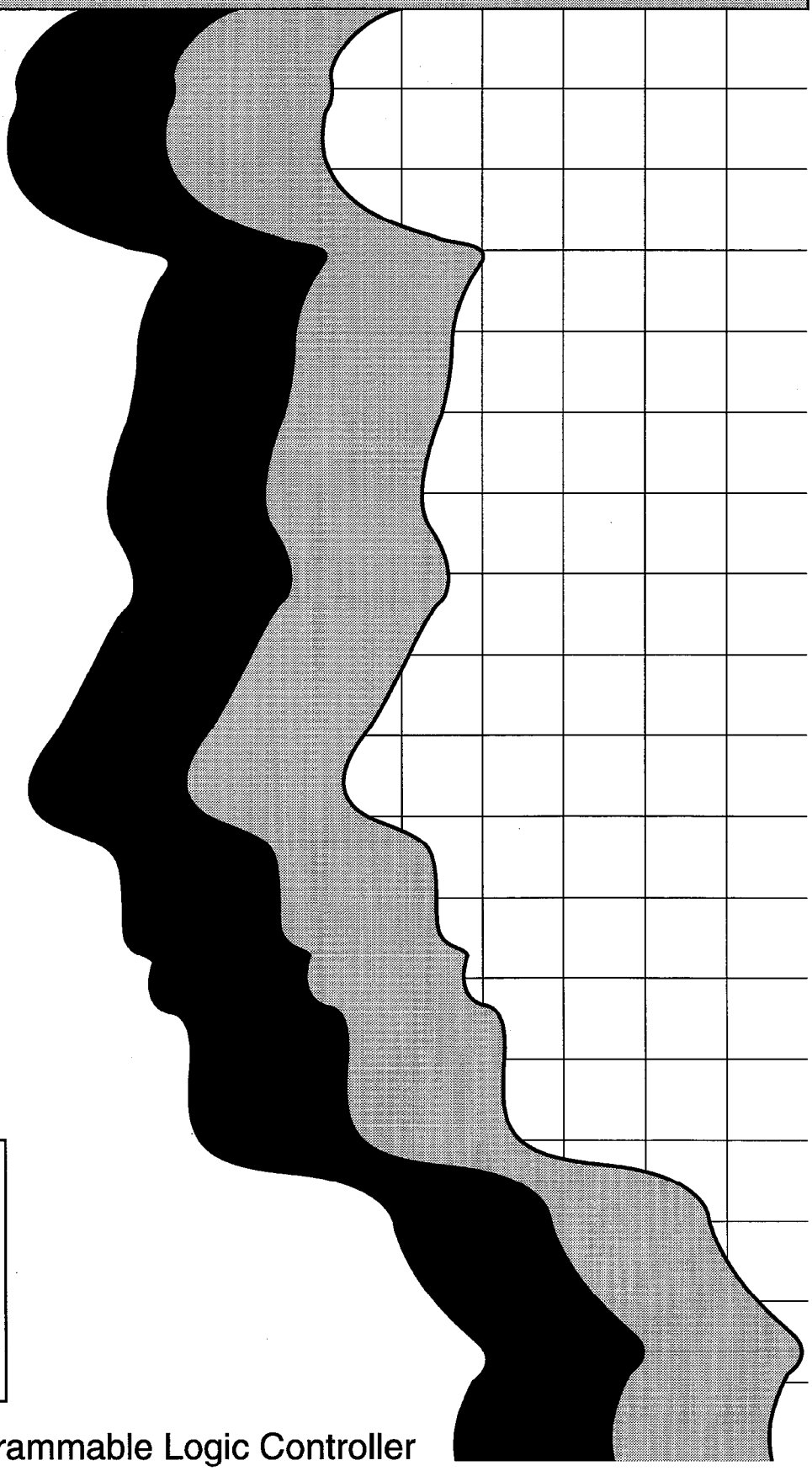
MITSUBISHI

Pt100 input module type A1S62RD3/4

User's Manual



MELSEC

Mitsubishi Programmable Logic Controller

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

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

These precautions apply only to Mitsubishi equipment. Refer to the CPU module user's manual for a descriprion of the PC system safty precautions.

These ●**SAFETY PRECAUTIONS**● classifiy the safty 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 circumestances, procedures indicated by **CAUTION** may also be linked to serious results.

In many 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.

[System Design Precautions]

⚠ CAUTION

- Do not bundle control lines or communication wires together with main circuit or power lines, or lay them close to these lines.
  As a guide, separate the lines by a distance of at least 100 mm, otherwise malfunctions may occur due to noise.

[Cautions on Mounting]

⚠ CAUTION

- Use the PC in an environment that conforms to the general specifications in the manual.
  Using the PC in environments outside the ranges stated in the general specifications will cause electric shock, fire, malfunction, or damage to/deterioration of the product.
- Install so that the pegs on the bottom of the unit fit securely into the base unit peg holes.
  Not installing the unit correctly could result in erroneous operation, damage, or pieces of the product falling.

[Cautions on Wiring]

⚠ CAUTION

- Be sure to ground the FG and LG terminals, carrying out at least class 3 grounding work with a ground exclusive to the PC.
  Otherwise there will be a danger of electric shock and malfunctions.
- Carry out wiring to the PC 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.

[Cautions on Startup and Maintenance]

DANGER

- Do not touch terminals while the power is ON.
  This will cause malfunctions.
- Switch the power off externally for all phases before cleaning or re-tightening terminal screws, otherwise you may sustain electric shock.

CAUTION

- Do not disassemble or modify any module.
  This will cause failure, malfuntion, injuries, or fire.
- Turn the power off when removing a unit. Trying to remove the unit while the power is on could damage the unit or result in erroneous operation.

[Cautions on Disposal]

CAUTION

- Dispose of this product as industrial waste.

REVISIONS

*The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number	Revision
Sep., 1991	IB (NA) 66338-A	First edition
May, 1997	IB (NA) 66338-B	Correction Sections 3.1, 3.2, 4.2, 4.5.1, 4.5.2, 4.5.3, APPENDIX 3, APPENDIX 4 Addition Chapter 2, Section 3.3.3, 3.3.5, 4.4.2
Feb., 2000	IB (NA) 66338-C	Partial correction Sections 3.2 Addition WARRANTY

Japanese Manual Version SH-3529-B

INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-A Series of General Purpose Programmable Controllers. Please read this manual carefully so that the equipment is used to its optimum. A copy of this manual should be forwarded to the end User.

Contents

1. INTRODUCTION

This manual explains the specifications and methods for manipulating and programming the A1S62RD3 platinum temperature-measuring resistor Pt100 temperature input module (hereafter called the A1S62RD3) and the A1S62RD4 platinum temperature-measuring resistor Pt100 temperature input module (hereafter called the A1S62RD4), which are used with an A1SCPU of the MELSEC-A series.

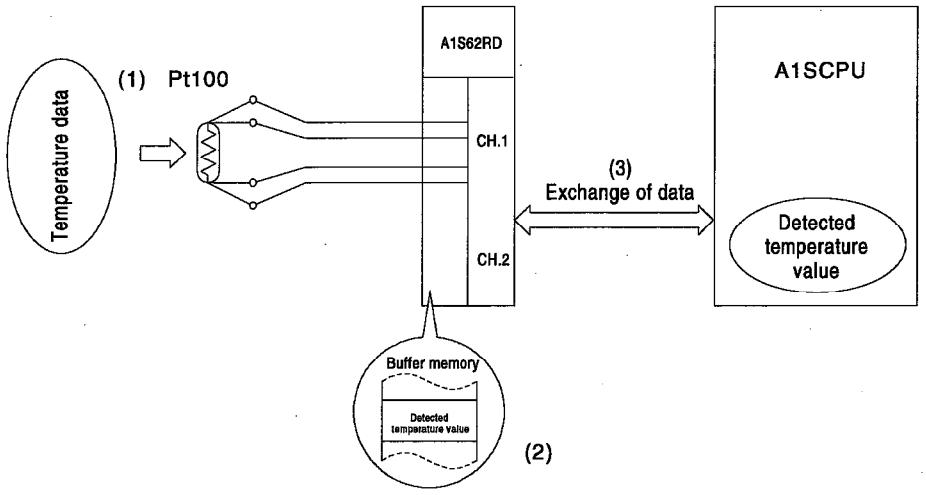
A1S62RD3 is a platinum temperature-measuring resistor for 3-wire-type connections.

A1S62RD4 is a platinum temperature-measuring resistor for 4-wire-type connections.

(Hereafter A1S62RD3 and A1S62RD4 are abbreviated as A1S62RD.)

The A1S62RD converts temperature data from a platinum temperature-measuring resistor JPt100 or Pt100 (hereafter called the Pt100) to either 16 or 32 bits of signed binary data. The sixteen (16) bits of signed binary data are expressed to the first decimal place. The thirty-two (32) bits of signed binary data are expressed to the third decimal place.

Temperature-Measuring Process



(1) A change in the ambient temperature of the Pt100 changes the resistance value.
(2) Temperature data is stored as a detected temperature value and is stored in the buffer memory of the A1S62RD.
(3) A detected temperature value stored in the buffer memory of the A1S62RD is read from A1SCPU.

1.1 Features

(1) The A1S62RD can read temperature data by connecting either an old JIS, a new JIS, or a DIN platinum temperature-measuring resistor directly to the A1S62RD.

(2) The value to the first or third decimal place of the input temperature data can be stored.

