INSTRUCTION MANUAL

MICRO-COMPUTER BASED DIGITAL INDICATOR   FIR-201-M

To prevent accidents arising from the misuse of this indicator, please ensure the operator receives this manual.

⚠ # Warning

Turn the power supply to the instrument OFF before wiring or checking.
Working or touching the terminal with the power switched ON may result in severe injury or death due to Electric Shock.

⚠ # Caution

Do not apply a commercial power surce to the sensor connected to the input terminal nor allow the power source to come into contact with the sensor.
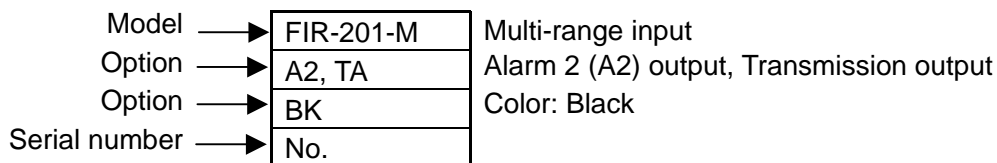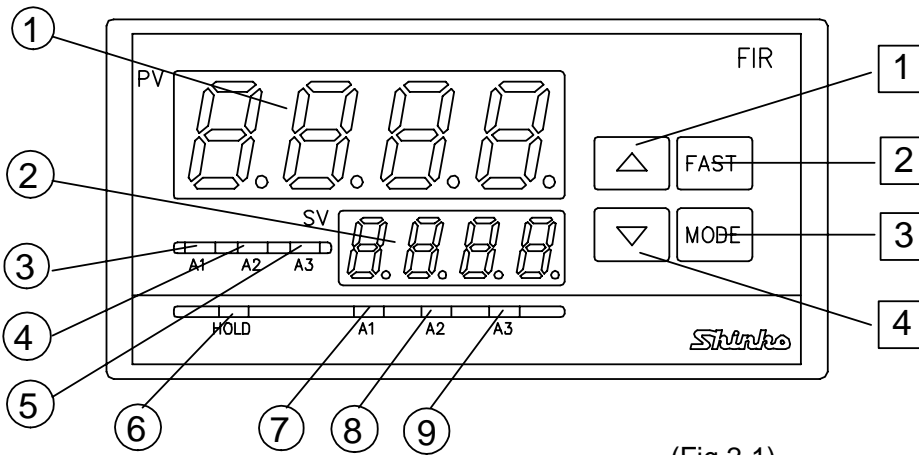
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1. Model

1.1 Model

FIR-201 - M, ☐ ☐ ☐			Series name: FIR-200 (W96 x H48 x D100mm)	
Input	M		Multi-range	
Option		A2	Alarm 2 (A2)	
		A3	Alarm 3 (A3)	
		TA	Transmission output	DC current: 4 to 20mA DC
		TV		DC voltage: 0 to 1V DC
		C5	Serial	RS-485
		C	communication	RS-232C
		P24	Insulated power output (24±3V DC)	
		BK	Color: Black	
		BL	Screw type mounting brackets	
		IP	Dust-proof/Drip-proof (IP54)	
		TC	Terminal cover	

1.2 How to read the model label

Model labels are attached to the case and the bottom of the inner assembly.

|		
Model ➤	FIR-201-M	Multi-range input
Option ➤	A2, TA	Alarm 2 (A2) output, Transmission output
Option ➤	BK	Color: Black
Serial number ➤	No.	

2. Name and functions of the sections

(Fig.2-1)

① **PV display**: Indicates PV (process variable) or characters in the setting mode with the red LED.

② **SV display**: Indicates the alarm value (A1, A2, A3) or set value in the setting mode with the green LED.

③ **Alarm 1 (A1) value indicator**:
The green LED lights when the SV display indicates Alarm 1 (A1) value.

④ **Alarm 2 (A2) value indicator**:
The green LED lights when the SV display indicates Alarm 2 (A2) value.

⑤ **Alarm 3 (A3) value indicator**:
The green LED lights when the SV display indicates Alarm 3 (A3) value.

⑥ **PV Hold indicator (HOLD)**: The yellow LED lights when PV is held.

⑦ **Alarm 1 (A1) action indicator**: The red LED lights when Alarm 1 (A1) output is on.

⑧ **Alarm 2 (A2) action indicator**: The red LED lights when Alarm 2 (A2) output is on.

⑨ **Alarm 3 (A3) action indicator**: The red LED lights when Alarm 3 (A3) output is on.

1 ▲ Increase key: Increases the numeric value.

2 FAST Fast key: Makes the numeric value change faster when pressing with the ▲ or ▼ key.

3 MODE Mode key: Selects the setting mode.

4 ▼ Decrease key: Decreases the numeric value.

3. Setup

Before supplying the power to the instrument, take the inner assembly out from the case by pushing the hook (right side of the unit) in the arrow direction and holding the latches (at the right and left side of the unit).
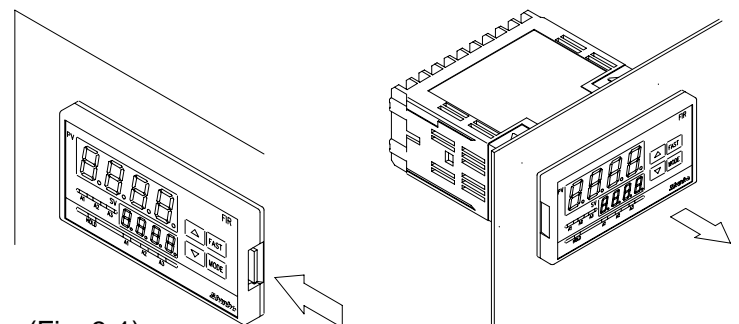
(Fig. 3-1)

Using a small flat blade screwdriver and tweezers, set the Sensor input, Unit ℃/℉, Hold function, Standby actions for Alarm 1 (A1), Alarm 2 (A2) and Alarm 3 (A3).

