

# Yamatake-Honeywell

## DIALAPAK

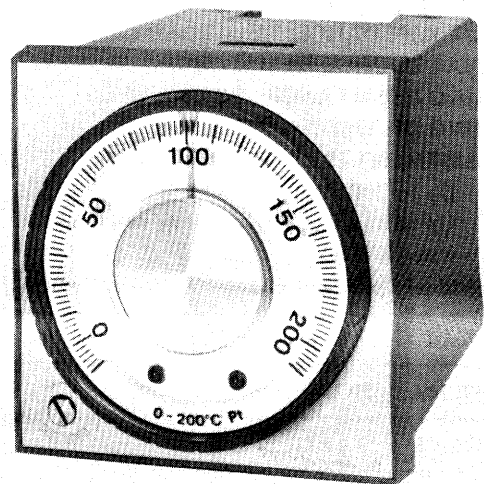
### INDICATING CONTROLLER

DialapaKs are compact, reliable, easy-to-use, vibration-resistant indicating controllers. They accept thermocouple, mV, mA, and resistance thermometer bulb inputs; perform control actions of a complexity ranging from two positions to PID control; and provide a relay contact, pulse, voltage, or current output.

These controllers have the following features:

- ☐ Clear indication of control condition.  
Because setting is performed by moving the scale, the setpoint is always at the center of the scale (noon position). When stable control is being performed, the meter pointer is also at the noon position, and can be easily monitored.
- ☐ High reliability.  
Solid-state electronics, such as monolithic ICs, etc, are used throughout the internal circuits. The indicating meter is built to be reasonably shock — and vibration-resistant.  
Because the indicating section and control section are separate, trouble in the indicating meter has no effect on control if that case.  
The transformer is installed outside the case so there is no heat buildup inside the case, thus ensuring stable operation.
- ☐ Wide scale type.  
The total scale length, including the marginal scale, is 166 mm, and is comparable to that of regular-size instruments.
- ☐ Tamper-proof setting.  
A lock mechanism prevents changing of the setpoint either by accident or by tampering.
- ☐ Application of DIN Standards.  
The external dimensions and panel cutout dimensions comply with DIN Standards.
- ☐ High input impedance.  
Because the input impedance is very high, the thermocouple used with the DialapaK can also be used with other instruments.
- ☐ Easy-to-service plug-in system.

## DIALAPAK INDICATING CONTROLLER



**R7670A,B,  
C,D,E,F  
R7673  
A,B,C,D  
R7674A,B**



# SPECIFICATIONS

## General Specifications

**INDICATING ACCURACY:**  $\pm 1\%$  F.S. \*(near setpoint)  
**INDICATING RANGE:**  $\pm 50\%$   
**SETPOINT ACCURACY:**  $\pm 1\%$  F.S. \*  
**SETTING RESOLUTION:**  $\pm 0.16\%$  F.S. or greater  
**SCALE LENGTH:**

145 mm (160 mm including overlap at both ends)

## MEASURING SYSTEM:

Thermocouple, mV, mA - potentiometer system

Thermodetector (RTD) - DC bridge system

**INPUT:** Thermocouple (R, K, J, E, T)

mV, mA (4 to 20 mA)

Thermodetector (RTD) (JIS Pt 100 ohms,  
nickel 508 ohms)

## CONTACT RATING LIFE:

3 A, 250 V AC (resistive load)

10,000,000 or more operations (115 V AC, 0.5 A)

50,000,000 or more operations (mechanical)

(Subsetting output is also the same relay.)

**BURN OUT:** Burn-out up scale

**INPUT IMPEDANCE:** 500 k $\Omega$  or greater (T/C)

**SIGNAL SOURCE RESISTANCE:** 0 to 100  $\Omega$

**WIRING RESISTANCE:** 0 to 4  $\Omega$  (RTD)

**WIRING DISTANCE UP TO WHICH**

**ADJUSTMENT IS UNNECESSARY: :**

Up to 200 m (T/CK)

Up to approximately 500 m with 1.6 mm diameter  
wire (RTD)

## Individual Specifications

**COLD JUNCTION COMPENSATION:** Built-in (T/C)

**INDUCTION RESISTIVITY:**

CMR 120 dB (Up to 250 V AC)

NMR 60 dB (Double the span voltage)

