DT	Sampling cycle	0.1 to 3276 s	0.1 s		
	REV	REV	Reverse action setting	00: Normal 01: Reverse	Reverse: 01		
	ARH	ARH	Integration cut point upper side *	0.0 to 125.0	100.0		Setting of industrial value for set value (SV)
	ARL	ARL	Integration cut point lower side *	0.0 to 125.0	100.0		
	TON	TON	Intermittent PID (with control)	0 to 9999 s	0 s		
	TOFF	TOFF	Intermittent PID (without control)	0 to 9999 s	0 s		
	EXM	EXM	EXT-MV setting	-25.0 to 125.0%	0.0%		
	C1	C1	MV 1 proportional cycle	1 to 255 s	Relay contact output 30 s, SSR/SSC drive output 2 s.		
	C2	C2	MV 2 proportional cycle	1 to 255 s			Indicated only for dual output type.
	MAN	MAN	Manual reset	-25.0 to 125.0%	0.0%		Effective only when I = 0.0.
Specification change channel	PVF	PVF	Measured value full scale	Input range upper limit setting	Specified when ordering		
	PVB	PVB	Measured value base scale	Input range lower limit setting	Specified when ordering		
	PVD	PVD	Measured value decimal point position	00: Without decimal point 01: 2nd digit from end 02: 3rd digit from end 03: 4th digit from end	Specified when ordering		00 and 01 only for thermocouple and resistance bulb
	PVT	PVT	PV input type	See page 17.	Specified when ordering		
	PVU	PVU	PV unit	00: °C 02: Other	Specified when ordering		
	SFT	SFT	PV zero shift *	-50.0 to 50.0	0.0		
	AOT	AOT	AO output type	00: Measured value (PV) output 01: Set value (SV) output 02: Control output value (MV) output	0.0		
	1TP	1TP	Main alarm 1 type	See page 17.	02		02: Upper limit deviation
	2TP	2TP	Main alarm 2 type	See page 17.	04		04: Lower limit deviation with hold
	1HS	1HS	Main alarm 1 hysteresis *	0.0 to 100.0	0.0		
	2HS	2HS	Main alarm 2 hysteresis *	0.0 to 100.0	0.0		

12. PARAMETER SET VALUE TABLE

Channel	Indication		Name/item	Setting range	Preset value	Entry column	Remarks
SYS CH	Specification change channel	MVF	Manipulated value full scale	-999 to 9999	600		Indicated only for inverter control type.
		MVB	Manipulated value base scale	-999 to 9999	0		
		MVD	Manipulated value decimal point position	00: Without decimal point 01: 2nd digit from end 02: 3rd digit from end 03: 4th digit from end	01		
		RIH	Remote setting indication inhibit	00: Release 01: Inhibit	Specified when ordering		With external set value input, T-link transmission and SV select: 00 Without above: 01
		SIH	SCC setting indication inhibit	00: Release 01: Inhibit	Specified when ordering		Not specified: 00
		MIH	A/M mode change inhibit	00: Release 01: Inhibit	00		
		CND	Startup control condition	00: Automatic 01: Manual	00		
		BRN	Burnout direction	00: Hold 01: Lower limit scale out 02: Upper limit scale out	01		Designation of manipulated out (MV) burnout direction
		POT	Potentiometer zero/span adjustment	00: No adjustment 01: Zero point adjustment 02: Span point adjustment	00		Indicated only for position feedback type.
		FIX	Trace fix command	01 registered for adjustment of potentiometer	00		
		RES	Reset command	01 registered when changing parameters other than SYS CH	00		
		RS485 transmission channel	RS485 transmission channel	STN	Station No.	00 to FF	01
SPD	Transmission speed			03: 9600 BPS 04: 19200 BPS	03		Connected to transmission interface board. (type PYY): 04
BIT	Bit format			01: No-parity stop bit 1 02: No-parity stop bit 2 11: Parity odd number stop bit 1 12: Parity odd number stop bit 2 21: Parity even number stop bit 1 22: Parity even number stop bit 2	01		Connected to transmission interface board. (type PYY): 12

Channel	Indication		Name/item	Setting range	Preset value	Entry column	Remarks
T-link transmission channel	000	MOD	T-link operation mode	00: 8W (PYH mode) 01: 4W (PYK mode)	00		
	001	STN	Station address	00 to FF	01		Hexadecimal setting
	002	TEM	EX-MV T-link setting	00: Use main unit data. 01: Use T-link transmission data.	00		
	003	DI1	DI1 T-link setting	00: Settable from main unit 01: Settable through T-link	00		
	004	DI2	DI2 T-link setting	00: Settable from main unit 01: Settable through T-link	00		
	005	DI3	DI3 T-link setting	00: Settable from main unit 01: Settable through T-link	00		