Sensor input selection
Unit selection
Hold function selection
Alarm 1 standby action selection
Alarm 2 standby action selection
Alarm 3 standby action selection

OFF → ON

(Fig. 3-2)

SW304 DIP switch

Sensor input selection

SW303 Rotary switch
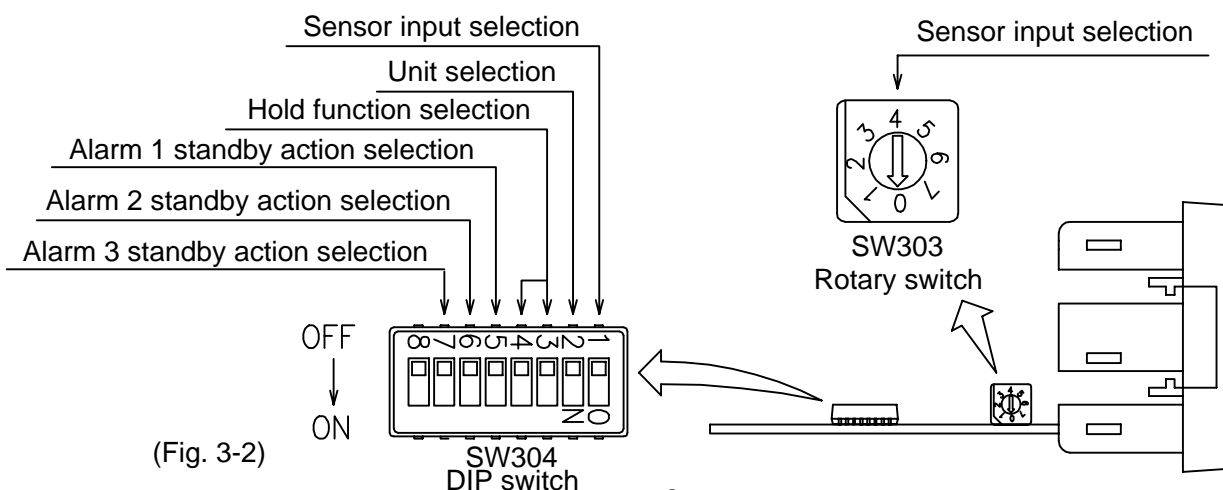
2

■ Setup

The following items can be set by SW304.
Default value: OFF for all switches.
(Table 3-1)

Item	Switch 304 No.	Selection		Switch status	
Sensor input *1	1	K, J, R, B, N, PL-Ⅱ, Pt100, JPt100		OFF	
		S, E, T, C, 4 to 20mA 0 to 20mA, 0 to 1V, K		ON	
Unit (℃ / ℉)	2	℃		OFF	
		℉		ON	
Hold function	3, 4	Hold		No.3: OFF	No.4: OFF
				No.3: ON	No.4: ON
		Peak hold		No.3: ON	No.4: OFF
		Bottom hold		No.3: OFF	No.4: ON
Alarm 1 (A1) standby action	5	Without standby action		OFF	
		With Standby action		ON	
Alarm 2 (A2) standby action*2	6	Without standby action		OFF	
		With Standby action		ON	
Alarm 3 (A3) standby action*3	7	Without standby action		OFF	
		With Standby action		ON	

*1: Use SW303 together.

*2: The standby action works only when A2 option is applied.

*3: The standby action works only when A3 option is applied.

■ Sensor selection

Select a sensor type with the switch (SW303) and switch (SW304, No.1).
Default value: K, -200 to 1370℃

(Table 3-2)

SW303 No.	SW304 No.1	Sensor type	Input range	
			SW304 (when No.2 is OFF)	SW304 (when No.2 is ON)
0	OFF	K	-200 to 1370℃	-320 to 2500℉
1	OFF	J	-200 to 1000℃	-320 to 1800℉
2	OFF	R	0 to 1760℃	0 to 3200℉
3	OFF	B	0 to 1820℃	0 to 3300℉
4	OFF	PL-Ⅱ	0 to 1390℃	0 to 2500℉
5	OFF	N	0 to 1300℃	0 to 2300℉
6	OFF	Pt100	-199.9 to 850.0℃	-199.9 to 999.9℉
7	OFF	JPt100	-199.9 to 500.0℃	-199.9 to 900.0℉

(Table 3-3)

SW303 No.	SW304 No.1	Sensor type	Input range	
			SW304 (when No.2 is OFF)	SW304 (when No.2 is ON)
0	ON	S	0 to 1760℃	0 to 3200℉
1	ON	E	0 to 1000℃	0 to 1800℉
2	ON	T	-199.9 to 400.0℃	-199.9 to 750.0℉
3	ON	C(W/Re5-26)	0 to 2315℃	0 to 4200℉
4	ON	4 to 20mA DC	-1999 to 9999	
5	ON	0 to 20mA DC	-1999 to 9999	
6	ON	0 to 1V DC	-1999 to 9999	
7	ON	K	0.0 to 400.0℃	0.0 to 750.0℉

After setup is completed, insert the internal assembly into the case.

(Do not confuse the top and bottom of the inner assembly. If inserting the assembly into the case in the wrong direction, the PCB may be damaged.)

Surely insert the assembly until it is locked by the hook at the right of the instrument. ("Click" sounds)
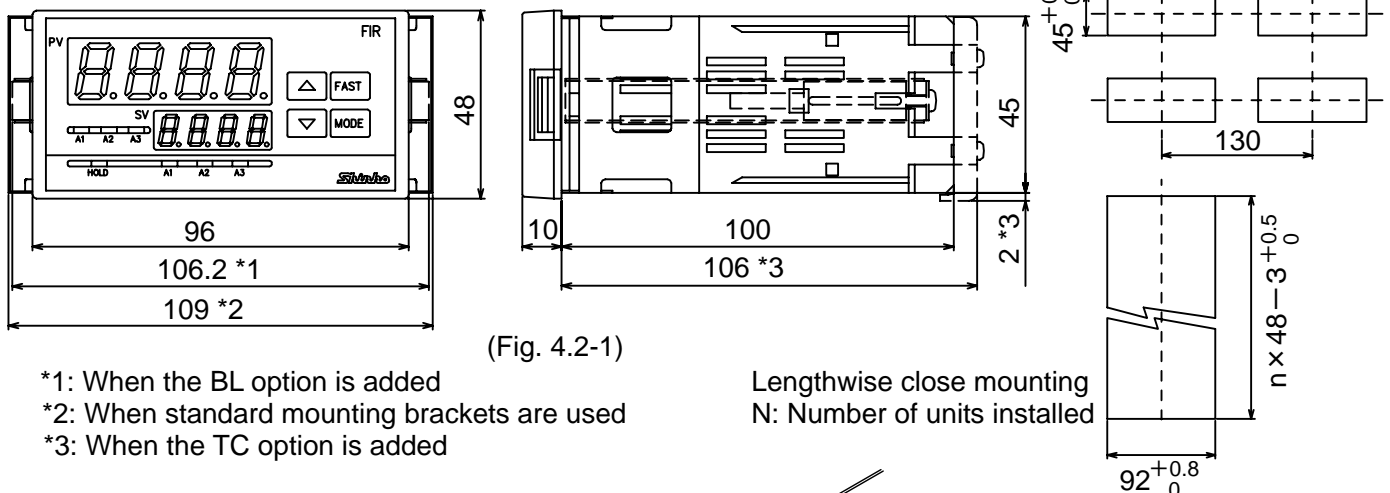
4. Mounting to the control panel

4.1 Site selection

Ensure the mounting location corresponds to the following conditions:

- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- Few mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of 0 to 50℃ (32 to 122℉) that does not change rapidly, and no icing
- An ambient non-condensing humidity of 35 to 85%RH
- No large capacity electromagnetic switches or cables through which large current flows
- No water, oil or chemicals or where the vapors of these substances can come into direct contact with the FIR-201-M
- If the FIR-201-M is installed through the control panel, the ambient temperature of the unit must be kept to under 50℃. Otherwise the life of electronic parts (especially electrolytic capacitors) of the unit will be shortened.

