

**Yamatake-Honeywell**

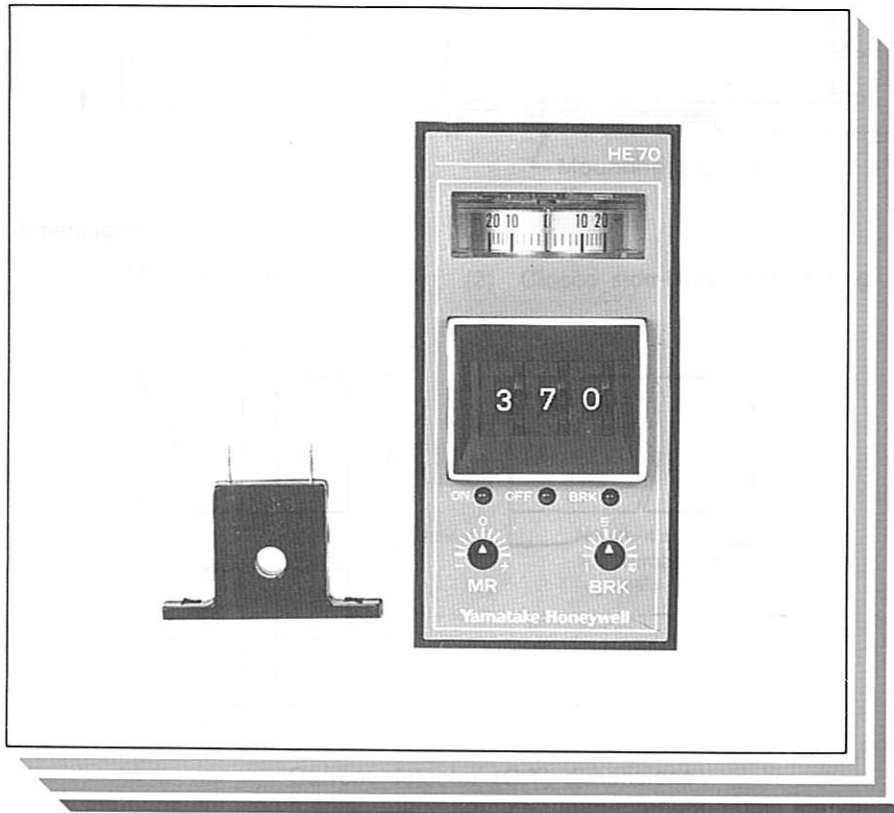


最新 92.6

**Temperature Controller  
with Heater Fuse Alarm  
HE70 Series (HE76ADJ)**

**Product  
Manual**

**Digiset (Deviation Indication)  
Temperature Controller**

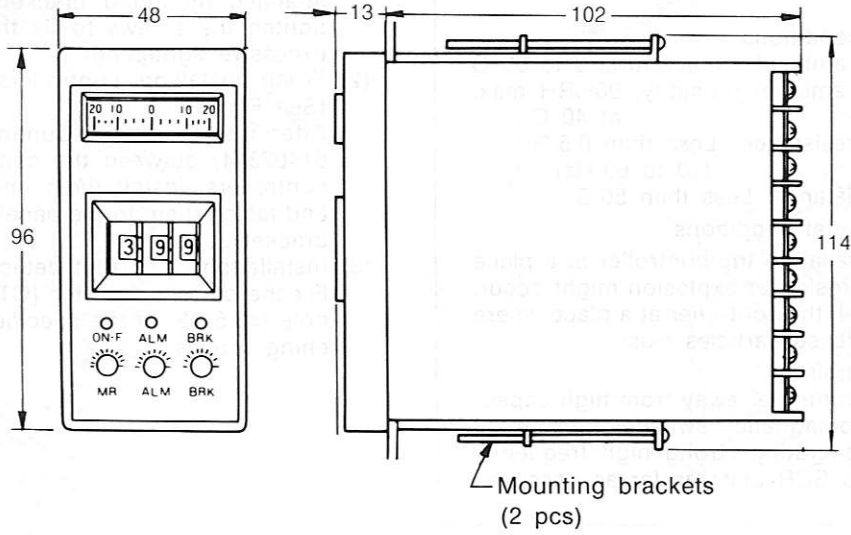


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# 1. DIMENSIONS AND PANEL CUTOUT DIMENSIONS

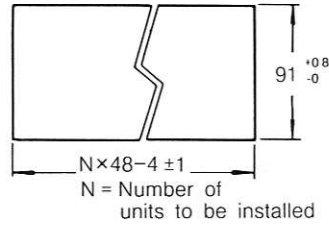
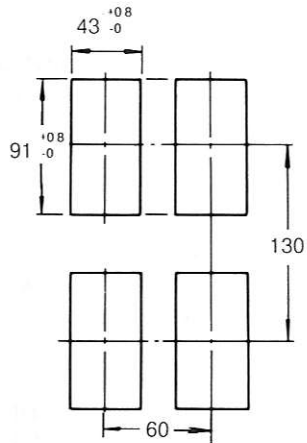
## Dimensions