## OPERATING AMBIENT CONDITIONS

**ALLOWABLE AMBIENT TEMPERATURE:**

$-10^{\circ}$  to  $50^{\circ}\text{C}$

**ALLOWABLE STORAGE TEMPERATURE:**

$-20^{\circ}$  to  $60^{\circ}\text{C}$

**ALLOWABLE AMBIENT HUMIDITY:**

90% RH or less at  $40^{\circ}\text{C}$

**VIBRATION RESISTANCE:** 0.5 G (10 to 60 Hz)

**POWER SUPPLY VOLTAGE:** 100 to 200 V AC,

50 to 60 Hz

**ALLOWABLE POWER SUPPLY VOLTAGE**

**VARIATION:**

100 V rating 85 to 110 V

200 V rating 180 to 242 V

**POWER CONSUMPTION:** 5 W maximum

**MASK MATERIAL:** Heat-resistant ABS resin

**EXTERNAL CASE MATERIAL:** Noriru resin

**MASK STANDARD COLOR:** Light beige  
(Munsell 4Y7.2/1.3)

**WEIGHT:** 0.7 kg (0.8 kg packed for shipping)

**ACCESSORIES:**

Mounting brackets (1 set)

\*Prescribed at the reference conditions.

\*F.S. means full scale.

Model	Input	Control Form	Specification
R7670A	T/C, mV, mA	Time proportioning	Proportional band: 2.5% F.S., Cycle rate: 40 or 20 seconds (changeable at the site, switch operation at top inside of body, 40 seconds at factory shipping), manual reset: 2.5% F.S. or greater, Output contacts: SPDT
R7670B	RTD		
R7670C	T/C, mV, mA	ON-OFF	Relay differential: 0.3% F.S. Output contacts: SPDT
R7670D	RTD		
R7670E	T/C, mV, mA	ON-OFF (differential adjustable)	Relay differential: 0.5 to 10% F.S. adjustable Output contacts: SPDT
R7670F	RTD		
R7673A	T/C, mV, mA	Time proportioning +ON OFF	Time proportioning operation has the same specifications as R7670A, B above. Relay differential: 0.6% F.S. (second stage), Second stage setting range: Main stage setting $\pm 20\%$ typical
R7673B	RTD		
R7673C	T/C, mV, mA	ON-OFF +ON-OFF	Main stage setting ON-OFF operation has the same specifications as R7670C,D above. Second-stage setting has the same specifications as R7673A,B second-stage setting above.
R7673D	RTD		
R7674A	T/C, mV, mA	Indicating meter	When the center of the scale is set to the arrow, 1.0% F.S. in range of $\pm 5\%$ from center of scale, 1.5% F.S. in $-40$ to $+10\%$ , others are 2.0% F.S. typical (*Because the scale can turn, the division which requires the highest accuracy can be set near the arrow.)
R7674B	RTD		



