MITSUBISHI

Pt100 Input Module

User's Manual

(Hardware)

A68RD3N/4N
A1S62RD3N/4N

Thank you for buying the Mitsubishi general-purpose programmable logic controller MELSEC Series

Prior to use, please read both this manual and detailed manual thoroughly and familiarize yourself with the product.

MODEL	A68/A1S62RD-U-HW
MODEL CODE	13JT68
IB(NA)-0800202-C(0707)MEE	

A
MELSEC

● SAFETY PRECAUTIONS ●
(Always read before starting use)

When using this equipment, thoroughly read this manual. Also pay careful attention to safety and handle the module properly.

These precautions apply only to this equipment.

Refer to the user's manual of the CPU module to use for a description of the PLC system safety precautions.

These "Safety Precautions" classify the safety precautions into two categories: "DANGER" and "CAUTION".

⬦DANGER	Procedures which may lead to a dangerous condition and cause death or serious injury, if not carried out properly.
⚠CAUTION	Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.

Depending on circumstances, procedures indicated by ⚠**CAUTION** may also be linked to serious results.

In any case, it is important to follow the directions for usage.

Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

[DESIGN PRECAUTIONS]

⚠**CAUTION**

● Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other.
  They should be installed 100mm (3.9inch) or more from each other.
  Not doing so could result in noise that would cause erroneous operation.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use each module in an environment as specified in the "general specification" in the detailed manual.
  Using the PLC outside the range of the general specifications may result in electric shock, fire or malfunction, or may damage or degrade the module.
- Before mounting the module, insert the module fixing hook at the bottom of the module into the fixing hole in the base unit. (The AnS series modules must be screwed to the base unit to the specified torque.) Improper mounting of the module can cause a malfunction, failure or drop.
- Do not touch the conductive area or electronic parts of the module directly. Doing so can cause the module to malfunction or fail.

[WIRING PRECAUTIONS]

⚠ CAUTION

- Always ground the FG terminal and SLD terminal to the protective ground conductor.
  Not doing so can cause a malfunction.
- Carry out wiring to the PLC correctly, checking the rated voltage and terminal arrangement of the product.
  Using a power supply that does not conform to the rated voltage, or carrying out wiring incorrectly, will cause fire or failure.
- Tighten the terminal screws to the stipulated torque.
  Loose screws will cause short circuits, fire, or malfunctions.
- Make sure that no foreign matter such as chips or wiring offcuts gets inside the module. It will cause fire, failure or malfunction.

[STARTING AND MAINTENANCE PRECAUTIONS]

⚠ CAUTION

- Do not touch the terminals before switching power off externally in all phases.
  Doing so can cause a malfunction.
- Start cleaning or terminal screw retightening after switching power off externally in all phases.
  Not doing so can cause a malfunction.
- Do not disassemble or modify any module.
  This will cause failure, malfuntion, injuries, or fire.
- Mount or dismount the module after switching power off externally in all phases.
  Not doing so can cause the module to fail or malfunction.
- Do not install/remove the terminal block more than 50 times after the first use of the product. (IEC 61131-2 compliant)

[DISPOSAL PRECAUTIONS]

⚠ CAUTION

- When disposing of this product, treat it as industrial waste.

Revisions

Print Date	*Manual Number	Revision
Mar, 2002	IB(NA)-0800202-A	First printing
Sep., 2006	IB(NA)-0800202-B	Paritial correction SAFETY PRECAUTIONS
Jul., 2007	IB(NA)-0800202-C	Paritial correction Chapter 4

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CONTENTS

About the Manuals

The following manuals are also related to this product.
Order them if necessary.

| Detailed Manual |

Manual name	Manual No. (Model code)
Type A68RD3N/4N, A1S62RD3N/4N Pt100 Input Module User's Manual	SH-080193 (13JR46)

1. Overview

This manual explains the specifications and part names of:

・Pt100 Input Module Type A68RD3N (hereafter abbreviated to the A68RD3N)
・Pt100 Input Module Type A68RD4N (hereafter abbreviated to the A68RD4N)
・Pt100 Input Module Type A1S62RD3N (hereafter abbreviated to the A1S62RD3N)
・Pt100 Input Module Type A1S62RD4N (hereafter abbreviated to the A1S62RD4N)

which are used with the MELSEC-A series PLC CPU module (hereafter abbreviated to the PLC CPU).
(The A68RD3N, A68RD4N, A1S62RD3N and A1S62RD4N are generically abbreviated to the RD3N/4N.)

# 2. Specification

2.1 Performance specifications

Item	Specifications			
	A68RD3N	A68RD4N	A1S62RD3N	A1S62RD4N
Measuring method	3-wire system	4-wire system	3-wire system	4-wire system
Output (temperature equivalent)	16-bit, signed binary data (-1800 to 6000: Value to first decimal place × 10 times) 32-bit, signed binary data (-180000 to 600000: Value to third decimal places × 1000 times)			
Usable platinum temperature measuring resistors	Pt100 (JIS C1604-1997, IEC 751-am2, JIS C1604-1989, DIN 43760-1980) JPt100 (JIS C1604-1981)			
Measured temperature ranges — Pt100	-180 to 600°C (27.10 to 313.71Ω)			
Measured temperature ranges — JPt100	-180 to 600°C (25.80 to 317.28Ω)			
Accuracy	±1% (accuracy relative to full-scale)			
Resolution	0.025°C			
Conversion speed	40ms / 1channel			
Number of analog input points	8 channels/1 module		2 channels/1 module	
Temperature detecting output current	1mA			
Insulation system	Across platinum temperature measuring resistor input - PLC power supply: Photocoupler-insulated Across platinum temperature measuring resistor input - channel: Non-insulated			
Insulation resistance	Across platinum temperature measuring resistor input - PLC power supply: 500VAC for 1 minute			
Broken wire detection	Detected channel by channel	Batch-detected on all channels	Detected channel by channel	Batch-detected on all channels
Number of occupied I/O points	32 points			
Connection terminals	38-point terminal block		20-point terminal block	
Applicable wire size	0.75 to 2mm^2		0.75 to 1.5mm^2	
Applicable crimping terminals	V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A			
Cable across RD3N/4N - platinum temperature measuring resistor	Refer to Section 2.2.			
Internal current consumption (5VDC)	0.94A	0.41A	0.49A	0.39A
Weight	0.43kg	0.43kg	0.27kg	0.27kg
Outline dimensions	250(H)37.5(W)131(D)mm		130(H)34.5(W)107.4(D)mm	