## Panel cutout dimensions

(1) Mounting with a space

(2) Closed side-by-side mounting



## Current detector (C.T) dimensions

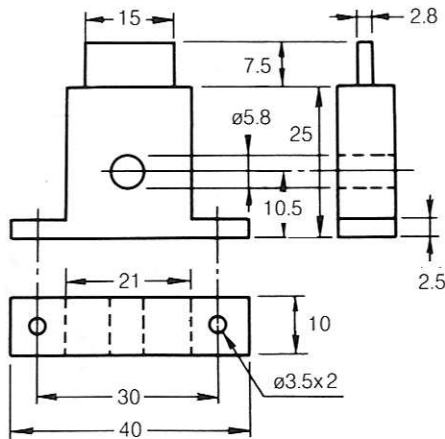


Fig. 1

## 2. INSTALLATION

### 1. INSTALLATION LOCATION LIMITATIONS

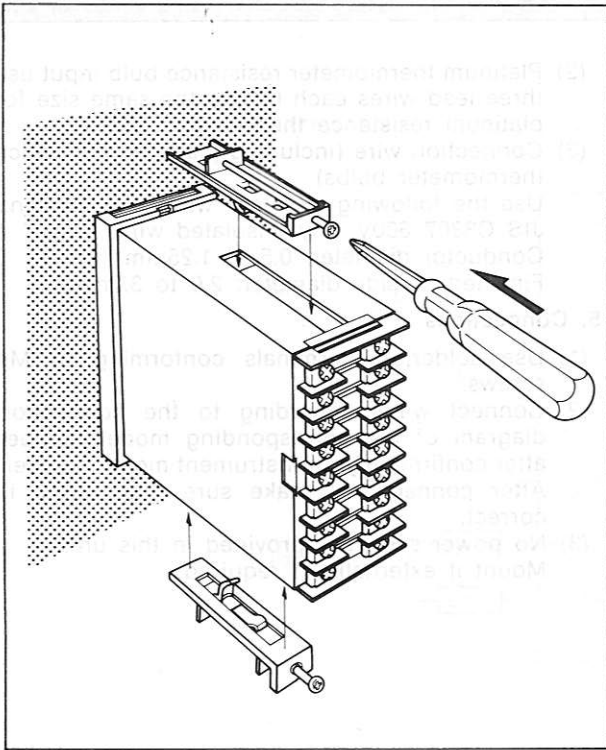
Observe the following conditions when mounting the controller.

- (1) Physical conditions
  - Allowable ambient temperature: 0 to 55°C
  - Allowable ambient humidity: 90%RH max. at 40°C
  - Vibration resistance: Less than 0.5 G (10 to 60 Hz)
  - Shock resistance: Less than 50 G
- (2) Environmental conditions
  - ① Avoid installing the controller at a place where corrosion or explosion might occur.
  - ② don't install the controller at a place where dust or grease particles exist.
- (3) Electrical noise
  - Keep the controller away from high capacity electromagnetic switches, electrical devices generating strong high frequency waves, and SCR units as far as possible.