Table 3. Types of auxiliary alarm outputs

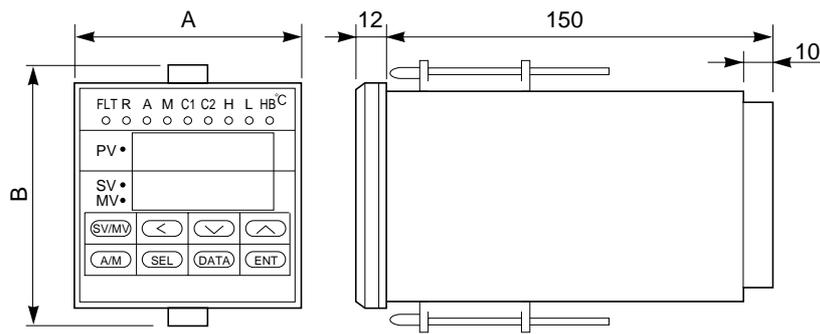
Code	Type
10	SV-H (Set value upper limit alarm)
11	SV-L (Set value lower limit alarm)
12	PV-H (Measured value upper limit alarm)
13	PV-L (Measured value lower limit alarm)
14	PV-HH (Measured value upper-upper limit alarm)
15	PV-LL (Measured value lower-lower limit alarm)
16	DV-H (Deviation "+" side alarm)
17	DV-L (Deviation "-" side alarm)
1A	MV-H (Manipulated output upper limit alarm)
1B	MV-L (Manipulated output lower limit alarm)
1C	DMP (Manipulated variable variation rate alarm)
1D	DPV (Measured value variation rate alarm)

12. PARAMETER SET VALUE TABLE

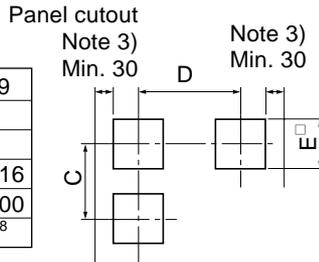
Channel	Indication	Name/item	Setting range	Preset value	Entry column	Remarks	
Output terminal define channel	DO1	DO1	DO1 output setting	00 to FF	12: PV-H	See Table 3 for code symbols.	
	DO2	DO2	DO2 output setting	00 to FF	13: PV-L		
	DO3	DO3	DO3 output setting	00 to FF	16: DV-H		
	M	M	—	—	—		
	H	H	AL1 terminal output setting	00 to FF	1E: Main alarm 1 output		
	HLP	HLP	H lamp setting	00 to FF	Indication of above output		
	L	L	AL2 terminal output setting	00 to FF	1F: Main alarm 2 output		
	LLP	LLP	L lamp setting	00 to FF	Indication of above output		
	HB	HB	HB terminal output setting	00 to FF	0D: Heater burnout alarm output		
	HBL	HBL	HB lamp setting	00 to FF	Indication of above output		
	C1L	C1L	C1 lamp setting	00 to FF	5F		
	C2L	C2L	C2 lamp setting	00 to FF	5E		
	Auto-tuning define channel	SVM	SVM	SV mode	00: Standard type (SV value 100%) 01: Low PV type (SV value -10%)	00	
PID		PID	PID selection	00: PI 01: PID	01		
STM		STM	Start mode	00: Auto-tuning not started at power ON 01: Auto-tuning started at power ON	00		
GAP		GAP	Auto-tuning dead band	0.0 to 100%	0.3%		
TMX		TMX	Maximum standby time	0.0 to 9999 min.	720 min.		
CMV		CMV	Cooling side output setting	-25.0 to 125.0%	100.0%		
A.L		A.L	Indication of L value after tuning	—	—		
A.P		A.P	Indication of P value after tuning	—	—		
A.I		A.I	Indication of I value after tuning	—	—		
A.D	A.D	Indication of D value after tuning	—	—			