2.2 Specifications when platinum resistance bulb is connected

(1) For A68RD3N and A1S62RD3N
   Make sure that the conductor resistance value between the Pt100 and
   A68RD3N/A1S62RD3N is 10 [Ω] or less per wire.
   All channels have the same specifications.
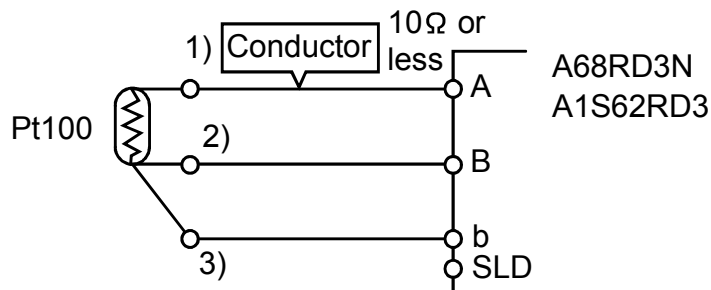
Wire so that the following is satisfied:
1) Conductor resistance value $\leqq 10$ (Ω)
2) Conductor resistance value $\leqq 10$ (Ω)
3) Conductor resistance value $\leqq 10$ (Ω)

(2) For A68RD4N and A1S62RD4N
   Make sure that the total resistance value of the conductors over which the
   current passes is 70 [Ω] or less.

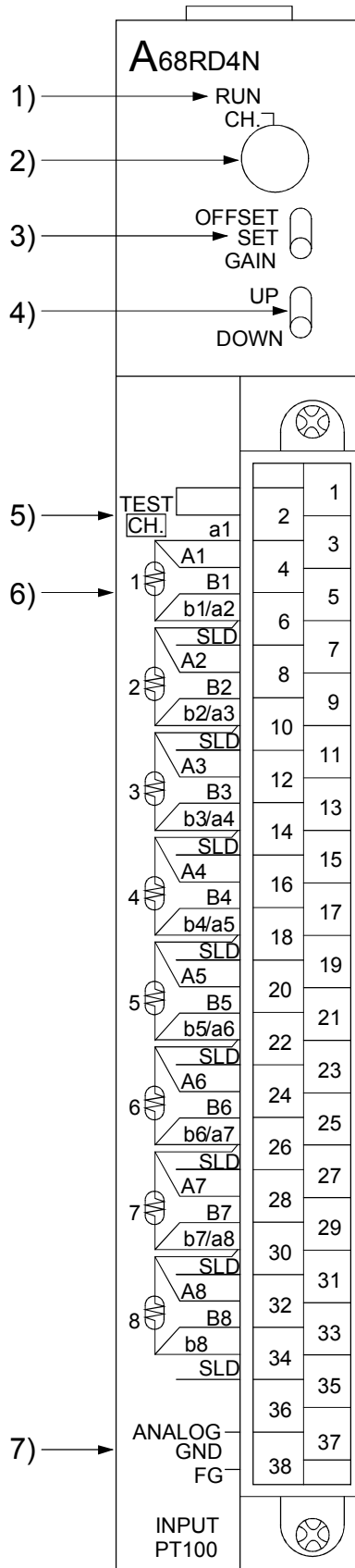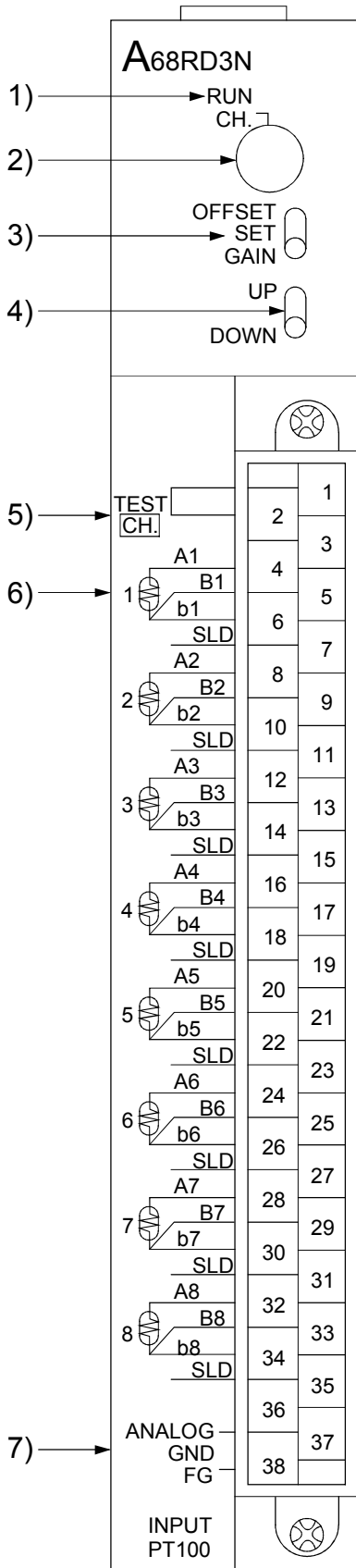   [Example] To connect Pt100 to both CH.1 and CH.2 (A1S62RD4N)
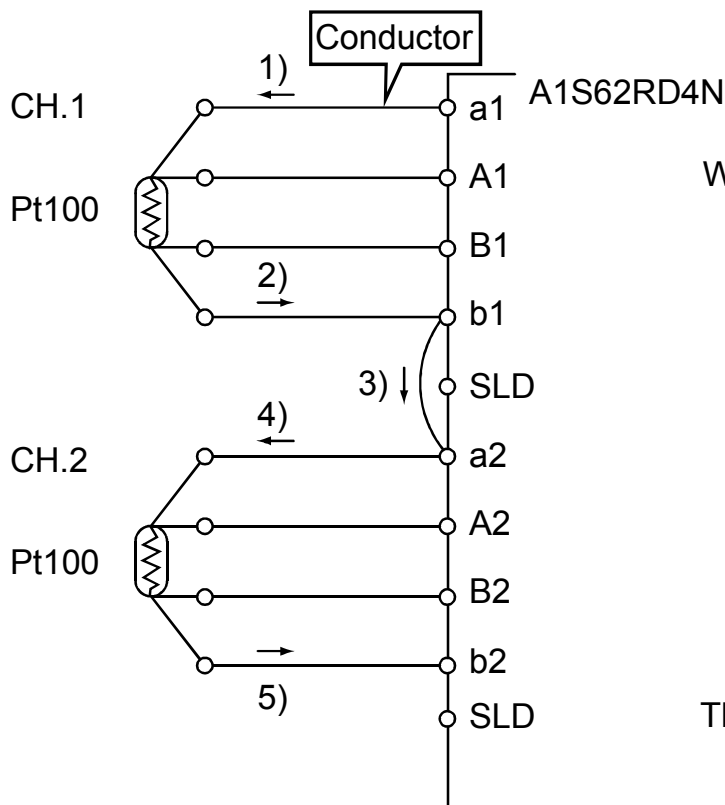
Wire so that 1) + 2) + 3) + 4) + 5) $\leqq 70$ (Ω)

The arrow ← indicates the current flow.