4.2 External dimensions, panel cutout (Scale: mm)

(Fig. 4.2-1)

*1: When the BL option is added
*2: When standard mounting brackets are used
*3: When the TC option is added

(Fig. 4.2-2)

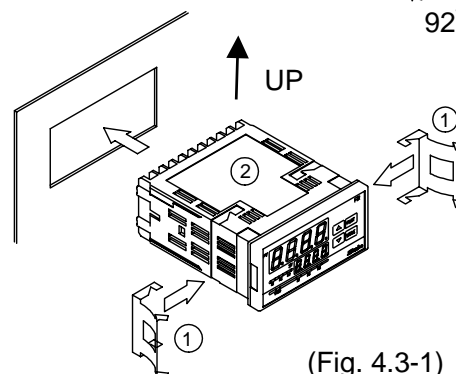Lengthwise close mounting
N: Number of units installed

4.3 Mounting

When using One-touch type mounting brackets

Mounting panel thickness: 1 to 3mm

First, mount One-touch type mounting brackets ① to the body, and then insert the unit ② from the panel front.

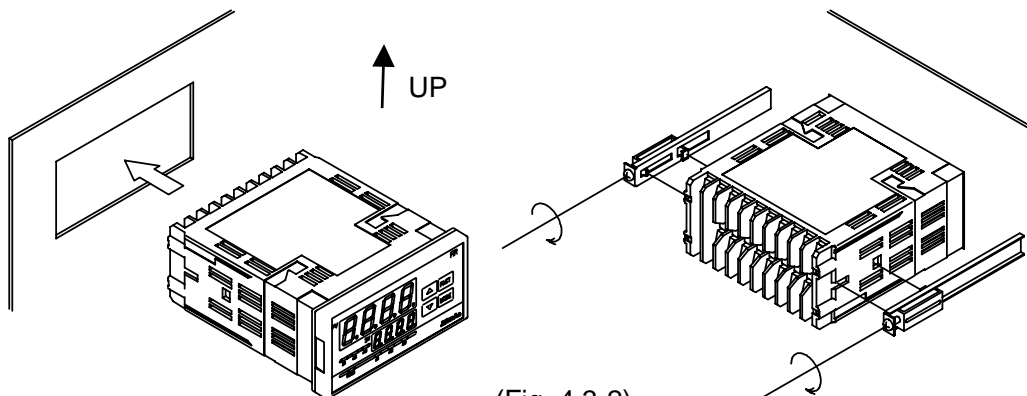When using Soft front cover (FC-R), the panel thickness for mounting will be 1 to 2.5mm.

UP

(Fig. 4.3-1)

4

When using Screw type mounting brackets [Option: BL]
Mounting panel thickness: 1 to 8mm
Insert the FIR-201-M from the panel front.
Slot the mounting bracket to the holes at the right and left side of the case, and screw in place.

↑ UP

(Fig. 4.3-2)

⚠ Notice

As the case is made of resin, do not use excessive force while screwing in the mounting bracket. The torque should be approximately 0.12N·m.
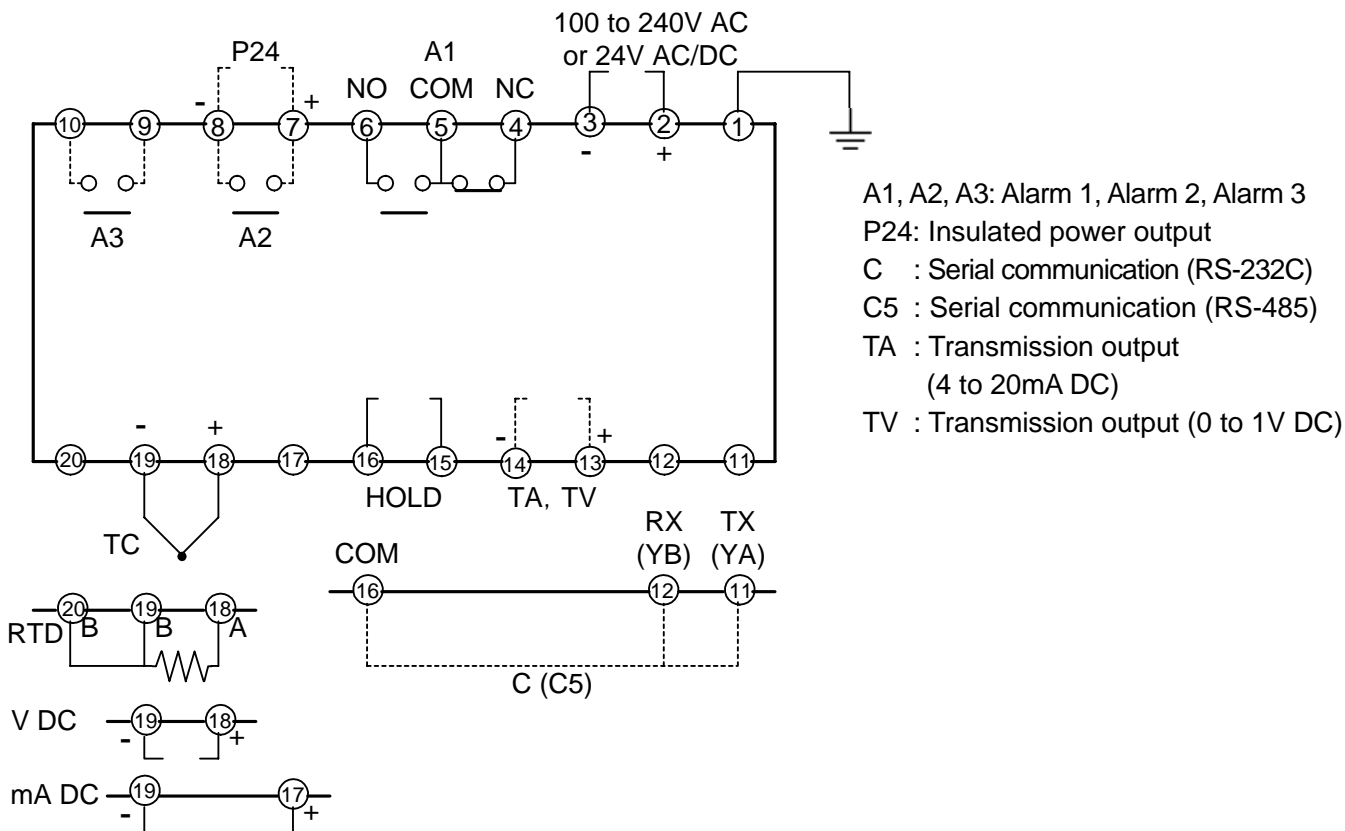
5. Terminal arrangement

⚠ Warning

Turn the power supply to the instrument OFF before wiring or checking.
Working or touching the terminal with the power switched ON may result in severe injury or death due to Electric Shock.