13. OUTLINE DIMENSIONS AND PANEL CUTOUT

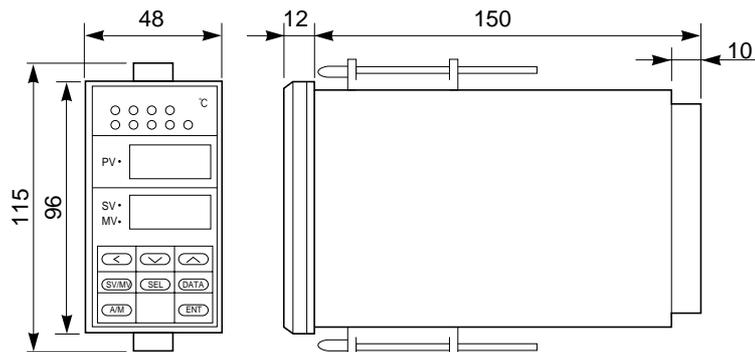
■ PYH7/PYH9 type



Type	PYH7	PYH9
A	72	96
B	91	115
C	Min. 92	Min. 116
D	Min. 82	Min. 100
E	$68^{+0.7}_0$	$92^{+0.8}_0$



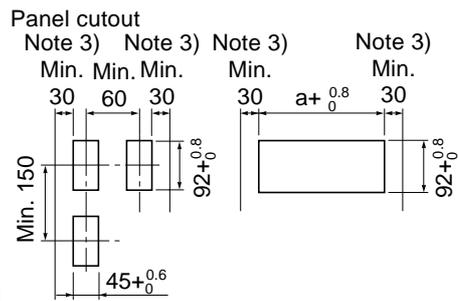
■ PYH5 type



Q'ty	2	3	4	5	6
a	93	141	189	237	285

(When two or more controllers are mounted together and used at power supply of 200 to 265V AC, provide a fan for ventilation.

Also, when a single controller is used or two or more controllers are mounted on top of one another, provide a fan.)



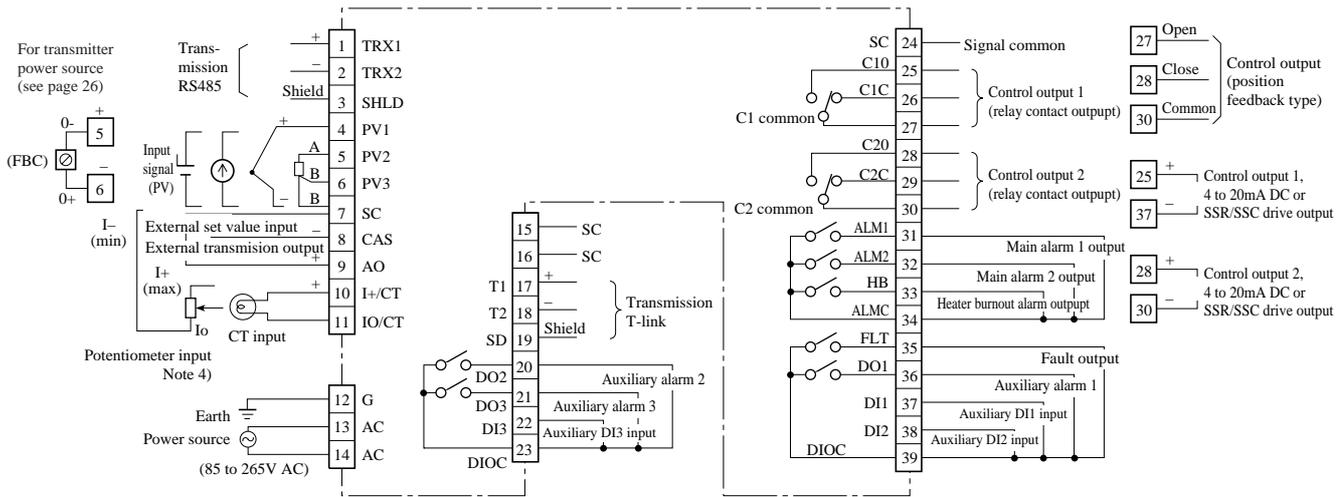
Note 1) Panel is 1 to 8mm thick.

Note 2) Two or more controllers can be mounted together side by side. When it is mounted on top of one another, it requires fixtures, and a minimum size shown in the above diagram must be maintained.