2

3. Names and Setting of Parts

3.1 Names of Parts

Terminal Block Layout		
Signal name	Terminal number	
	A68RD 3N	A68RD 4N
1	TEST	
2	TEST	
3	Blank	a1
4	A1	
5	B1	
6	b1	b1/a2
7	SLD	
8	A2	
9	B2	
10	b2	b2/a3
11	SLD	
12	A3	
13	B3	
14	b3	b3/a4
15	SLD	
16	A4	
17	B4	
18	b4	b4/a5
19	SLD	
20	A5	
21	B5	
22	b5	b5/a6
23	SLD	
24	A6	
25	B6	
26	b6	b6/a7
27	SLD	
28	A7	
29	B7	
30	b7	b7/a8
31	SLD	
32	A8	
33	B8	
34	b8	
35	SLD	
36	Blank	
37	ANALOG GND	
38	FG	

3
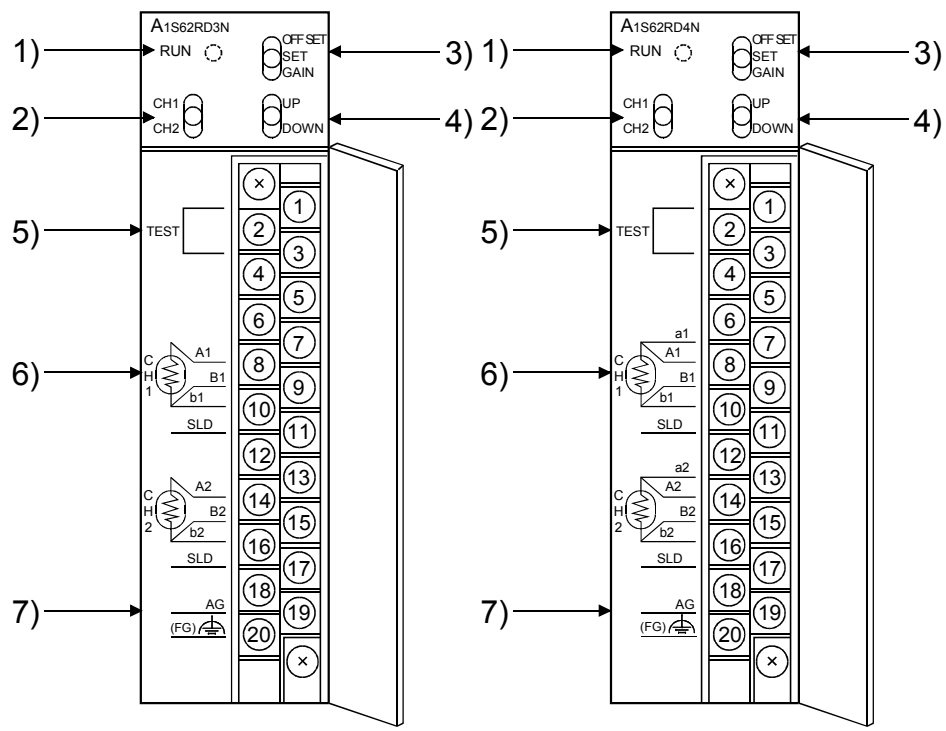
	Terminal Block Layout	
Signal name	Terminal number	
	A1S62 RD3N	A1S62 RD4N
1	TEST	
2	Blank	
3	TEST	
4	Blank	
5	Blank	
6	Blank	
7	Blank	a1
8	A1	
9	B1	
10	b1	
11	SLD	
12	Blank	
13	Blank	a2
14	A2	
15	B2	
16	b2	
17	SLD	
18	Blank	
19	AG	
20	FG	

No.	Name	Details		
1)	Operation status display LED (RUN LED)	Normal mode	ON : In normal operation Flicker : Write data error occurring OFF : 5VDC power OFF or watch dog timer error occurring	
		Test mode	Flicker : When the OFFSET/GAIN setting switch is set to OFFSET or GAIN, the LED will flicker at 0.5 second intervals. OFF : OFFSET/GAIN setting switch set to SET.	
2)	Channel selection switch	Selects the channel for adjusting the offset and gain for error compensation. (When A68RD3N/4N is used, the 0, 9 position setting is not managed.) Factory-Set A68RD3N/4N : 0 A1S62RD3N/4N : CH1		
3)	OFFSET/GAIN setting switch	Sets the offset value and gain value for the test mode. Factory-Set : SET 1) OFFSET position : Offset value compensation mode 2) GAIN position : Gain value compensation mode 3) SET position : Offset value/gain value save mode The temperature detection value at the time the switch is changed from the OFFSET/ GAIN position to the SET position is saved in the RD3N/4N internal memory as the offset/gain value.		
4)	UP/DOWN switch	Increments/decrements the offset value/gain value for the channel being used at the following rate. 1) ON for less than 1.5 seconds: Increments/decrements in 0.025°C units. 2) ON for 1.5 seconds or more: Increments/decrements in 0.1°C unit every 0.04 seconds.		
5)	Test mode terminal	Short the terminals when making error compensation.		
6)	Pt100 connection terminal	Connect the Pt100.		
7)	Analog/ground terminal	Use to provide a separate ground.		

3.2 Error compensation procedures

```
┌──────────────────────────────────┐
│              Start               │
└──────────────────────────────────┘
                 │
                 ▼
┌──────────────────────────────────┐
│ Short-circuit the TEST terminals │
│  (A68RD3N/4N:Terminals1-2,       │
│ A1S62RD3N/4N:Terminals1-3),      │
│ and enter the test mode.         │
└──────────────────────────────────┘

A)──────────────►│
                 ▼
┌──────────────────────────────────┐
│ Using the channel selection switch,│
│ set the channel to be compensated.│
└──────────────────────────────────┘
                 │
                 ▼
┌──────────────────────────────────┐
│ Input the value for the offset value.│
│                                  │
│   -50[℃]              RD3N/4N    │
│   Pt100 or                       │
│   standard resistor, etc.        │
└──────────────────────────────────┘
                 │
                 ▼
┌──────────────────────────────────┐
│ Set the OFFSET/GAIN setting switch│
│ to OFFSET.                       │
│                                  │
│  OFF SET   ( RUN LED flickers   │
│    SET     ( at 0.5s intervals. │
│  GAIN                            │
└──────────────────────────────────┘
                 │
                 └──────────┐
                            │ (to top right)
```

Adjust to the offset value with the UP/DOWN switch.

UP
DOWN

Buffer memory

-497 ⇨ -500

Set the OFFSET/GAIN setting switch to SET.