### 2. INSTALLATION METHOD

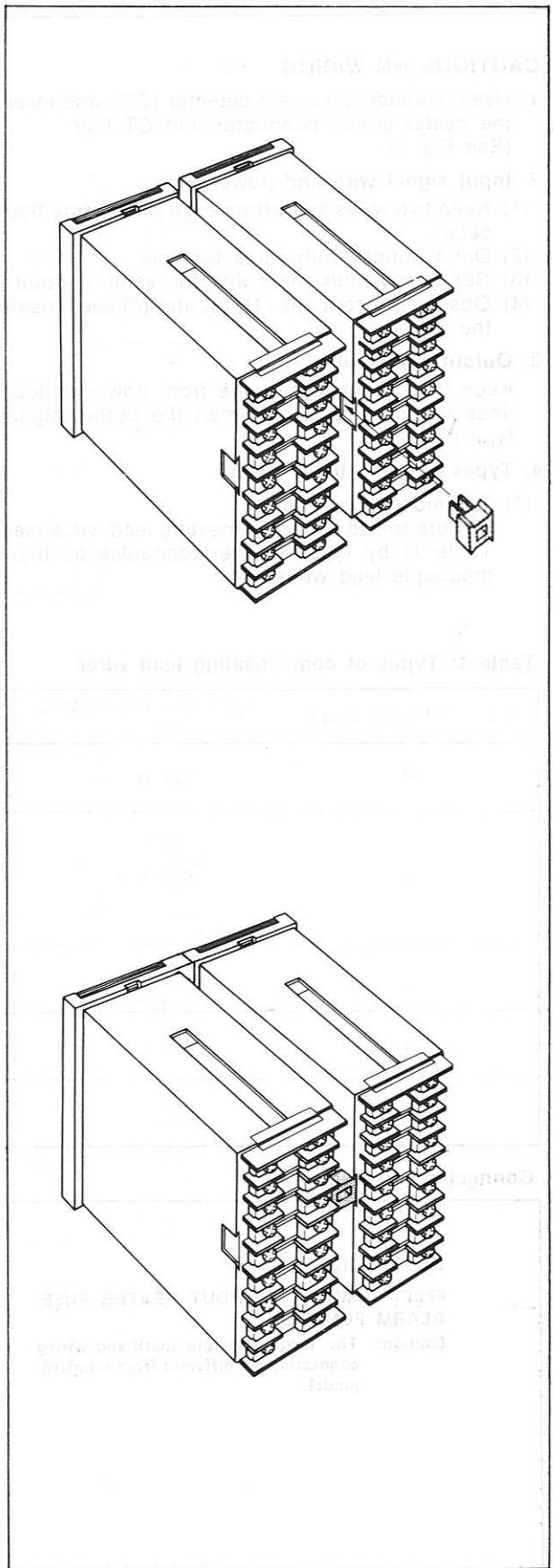
- (1) When installing controllers with a space; (See Fig. 2)  
Install the case into the panel cutout, mount two attached mounting brackets to the case, and tighten the screws to fix the case without any excessive tightening.
- (2) When installing controllers closely in series; (See Fig. 4)  
After inserting the mounting spacer (Part No. 81402344) between the controllers to fix these controllers, install them into the panel cutout, and fasten them to the panel using the mounting brackets.
- (3) Installation of current detector (See Fig. 3)  
Fix the current detector (CT) into the mounting hole ( $\pm 3.5 \times 2$ ) at the specified position by tightening screws.

**Panel installation**

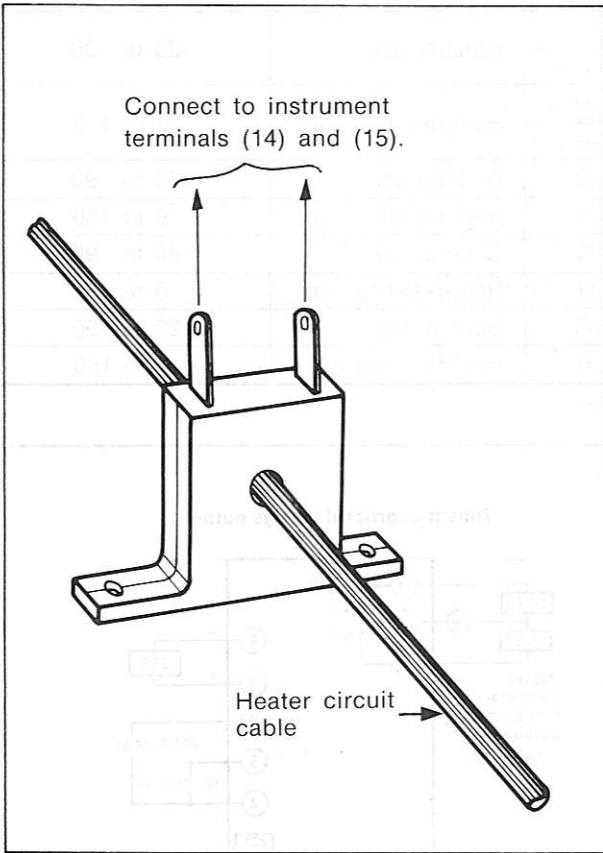


**Fig. 2**

**Closed side-by-side mounting**



**Installation of current detector**



**Fig. 3**

**Fig. 4**

# 3. WIRING

## CAUTIONS ON WIRING

1. Use the attached current detector (CT), and insert the heater circuit conductor into CT hole.  
(See Fig. 3)
2. **Input signal wire and power wire**
  - (1) Keep two wires apart from each other more than 50cm.
  - (2) Don't bundle both wires together.
  - (3) Don't feed both wires into the same conduit.
  - (4) Observe precautions (1), (2) and (3) even inside the panel.
3. **Output signal wire**  
Keep the output signal wire from power or load lines as far as possible when the output signal type is voltage.
4. **Types of wires to be used**
  - (1) Thermocouple input  
Be sure to use the compensating lead wires (see Table 1) by types of thermocouples as thermocouple lead wires.