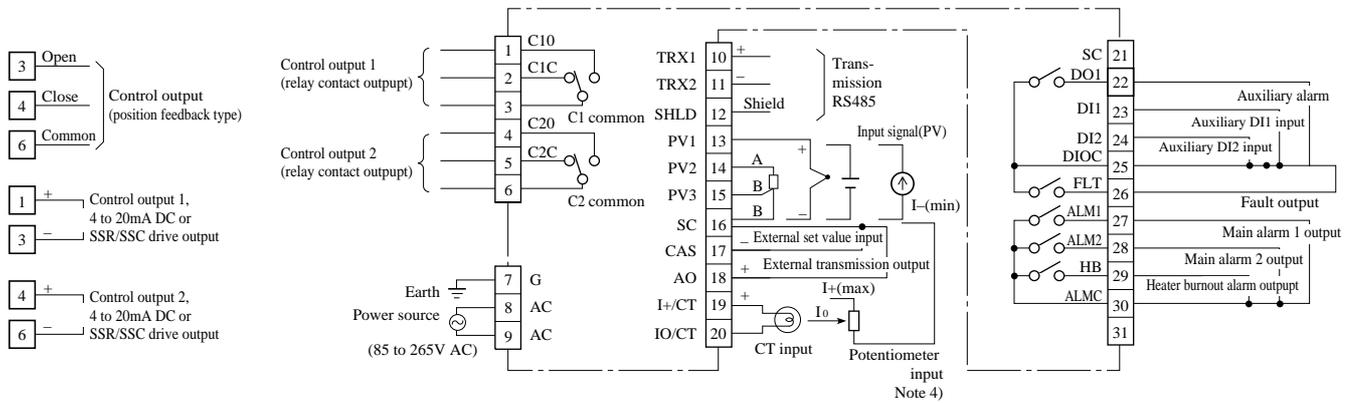
Note 3) Allow a space of more than 30mm to both sides of the controller when mounting a device with a long depth.

14. CONNECTION DIAGRAM

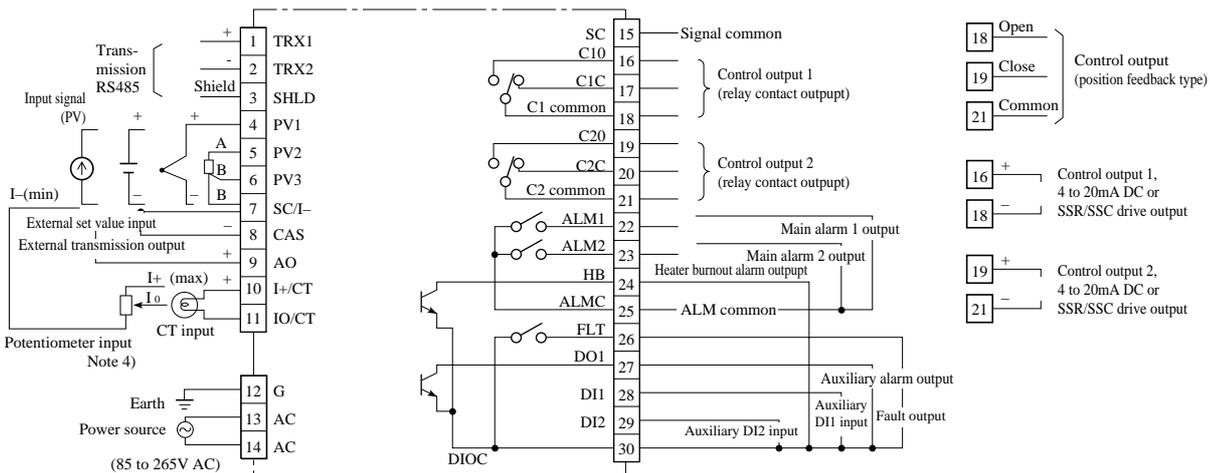
■ PYH9 type



■ PYH7 type



■ PYH5 type



The connecting terminal No. varies with each type of controller.

For details, refer to the terminal nameplate attached to the terminal block. Make sure the connection is correct.