OFF SET
   SET   (The offset value
GAIN   (will be saved.

1)

1)

```
┌─────────────────────────────────────┐        ┌─────────────────────────────────────┐
│ Input the value for the gain value. │        │ Set the OFFSET/GAIN setting switch  │
│                                     │        │ to SET.                             │
│   ⟨ 80[℃] ⟩      ┌RD3N/4N┐          │        │                                     │
│                                     │        │   OFF SET    ⟨ The gain value      ⟩│
│   Pt100 or                          │        │   SET          will be saved.       │
│   standard resistor, etc.           │        │   GAIN                              │
└─────────────────────────────────────┘        └─────────────────────────────────────┘
                  │                                              │
                  ▼                                              ▼
┌─────────────────────────────────────┐                    ◇ Is compensation ◇
│ Set the OFFSET/GAIN setting switch  │          No        ◇ of the channel being used ◇
│ to GAIN.                            │       A) ◄─────────◇ completed?        ◇
│                                     │                         │
│   OFF SET    ⟨ RUN LED flickers   ⟩ │                        YES
│   SET          at 0.5s intervals.   │                         │
│   GAIN                              │                         ▼
└─────────────────────────────────────┘        ┌─────────────────────────────────────┐
                  │                             │ Release the TEST terminals.         │
                  ▼                             └─────────────────────────────────────┘
┌─────────────────────────────────────┐                         │
│ Adjust to the gain value with the   │                         ▼
│ UP/DOWN switch.                     │        ┌─────────────────────────────────────┐
│                                     │        │              End                    │
│      UP                             │        └─────────────────────────────────────┘
│      DOWN                           │
│                                     │
│      Buffer memory                  │
│      797  ⇨  800                    │
└─────────────────────────────────────┘
```

┌──┐
│ │ Point │   │
│ 1) Once the offset/gain is set with the test mode, the offset value cannot be │
│   checked by setting the OFFSET/GAIN setting switch to OFFSET again. (The │
│   setting value is held.)   │
│ 2) If the device is used in the normal mode after the offset/gain is set with the test │
│   mode, the previously set offset value and gain value cannot be confirmed by │
│   entering the test mode. (The setting value is held.)   │
└──┘

4. Handling

(1) The main case and terminal block are made of resin, so do not drop it or apply strong impacts.

(2) Do not remove the module's PCB from the case. Failure to observe this could lead to faults.

(3) Make sure that foreign matter, such as wire scraps, do not enter the module during wiring. Remove any foreign matter that enters.

(4) Tighten the module installation screws and terminal screws within the following ranges.

Screw position	Tightening torque range	
	A68RD3N/4N is used	A1S62RD3N/4N is used
Module installation screw	78 to 118N•cm (M4 screw)	78 to 118N•cm (M4 screw)
Terminal block installation screw	39 to 59N•cm (M3 screw)	59 to 88N•cm (M3.5 screw)
Terminal block terminal screw	78 to 118N•cm (M4 screw)	78 to 118N•cm (M4 screw)

5. Wiring

5.1 Precautions for connecting

Precautions for connecting the Pt100 to the RD3N/4N, and the connection methods are described below.

(1) Use separate cables for the AC and RD3N/4N external input signal, and make sure that the cable is not affected by the AC side surge or inductance.

(2) Do not lay the cables near or with the main circuit wires, high-voltage wires or load wires other than those from the PLC. Failure to observe this will increase the effect of noise, surge and inductance.

(3) Ground the shield wire or shield clamp shield to one point on the PLC side. Note that in some cases, grounding these at an external source may be preferable depending on the state of the external noise.

5.2 Connection to A68RD3N, A1S62RD3N

(1) The highest precision can be achieved by connecting a 3-wire type Pt100 to the A68RD3N and A1S62RD3N.
An example of connecting a 3-wire Pt100 is shown below.

Ex. the A68RD3N
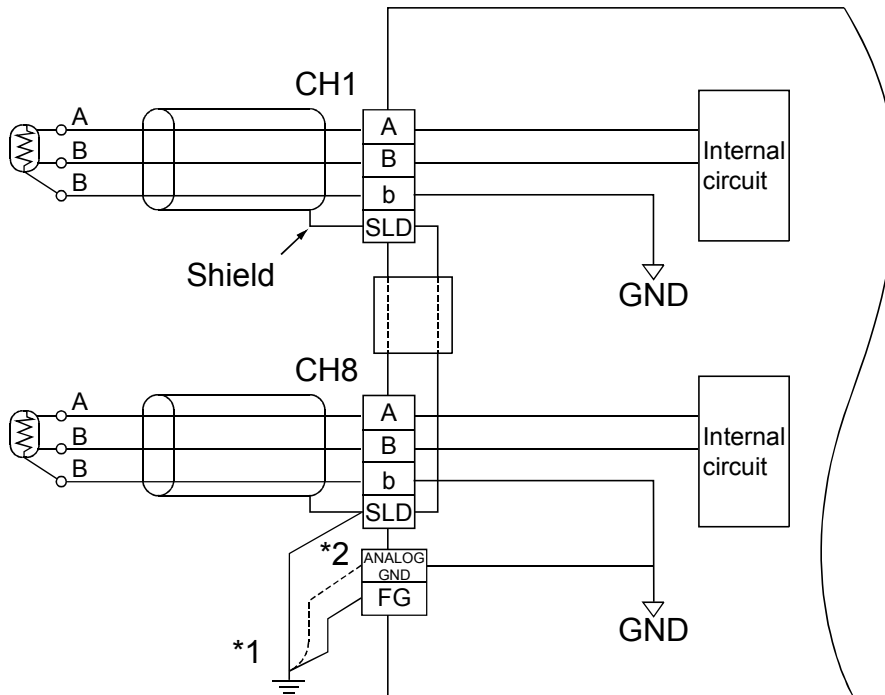
*1 Also ground the power supply unit's FG.
*2 It may be preferable to connect this depending on the working environment.
   When the A1S62RD3N is used, the terminal name is AG.

(2) A 4-wire type or 2-wire type Pt100 can also be used with the A68RD3N and A1S62RD3N.
Connect as shown below when connecting a 4-wire type or 2-wire type Pt100.