Example:

Temperature data: 150.125 [°C] <
- 150.1 [°C] ..... Value to the first decimal place is stored.
- 150.125 [°C] ..... Value to the third decimal place is stored.

(3) One module can be connected to two (2) Pt100s.

(4) Three conversion processing methods (sample processing, time-average processing, and number of times of average processing) can be selected.

(5) Pt100 or cable disconnections can be detected.

- A1S62RD3 : Detection by each channel.
- A1S62RD4 : Joint detection by all channels.

(6) Each channel can set the conversion enable/disable.

REMARK

1* : The old JIS, the new JIS, and the DIN platinum temperature-measuring resistors are as follows:

- Old JIS : JIS C1604-1981
- New JIS : JIS C1604-1989
- DIN : DIN 43760-1980

2. SYSTEM CONFIGURATIONS

(1) Applicable CPU
- A1SJCPU(S3)
- A1SCPU
- A2SCPU
- A2ASCPU(S1)
- A52GCPU(T21B)

(2) Number of Installation Modules
There are no restrictions on the number of modules to be installed as long as the occupied number of I/O points is within the range of number of I/O points of the applicable CPU.

(3) Installation Slots
A module can be installed in any slot in a base unit with an exception of the following cases.
If a module is installed in an extension base (A1S52B, A1S55B, A1S58B) which does not have a power supply module, sufficient power may not be supplied.
When installing an A1S62RD in an extension base which is not equipped with a power supply module, select a power supply module, a base unit, an extension base unit and an extension cable by taking the following into consideration.
1) Current capacity of the power supply module in the base unit
2) Voltage drop at the base unit
3) Voltage drop at the extension unit
4) Voltage drop at the extension cable

(4) Data Link System
In the data link system, the module can be installed at any of the master station, local station, and remote I/O station. For an example of program at the remote I/O station, refer to MELSECNET, MELSECNET/B data link system Reference manual.

REMARK

For the calculation of the range of I/O points and voltage drop, refer to the following manuals.

- A1SJCPU User's manual ..... IB(NA)66446
- A1S/A1SC24-R2/A2SCPU(S1) User's manual ..... IB(NA)66320
- A2ASCPU(S1) User's manual ..... IB(NA)66536
- A52GCPU(T21B) Reference manual ..... IB(NA)66420
- Q2AS(H)CPU(S1) User's manual ..... SH(NA)3599

3. SPECIFICATIONS

This chapter describes the general specifications, performance specifications, and I/O conversion characteristics of the A1S62RD.

3.1 General Specifications

Table 3.1 shows the general specifications of the A1S62RD.

Table 3.1 General Specifications

Item	Specifications				
Operating ambient temperature	0 to 55°C				
Storage ambient temperature	–20 to 75°C				
Operating ambient humidity	10 to 90%RH, non-condensing				
Storage ambient humidity	10 to 90%RH, non-condensing				
Vibration resistance	Conforms to **JIS C 0911	**Frequency**	**Acceleration**	**Amplitude**	**Sweep Count**
		10 to 55 Hz	–	0.075 mm (0.003 inch)	10 times
		55 to 150 Hz	9.8 m/s^2 (1 g)	–	*(1 octave/minute)
Shock resistance	Conforms to **JIS C 0912 (10 g x 3 times in directions)				
Noise Durability	By noise simulator of 1500 Vpp noise voltage, 1 μs noise width and 25 to 60 Hz noise frequency.				
Dielectric withstand voltage	500 VAC for 1 minute across DC external terminals and ground				
Insulation resistance	5 MΩ or larger by 500 VDC insulation resistance tester across AC external terminals and ground				
Operating ambience	Free of corrosive gases. Dust should be minimal.				
Cooling method	Self-cooling				

REMARK

One octave marked * indicates a change from the initial frequency to either half or double the frequency. For example, any of the changes from 10Hz to 20Hz, from 20Hz to 40Hz, from 40Hz to 20Hz, and 20Hz to 10Hz are referred to as one octave.

**JIS: Japanese Industrial Standard

3.2 Performance Specifications

The following table gives the performance specifications of the A1S62RD.

Table 3.2 Performance Specifications

Item	A1S62RD3	A1S62RD4
Method of measurement	3-wire type	4-wire type
Connectable temperature-measuring resistor	Pt100 (conforms to JIS C1604-1989 and DIN 43760-1980)	
	JPt100 (conforms to JIS C1604-1981)	
Output current for detecting temperature	4.2 mA (MIN), 4.7 mA (MAX)	
Temperature input range	Pt100 : −180 [°C] to 600 [°C] (27.08 Ω to 313.59 Ω)	
	JPt100 : −180 [°C] to 600 [°C] (25.8 Ω to 317.28 Ω)	
Detected temperature value	16 bit signed binary −1800 to 6000 (value to the first decimal place x 10)	
	32 bit signed binary −180000 to 600000 (value to the third decimal place x 1000)	
Resolution	0.025 °C	
Overall accuracy	± 1% (accuracy for full scale)	
Conversion speed	40 ms/1 channel	
Number of temperature input device points	2 channels/1 module	
Insulation method	Between channels: No insulation Between an input terminal and PC CPU power: Photocoupler insulation	
Number of I/O device points	32	
Connection terminal block	20-point terminal block	
Applicable wire gauge	0.75 to 2 mm^2 (Applicable tightening torque 7 kg-cm)	
Cable between A1S62RD and Pt100	See Section 3.2.1.	
Applicable solderless terminal	V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A	
5 VDC internal current consumption (A)	0.54	0.44
Weight (kg)	0.29	0.28

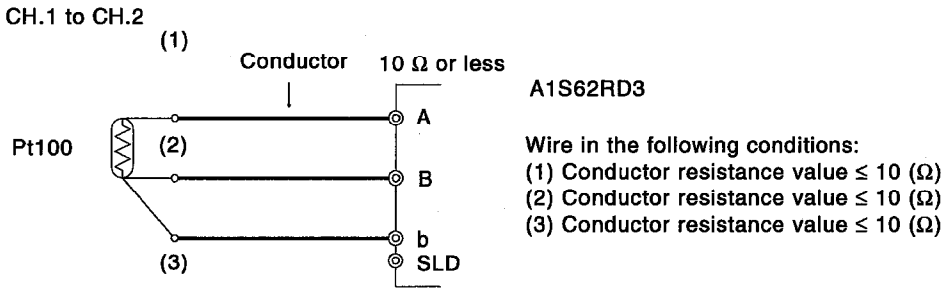
3.2.1 Specifications when connecting with a platinum temperature-measuring resistor

The following specifications apply when an A1S62RD3/A1S62RD4 is connected with a platinum temperature-measuring resistor.

(1) A1S62RD3

Set the conductor resistance value between Pt100 and A1S62RD3 to 10 Ω or less per wire.

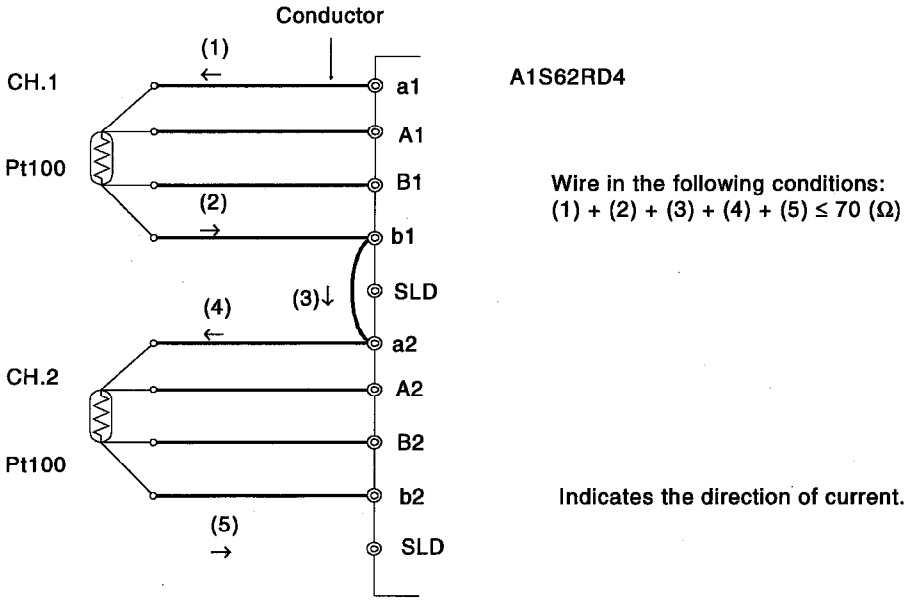
The specifications are common to CH.1 and CH.2.



(2) A1S62RD4

Set the total resistance value of the conductor where the current runs to 70 Ω or less.

Example: Connecting Pt100 to CH.1 and CH.2



3.3 Functions

This section explains the various functions of the A1S62RD

3.3.1 Functions list

The following table lists the functions of the A1S62RD.