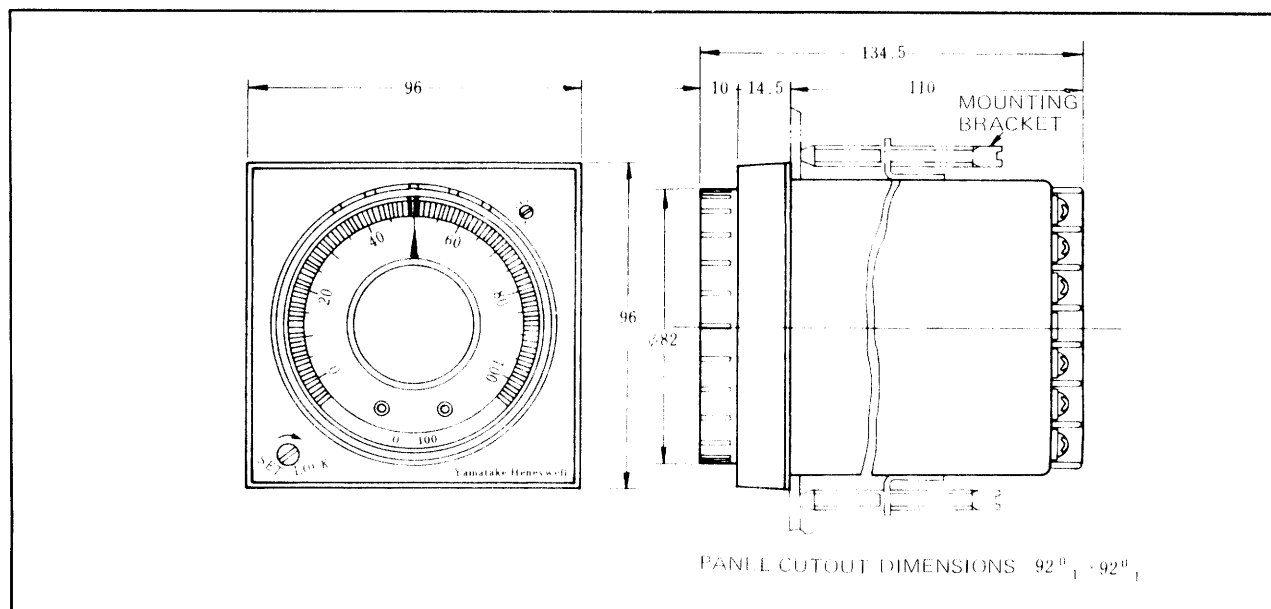


Fig. 1

## INSTALLATION • WIRING

### 1. Installation Location

The instrument must not be exposed to high temperature, high humidity, or dusty or corrosive atmospheres. An ideal installation location has clean, dry air and only small temperature variations. The ambient temperature must be between  $-10^{\circ}$  and  $+50^{\circ}\text{C}$ , and the humidity must not exceed 90% RH.

### 2. Installation Method

Insert the instrument into the hole cut in the panel from the front and fasten it with the two sets of mounting brackets supplied.

Fasten the mounting brackets at the top and bottom from the back of the case.

Do not tighten the mounting brackets too tightly. (Torque; 10 kg.cm or less)

### 3. Wiring Precautions

(1) Use JIS C3307 600V vinyl-insulated wire having a conductor diameter of 0.5 mm to 1.25 mm and a finished outside diameter of 2.0 mm to 3.2 mm (AWG #22 - #16).

(2) Wire the instrument according to the external connection terminal symbols. Use solderless terminals. (See Figure 2.)

#### (3-A) RTD input only

Use a 3-wire type RTD with this instrument. Use three lead wires of the same thickness between the RTD and meter terminals (A), (B), and (C). Adjustment is unnecessary if the wiring length is less than 500 m (4 ohms) for 1.6 mm diameter wire.

#### (3-B) Thermocouple input only

Use thermocouple compensation wires between the thermocouple and meter input terminals (A) and (B).

(A) is the "+" side. When using a K thermocouple, adjustment is unnecessary if the wiring is less than about 200 m long (100 ohms).

Type and Symbol	Surface Insulator Color	Type of Compensation Wire		Use
		+ Side (red)	- Side (white)	
J	Yellow	Iron	Constantan	Regular High temperature
K	Blue	Copper Iron	Constantan Copper Nickel alloy	Regular High temperature
R	Black	Copper	Copper Nickel alloy	Regular High temperature
E	Violet	Copper Chromel	Constantan Constantan	Regular High temperature
T	Light brown	Copper	Constantan	Regular High temperature

(4) This instrument does not have an internal power switch or fuse. If these are necessary, provide them on the outside.

(5) To prevent induction, do not run the wire between the meter and thermocouple through the same conduit as power wires.

(6) Pay careful attention to item (5) inside the instrument panel also.