Moreover, the instrument must be grounded before the power supplied to the instrument is turned on.

A1, A2, A3: Alarm 1, Alarm 2, Alarm 3
P24: Insulated power output
C : Serial communication (RS-232C)
C5 : Serial communication (RS-485)
TA : Transmission output
   (4 to 20mA DC)
TV : Transmission output (0 to 1V DC)

(Fig. 5-1)

The terminal block of this instrument is designed to be wired from the upper side.
Lead wire must be inserted from the upper side of the terminal, and fastened by the terminal screw.

Dotted lines show options, and the terminals are equipped only when the option is applied.

■ Solderless terminal

Use a solderless terminal with an insulation sleeve in which the M3 screw fits as shown below.
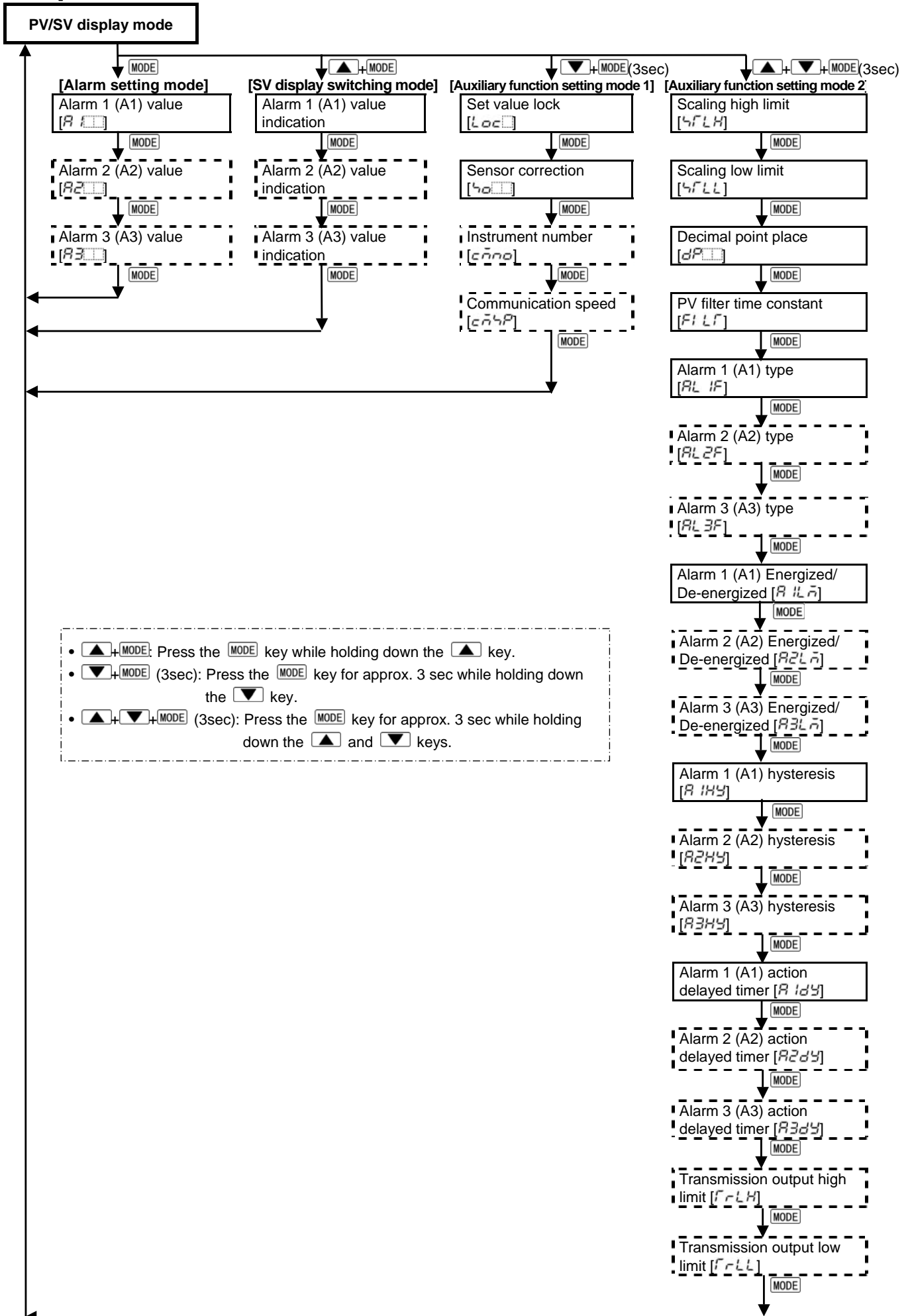Tightening torque should be approximately 0.63N·m.
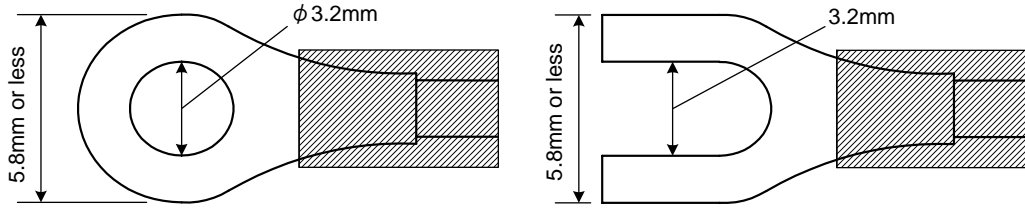
Solderless terminal	Manufacturer	Model	Tightening torque
Y type	Nichifu Terminal Industries CO.,LTD.	TMEV1.25Y-3	Approx. 0.63N·m
	Japan Solderless Terminal MFG CO.,LTD.	VD1.25-B3A	
Round type	Nichifu Terminal Industries CO.,LTD.	TMEV 1.25-3	
	Japan Solderless Terminal MFG CO.,LTD.	V1.25-3	

⚠ Notice

- **Use a thermocouple and compensation lead wire corresponding to the input specifications of this indicator.**

- **Use a 3-wire RTD which corresponds to the input specification of this indicator.**

- **This indicator does not have a built-in power switch or fuse. Therefore, it is necessary to install them in the circuit near the external indicator.**

- **In the case of 24V DC, do not confuse the polarity.**

- **When using a relay contact output type, externally use a relay according to the capacity of the load to protect the built-in relay contact.**

- **When wiring, keep the input wires (TC, RTD, etc.) away from AC sources and load wires to avoid external interference.**

- **Use a thick wire (1.25 to 2.0mm^2) for grounding.**

6. Operation flowchart

PV/SV display mode

MODE

[Alarm setting mode]

Alarm 1 (A1) value [A 1]

MODE

Alarm 2 (A2) value [A2]

MODE

Alarm 3 (A3) value [A3]

MODE

▲+MODE

[SV display switching mode]

Alarm 1 (A1) value indication

MODE

Alarm 2 (A2) value indication

MODE

Alarm 3 (A3) value indication

MODE

▼+MODE(3sec)