- (2) Platinum thermometer resistance bulb input use three lead wires each having the same size for platinum resistance thermometer bulbs.
- (3) Connection wire (including platinum resistance thermometer bulbs)  
Use the following standard wire or equivalent.  
JIS C3307 600V vinyl insulated wire  
Conductor diameter: 0.5 to 1.25mm  
Finished outside diameter: 2.0 to 3.2mm

## 5. Connections

- (1) Use solderless terminals conforming to M4 screws.
- (2) Connect wires according to the connection diagram of the corresponding model number after confirming your instrument model number. After connections, make sure that wiring is correct.
- (3) No power switch is provided in this unit.  
Mount it externally, if required.

Table 1: Types of compensating lead wires

Type of thermocouple	Type of compensating lead wire	Symbol	Usage	Working atmospheric temperature
R	For R	RX-G	General use	0 to 90
		RX-H	Heat-resisting use	0 to 150
K	For K	KX-G	General use	-20 to 90
		KX-GS		
		KX-H	Heat-resisting use	0 to 150
KX-HS				
E	For E	EX-G	General use	-20 to 90
		EX-H	Heat-resisting use	0 to 150
J	For J	JX-G	General use	-20 to 90
		JX-H	Heat-resisting use	0 to 150
T	For T	TX-G	General use	-20 to 90
		TX-H	Heat-resisting use	0 to 150

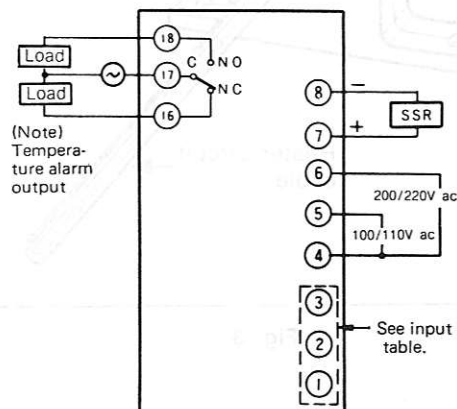
## Connection diagram

HE76ADJ0499:

SPECIAL MODEL WITHOUT HEATER FUSE ALARM FUNCTION

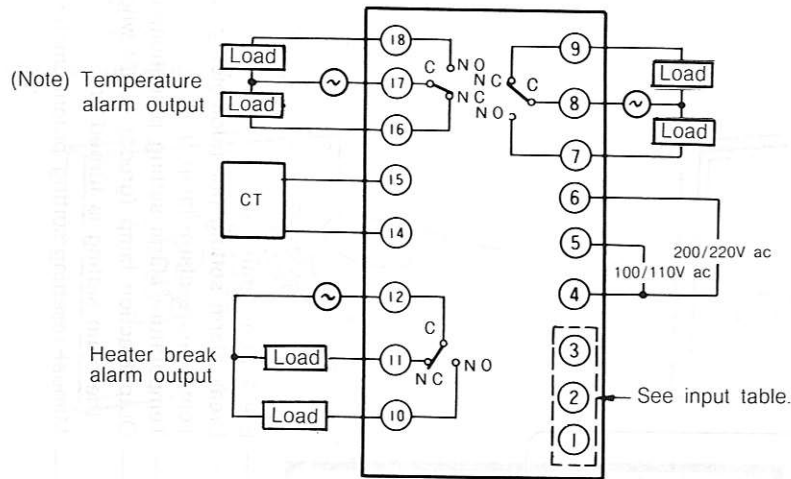
Caution: The layout of front mask and wiring connection are different from standard model.

### Time proportional voltage output

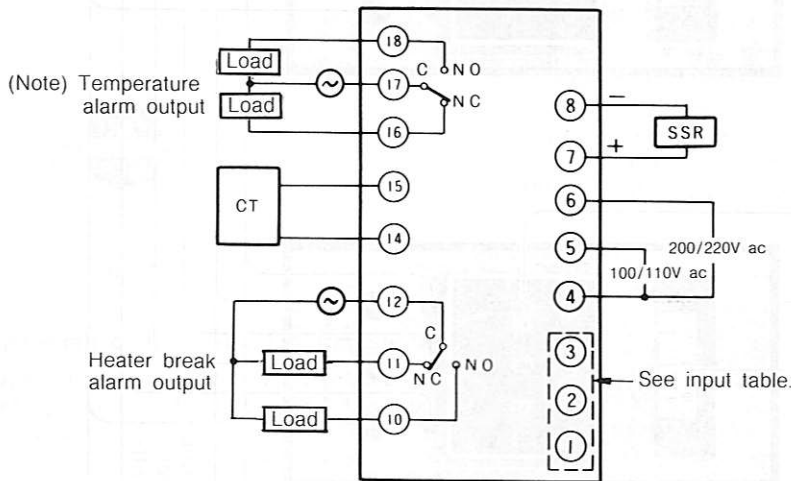


Connection diagram

On-off time-proportional relay output



Time proportional voltage output



Input table

Thermocouple (J and K)	Resistance thermometer bulb (JIS PT 100Ω)

(Note) Temperature alarm output terminals ⑬, ⑭ and ⑮ are used for model HE71 and HE76.