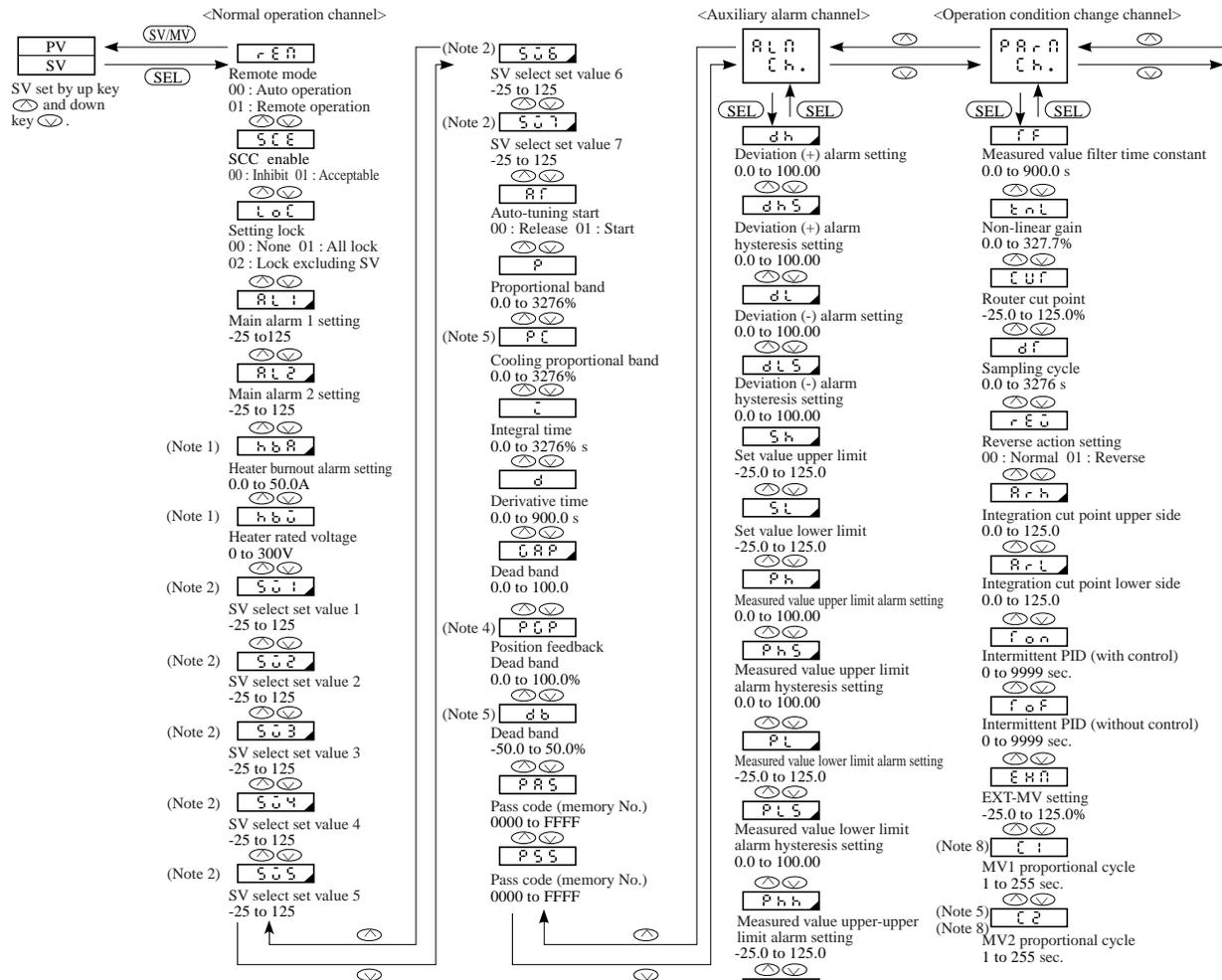
Note 1) Power fuse is not provided, so external protective circuit should be used.

Note 2) The G terminal must be grounded to the earth.

Note 3) Do not use the blank terminals.

Note 4) Wires for the potential input signal, thermocouple input and resistance bulb input must be connected directly to the PYH main unit terminals.

15. PARAMETER LIST



Basic operation of keys

- For fast-forward/backward, press the (▲) key or (▼) key and (◀) key at the same time.
- When calling an item to change data, press the (DATA) key. The item indication flickers. Data should be set thereafter.

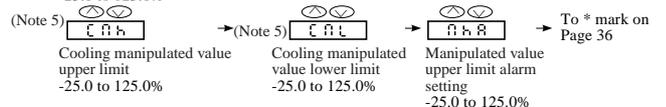
Registration of new data

- New SV value is registered automatically without pressing the (ENT) key.
- When changing data from normal operation channel to the operating condition change channel, press the (ENT) key to register the data.
- When changing data from specification change channel to input/output information channel, press the (ENT) key, then change the specification change channel to (RES) = 1, and press the (ENT) key to register the data. After registration, all LED light up for a moment and output is ON. But, it is not an error.

*1 []: Setting range in industrial value %.