[Auxiliary function setting mode 1]

Set value lock [Loc]

MODE

Sensor correction [5o]

MODE

Instrument number [cᴰno]

MODE

Communication speed [cᴰ5P]

MODE

▲+▼+MODE(3sec)

[Auxiliary function setting mode 2]

Scaling high limit [5rLH]

MODE

Scaling low limit [5rLL]

MODE

Decimal point place [dP]

MODE

PV filter time constant [FILr]

MODE

Alarm 1 (A1) type [AL 1F]

MODE

Alarm 2 (A2) type [AL2F]

MODE

Alarm 3 (A3) type [AL 3F]

MODE

Alarm 1 (A1) Energized/De-energized [A 1Lᴰ]

MODE

Alarm 2 (A2) Energized/De-energized [A2Lᴰ]

MODE

Alarm 3 (A3) Energized/De-energized [A3Lᴰ]

MODE

Alarm 1 (A1) hysteresis [A 1HY]

MODE

Alarm 2 (A2) hysteresis [A2HY]

MODE

Alarm 3 (A3) hysteresis [A3HY]

MODE

Alarm 1 (A1) action delayed timer [A 1dY]

MODE

Alarm 2 (A2) action delayed timer [A2dY]

MODE

Alarm 3 (A3) action delayed timer [A3dY]

MODE

Transmission output high limit [rrLH]

MODE

Transmission output low limit [rrLL]

MODE

- ▲+MODE: Press the MODE key while holding down the ▲ key.
- ▼+MODE (3sec): Press the MODE key for approx. 3 sec while holding down the ▼ key.
- ▲+▼+MODE (3sec): Press the MODE key for approx. 3 sec while holding down the ▲ and ▼ keys.

PV display indicates sensor characters and temperature unit, and the SV display indicates the input range high limit value for approx. 2 seconds after the power is turned on. See (Table 6-1).
During this time, all outputs and LED indicators are in off status. After that, the PV display indicates actual temperature and the SV display indicates alarm value, and measuring starts.

(Table 6-1)

Input	℃		℉	
	PV display	SV display	PV display	SV display
K	t⎕⎕C	1370	t⎕⎕F	2500
J	J⎕⎕C	1000	J⎕⎕F	1800
R	r⎕⎕C	1760	r⎕⎕F	3200
B	b⎕⎕C	1820	b⎕⎕F	3300
PL-Ⅱ	PL2C	1390	PL2F	2500
N	n⎕⎕C	1300	n⎕⎕F	2300
S	5⎕⎕C	1760	5⎕⎕F	3200
E	E⎕⎕C	1000	E⎕⎕F	1800
T	r⎕⎕C	400.0	r⎕⎕F	750.0
C	c⎕⎕C	2315	c⎕⎕F	4200
Pt100	Pr⎕C	850.0	Pr⎕F	999.9
JPt100	JPr⎕C	500.0	JPr⎕F	900.0
4 to 20mA DC	42A⎕	Scaling high limit value	42A⎕	Scaling high limit value
0 to 20mA DC	02A⎕		02A⎕	
0 to 1V DC	01U⎕		01U⎕	
K (with a decimal point)	t⎕4C	400.0	t⎕4F	750.0

6.1 SV display switching mode

Set values of Alarm 1 (A1), Alarm 2 (A2) and Alarm 3 (A3) can be indicated on the SV display by pressing the MODE key while holding down the ▲ key.

Name, Description	Default
Alarm 1 (A1) value indication • Alarm 1 (A1) value is indicated on the SV display and its indicator lights. • Not available if No alarm action is selected during Alarm 1 (A1) type selection.	0℃
Alarm 2 (A2) value indication • Alarm 2 (A2) value is indicated on the SV display and its indicator lights. • Not available if A2 option is not applied or if No alarm action is selected during Alarm 2 (A2) type selection.	0℃
Alarm 3 (A3) value indication • Alarm 3 (A3) value is indicated on the SV display and its indicator lights. • Not available if A3 option is not applied or if No alarm action is selected during Alarm 3 (A3) type selection.	0℃

6.2 Alarm setting mode

Character	Name, Description, Setting range	Default
A1⎕⎕	**Alarm 1 (A1) value setting** • Sets the action point for Alarm 1 (A1) output. • Not available if No alarm action is selected during Alarm 1 (A1) type selection. • Setting range: See (Table 6.2-1).	0℃
A2⎕⎕	**Alarm 2 (A2) value setting** • Sets the action point for Alarm 2 (A2) output. • Not available if A2 option is not applied or if No alarm action is selected during Alarm 2 (A2) type selection. • Setting range: See (Table 6.2-1).	0℃

Character	Name, Description, Setting range	Default
A3	**Alarm 3 (A3) value setting** • Sets the action point for Alarm 3 (A3) output. • Not available if A3 option is not applied or if No alarm action is selected during Alarm 3 (A3) type selection. • Setting range: See (Table 6.2-1).	0℃

(Table 6.2-1)

Character	Setting range	Setting range (DC input)
Process high alarm	Input range low limit value to input range high limit value	Scaling low limit value to scaling high limit value
Process low alarm	Input range low limit value to input range high limit value	Scaling low limit value to scaling high limit value

The placement of the decimal point place follows the selection and input rating.
The setting range of process alarm with standby function is the same as the above.

6.3 Auxiliary function setting mode 1

Character	Name, Description, Setting range	Default

Loc	**Set value lock selection**
	• Locks all set values to prevent setting errors.
	  The setting item to be locked depends on the selection.
	• *----* (Unlock): All set values can be changed.
	  Lc 1 (Lock 1): None of the set values can be changed.
	  Lc2 (Lock 2): Only alarm setting mode can be changed.
	  Lc3 (Lock 3): All setting items can be changed, however the value
	                  Returns to the former value after the power is turned off
	                  since the value is not saved in the non-volatile memory.
	• When C or C5 option is applied, be sure to select Lock 3 considering the life of non-volatile memory.
		Unlock

Sc	**Sensor correction setting**
	• Sets a sensor correction value.
	• Setting range: -100.0 to 100.0℃ (℉)
	  DC input: -1000 to 1000 (The placement of the decimal point follows
	                          the selection.)
		0.0℃

cmno	**Instrument number setting** • Sets an individual instrument number of the unit when communicating with plural units in serial communication. • Available only when the C or C5 option is applied. • Setting range: 0 to 95	0

cmsP	**Communication speed selection**
	• Selects a communication speed equal to the speed of the host computer.
	• Available only when the C or C5 option is applied.
	• *24*: 2400bps
	  48: 4800bps
	  96: 9600bps
	  192: 19200bps
		9600bps