Table 3.3 List of Functions

Item	Description	Section Reference
Conversion enable/disable setting of each channel	Temperature detection enable/disable is set.	3.3.2
Sampling/average processing setting	The detected temperature is processed according to the set processing method. The result is stored in buffer memory. There are three kinds of processing methods: • Sample processing • Time-average processing • Count-average processing	3.3.3
Storage of a detected temperature value	Values to the first and third decimal places are given. • Value to the first decimal place (16-bit signed binary) Example: 53.8 [°C] → 538 • Value to the third decimal place (32-bit signed binary) Example: 216.025 [°C] → 216025	3.3.4
Disconnection detection	Disconnection of Pt100 or cable is detected. • A1S62RD3 A disconnection at a channel is detected and the disconnection-detected flag (X3 and X4) that corresponds to that channel is set. • A1S62RD4 If either channel disconnects, it is detected and the disconnection-detected flag (X3) is set.	3.3.5
Setting of a platinum temperature-measuring resistor	The type of platinum temperature-measuring resistor to be used is set. There are two kinds of platinum temperature-measuring resistors: • Pt100: new JIS and DIN type (JIS C1604-1989, DIN 43760-1980) • JPt100: old JIS type (JIS C1604-1981)	3.3.6

3.3.2 Conversion enable/disable channel setting

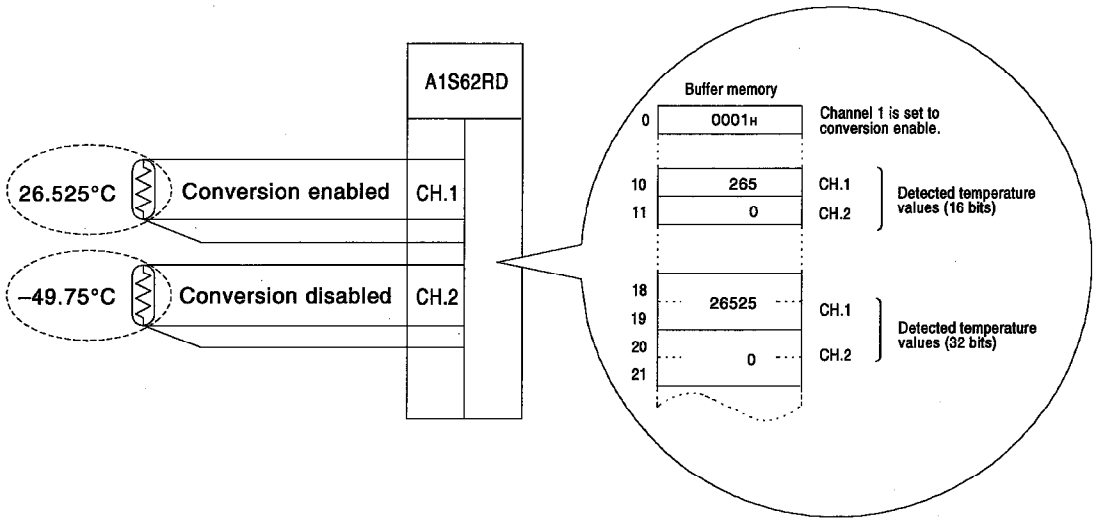
(1) Temperature detection enable/disable is set for each channel.

- Conversion enable : The external temperature is received, and disconnection detection is done.
- Conversion disable : The external temperature is not received, and disconnection detection is not done.

(2) All channels are set to the default conversion disable.

Set the channel to the buffer memory (address 0) for conversion enable/disable setting to convert to the conversion enable. (See section 3.5.2)

Example: When channel 1 is set to conversion enable



(3) The unused channel is set to conversion disable to shorten the sampling time.

Example:

1) When channels 1 and 2 are set to conversion enable

   Sampling time = 2 x 40 ms = 80 ms

2) When channel 1 is set to conversion enable

   Sampling time = 1 x 40 ms = 40 ms

(4) When the conversion enable is switched to conversion disable, the following processing is executed.

(a) Buffer memory (address 35) to store the conversion completed flag of channels 1 and 2 is reset.

(b) Disconnection-detected flag is reset.

POINT

The detected temperature value stored in the buffer memory holds data before writing a conversion enable/disable setting.

REMARKS

(1) Section 3.5 gives details about the buffer memory.

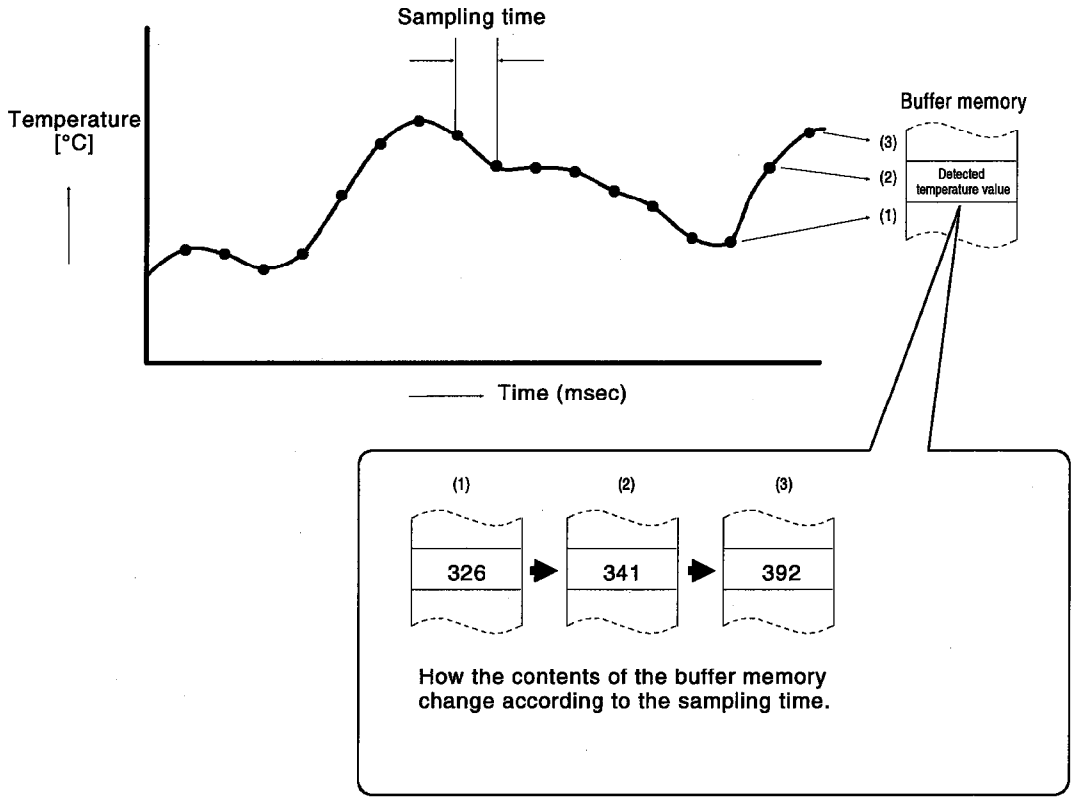
(2) Section 3.3.5 gives details about the disconnection detection, and Section 3.4 gives details about the disconnection-detected flag.

3.3.3 Sampling and time-average processing

Designation of sampling processing or time-average processing is made by buffer memory (address 1) where averaging processing is designated.

(1) Sampling

Data in a channel is converted according to the sampling time set in the PC CPU. The detected temperature values are stored in the buffer memory.



REMARKS

(1) The sampling time varies according to the number of channels.

Sampling time = number of channels to be used x 40 msec (msec)

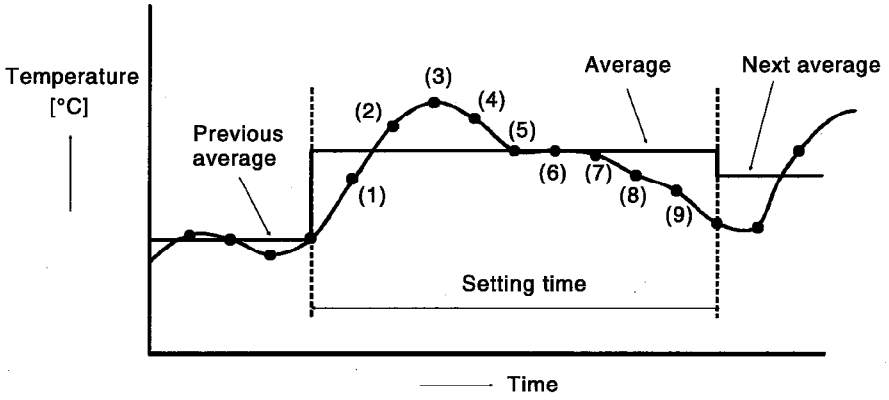
Example: When channel 1 is used
1 x 40 = 40 [ms]

(2) Section 3.5 gives details about the buffer memory.

(2) Time-average processing time

Data conversion in the channel is done in the time that is set in the PC CPU for average processing.

A detected temperature value is read per sampling time in the range of setting time (80 to 32000 ms) and the average of the remaining values (except for maximum and minimum values) is stored in buffer memory.



Data

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
180	210	220	215	205	200	195	180	170

Maximum value

Minimum value

$$\text{Average} = \frac{180 + 210 + 215 + 205 + 200 + 195 + 180}{7} = 198$$

Stored in buffer memory.

The previous average is stored in buffer memory until the average of the new detected temperature value is stored.