4-wire type
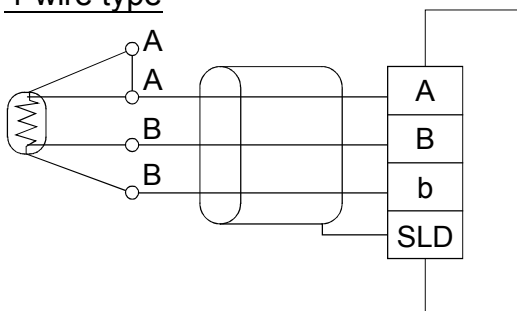
2-wire type
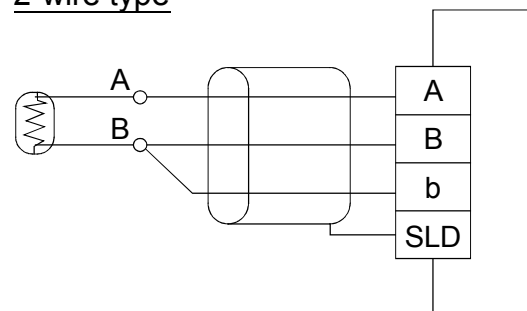
5.3 Connection to A68RD4N, A1S62RD4N and precautions

(1) The highest precision can be achieved by connecting a 4-wire type Pt100 to the A68RD4N and A1S62RD4N.
An example of connecting a 4-wire Pt100 is shown below.

Ex. the A68RD4N
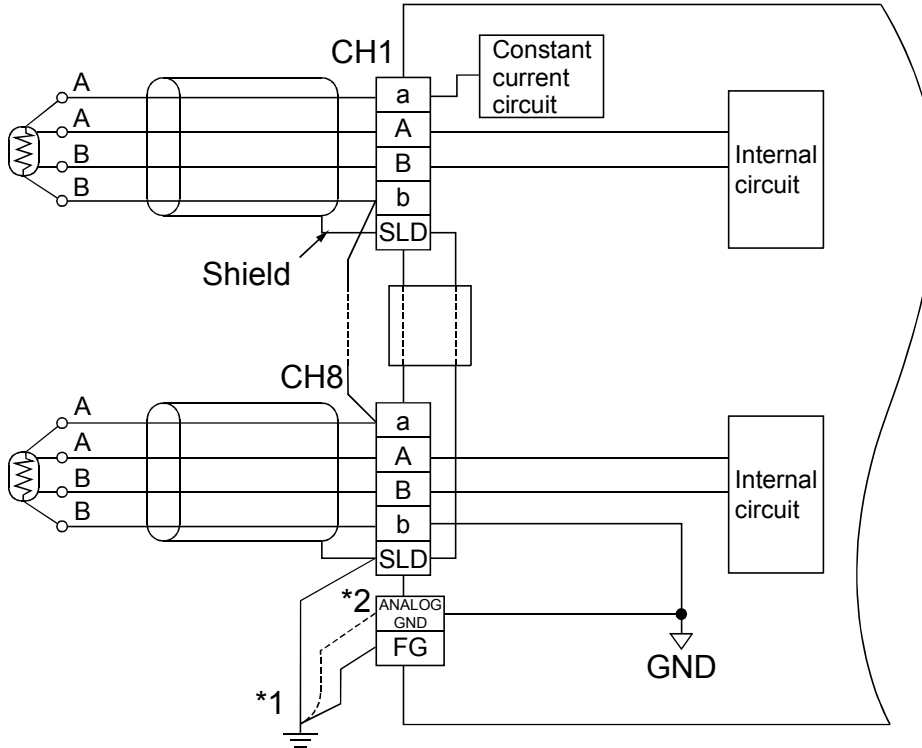
*1 Also ground the power supply unit's FG.
*2 It may be preferable to connect this depending on the working environment.
   When the A1S62RD4N is used, the terminal name is AG.

(2) A 3-wire type or 2-wire type Pt100 can also be used with the A68RD4N and A1S62RD4N. Connect as shown below when connecting a 3-wire type or 2-wire type Pt100.

9
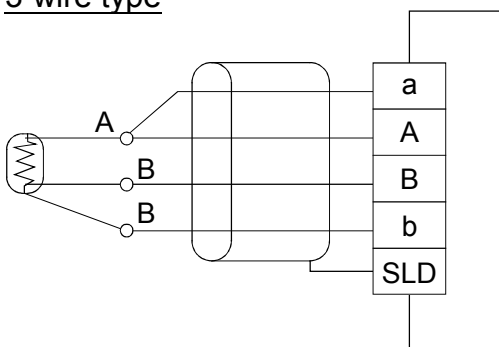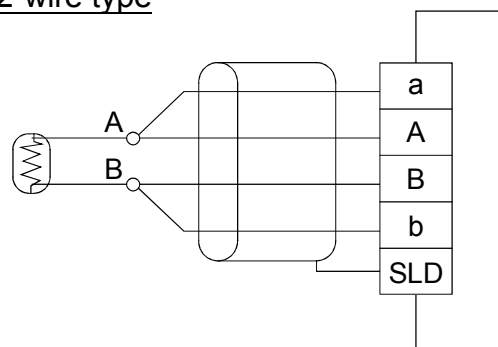
(3) Precautions for connection to A68RD4N and A1S62RD4N
The following are the precautions for connection of Pt100 to the A68RD4N and A1S62RD4N.

(a) Perform wiring so that there is continuity between the following terminals.

When all channels are used on A68RD4N

CH.1　　CH.2　　CH.3　　CH.4　　CH.5　　CH.6　　CH.7　　CH.8

a1 A1　B1 b1/a2 A2　B2 b2/a3 A3　B3 b3/a4 A4　B4 b4/a5 A5　B5 b5/a6 A6　B6 b6/a7 A7　B7 b7/a8 A8　B8 b8
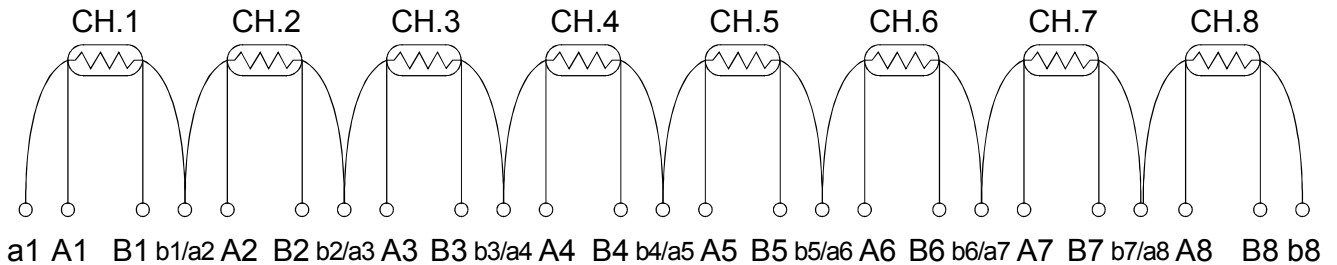
When all channels are used on A1S62RD4N

CH.1　　　　　　CH.2

a1 A1　B1　b1　　　a2 A2　B2　b2
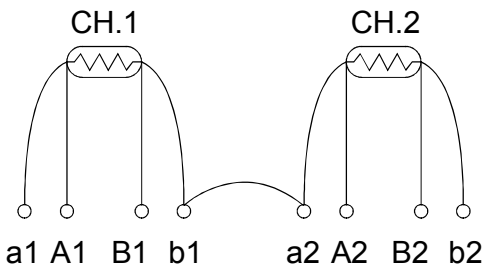
(b) Skip the terminals of the unused channels.