6.4 Auxiliary function setting mode 2

Character	Name, Description, Setting range	Default
५୮ㄥH	**Scaling high limit setting** • Sets the scaling high limit value. • Available only when DC input is selected during sensor selection. • Scaling low limit value to input range high limit value	9999
५୮ㄥㄥ	**Scaling low limit setting** • Sets the scaling low limit value. • Available only when DC input is selected during sensor selection. • Input range low limit value to scaling high limit value	-1999

dP☐☐	**Decimal point place selection**
	• Selects the decimal point place.
	• Available only when DC input is selected during sensor selection.
	  ☐☐☐*0*: No decimal point
	  ☐☐*0.0*: 1 digit after the decimal point
	  ☐*0.0.0*: 2 digits after the decimal point
	  0.0.0.0: 3 digits after the decimal point
		No decimal point

Fl ㄥ୮	**PV filter time constant setting** • Sets the PV filter time constant. • If the value is set too large, it affects alarm action due to the delay of response. • Setting range: 0.0 to 10.0sec	0.0 seconds

RㄥIF	**Alarm 1 (A1) type selection**
	• Selects an Alarm 1 (A1) action.
	  (If the alarm type is changed, the previous set value is ineffective.)
	• Selection item:
	  - - - -: No alarm action
	  H☐☐☐: Process high alarm
	  ㄥ☐☐☐: Process low alarm
		No alarm action

Rㄥ2F	**Alarm 2 (A2) type selection** • Selects an Alarm 2 (A2) action. • This setting item is available only when the A2 option is applied. (If the alarm type is changed, the previous set value is ineffective.) • Selection item is the same as that of Alarm 1 (A1) type selection.	No alarm action
Rㄥ3F	**Alarm 3 (A3) type selection** • Selects an Alarm 3 (A3) action. • This setting item is available only when the A3 option is applied. (If the alarm type is changed, the previous set value is ineffective.) • Selection item is the same as that of Alarm 1 (A1) type selection.	No alarm action
R Iㄥ⊼	**Alarm 1 (A1) action Energized/De-energized selection** • Selects Alarm 1 (A1) action Energized or De-energized. • Not available if No alarm action is selected during Alarm 1 (A1) type selection. • Selection item: noⅯ☐: Energized, ⌐E∀☐: De-energized	Energized
R2ㄥ⊼	**Alarm 2 (A2) action Energized/De-energized selection** • Selects Alarm 2 (A2) action Energized or De-energized. • This setting item is not available if A2 option is not applied or if No alarm action is selected during Alarm 2 (A2) type selection. • Selection item is the same as that of Alarm 1 (A1) action Energized/ De-energized selection.	Energized
R3ㄥ⊼	**Alarm 3 (A3) action Energized/De-energized selection** • Selects Alarm 3 (A3) action Energized or De-energized. • This setting item is not available if A3 option is not applied or if No alarm action is selected during Alarm 3 (A3) type selection. • Selection item is the same as that of Alarm 1 (A1) action Energized/ De-energized selection.	Energized

| Character	Name, Description, Setting range	Default
A1HY	**Alarm 1 (A1) hysteresis setting** • Sets Alarm 1 (A1) action hysteresis. • Not available if No alarm action is selected during Alarm 1 (A1) type selection. • Setting range: 0.1 to 100.0℃ 　　　　DC input: 1 to 1000 (The placement of the decimal point place follows the selection.)	1.0℃
A2HY	**Alarm 2 (A2) hysteresis setting** • Sets Alarm 2 (A2) action hysteresis. • Not available if A2 option is not applied or if No alarm action is selected during Alarm 2 (A2) type selection. • The setting range is the same as that of Alarm 1 (A1) hysteresis setting.	1.0℃
A3HY	**Alarm 3 (A3) hysteresis setting** • Sets Alarm 3 (A3) action hysteresis. • Not available if A3 option is not applied or if No alarm action is selected during Alarm 3 (A3) type selection. • The setting range is the same as that of Alarm 1 (A1) hysteresis setting.	1.0℃
A1dY	**Alarm 1 (A1) action delayed timer setting** • Sets Alarm 1 (A1) action delayed timer. • The alarm is activated when the setting time has passed after the input enters alarm output range. • Not available when No alarm action is selected during Alarm 1 (A1) type selection. • Setting range 0 to 9999 seconds	0 seconds
A2dY	**Alarm 2 (A2) action delayed timer setting** • Sets Alarm 2 (A2) action delayed timer. • The alarm is activated when the setting time has passed after the input enters alarm output range. • Not available if the option A2 is not applied or if No alarm action is selected during alarm 2 (A2) type selection. • The setting range is the same as that of Alarm 1 (A1) action delayed timer setting.	0 seconds
A3dY	**Alarm 3 (A3) action delayed timer setting** • Sets Alarm 3 (A3) action delayed timer. • The alarm is activated when the setting time has passed after the input enters alarm output range. • Not available if the option A3 is not applied of if No alarm action is selected during Alarm 3 (A3) type selection. • The setting range is the same as that of Alarm 1 (A1) action delayed timer setting.	0 seconds
TrLH	**Transmission output high limit setting** • Sets the transmission output high limit value. 　(For TA option, corresponds to the value at 20mA DC output) • This setting item is available only when the TA or TV option is applied. • Setting range: Transmission output low limit value to input range high limit value.	1370℃
TrLL	**Transmission output low limit setting** • Sets the transmission output low limit value. 　(For TA option, corresponds to the value at 4mA DC output.) • This setting item is available only when the TA or TV option is applied. • Setting range: Input range minimum value to transmission output high limit value.	-200℃

Sensor correction

This corrects the input value from the sensor. When a sensor cannot be set at the exact location where measurement is desired, the sensor measured temperature may deviate from the temperature in the measured location.

When measuring with plural FIR-201-M units, sometimes the measured temperatures (input value) do not concur due to differences in sensor accuracy or dispersion of load capacities. In such a case, the measurement can be set at the desired temperature by adjusting the input value of sensors.

Alarm action Energized/De-energized

If an alarm action Energized is selected, the alarm output (between terminals 5-6, 7-8 or 9-10) is conducted (ON) while the alarm action indicator is being lit, and it is not conducted (OFF) while the alarm action indicator is being unlit.

If an alarm action De-energized is selected, the alarm output (between terminals 5-6, 7-8 or 9-10) is not conducted (OFF) while the alarm action indicator is being lit, and it is conducted (ON) while the alarm action indicator is being unlit.

Process high alarm (Energized)
(Fig. 6.4-1)

Process high alarm (De-energized)
(Fig. 6.4-2)
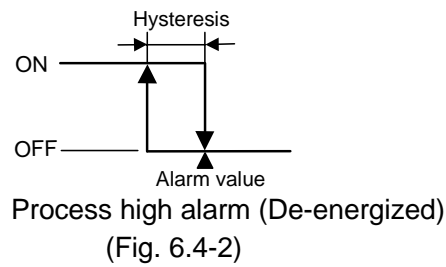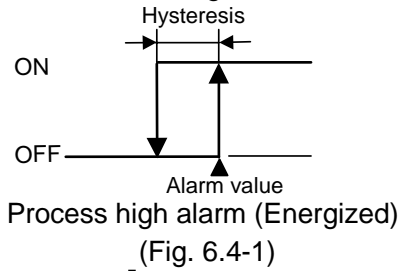
7. Operation

After the FIR-201-M has been mounted to the control panel and wiring is completed, operate the unit following the procedures below.