REMARKS

(1) The sampling count at a specified time varies with the number of channels.

$$\text{Sampling count} = \frac{\text{setting time}}{\text{number of channels used} \times 40 \text{ ms [ms]}}$$

Example: When channels 1 and 2 are used, and the setting time is 60 msec

$$\text{Sampling count} = \frac{600 \text{ ms}}{2 \times 40 \text{ ms}} = 7.5$$

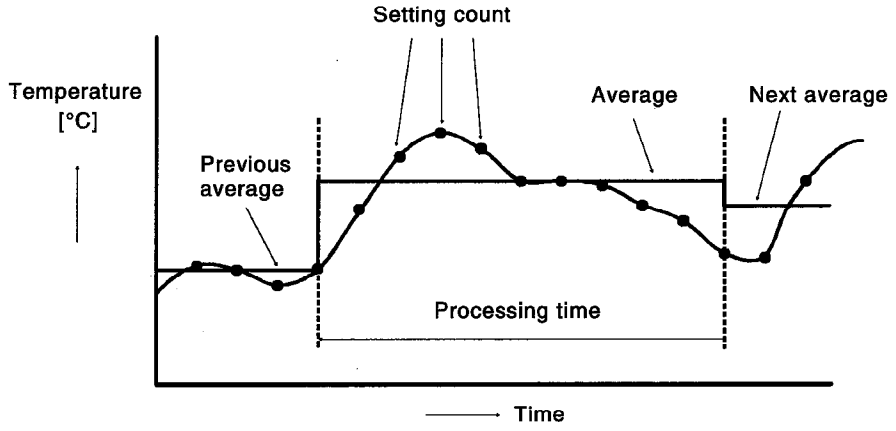
The sampling count is rounded down to 7.

(2) Section 3.5 gives the buffer memory to store a detected temperature value.

(3) Count average processing

Data conversion in the channel is done in the time set in the PC CPU for average processing.

A detected temperature value is read per the sampling time in the range of (1 to 800 times) and the average of the remaining values (except for maximum and minimum values) is stored in buffer memory.



The previous average is stored in the buffer memory until the average of the newly detected temperature value is stored.

REMARKS

(1) The sampling time at a specified count varies with the number of channels.

Sampling time = setting count x number of channels used x 40 ms [ms]

Example When channels 1 and 2 are used, the setting count is 10 and 15, and the sampling time is as follows:

Channel	Setting Count	Sampling Time
CH. 1	10	10 times x 2 x 40 ms = 800 [ms]
CH. 2	15	15 times x 2 x 40 ms = 1200 [ms]

(2) Section 3.5 gives the detected temperature value to store to the buffer memory .

3.3.4 Storage of a detected temperature value

Temperature can be detected with the A1S62RD within the range of –180 °C to 600 °C.

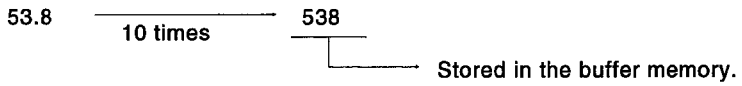
Detected temperature values to the first and third decimal places are stored in the buffer memory.

(1) Values to the first decimal place:

Values to the first decimal place are multiplied by 10 and expressed as 16-bit signed binary values.

The data within the range of –1800 to 6000 is stored.

Example: 53.8 °C

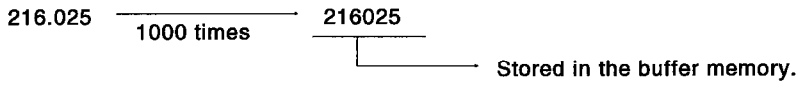


(2) Values to the third decimal place:

Values to the third decimal place are multiplied by 1000, and expressed as 32-bit signed binary values.

The data within the range of –180000 to 600000 is stored.

Example: 216.025 °C



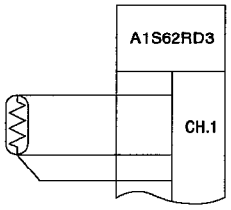
3.3.5 Disconnection detection

Disconnection of a Pt100 or cable is detected.

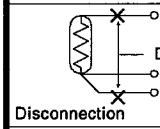
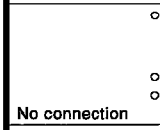
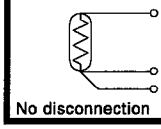
(1) A1S62RD3 (3-wire type)

Disconnection at each channel is detected and the disconnection-detected flag (X3 to X4) that corresponds to that channel is set.

However, this applies only in channels specified for conversion enabled.



Connections between CH1 and a Pt100

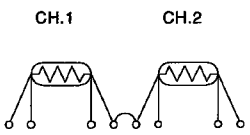
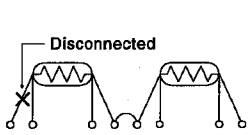
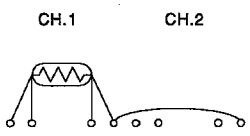
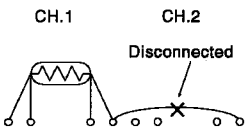
Connection Example	Conversion-Enabled/Disabled Specification	Disconnection-Detected (X3)
 Disconnected; Disconnection	Conversion enabled	ON
	Conversion disabled	OFF
 No connection	Conversion enabled	ON
	Conversion disabled	OFF
 No disconnection	Conversion enabled	OFF
	Conversion enabled	

(2) A1S62RD4 (4-wire type)

Disconnection at each channel is detected and the Σ disconnection-detected flag (X3) is set.

However, if all channels are specified for conversion disabled, disconnections are not detected.

If at least one channel is specified for conversion enabled, disconnections are detected.

	Σ Disconnection-Detected Flag (X3)			
	All Channels are Used		CH.1 is Used	
Connection example	 CH.1 CH.2; No disconnection	 Disconnected; Disconnection	 CH.1 CH.2; No disconnection	 CH.1 CH.2 Disconnected; Disconnection
CH.1 and CH.2 are enabled.	OFF	ON		
CH.1 is enabled.	OFF	ON	OFF	ON
CH.2 is enabled.	OFF	ON		
CH.1 and CH.2 are disabled.	OFF			

POINTS

(1) Be sure to set the channel which is not connected to or used by the Pt100 to conversion disabled. If it is set to conversion enabled, the disconnected-detected flag is set.

(2) Section 3.4.4 gives details about disconnection-detected flags.

(3) Section 4.5 gives details about Pt100 connections.

3.3.6 Specifying platinum temperature-measuring resistors

Two types of platinum temperature-measuring resistor - the JPt100 (new JIS type C1604-1989 and DIN type 43760-1980) or the Pt100 (old JIS type C1604-1981) - can be used in the A1S62RD.

Specifying the type of platinum temperature-measuring resistor by using buffer memory (address 36) sets all channels to a specified type.

(The type is set to Pt100 when power is turned ON or the CPU is reset.)

POINT

Two different types of platinum temperature-measuring resistors cannot be used simultaneously in one module. If two types are used, the correct temperature detection cannot be achieved in the channel which has a different platinum temperature-measuring resistor than the one specified.

REMARKS

(1) Appendix 2 gives details about the standard resistance values of the platinum temperature-measuring resistors.

(2) Section 3.5 gives details about the buffer memory.

3.4 CPU I/O Signal

This section explains the functions of I/O signals that control the A1S62RD and the PC CPU.

X devices refer to input signals from the A1S62RD to the CPU.

Y devices refer to output signals from the CPU to the A1S62RD.

The device signals (X and Y) shown in this section are used when the A1S62RD is loaded into slot 0 of the main base unit.

Table 3.4 A1S62RD3 I/O Signals

Signal Direction: A1S62RD3 → CPU		Signal Direction: CPU → A1S62RD3	
Device No.	Description	Device No.	Description
X0	WDT error flag	Y0 to Y11	Unusable
X1	READY flag		
X2	Write data error flag		
X3	CH.1: Disconnection-detected flag		
X4	CH.2: Disconnection-detected flag		
X5 to X1F	Unusable	Y12	Error code reset flag
		Y13 to Y1F	Unusable

Table 3.5 A1S62RD4 I/O Signals

Signal Direction: A1S62RD4 → CPU		Signal Direction: CPU → A1S62RD4	
Device No.	Description	Device No.	Description
X0	WDT error flag	Y0 to Y11	Unusable
X1	READY flag		
X2	Write data error flag		
X3	Σ disconnection-detected flag (CH.1 and CH.2)		
X4 to X1F	Unusable	Y12	Error code reset flag
		Y13 to Y1F	Unusable

3.4.1 WDT (watch dog timer) error flag (X0)

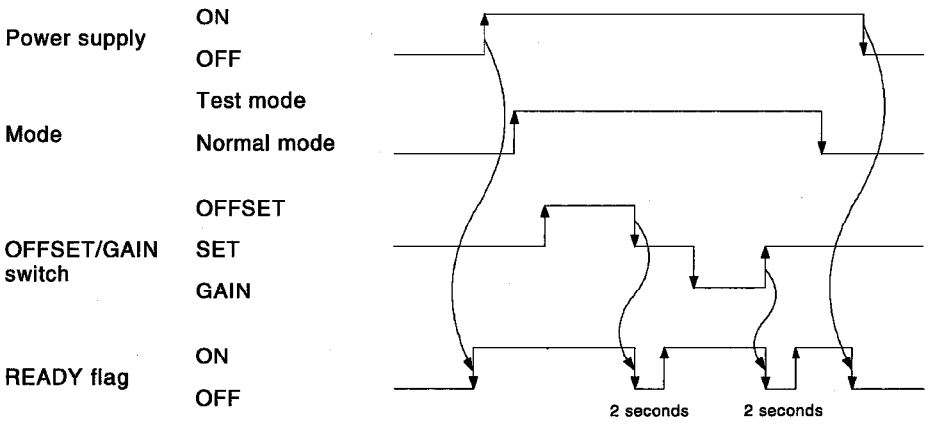
This flag is set when the self-diagnosis function of the A1S62RD detects a WDT error.

While the error flag is set, the conversion of the A1S62RD does not RUN. If the error flag (X0) is set, hardware malfunctions may occur.

3.4.2 READY flag (X1)

This flag is set when the conversion is ready after turning ON or resetting the CPU in the normal mode (*1).