When only CH1, 2, 3 and 6 are used on A68RD4N

CH.1　　CH.2　　CH.3　　CH.4　　CH.5　　CH.6　　CH.7　　CH.8

a1 A1　B1 b1/a2 A2　B2 b2/a3 A3　B3 b3/a4 A4　B4 b4/a5 A5　B5 b5/a6 A6　B6 b6/a7 A7　B7 b7/a8 A8　B8 b8
 *Always wire terminals a1 and b8.
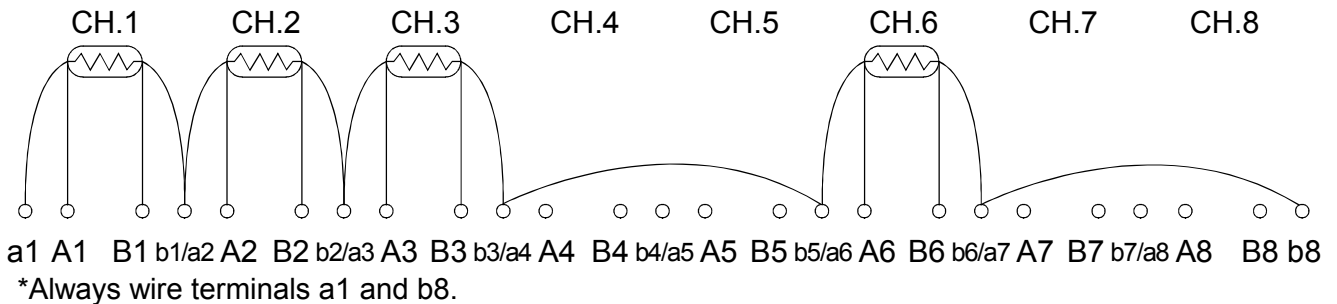
When only CH1 is used on A1S62RD4N

CH.1　　　　　　CH.2

a1 A1　B1　b1　　　a2 A2　B2　b2
 *Always wire terminals a1 and b2.
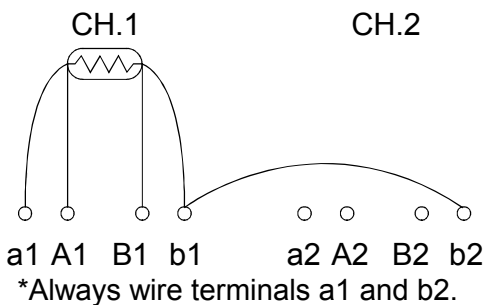
┌───┐
│ Point   │
│ Always specify "conversion disable" for the channels not connected with Pt100. │
│ When the channels not connected with Pt100 are specified as "conversion enable", the wire break │
│ detection flag turns ON if a wire break does not occur on the channel connected with PT100. │
└───┘

6. External Dimension Diagram

6.1 A68RD3N

Unit:mm(inch)

6.2 A68RD4N

4.2 (0.17)

N3×0.5×6
Installation screw

2 (0.08)

A68RD4N

RUN
CH.

OFFSET
SET
GAIN

UP

DOWN

8.6 (0.34)

250 (9.85)

7.2 (0.28)

TEST
CH.

1	a1
1	A1
	B1
	b1/a2
	SLD
2	A2
	B2
	b2/a3
	SLD
3	A3
	B3
	b3/a4
	SLD
4	A4
	B4
	b4/a5
	SLD
5	A5
	B5
	b5/a6
	SLD
6	A6
	B6
	b6/a7
	SLD
7	A7
	B7
	b7/a8
	SLD
8	A8
	B8
	b8
	SLD

ANALOG
GND
FG

INPUT
PT100

6(0.24)

10(0.39)

4.2
(0.17)

106 (4.18)

131 (5.16)

25
(0.99)

18
(0.71)

37.5 (1.48)

Unit:mm(inch)