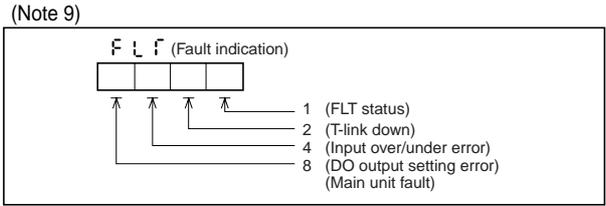
Item indication varies with specifications

- (Note 1) Indication only for heater burnout alarm type
- (Note 2) Indication only for SV select type
- (Note 3) Indication only for inverter control type
- (Note 4) Indication only for position feedback control type
- (Note 5) Indication only for dual control type
- (Note 6) Indication only for transmission function RS-485
- (Note 7) Indication only for transmission function T-link type
- (Note 8) Indication of contact or SSR drive output



When changing data in SYS CH and subsequent, reset the contents of parameters displayed in industrial value

<Specification change channel>	<RS-485 (Note 6) transmission channel>	<T-link (Note 7) transmission channel>	<Output terminal define channel>	<Auto-tuning define channel>	<Input/output data channel>	
<p>5 4 5 C h.</p> <p>SEL ↓ ↑ SEL</p> <p>P u f</p> <p>Measured value full scale -999 to 9999</p> <p>P u b</p> <p>Measured value base scale -999 to 9999</p> <p>P u d</p> <p>Measured value decimal point position 00: Without decimal point 01: 2nd digit from end 02: 3rd digit from end 03: 4th digit from end</p> <p>P u r</p> <p>PV input type P u u</p> <p>PV unit 00: °C 02: Other</p> <p>S f r</p> <p>PV zero shift -50.0 to 50.0</p> <p>R o f</p> <p>AO output type 00: PV output 01: SV output 02: MV output</p> <p>i f p</p> <p>Main alarm 1 type 2 f p</p> <p>Main alarm 2 type i h s</p> <p>Main alarm 1 hysteresis 0.0 to 100.0</p> <p>2 h s</p> <p>Main alarm 2 hysteresis 0.0 to 100.0</p> <p>i u f (Note 3)</p> <p>Manipulated value full scale -999 to 9999</p> <p>i u b (Note 3)</p> <p>Manipulated value base scale -999 to 9999</p> <p>i u d (Note 3)</p> <p>Manipulated value decimal point position 00: Without decimal point 01: 2nd digit from end 02: 3rd digit from end 03: 4th digit from end</p> <p>r c h</p> <p>Remote setting indication inhibit 00: Release 01: Inhibit</p> <p>S c h</p> <p>SCC setting indication inhibit 00: Release 01: Inhibit</p> <p>i c h</p> <p>A (-) M mode change inhibit 00: Release 01: Inhibit</p> <p>From Page 35* → i h s</p>	<p>4 8 5 C h.</p> <p>SEL ↓ ↑ SEL</p> <p>S r n</p> <p>Station No. 00 to FF</p> <p>S p d</p> <p>Transmission speed 03: 9600BPS 04: 19200BPS</p> <p>b c f</p> <p>Bit format 01: No-parity stop bit 1 02: No-parity stop bit 2 11: Parity odd number stop bit 1 12: Parity odd number stop bit 2 21: Parity even number stop bit 1 22: Parity even number stop bit 2</p>	<p>r l t C h.</p> <p>SEL ↓ ↑ SEL</p> <p>n o d</p> <p>T-link operation mode 00: 8W (PYH mode) 01: 4W (PYK mode)</p> <p>S f n</p> <p>Station address 00 to FF</p> <p>f e n</p> <p>EX-MV T-link setting 00: Main unit data use 01: T-link transmission data use</p> <p>d l i</p> <p>D11 T-link setting 00: From main unit 01: From T-link</p> <p>d l 2</p> <p>D12 T-link setting 00: From main unit 01: From T-link</p> <p>d l 3</p> <p>D13 T-link setting 00: From main unit 01: From T-link</p>	<p>o n f C h.</p> <p>SEL ↓ ↑ SEL</p> <p>d o 1</p> <p>DO1 output setting</p> <p>d o 2</p> <p>DO2 output setting</p> <p>d o 3</p> <p>DO3 output setting</p> <p>n</p> <p>AL1 terminal output setting 00 to FF</p> <p>h l p</p> <p>H lamp setting 00 to FF</p> <p>l</p> <p>AL2 terminal output setting 00 to FF</p> <p>l l p</p> <p>L lamp setting 00 to FF</p> <p>h b</p> <p>HB terminal output setting 00 to FF</p> <p>h b l</p> <p>HB lamp setting 00 to FF</p> <p>l i l</p> <p>C1 lamp setting 00 to FF</p> <p>l c l</p> <p>C2 lamp setting 00 to FF</p>	<p>r u n C h.</p> <p>SEL ↓ ↑ SEL</p> <p>S v n</p> <p>SV mode 00: Standard type 01: Low PV type</p> <p>P i d</p> <p>PID selection 00: PI 01: PID</p> <p>S f n</p> <p>Start mode 00: Standard 01: Start at power ON</p> <p>A u t o</p> <p>Auto-tuning dead band 0.0 to 100.0%</p> <p>f n h</p> <p>Max. standby time 0.0 to 9999 min</p> <p>l n w</p> <p>Cooling side output setting -25.0 to 125.0%</p> <p>R . l</p> <p>Indication of L value after AT</p> <p>R . p</p> <p>Indication of P value after AT</p> <p>R . i</p> <p>Indication of I value after AT</p> <p>R . d</p> <p>Indication of D value after AT</p>	<p>(Note 9) f l t C h.</p> <p>SEL ↓ ↑ SEL</p> <p>R l i</p> <p>Fault indication</p> <p>R l n</p> <p>Alarm indication</p> <p>n o d</p> <p>Control mode</p> <p>d l</p> <p>Digital input value</p> <p>S d c</p> <p>Soft digital input value</p> <p>P u d</p> <p>PV1</p> <p>P u n</p> <p>PV2</p> <p>l r s</p> <p>AI 1</p> <p>l f</p> <p>AI 2</p> <p>f n p</p> <p>Cooling point compensation temperature</p> <p>R o</p> <p>AO output value</p> <p>i u i</p> <p>MV1 output</p> <p>i u e</p> <p>MV2 output</p> <p>d o</p> <p>DO output</p>	<p>SEL ↓ ↑ SEL</p> <p>r e s</p> <p>Data indication for product type, etc.</p>
<p>⚠ CAUTION</p> <p>Never manipulate Type Ch, or the instrument may not be operated properly.</p>						
<p>⚠ CAUTION</p> <p>This I/O channel is a parameter for "reading only", and cannot be set.</p>						
<p>(Note 4) P o f</p> <p>Potentiometer zero/span adjustment 00: None 01: Zero 02: Span</p> <p>F c R</p> <p>Command (used for POT write) 00: - 01: FIX start</p> <p>r e s</p> <p>Reset command</p> <p>When changing the contents of parameters in SYS CH and other channels, be sure to press the reset key for registration (power ON/OFF is also available).</p>						
<p>Manipulated value upper limit alarm hysteresis setting 0.0 to 100.0%</p> <p>Manipulated value lower limit alarm setting -25.0 to 125.0%</p> <p>Manipulated value lower limit alarm hysteresis setting 0.0 to 100.0%</p> <p>Measured value change rate alarm setting 0.0 to 100.0%</p> <p>Manipulated value change rate limit setting 0.0 to 100.0%</p>						