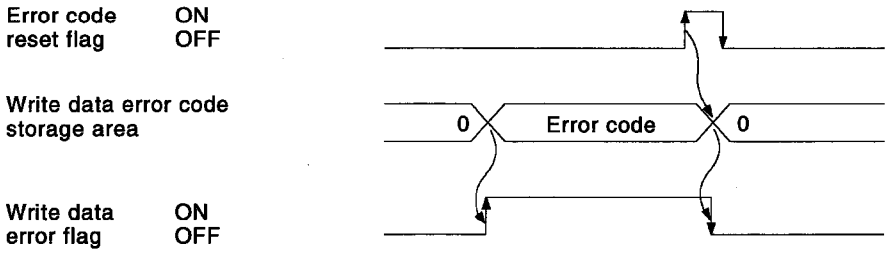
This flag is reset in the test mode (*2) when the OFFSET/GAIN switch is set to SET.



3.4.3 Write data error flag (X2) and error code reset flag (Y12)

This flag is set when an error other than the watchdog timer error occurs in the A1S62RD and the error code is stored in the buffer memory error code storage area (address 34).

If "0" is written to the setting value check code storage area or the error reset flag is set with a sequence program, the error code is reset.



REMARKS

(1) Section 3.5.6 gives details about write data error code.

(2) *1:Normal mode refers to the state of terminals 1 and 3 when the A1S62RD is disconnected.

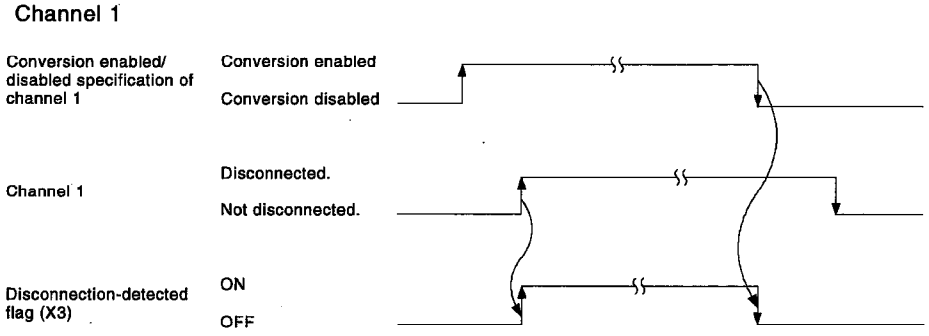
(3) *2:Test mode refers to the state of terminals 1 and 3 when the A1S62RD is connected.
Additionally, an error can be compensated in the test mode.

3.4.4 Disconnection-detected flag

(1) A1S62RD3

When a channel set to conversion enabled is disconnected, the disconnection-detected flag (X3 and X4) of its channel is set.

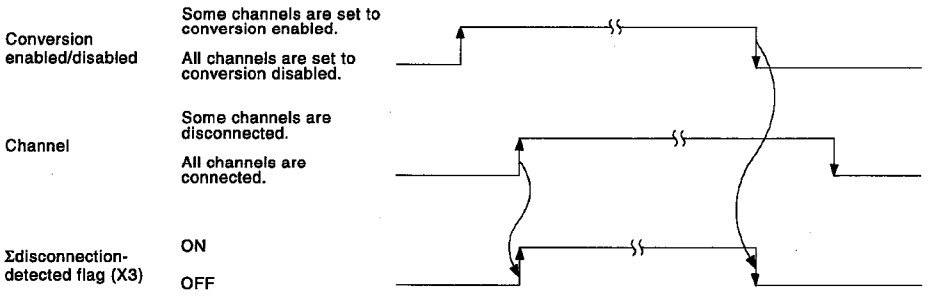
If a channel is set to conversion disabled, the disconnection-detected flag is always reset.



(2) A1S62RD4

When some of the channels are set to conversion enabled, and any of the channels are disconnected, the Σdisconnection-detected flag (X3) is set.

When all of the channels are set to conversion disabled, the disconnection-detected flag (X3) is always reset.



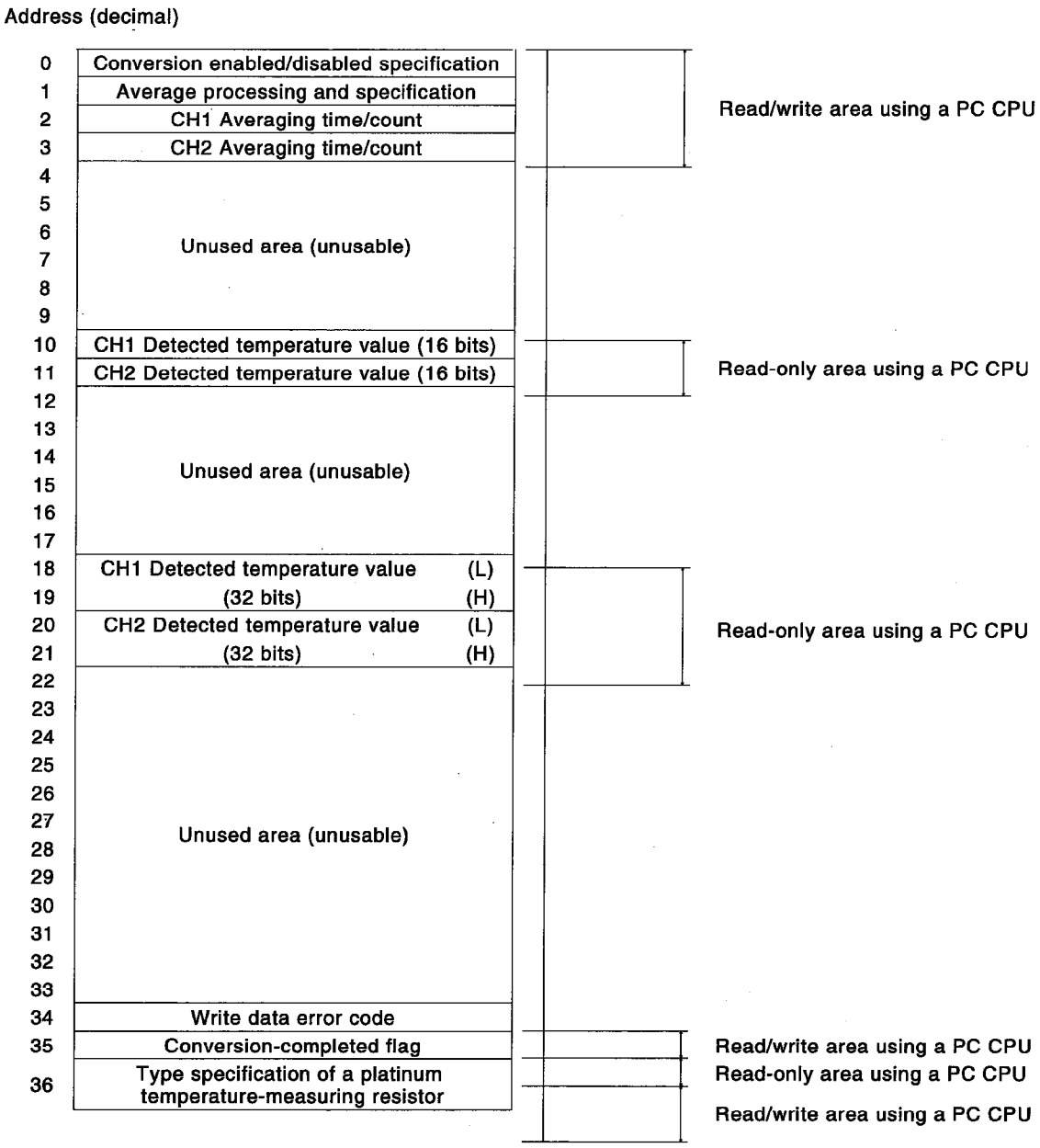
REMARK

Section 3.3.5 gives details of disconnection detection.

3.5 Buffer Memory

3.5.1 Buffer memory allocation

The following describes the buffer memory allocation (not battery-backed) of an A1S62RD.



POINT

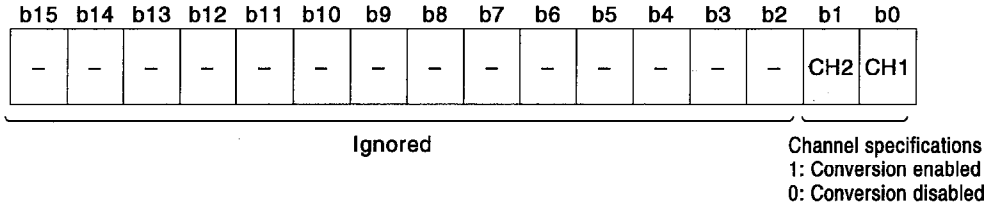
When using a PC CPU, the buffer memory addresses 10, 11, 18 to 21, and 35 are read areas. Therefore, never write with a PC CPU because the A1S62RD always overwrites a detected temperature value. Thus, even when only writing, the buffer memory data is cleared.

3.5.2 Buffer for conversion enabled/disabled specifications (Address 0)

This area is used to set the temperature detection.

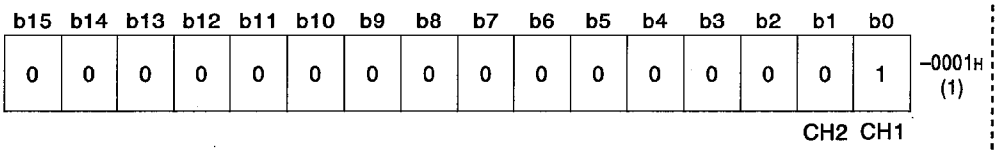
(1) When the power is turned ON, the channel specification is set at "0000H(0)" for conversion disabled for all channels.