(1) Turn the power supply to the FIR-201-M ON.

For approximately 2 seconds after the power is turned on, the sensor type and temperature unit are indicated on the PV display and input range high limit value is indicated on the SV display. See (Table 6-1). During this time, all outputs and LED indicators are in OFF status.

After that, actual temperature is indicated on the PV display, and alarm value is indicated on the SV display.

(2) Input each set value.

Input each set value, referring to Chapter "6. Operation flowchart".

[HOLD function usage]

To use the Hold function, connect terminals 15 and 16.

Select a Hold type with the switch (SW304).

Hold   : The PV at the given time is held and indicated.

Peak hold   : The updated maximum PV is indicated.

Bottom hold: The updated minimum PV is indicated.

8. Alarm action

	Process high alarm action	Process low alarm action
Alarm action		
Output		
Indicator	Unlit Lit	Lit Unlit
	Process high alarm with standby	Process low alarm with standby
Alarm action		
Output		
Indicator	Unlit Lit	Lit Unlit

: Acts ON or OFF.

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9. Other functions

(1) Input abnormality

Indication	Contents
Flashes [‾ ‾ ‾ ‾]	Overscale: The measured value has exceeded the indication range high limit value.
Flashes [_ _ _ _]	Underscale: The measured value has dropped below the indication range low limit value.

Thermocouple and RTD input

Input	Input range	Indication range
T	−199.9 to 400.0℃	−199.9 to 405.0℃
	−199.9 to 750.0℉	−199.9 to 759.0℉
Pt100	−199.9 to 850.0℃	−199.9 to 860.0℃
	−199.9 to 999.9℉	−199.9 to 999.9℉
JPt100	−199.9 to 500.0℃	−199.9 to 506.0℃
	−199.9 to 900.0℉	−199.9 to 999.9℉

Indication range for thermocouple inputs other than the above:
Input range low limit value – input span x 1% to Input range high limit value + input span x 1%

DC input
Indication range: [Scaling low limit value–Scaling span x 1%] to [Scaling high limit value +Scaling span x 10%]
However, " ‾ ‾ ‾ ‾ " or " _ _ _ _ " flashes when a range of −1999 to 9999 is exceeded.

DC input disconnection: When DC input is disconnected, PV display flashes " _ _ _ _ " for 4 to 20mA DC input, and " ‾ ‾ ‾ ‾ " for 0 to 1V DC input. For 0 to 20mA DC, the PV display indicates the value corresponding with 0mA input.

(2) Self-diagnosis
The CPU is monitored by a watchdog timer, and if an abnormal status is found on the CPU, the indicator is switched to warm-up status with all outputs turned off.

(3) Automatic cold junction temperature compensation (only for thermocouple)
This detects the temperature at the connection terminal between the thermocouple and the instrument, and always maintains it on the same status as if the reference junction is located at 0℃ (32℉).

(4) Warm-up indication
For approximately 2 seconds after the power supply to the instrument is turned on, the input type and temperature unit are indicated on the PV display and input range high limit value (for DC input, scaling high limit value) is indicated on the SV display.

10. Specifications

10.1 Standard specifications

Mounting　　　Flush
Setting　　　Input by membrane sheet key.
Display　　　PV display: Red LED 4 digits, Character size 14.3(H) x 8(W)mm
　　　　　　　SV display: Green LED 4 digits, Character size 8(H) x 3.8(W)mm
Indicating accuracy　Within ±0.2% of each input span ±1digit, however,
　　　　　　　K, J, T input, less than 0℃ (32℉): Within ±0.4% of each input span ±1digit
　　　　　　　R, S input, 0 to 200℃ (0 to 400℉): Within ±4℃ (8℉)
　　　　　　　B input, 0 to 300℃ (0 to 600℉): Accuracy is not guaranteed.
　　　　　　　(Cold junction temperature compensating accuracy, ±1℃ at 25±25℃)
Sampling period　0.125 seconds
Input
　　Thermocouple : K, J, R, S, B, E, T, C (W/Re5-26), N, PL-Ⅱ
　　　　　　　External resistance, 100Ω or less
　　　　　　　When input is burnt out, upscale
　　RTD　　　: Pt100, JPt100 3-wire system
　　　　　　　Allowable input lead wire resistance (10Ω or less per wire)
　　　　　　　When input is burnt out, upscale
　　DC current　: 0 to 20mA DC, 4 to 20mA DC
　　　　　　　Input impedance, 50Ω
　　　　　　　When the input is disconnected: 0 to 20mA DC: The same as 0mA
　　　　　　　　　　　　　　　　　　4 to 20mA DC: Downscale
　　DC voltage　: 0 to 1V DC
　　　　　　　Input impedance, 1MΩ or more
　　　　　　　Allowable input voltage, 5V or less
　　　　　　　Allowable signal source resistance, 2kΩ or less
　　　　　　　When input is burnt out, upscale

Alarm 1 (A1) output
Setting by the process variable.
When the input value goes out of the action point, the output is turned on or off according to the alarm action type or Energized/De-energized selection.

Setting accuracy	Within ±0.2% of input span ±1digit
Action	ON/OFF action
Hysteresis	TC, RTD input: 0.1 to 100.0℃(℉)
	DC input: 1 to 1000 (The placement of the decimal point follows the selection.)
Output	Relay contact: 1a1b
Control capacity	3A 250V AC (resistive load)
	1A 250V AC (inductive load, cosø=0.4)

Supply voltage   100 to 240V AC, 50/60Hz   or 24V AC/DC, 50/60Hz
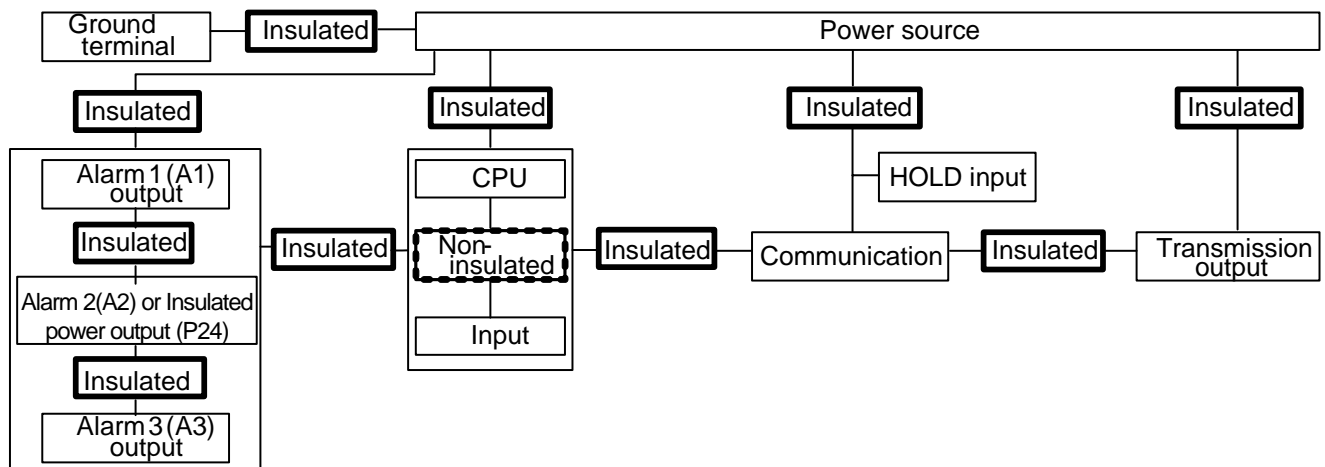**Allowable voltage fluctuation** 100 to 240V AC: 85 to 264V AC
                           24V AC/DC: 20 to 28V AC/DC
Ambient temperature   0 to 50℃ (32 to 122℉)
Ambient humidity   35 to 85%RH (Non-condensing)
Power consumption   Approx. 15VA
Circuit insulation configuration