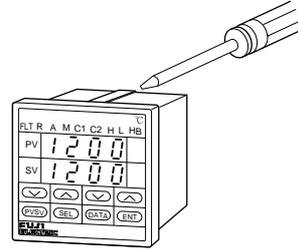


16. INSTALLATION AND WIRING

■ Installation

- This controller complies with DIN43700 standards.
- Recommended thickness of the panel is 1 to 8 mm.
- When mounting, attach the mounting brackets (two) on the top and bottom and tighten with a flat blade screwdriver.

(Tightening torque: About 147N • cm or less)



■ Environment of installation location

- Do not install in a place with corrosive gases (sulfuric gas, ammonia, etc.).
- Do not install in a place subject to vibration, impact, water or high temperature.
- Do not install near a device generating high frequency noise.
- Do not install in a place where ambient temperature changes suddenly or radiation from furnace is present. Ambient temperature of installation location should be -10 to 50°C.

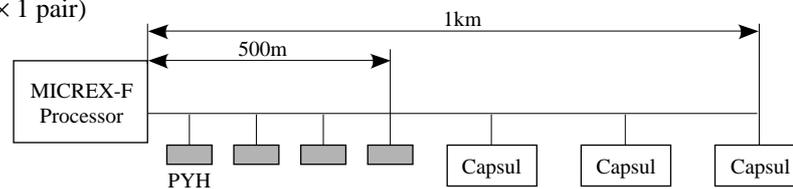
■ Wiring

- For thermocouple input, connect the specified compensating lead wire.
- For resistance bulb input, use a lead wire having a small resistance.
- To prevent the effect of inductive noise, input signal cable and controller cable connected to power supply should be wired away from the power line and the load line.
- For the controller with heater burnout alarm, the heater and controller power sources should be connected to the same power line.
- Input signal cable should be wired away from output signal cable and protected with a shield.