#### (4) Wiring Example

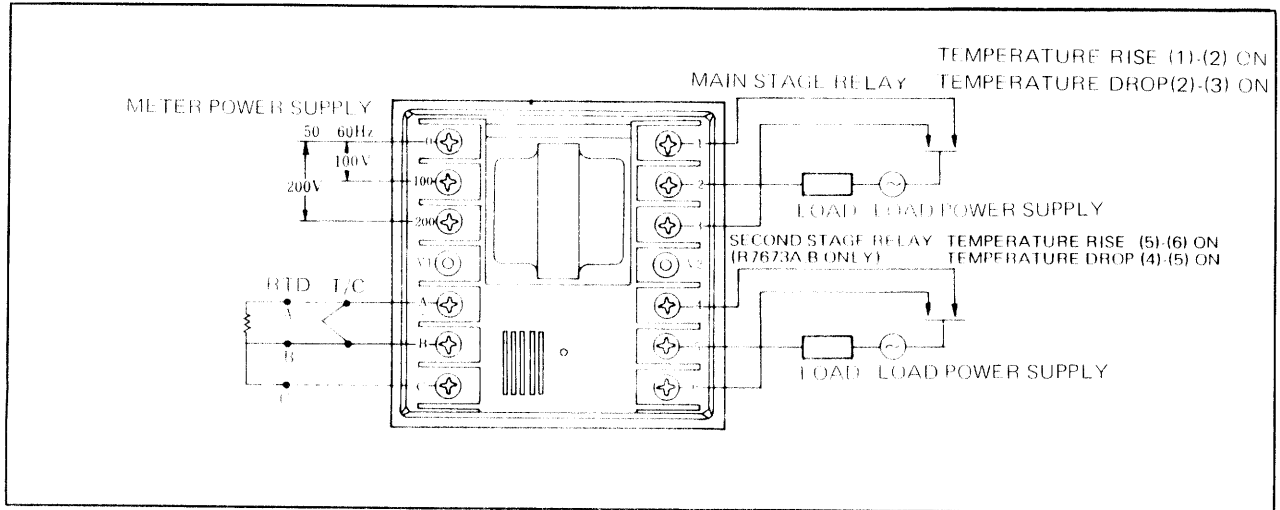


Fig. 2

## OPERATION

### 1. Preparations

- (1) Check the line voltage and ensure that the power lead wires are connected to the correct terminals.
- (2) Check that the wires between the RTD and meter are connected to (A), (B), and (C) correctly.
- (3) After checking (1) and (2) above, turn on the instrument power.

### 2. Temperature Setting

Before setting, check that SET LOCK is not set. After loosening the SET LOCK screw, turn the setting dial to the left or right and align the desired value with the red arrow.

### 3. Second-Stage Setting (two-stage type only)

#### A. When used as high limit (Photo 2)

(Example)

Scale range  $0^{\circ}$  to  $200^{\circ}\text{C}$

Set temperature (main stage)  $100^{\circ}\text{C}$

High limit set temperature  $115^{\circ}\text{C}$

(Temperature difference from main stage  $15^{\circ}\text{C}$ )

In this case, the second-stage setting range is 20% F.S. ( $60^{\circ}$  to  $140^{\circ}\text{C}$ ) with the main stage as the center.

- (1) First, set the main stage to  $100^{\circ}\text{C}$  and enter an input corresponding to the set temperature. (Pointer indicates  $100^{\circ}\text{C}$ .)
- (2) Next, turn the setting dial clockwise ( ) and set to a temperature ( $85^{\circ}\text{C}$ ) lower than the high limit by the amount ( $15^{\circ}\text{C}$ ) of the temperature difference.
- (3) At this time, turn the second-stage setting potentiometer until the red LED switches from off to on.
- (4) Return the main stage to  $100^{\circ}\text{C}$ . This ends high limit setting. When used as for high limit control, the output terminals are (5)-(6).

#### B. When used as low limit

The procedure is the same as the above, only perform the setting in reverse.

Low limit set temperature  $52^{\circ}\text{C}$   
(Temperature difference from main stage  $8^{\circ}\text{C}$ )  
In this case, the second stage setting range is  $\pm 20\%$  F.S. ( $40^{\circ}$  to  $80^{\circ}\text{C}$ ) with the main stage as the center.

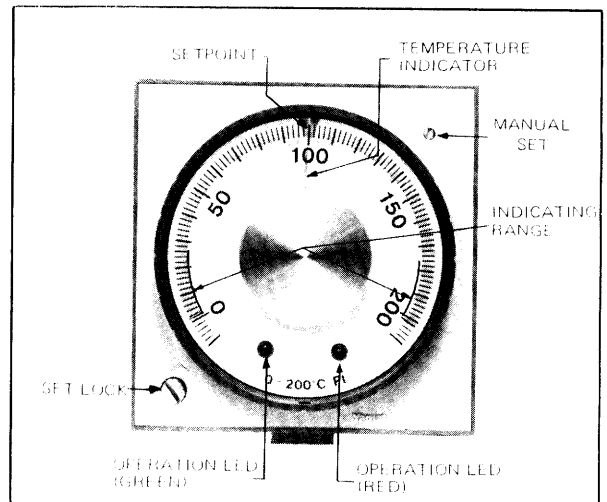


Photo 1.