Fig. 5

# 4. FRONT PANEL LAYOUT

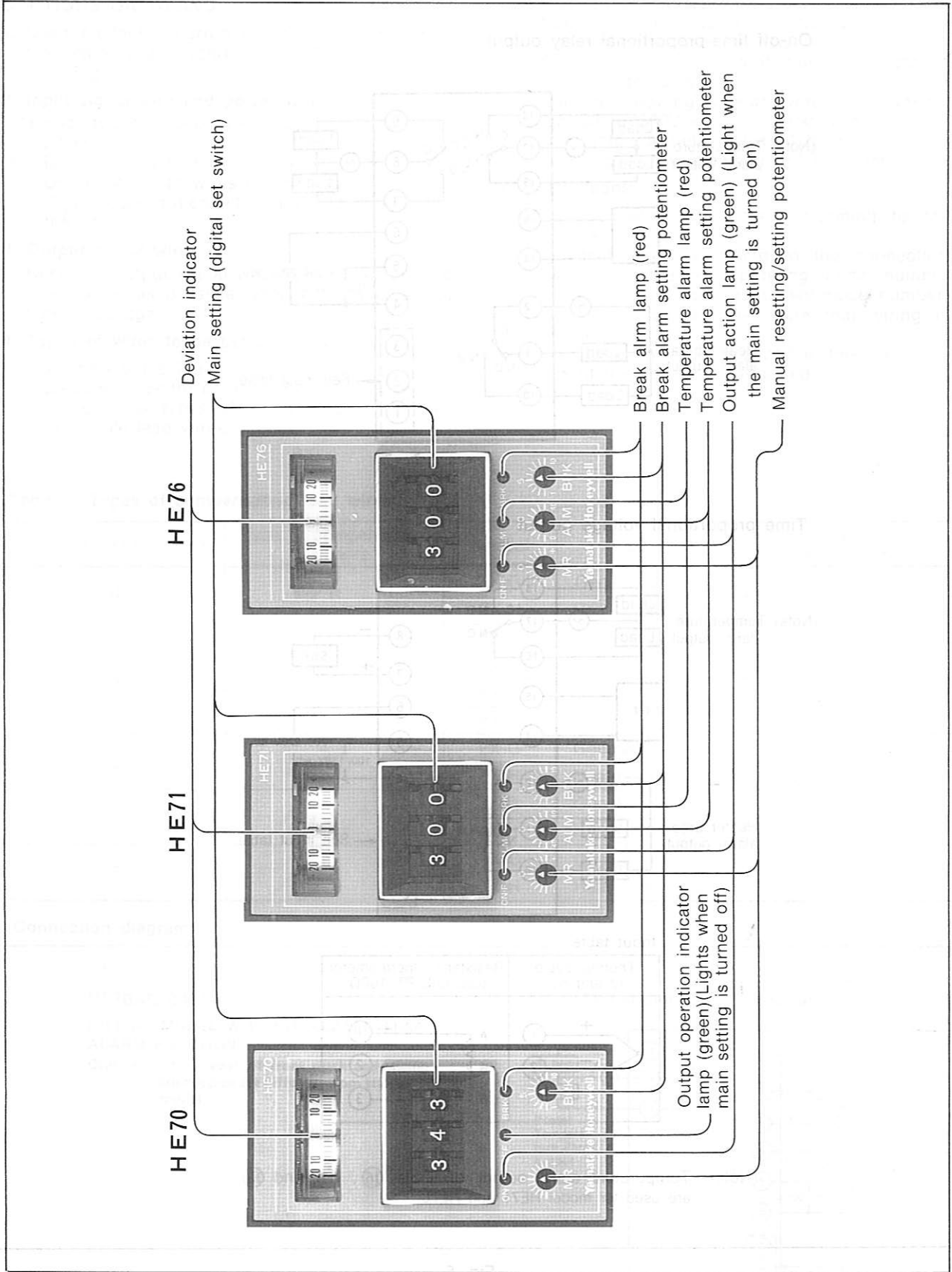


Photo 1

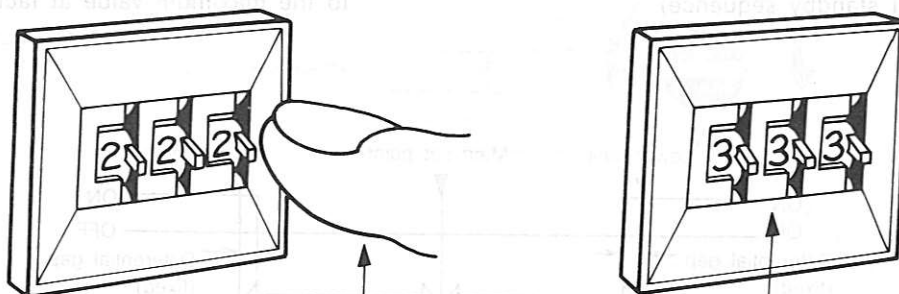
# 5. MAIN SETTINGS AND VARIOUS CONTROL

## CONSTANT PARAMETERS SETTING

### 1. Precautions before Starting Operation

- (1) Check the controller power voltage
- (2) Turn off the instrument power supply without fail when drawing the controller out of the case or encasing the controller into the case.
- (3) Don't let the chassis terminals get dirty.