Insulation resistance
10MΩ or more, at 500V DC
Dielectric strength
Between input terminal and ground terminal ------- 1.5kV AC for 1 minute
Between input terminal and power terminal -------- 1.5kV AC for 1 minute
Between power terminal and ground terminal ----- 1.5kV AC for 1 minute
Between output terminal and ground terminal ----- 1.5kV AC for 1 minute
Between output terminal and power terminal ------ 1.5kV AC for 1 minute
  Output terminal: Alarm (A1, A2, A3) output terminals, Insulated power output terminals, Transmission
                   output terminals, Communication terminals

Weight   Approx. 350g
External dimension   96(W) x 48(H) x 100(D)mm
Material   Panel and case: Flame-resistant resin
Color   Panel and case: Light gray
Attached functions   Set value lock, sensor correction, multi-range, multi-function, power failure
                         countermeasure, self-diagnosis, automatic cold junction temperature
                         compensation, input abnormality, warm-up indication, Hold function.
Accessories   Mounting brackets (standard, 1 set), Instruction manual (1 copy),
                         Unit label (1), Terminal cover (1 piece, when TC option is applied),
                         Screw type mounting brackets (1 set, when BL option is applied)

10.2 Optional specifications

Alarm 2 (A2) output (Option code: A2), Alarm 3 (A3) output (Option code: A3)

Setting by the process variable.

When the input value goes out of the action point, the output is turned on or off according to the alarm action type or Energized/De-energized selection.

The A2 option and P24 option cannot be applied together.

Setting accuracy	Within ±0.2% of input span ±1digit
Action	ON/OFF action
Hysteresis	TC, RTD input, 0.1 to 100.0℃ (℉)
	DC input, 1 to 1000 (The placement of the decimal point follows the selection.)
Output	Relay contact: 1a
Control capacity	3A 250V AC (resistive load)
	1A 250V AC (inductive load, cosø=0.4)

Transmission output (Option code: TA, TV)

Converting the input value to analog signal every 0.125 seconds, outputs the value in current or voltage.

Resolution	1/10000
DC current (TA)	4 to 20mA DC (Load resistance, maximum 500Ω)
DC voltage (TV)	0 to 1V DC (Load resistance, minimum 100kΩ)
Output accuracy	Within ±0.3% of input span

Serial communication (Option code: C, C5)

The following can be operated from the external computer.

(1) Reading and setting of all values
(2) Reading the input value and action status
(3) Function change

Communication line	EIA RS-485 (Option code: C5)
	EIA RS-232C (Option code: C)
Number of units connected	RS-232C: 1 unit (Parallel connection is impossible.)
	RS-485: Maximum 31 units of FIR-201-M
Communication method	Half-duplex communication start-stop synchronization
Communication speed	2400, 4800, 9600, 19200bps (Selectable by keypad operation)
Data format	Start bit : 1
	Data bit : 7
	Parity : Even parity
	Stop bit : 1

Insulated power output (Option code: P24)

This provides 24V DC of insulated power output.

This and A2 option cannot be applied together.

Output: 24±3V DC, maximum load current: 30mA DC, Ripple voltage: Within 200mV DC

Color (Option code: BK)

Front panel : Dark gray
Case : Black

Screw type mounting bracket (Option code: BL)

Panel thickness 1 to 8mm

Dust-proof/Drip-proof (Option code: IP)

Dust-proof/Drip-proof specification (IP54)

Effective only for front panel (Case section is excluded.)

To protect the indicator from water leak between control panel and indicator, take note of the following.

(1) Use a screw type mounting brackets.
(2) The panel cutout dimensions should be proper and have no burrs.
(3) The control panel surface to be mounted should be vertical.

Please use the front cover (soft type, sold separately) for comprehensive Dust-proof and Drip-proof protection.

Terminal cover (Option code: TC)

Electrical shock protection terminal cover

Designated specifications

(1) Input, input range: Shipped as designated range
(2) Alarm type: Shipped as designated alarm type
(3) Transmission output scaling: Shipped as designated scaling range

11 Troubleshooting

When any malfunction occurs, refer to the following items after checking the power supply and the wiring.

> ## ⚠ Warning
> **Turn the power supply to the instrument OFF before wiring or checking.**
> **Working or touching the terminal with the power switched ON may result in severe injury or death due to Electric Shock.**

Problem	Presumed cause and solution

[‾ ‾ ‾ ‾] is flashing on the PV display.	• Thermocouple or RTD is burnt out.
	[Thermocouple]
	  If the input terminals of the instrument is shorted and if a value around room temperature is indicated, the instrument is likely to operating normally, however, the sensor may be burnt out.
	[RTD]
	  If approx. 100Ω of resistance is connected between the input terminals A-B of the instrument and between B-B is shorted, and if a value around 0℃ (32℉) is indicated, the instrument is likely to operating normally, however, the sensor may be burnt out.
	• The lead wire of thermocouple or RTD is not securely connected to the instrument terminal.

[₋ ₋ ₋ ₋] is flashing on the PV display.	• Check if polarity of thermocouple or compensating lead wire is correct. • Check whether codes (A, B, B) of RTD agree with the instrument terminals.
The value on the PV display does not change.	• The Hold function is working.
The alarm action indicator does not light. The SV display does not indicate anything.	• No alarm action is selected during the Alarm type selection.
The indication of PV display is abnormal or unstable.	• Check whether sensor input is correct. • Check whether temperature unit ℃ or ℉ is correct. • Sensor correction value is unsuitable. • Specification of the TC or RTD is not correct. • AC leaks into the TC or RTD circuit. • There may be equipment that interferes with or makes noise near the FIR-201-M
The setting value does not change even if the [▲] or [▼] key is pressed.	Lock 1 or Lock 2 is selected during Set value lock selection.

For all other malfunctions, please contact our main office or dealers.