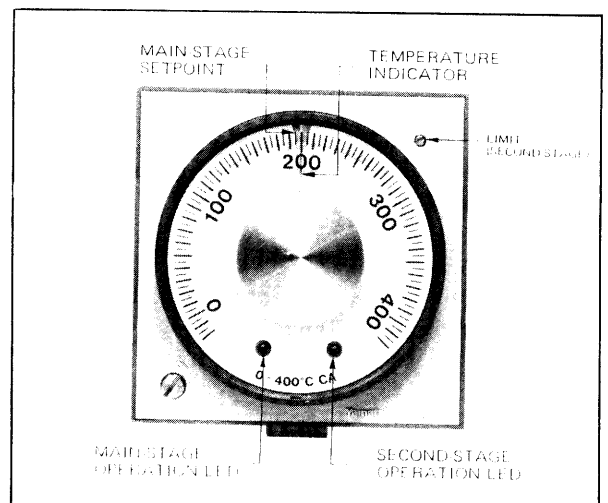


Photo 2.



#### 4. Indicator (R7374) Setting

The scale of this indicator can be turned so that precision can be obtained at the most important point. Setting is completed by setting the necessary point to the arrow on the decorative plate and tightening the set lock screw. (Photo 2)

#### 5. Wide Differential Setting (Differential variable type)

(Example)

To set ON at 180°C and OFF at 160°C,  
temperature scale range 0° to 300°C

- (1) Set the temperature setpoint to 180°C and enter an input corresponding to 180°C. (Temperature indication 180°C.)
- (2) Next set the main stage to 200°C, and turn the differential dial to the point at which the green LED lights.

This completes differential setting.

#### 6. Relay Action

- (1) R7670A,B time proportioning type

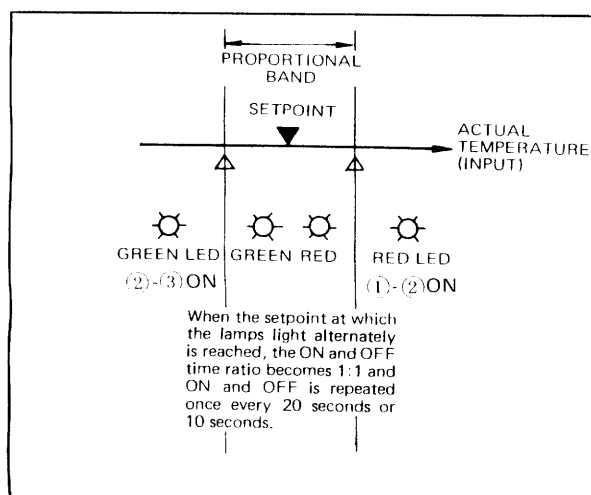


Fig. 3.

- (2) R7670C,D,E,F, ON-OFF operation type

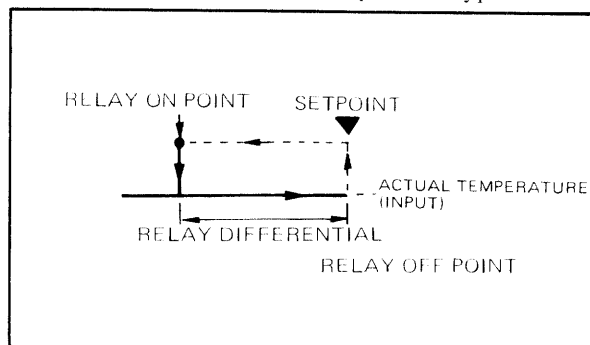


Fig. 4.

The relay differential is 0.5% F.S., fixed for C and D type and adjustable 0.5 to 10% F.S. for E and F type.