■ T-link transmission cable

- Be sure to use the following cable (Max. 500m).

Twisted pair cable (equivalent to the twisted pair cable manufactured by The Furukawa Electric Co., Ltd. Type: CPEV-SB, $\phi 0.9 \times 1$ pair)



■ Use of controller output for sequence circuit

- When power is ON, it takes a few seconds until the internal relay starts operating. To use the controller contact output for the sequence circuit, a delay relay should also be used.

When external wiring generates much noise, a protective device such as a surge killer should be used.

■ In case there is much noise from external wiring, the following countermeasure is required.

When a contactor is connected as a load of digital output such as a relay contact output or alarm output, use a surge absorber on the coil side of the contactor.

Fuji's absorber: Z-rap (200V AC, ENB461D-14A)

■ Wiring of load circuit

- When the controller is used frequently such as for proportional action and a load which just satisfies the capacity of the output relay is connected, the life of the controller is shortened. In such a case, it is recommended to use SSR or SSC output type.

Solenoid switch: Proportional cycle, 30 s or more

SSC, SSR: Proportional cycle, one sec. or more

- Relay contact output and alarm output are insulated from input, but other outputs are not insulated and an insulating transformer should be used as necessary.

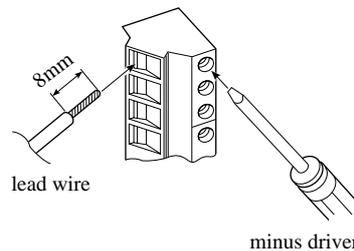
■ Terminals

- Rod type cramp terminals are used. Select wiring materials from the following.

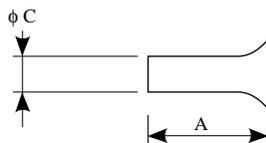
Solid wire : 2.5 mm² max.

Twisted wire: 1.5 mm² max.

AWG: 14



- Use twisted wire of 0.75mm² for tightening 2 leads together.
- The length of lead wire without sheath is about 8 mm.
The end of lead wire should be properly treated.
- Do not allow excessive force when tightening terminal screws.
- Use of rod terminals shown below is recommended.



Maker: Phoenix Contact Co.
Name of product: Ferrule without insulating collar

Kinds	Part No.	A (mm)	ϕC (mm)
For 0.5 sq	3200218	6	1.0
For 0.75 sq	3200221	6	1.4
For 1.0 sq	32002476	6	1.6
For 1.5 sq	3200263	7	1.8

17. CODE SYMBOLS

1	2	3	4	5	6	7	8	9	10	11	12	13	Description
P	Y	H											
			5				3						Front panel size 48 × 96mm *1 72 × 72mm 96 × 96mm
			7				2						Control functions Fixed value control type Fixed value control type (SV select type) Inverter control type (SV select type) ... PYH9 only Position feedback control type Position feedback control type (SV select type) Dual control type Dual control type (SV select type)
			9				2						
		A											
		B											
		C											
		D											
		E											
		F											
		G											
			1										Control output 1 Relay contact output SSR/SSC drive output 4 to 20mA DC output Pulse output (position feedback control type only)
			2										Control output 2 (dual control type only) None Relay contact output SSR/SSC drive output 4 to 20mA DC output
			3										
			4										
			0										Additional specification 1 None With heater burnout alarm (control output; relay contact output only)
			1										
								0					Transmission function None With RS-485 With T-link for MICREX-F (PYH9 only)
								1					
									Y				Additional specification 2 None With external set value input With external transfer output A + B
									R				
									T				
										Y			Input specification type mV / Thermocouple / resistance bulb multi-input type 4 to 20mA DC / 1 to 5V DC multi-input type 4 to 20mA DC (with transmitter power source) input type (Unavailable for 10th digit T)
										A			
										B			
											C		Digital output None DO1 DO1 + DO2 DO1 + DO2 + DO3 } PYH9 only

*1: PYH5□□□¹/₂ } Case is not compatible.
 PYH5□□□₃ } Replace together with case.