(2) Conversion enabled/disabled can be changed with the sequence program to reduce the sampling time.



Example: To specify channel 1 for conversion

By writing 0001H(1) to specify the channels for conversion enabled/disabled, the sampling time is obtained as 40 ms x 1 = 40 ms.



REMARK

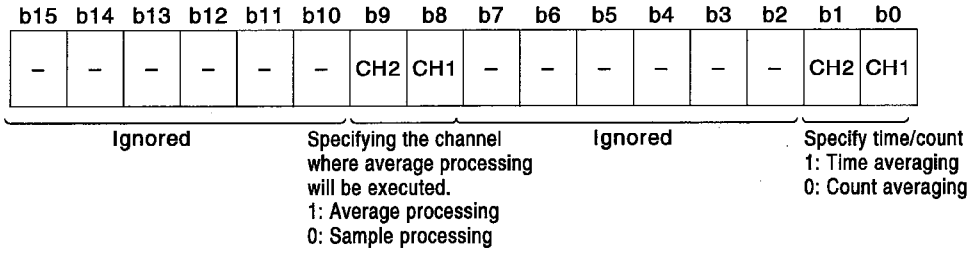
Section 3.3.2 gives conversion enabled/disabled specifications

3.5.3 Buffer for average processing specifications (Address 1)

This area is used to set the sample processing or average processing.

(1) When the power is turned ON and the READY flag of the A1S62RD is set, all of the channels are set for sample processing.

(2) Use the buffer memory address 1 for selection of sample processing or average processing and the specification of the processing method (time average/count average).



POINT

When the average processing is not specified, sample processing is set without regard to the time/count specification.

REMARK

Section 3.3.3 gives sample processing and average processing-details.

3.5.4 Buffer for averaging time/count (Addresses 2 and 3)

(1) When the power is turned ON, the averaging time and averaging count are set to 0.

(2) The setting ranges are as indicated below:

Average processing in terms of time : 80 to 32000 ms

Average processing in terms of count : 1 to 800 times

POINT

If a value outside of the above range has been written, a setting error occurs and the buffer memory for averaging time/count is rewritten.

However, the A1S62RD performs conversion processing at the averaging time or count previously set.

REMARK

(1) Section 3.3.3 gives averaging time/count-details.

3.5.5 Buffer for detected temperature value (Addresses 10, 11, 18 to 21)

Two types of detected temperature storing areas are provided depending on the bit size of the data - 16-bit data storing area and 32-bit data storing area.

(1) For 16 bit data (addresses 10 and 11)

Ten (10) times the value of a detected temperature is stored in the range from –1800 to 6000 as a 16-bit signed binary value.

If a detected temperature value is negative, this is stored as a complement of 2.

Example 1: If a detected temperature value is 123.025°C, 1230 is stored.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	1	0	0	1	1	0	0	1	1	1	0

Example 2: If a detected temperature value is –123.025 °C, –1230 is stored.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
1	1	1	1	1	0	1	1	0	0	1	1	0	0	1	0

(2) For 32 bit data (addresses 18 to 21)

One-thousand (1000) times the value of a detected temperature value is stored in the range from –180000 to 600000 as a 32-bit signed binary value.

If a detected temperature value is negative, this is stored as a complement of 2.

Example 1: If a detected temperature value is 123.025 °C, 123025 is stored.

b31	to	b24	b23	to	b16	b15	to	b8	b7	to	b0
0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0			0 1 1 1 1 0 0 0			0 1 0 0 1 0 0 0			1

Example 2: If a detected temperature value is –123.025 °C, –123025 is stored.

b31	to	b24	b23	to	b16	b15	to	b8	b7	to	b0
1 1 1 1 1 1 1 1		1 1 1 1 1 1 1 1			1 0 0 0 0 1 1 1			1 0 1 1 0 1 1 1			1

REMARK

Section 3.3.4 gives detected temperature value-details.

3.5.6 Buffer for write data error code (Address 34)

This area is used to check whether data written to an A1S62RD from a CPU has been written to the WRITE area within the setting range.

(1) When data is read from the PC CPU, the A1S62RD checks the following:

- Data range check for the averaging count and averaging time.
- Data check for writing to the read-only area.

If any value is outside the specified range or if data is written to the read-only area, the A1S62RS stores the error code as a 16-bit binary value. Section 6.1 gives error code details.

(2) If there is more than one error code, the first data error code detected by the A1S62RD will be stored. The others are not stored.

(3) To reset an error code, write 0 from the PC CPU.

If an error is reset without correcting the error, the data error code is set to 0 and the RUN LED of A1S62RD stops flashing.

POINTS

(1) When a value other than "0" is written, the error code is not reset.

(2) Error code reset can be done by setting the error reset flag (Y12). (See Section 3.4.3.)

3.5.7 Buffer for conversion-completed flag (Address 35)

This area is used to check whether the channel specified for conversion-enabled can detect the temperature correctly.

(1) After power ON, the processing of the conversion-completed flag is performed only once, when the channel specification for conversion enabled/disabled (address 0) is changed.

- Conversion enabled/disabled specification change from 0 to 1:

  After setting conversion enabled and storing a detected temperature value in buffer memory, the conversion-completed flag of its corresponding channel is set to 1.
- Conversion enabled/disabled specification change from 1 to 0:

  The conversion-completed flag of its corresponding channel is set to 0.

(2) A conversion-completed flag is provided to each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	CH2	CH1

Conversion-completed flag
1: Conversion completed
2: Conversion not completed

(3) The conversion-completed flag can be used for the interlock when reading the detected temperature value of the channel where average processing is executed.

3.5.8 Buffer for the type of specifications for a platinum temperature-measuring resistor (Address 36)

(1) When the power supply is turned ON, the type is set to new JIS/DIN.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
															1/0

Ignored

Type specifications of a platinum temperature-measuring resistor
1: Old JIS type
0: New JIS/DIN type

(2) All channels correspond to a specified type.

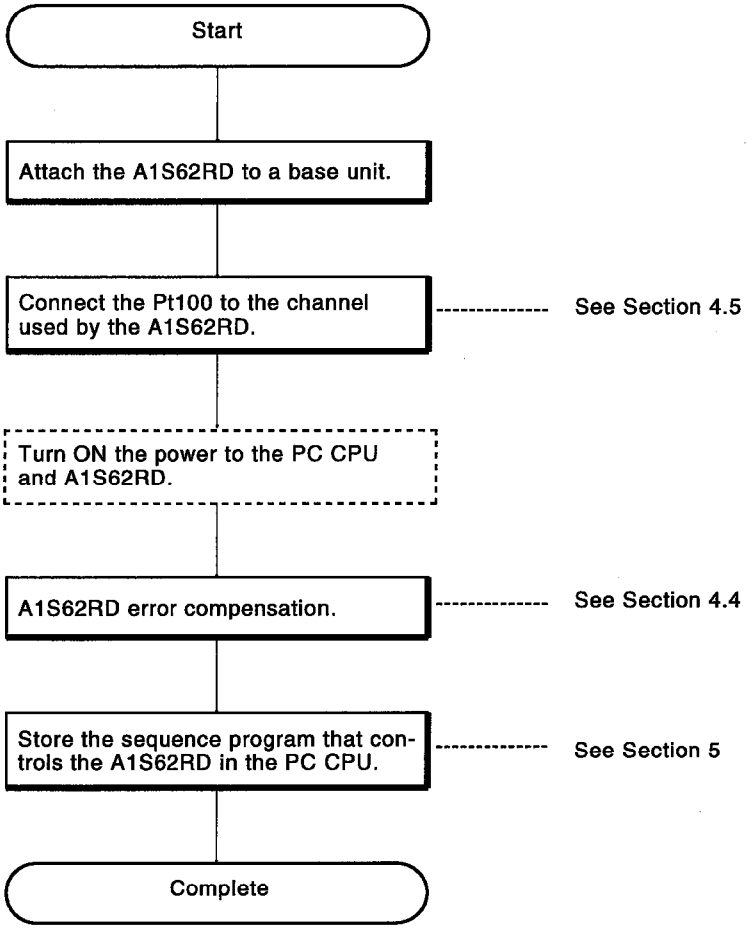
REMARK

Section 3.3.6 gives platinum temperature-measuring resistor-details.

4. PRE-OPERATION SETTINGS AND PROCEDURES

4.1 Pre-Operation Procedures

The pre-operation settings and procedures of the A1S62RD are given below.



4.2 Handling Instructions

The following explains the handling instructions for the A1S62RD.

(1) Since the case and terminal block of the module are plastic, do not drop the module. Hard impacts must not be applied, either.

(2) Do not remove the printed circuit boards from their housing. Otherwise, it will cause fault.