### 2. Main Setting (temperature setting)



Set a desired temperature by turning the wheels of the digital set switches every digit.

Fig. 6

### 3. Break Alarm Setting

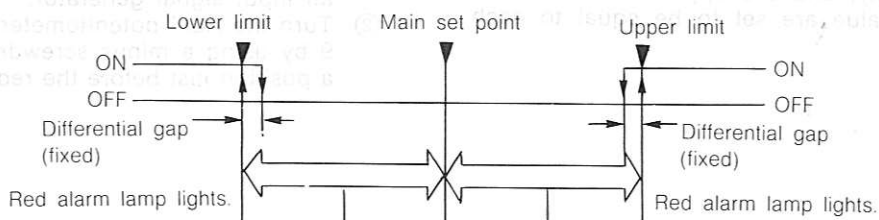


Fig. 7

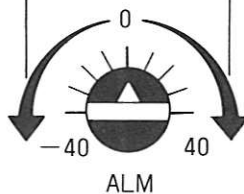
Set mark of the BRK setting potentiometer to a desired scale by turning it using a minus screwdriver. For setting scale indications 1 to 10, one scale division corresponds to 1A when the setting range is 1 to 10A (standard type) or to 2A when the setting range is 2 to 20A (option).

### 4. HE71 Upper-limit or Lower-limit Alarm Setting

- (1) Alarm type: Upper-limit or lower-limit alarm  
Setting range: Main set point  $\pm 40^{\circ}\text{C}$  (Set to the maximum value at factory)



The lower-limit set point variable is farer from the main set point variable when turning this potentiometer counterclockwise from 0 to -40, and it is closer to the main set point when turning this potentiometer clockwise from -40 to 0.



The upper-limit set point variable is farer from the main set point when turning this potentiometer clockwise from 0 to 40, and it is closer to the main set point when turning this potentiometer counterclockwise from 40 to 0.

Fig. 8

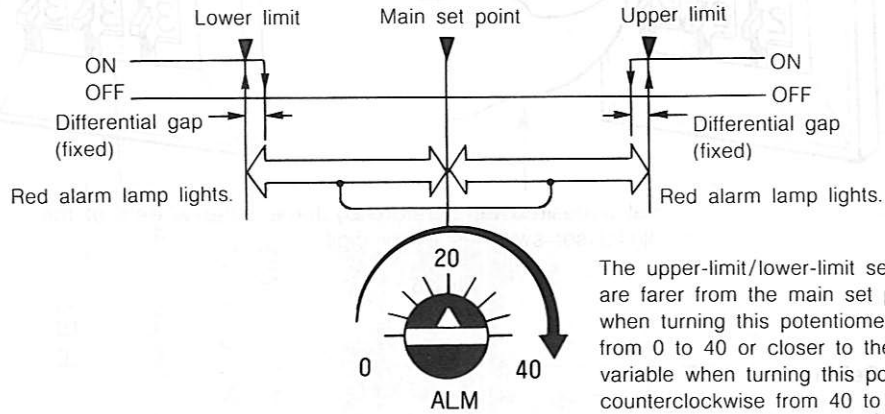
- (2) Setting  
Set mark of ALM setting potentiometer to a desired upper-limit or lower-limit scale (1 scale division = about 10°C) by turning the potentiometer using a minus screwdriver.
- (3) Precise setting  
Observe the following procedure, if precise setting is required.

- ① Apply an input corresponding to the upper-limit or lower-limit alarm set point variable from an input signal generator.
- ② Turn the ALM potentiometer by using a minus screwdriver according to Fig. 8, and set it to a position just before the red ALM lamp lights.

### 5. HE76 Upper-limit/Lower-limit Alarm Setting

- (1) Alarm type: Upper-limit/lower-limit alarm (with a lower-limit standby sequence)

Setting range: Main set point variable  $\pm 40^\circ\text{C}$  (set to the maximum value at factory)



The upper-limit/lower-limit set point variables are farther from the main set point variable when turning this potentiometer clockwise from 0 to 40 or closer to the main set point variable when turning this potentiometer counterclockwise from 40 to 0.

- ① The lower-limit alarm does not function when actual temperature at the start time is lower than the lower-limit.
- ② An ON signal outputs when temperature lowers after actual temperature has risen and entered into the proportional band again.