12

6.3 A1S62RD3N

6.5 (0.26)	
93.6 (3.69)	
7.3 (0.29)	
34.5 (1.36)	
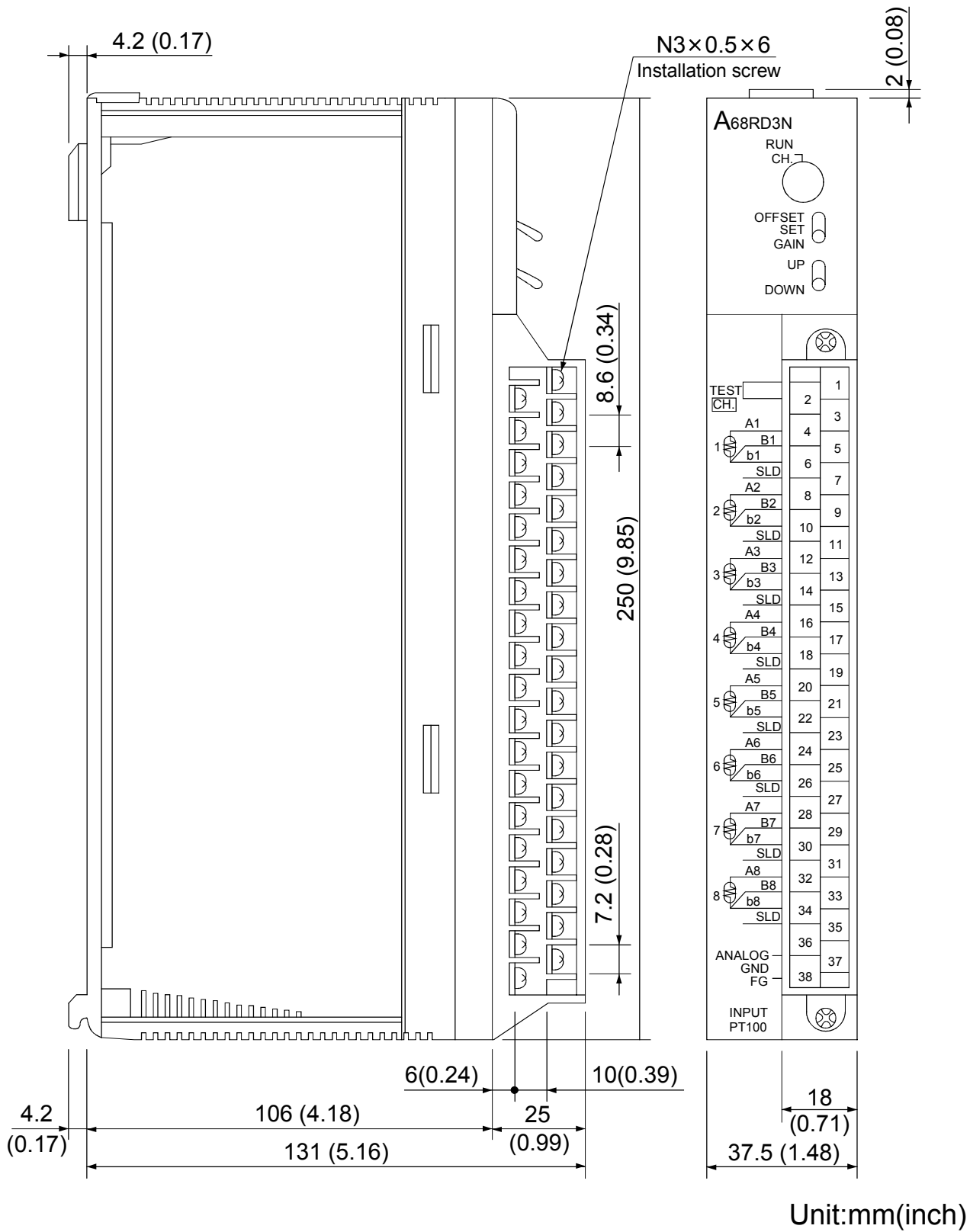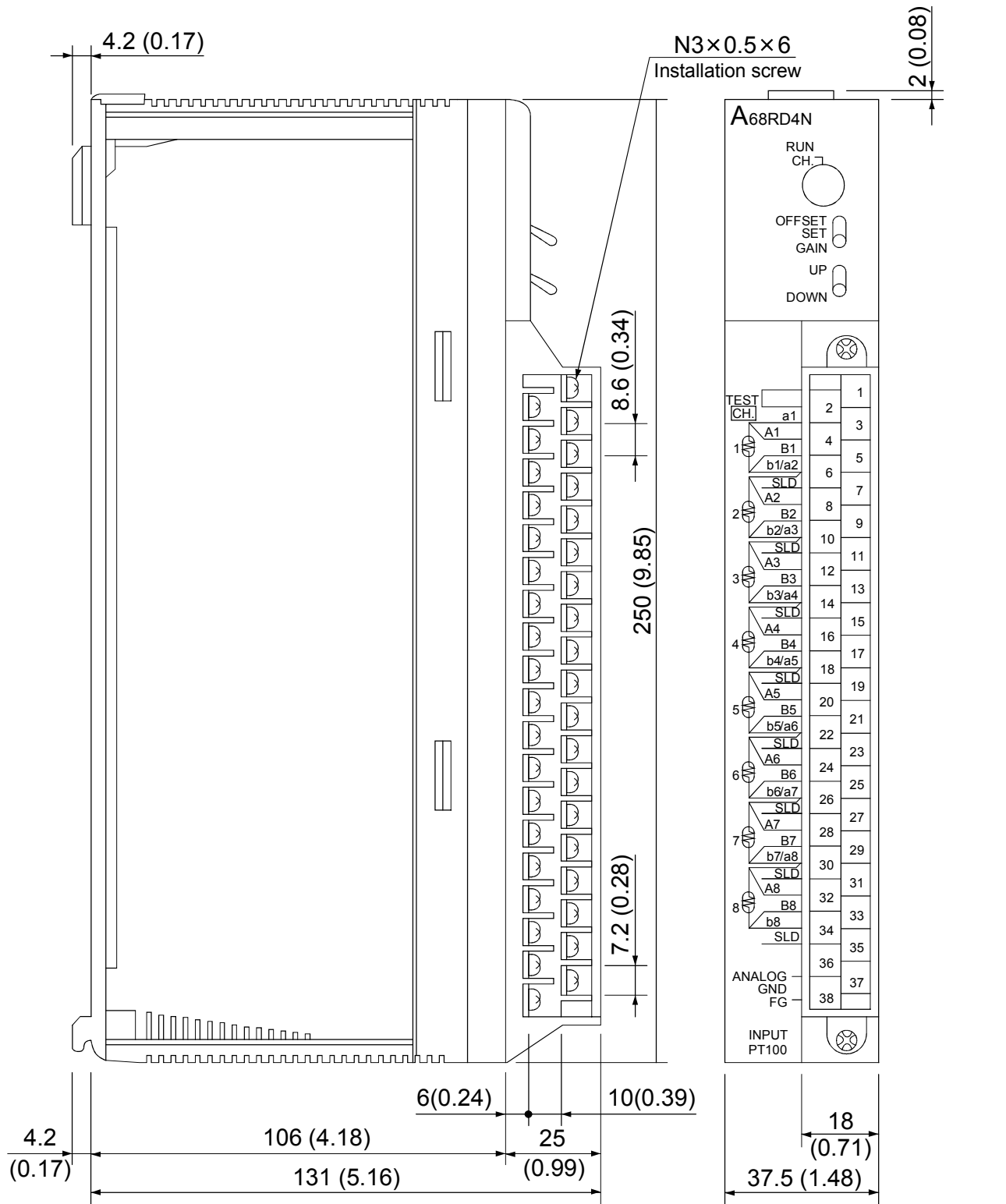
Unit:mm(inch)