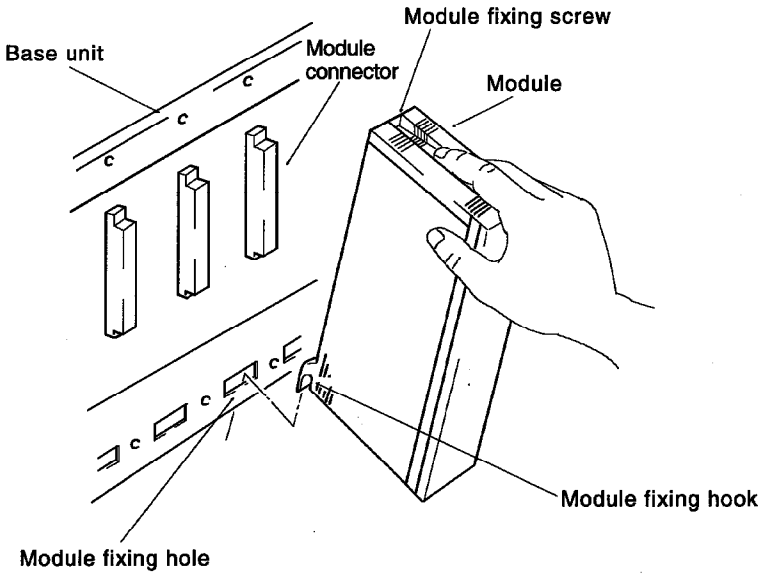
(3) Make sure that no conductive debris can enter the module. If it does, make sure that it is removed.

(4) Tighten the terminal screws as specified below:

Screw	Tightening Torque Range (kg·cm) (lb·in)
I/O terminal block terminal screws (M3.5)	6 (5.19) to 9 (7.80)
I/O terminal block installation screws (M4)	8 (6.93) to 12 (10.39)
Module mounting screw (M4)	8 (6.93) to 12 (10.39)

(5) To install a module to the base unit, insert the module fixing hook into the module fixing hole on the base unit and tighten the module fixing screw.

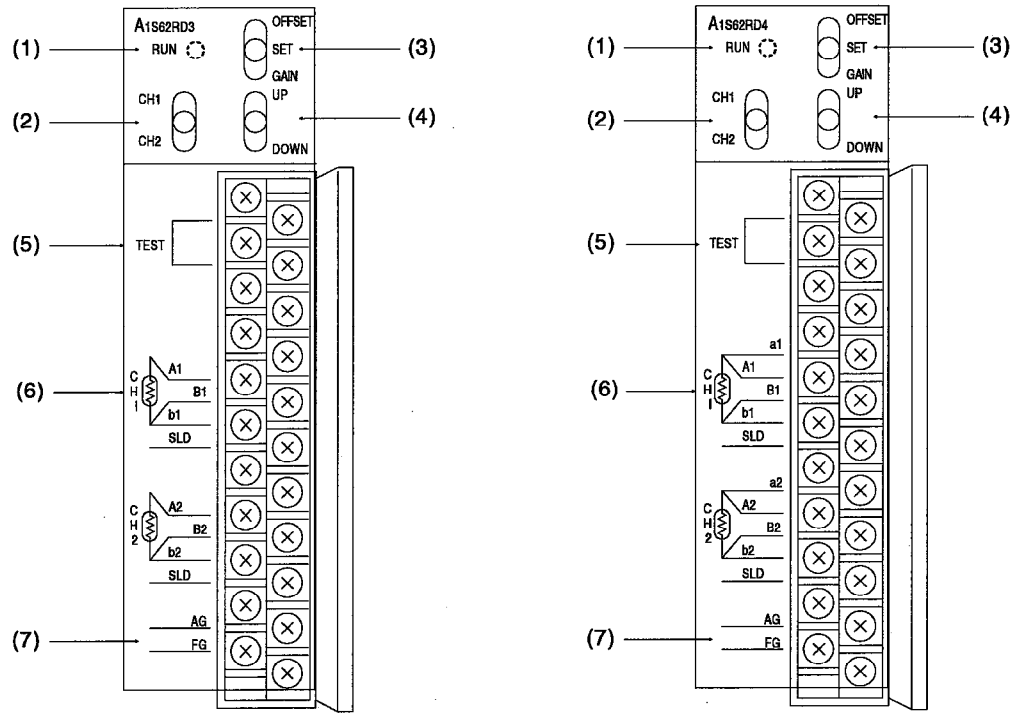
To remove a module, loosen the module fixing screw, and pull the module fixing hook out of the module fixing hole.



4.3 Nomenclature

The following gives the nomenclature of each part of the A1S62RD3 and A1S62RD4.

Table 4.1 Nomenclature



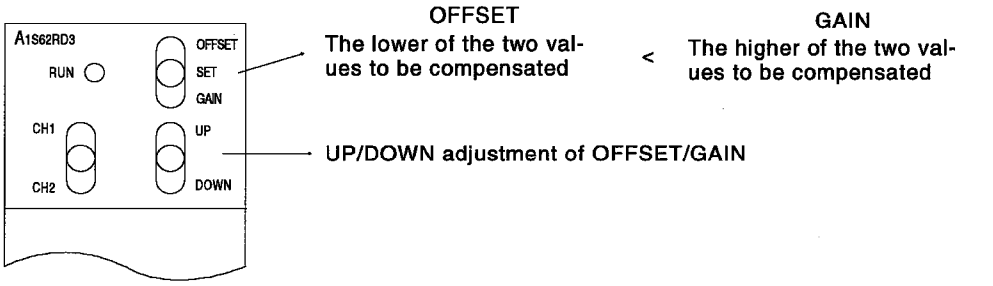
A1S62RD3 A1S62RD4

No.	Description	Application	
(1)	Operating status display LED (RUN LED)	Normal mode	ON : Normal operation Flash : Write data error OFF : 5 VDC power OFF or WDT error
		Test mode	ON : When the offset/gain select switch is set to either OFFSET or GAIN, this LED flashes every 0.5 s. OFF : OFFSET and GAIN switches are set to the SET position.
(2)	Channel select switch	Used for an offset and gain adjustment when error compensation is selected.	
(3)	OFFSET/GAIN setting switch	Used to set the offset and gain values in the test mode. (1) OFFSET Position : The calibration mode of an offset value (2) GAIN Position : The calibration mode of a gain value (3) SET Position : Storage mode of an offset/gain value When a switch is changed from OFFSET/GAIN to SET, the detected temperature value is stored in the internal memory of the A1S62RD as an offset/gain value.	
(4)	UP/DOWN switch	Increases or decreases the offset/gain value of a channel to be used at the following rate: (1) ON (Less than 1.5 s) : The value increases or decreases every time in units of 0.025 °C. (2) ON (1.5 s or more) : The value increases or decreases 0.1 °C every 0.04 s.	
(5)	Test mode terminals	During error compensation, terminals 1 and 3 are shorted.	
(6)	Pt100 connecting terminal	Used to connect a Pt100. (See Section 4.5.)	
(7)	Analog/ground terminals	Grounding should be provided when necessary.	

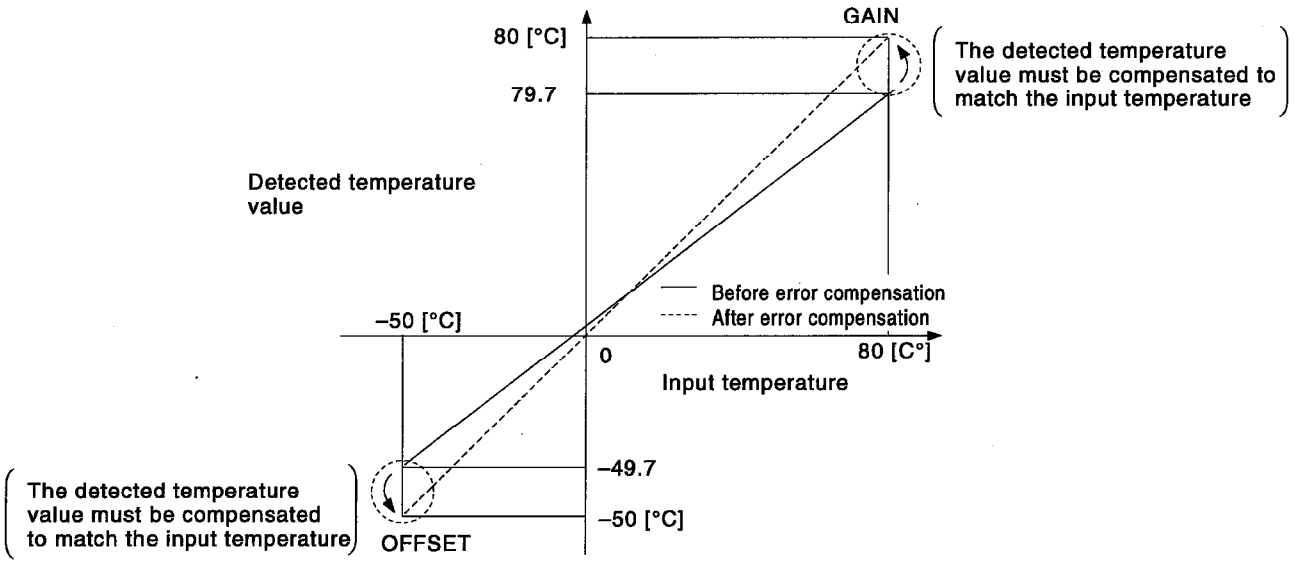
4.4 Error Compensation

Error compensation is done (a) when starting up a system, or (b) when a correct detected temperature value cannot be obtained.

Error compensation is done by reading a detected temperature value from the buffer memory with a sequence program, and monitoring it with a peripheral device.



The characteristics of the detected temperature value for an input temperature are indicated below. Compensate detected temperature values so that the detection value corresponds to the input temperature.



* Error compensation can be done using a standard resistor instead of inputting a direct temperature to the Pt100.

Resistance value of a standard resistor = Standard resistance value of Pt100 for an input temperature that is an offset/gain value (see Appendix 2).