- (3) R7673A,B,C,D second-stage type

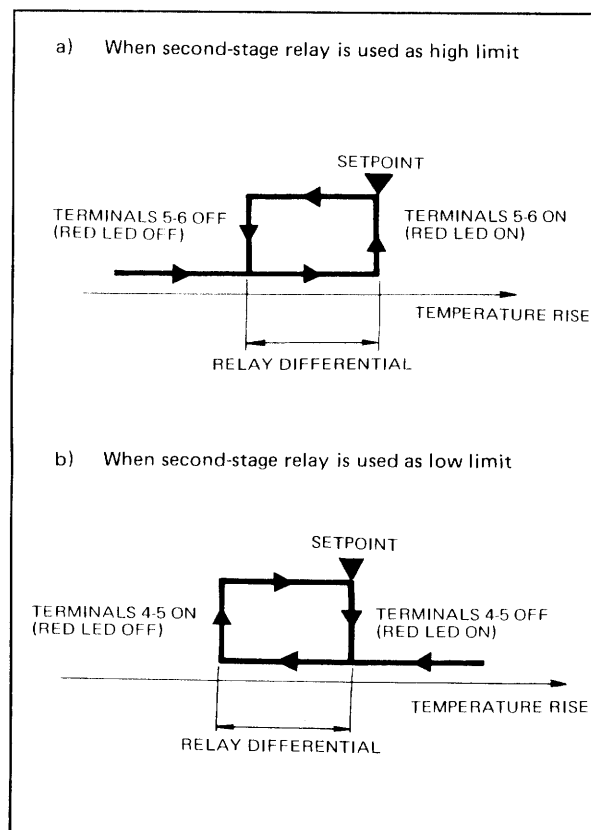


Fig. 5 Second-stage relay differential

## TROUBLESHOOTING

When the system fails and control is not performed correctly, check the line voltage, detector, and load circuit as described below.

#### Normal operation

When the instrument is operating normally, the measured temperature indicator (red) remains close to the setpoint

(red arrow) and the green and red LEDs turn on and off alternately in accordance with the control relay operation.

If the red pointer changes suddenly or stops above or below the setpoint (red arrow), the temperature controller is probably faulty. Check the line voltage, detector, and load circuit in accordance with the following items.



### During starting operation

Symptom	Probable Cause	Check Point
Indicator LEDS do not turn on.	Incorrect line voltage.	Check the line wire connections and the line voltage.
Green LED turns on and pointer deflects to the lower limit of the indicating range.	(1) Detector wiring incorrect. (2) Input wire shorted.	Check the detector wiring. Check the detector. (See Note 1.)
Red LED turns on and pointer deflects to the upper limit of the indicating range.	Detector open.	Check the detector. (see to Note 1 for check method.)
Green LED turns on but temperature does not rise.	External load circuit connection incorrect.	Check the output terminal external load circuit connections. (See Figure 2.)

### During operation

Symptom	Probable Cause	Check Point
Red LED turns on and pointer deflects to the lower limit of the indicating range.	Detector shorted.	Check the detector. (see Note 1 for the check method.)
Red LED turns on and pointer deflects to upper limit of indicating range.	Detector open.	
Green LED turns on but temperature does not rise.	Output relay or external load circuit faulty.	Check the output relay and external load circuit.

#### Note 1. RTD check

Disconnect the RTD wiring from meter input terminals (A), (B), and (C) and measure the resistance between the RTD terminals with a multimeter, etc. (See table at right.)

RTD	Between (A) and (B)	Between (B) and (C)
Normal	Resistance about 105 to 110 ohms with JIS Pt 100 ohms, and about 540 to 570 ohms for Ni RTDK (when detected temperature is about room temperature)	Shorted state (about 0 ohms)
Replacement necessary	Does not conduct (infinite resistance)	Does not conduct (infinite resistance)
	Shorted state (about 0 ohms)	

#### Thermocouple check

If the pointer indicates room temperature (to be precise, the temperature of meter connection terminals), the red LED blinks, and control is performed normally when the meter (+) and (–) input terminals are shorted together and the temperature setting is set to room temperature, the thermocouple is open. Replace the thermocouple.

If the thermocouple and external load circuit are normal when the checks above are performed, or the trouble point cannot be found, contact your local Yamatake-Honeywell representative.

## MAINTENANCE

To replace the instrument, pull out the old instrument while pushing up the stopper at the bottom front of the instrument. The new instrument can be easily inserted into the case.

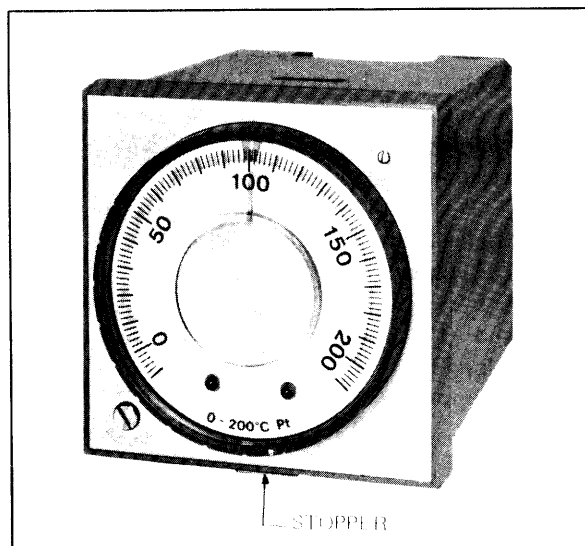


Photo 3.