Fig. 9

- (2) Setting  
Set mark of the ALM setting potentiometer to desired upper-limit/lower-limit scales division (1 scale division = about 10°C) by using a minus screwdriver. The upper-limit/lower-limit are set simultaneously, and the upper-limit value and lower-limit value are set to be equal to each other.

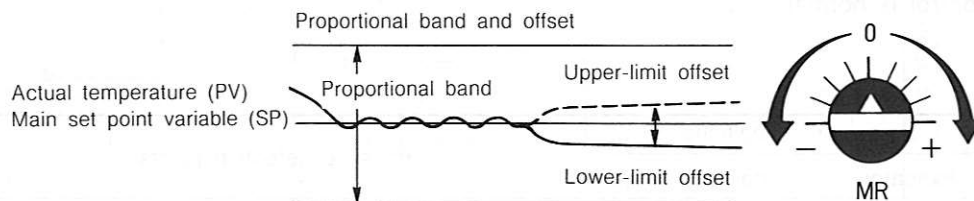
- (3) Precise Setting  
Observe the following procedure when precise setting is required.
  - ① Apply inputs corresponding to the upper-limit and lower-limit alarm set point variables from an input signal generator.
  - ② Turn the ALM potentiometer according to Fig. 9 by using a minus screwdriver, and set it to a position just before the red ALM lamp lights.

## 6. Manual Reset (offset cancel) Setting

(1) Applicable model: Applicable to the time proportional action relay contact output type (HE7C) and voltage output type (HE7D) only.

Resetting range: More than  $\pm 1/2$  proportional band (at factory)

Turn the potentiometer counterclockwise ((-) direction) when the offset is produced above the main set point variable.



Turn the potentiometer clockwise ((+) direction) when the offset is produced below the main set point variable.

Fig. 10

### (2) Setting

The offset may occur during the proportional control operation. When the offset occurs, the indicating remains deviated above or below the set point variable.

For cancelling the offset, coincide the indicating

value and main set point variable with each other by manual resetting using the MR setting potentiometer according to Fig. 10. It takes time until an effect appears. Perform this setting slowly.

# 6. TROUBLESHOOTING

## 1. Operation

Start operation after preliminary operation has been completed.

### (1) Normal operation

The red pointer indicates about 0, and the red and green LEDs flicker according to the control action when the control is normal.

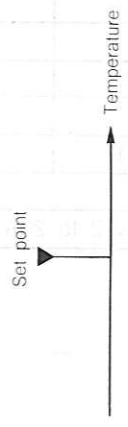
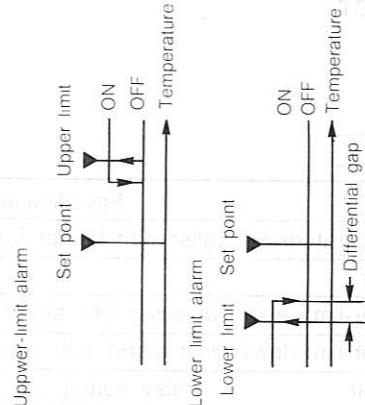
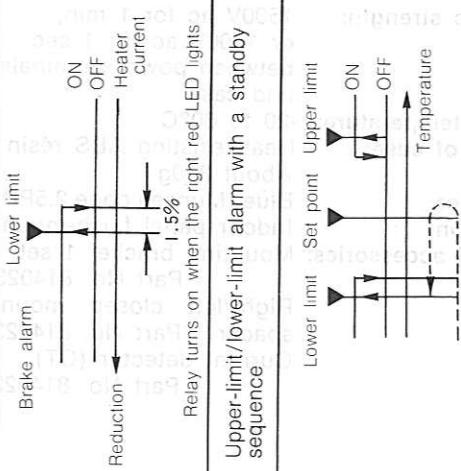
### (2) Abnormal operation

Table 2 shows abnormal causes when the controller functions abnormally.

**Table 2**

Symptoms	Instrument conditions		Possible defective points
	Indicator	Indicator lamp	
Temperature does not increase.	Overshooting (+)	Red lamp lights.	Break of thermocouple and compensating lead wire Connection failure of input terminals
	Overshooting (-)	Green lamp lights.	Heater breaks or connection failure Electromagnetic switch, SSR, or control unit is faulty. Fuse is blown out.
	Does not deflect from 0.	Does not light.	Power circuit is broken, a connection is wrong failure or not specified voltage is applied.
Temperature rises excessively.	Overshooting (-)	Green lamp lights.	Thermocouple is shorted. Thermocouple is not inserted (mounted). Thermocouple or compensating lead wire polarity is negative.
	Overshooting (+)	Red lamp lights.	Melting of electromagnetic switch contact SSR or controller is faulty.
	Indicates the vicinity of 0 position.	Normal ON-OFF action	Poor insulation of input circuit Input circuit is not properly mounted (inserted).
—	Fluctuates	Unstable	Influence of induced interferences and noises AC leak to resistance thermometer bulb Connection failure of terminals
Alarm action failure	Normal	Red lamp lights.	Alarm circuit is faulty.
Break alarm action error	—	Red lamp lights.	CT is not properly connected or CT is faulty.