6.4 A1S62RD4N

Unit:mm(inch)
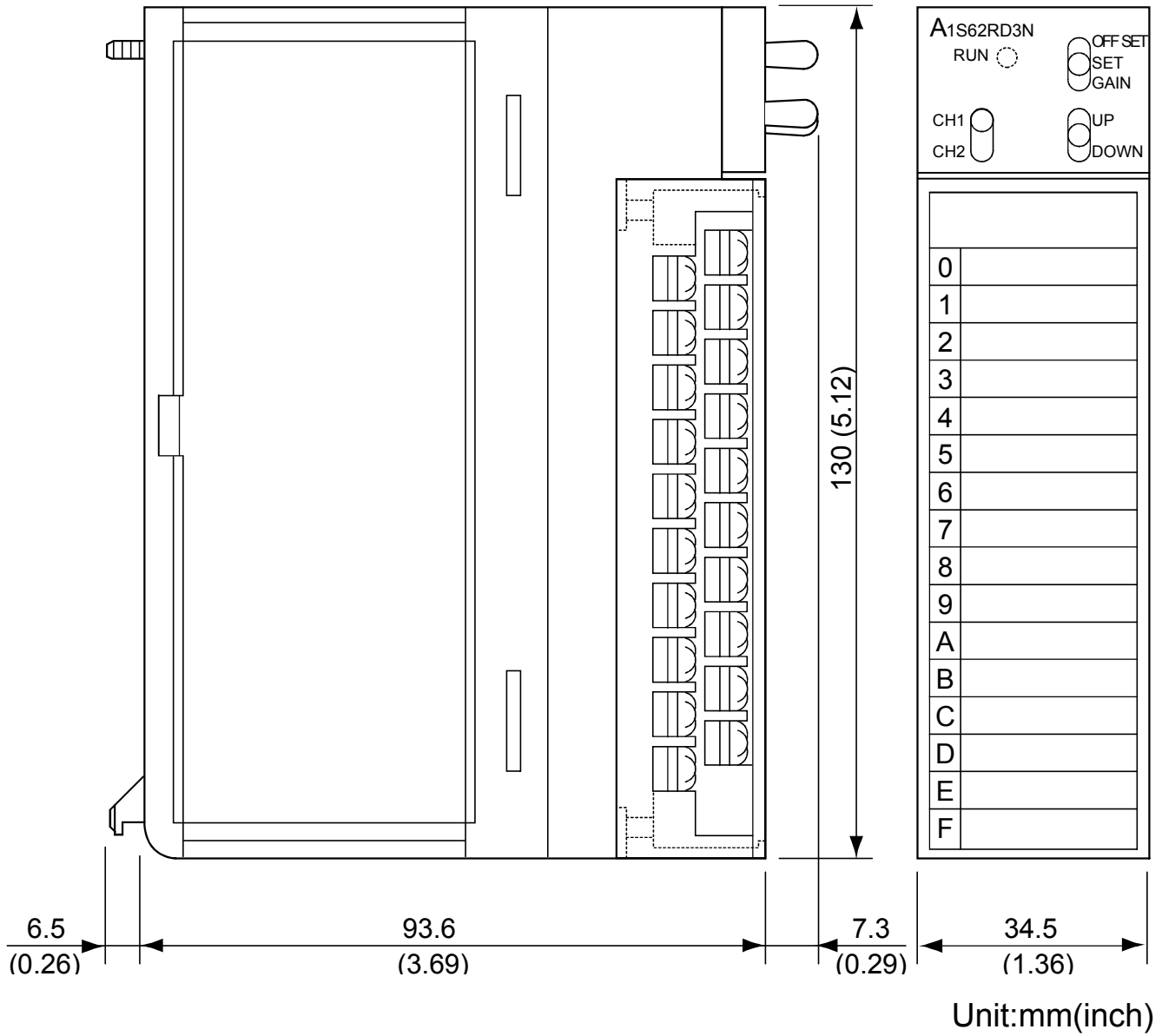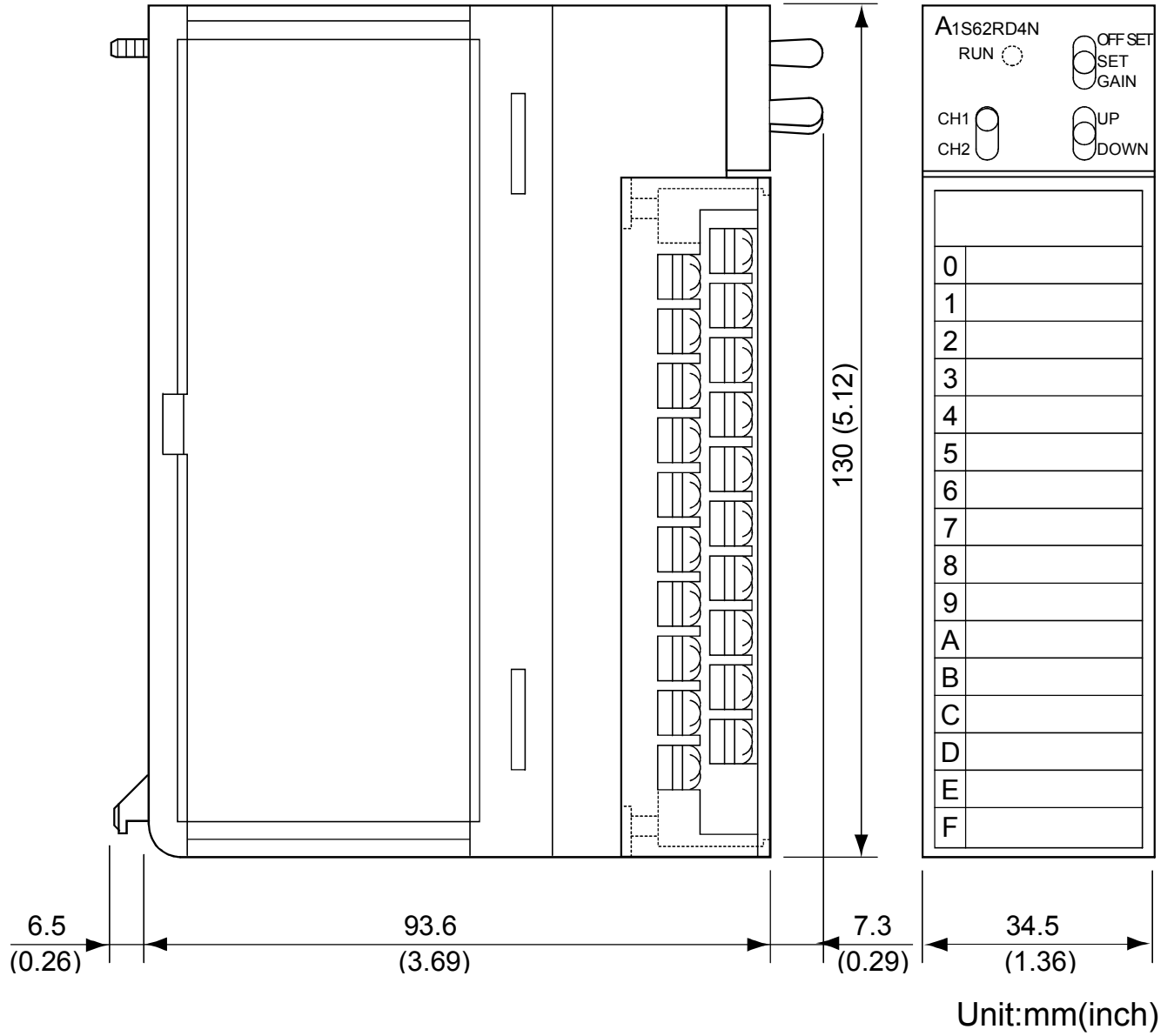
Warranty

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

⚠ For safe use

• This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.

• Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.

• This product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

When exported from Japan, this manual does not require application to the Ministry of Economy, Trade and Industry for service transaction permission.