# 7. SPECIFICATIONS AND MODEL SELECTION GUIDE

Specifications	HE70 series	Temperature alarm with heater fuse alarm	
Indication method	Division meter indication	Break alarm setting range	1 to 10A (Standard)
Indication range	±20°C	Break alarm action	On-off action
Indication accuracy	±1.5%FS (At scale center)	Break alarm sensitivity	1.5% of the maximum set point variable
Setting method	Digital set switch	Break alarm output	SPDT relay contact
Setting accuracy	±1%FS	Break alarm output rating	220V ac 1A resistive load
Temperature alarm	Not provided.	Upper-limit or lower-limit alarm	Upper-limit/lower-limit alarm with a standby sequence
Alarm action	 <p style="text-align: center;">Set point</p>	 <p style="text-align: center;">Upper-limit alarm Lower limit alarm</p>	 <p style="text-align: center;">Lower limit    Set point    Upper limit</p> <ul style="list-style-type: none"> <li>• Alarm action does not function at actual temperature at the start time (lower-limit condition)</li> <li>• An ON signal is output when temperature lowers after actual temperature has risen and centered into the proportional band once</li> </ul> <p style="text-align: center;">39</p>
Output	—	SPDT relay contact	SPDT relay contact
Output rating	—	220V ac 1A	220V ac 1A
Temperature alarm setting range	—	Set point variable ±40°C	Set point variable ±40°C
Temperature alarm differential gap	—	2.5°C fixed	2.5°C fixed
Control action	On-off action	Time proportional	Time proportional
Output	SPDT relay contact	SPDT relay contact	Voltage
Output rating	220V ac 5A resistive load	220V ac 5A resistive load	(Internal resistance 700Ω with a short-circuit protective circuit)
Differential gap	2.5°C fixed in case of thermocouple input 1°C fixed in case of resistance thermometer input	—	—
Proportional band	—	10°C fixed in case of thermocouple input 5°C fixed in case of resistance thermometer input	10°C fixed in case of thermocouple input 5°C fixed in case of resistance thermometer input
Cycle time	—	15sec	3sec
Manual resetting range	—	More than ±1/2 proportional band	More than ±1/2 proportional band
LED display	Relay turns on when the left green LED lights.	Relay turns on when the left green LED lights.	Output turns on when the left green LED lights.

Input type	Thermocouple, resistance thermometer bulb
Range	See model number table code number IV.
Option	Break alarm setting range : 2 to 20A

**Allowable wiring resistance:**

Thermocouple; Lower than 100Ω in total  
Resistance thermometer bulb; lower than 2.5Ω in each wire

**Burnout:**

Up-scale (thermocouple only)

**Rated power voltage:**

100/110V ac, 200/220V ac 50/60Hz

**Allowable power voltage fluctuation:**

90 to 125V ac at 100/110V ac rating  
180 to 250V ac at 200/220V ac rating

**Power consumption:**

Lower than about 2W

**Insulation resistance:**

Higher than 10MΩ between each terminal and case by using a 500V dc megger  
Impossible between temperature input terminal and CT input terminal

**Dielectric strength:**

1500V ac for 1 min, or 1800V ac for 1 sec between power terminals and case

**Storage temperature:**

-20 to 60°C

**Material of case:**

Heat-resisting ABS resin

**Weight:**

About 310g

**Mask color:**

Blue (Munsell code 2.5PB6/9)

**Installation:**

Indoor panel flush-mount

**Standard accessories:**

Mounting bracket 1 set  
Part No. 81402343  
Right/left closed mounting spacer  
Part No. 81402344  
Current detector (CT)  
Part No. 81402342

**Model Selection Guide** I II A III IV V

Code No.	Model No.		Specifications		
I	Basic model No.	HE7	Temperature controller with heater fuse alarm		
II	Alarm	0	None		
		1	Upper-limit alarm or lower-limit alarm		
		6	Upper-limit/lower-limit alarm with standby sequence		
III	Control mode and Output	A	On-off relay output		
		C	Time proportional relay output		
		D	Time proportional voltage output		
IV	Input type and Range		Input type	Range	Setting resolution
		J04	J	0 to 399°C	1°C
		K04	K	0 to 399°C	1°C
		K15	K	0 to 999°C	1°C
		P04	JIS Pt100Ω	0 to 399°C	1°C
V	Option	00	None		
		01	Heater capacity 2 to 20A		

*Specifications are subject to change without notice.*

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