POINTS

(1) Complete the error compensation at the highest and lowest temperatures of the available range. Doing so yields a high-precision offset/gain value.

(2) To set an offset/gain value, read the detected temperature value with a sequence program. However, provide interlock to read a detected temperature value when the READY flag (X1) is set.

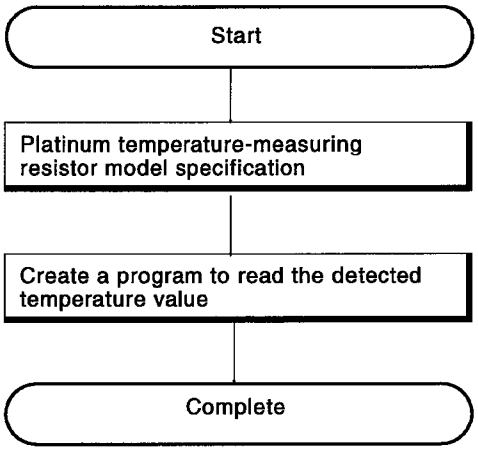
(3) The offset/gain value must be within the input temperature range.

(4) The offset/gain value is stored in the A1S62RD.
Even if the power supply is turned OFF, this data is not cleared from memory.

(5) If error compensation is executed in test mode, error is occurred within the overall accuracy (±1 %) after the mode is changed to the normal mode.

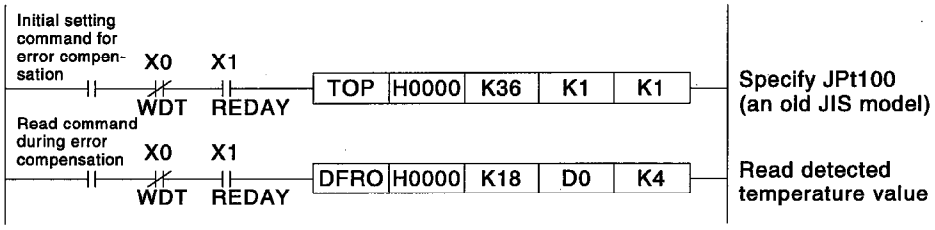
4.4.1 Initial setting

The initial setting procedure shown below must be used for error compensation.



Sample program

When channels 1 and 2 are set to JPt100 (old JIS)



POINT

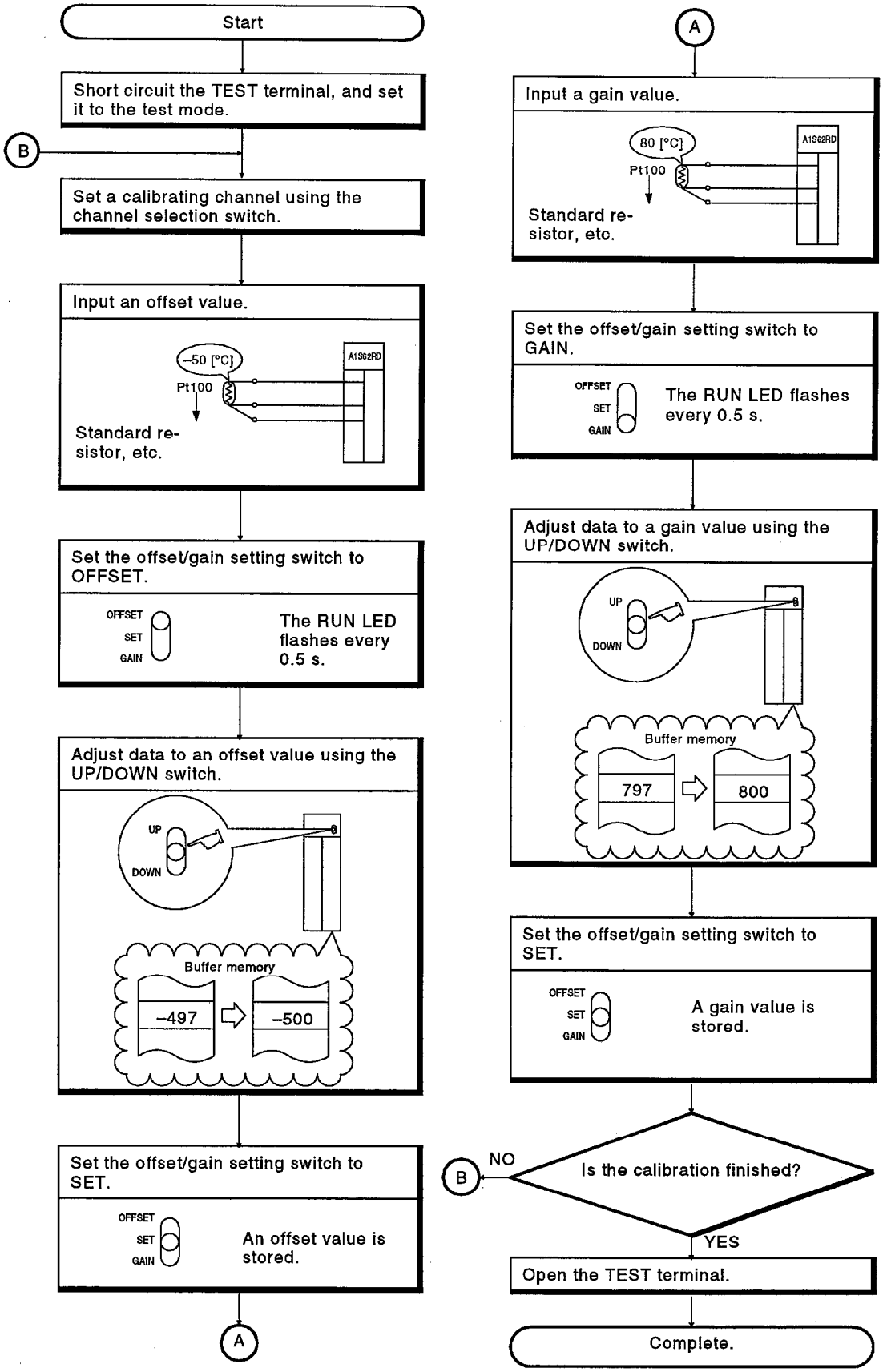
Before setting the test mode, do the initial setting for error compensation in the normal mode.

REMARK

Section 5.2 and the ACPU Programming Manual (common instruction) gives TOP and DFRO instructions.

4.4.2 Error compensation procedure

The error compensation procedure is shown below.



POINTS

(1) If the offset/gain setting switch is returned back to the OFFSET position after setting the offset/gain in the test mode, the set offset value cannot be checked. The set value is retained.

(2) After operating the module in the normal mode with the offset/gain set in the test mode, the set offset and gain values cannot be checked even if the mode is changed back to the test mode. The set values are retained.

4.5 Connecting a Platinum Temperature-Measuring Resistor

The method for connecting a Pt100 to a 3-wire (A1S62RD3) or 4-wire (A1S62RD4) model is explained below

4.5.1 Cautions on connection

To design the reliable system allowing the A1S62RD to operate at its full performance, it is necessary to design the external wiring so that it is not influenced by noise.
The cautions that require your careful attention are indicated below.

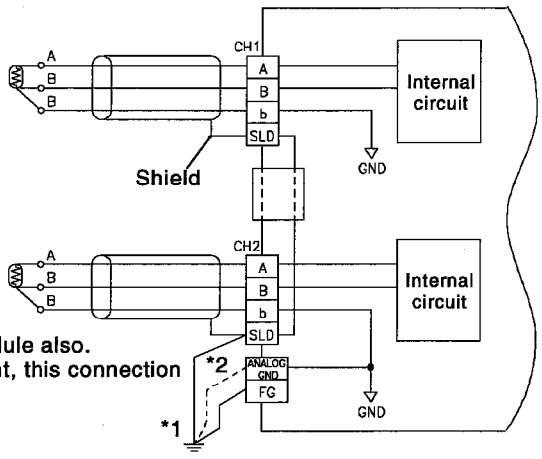
(1) Use separate cable for external input signals of A1S62RD from the cable that carries AC power so that the signals will not be influenced by AC surge and induction.

(2) Do not run the external wiring cables with or near the cables such as main circuit cable, high-voltage cable, and cables carrying load from other than the programmable controller.

(3) The shield of the shielded wire or cable must be grounded at the programmable controller side (one-point grounding). There are cases the shield should be grounding externally depending on external noise condition.

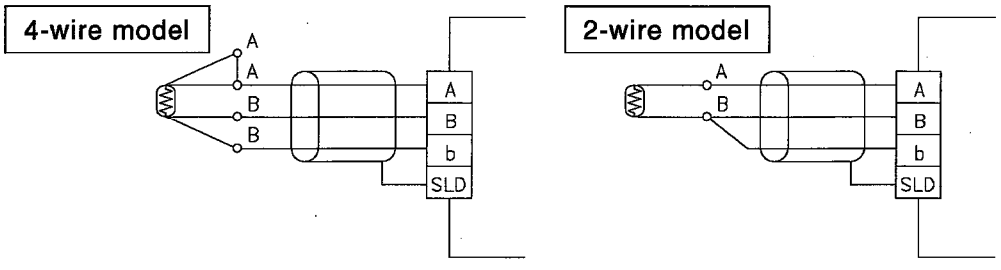
4.5.2 Connecting to an A1S62RD3

(1) The highest measurement accuracy is obtained by using a 3-wire Pt100. An example of connection of a 3-wire Pt100 to an A1S62RD3 is shown below.



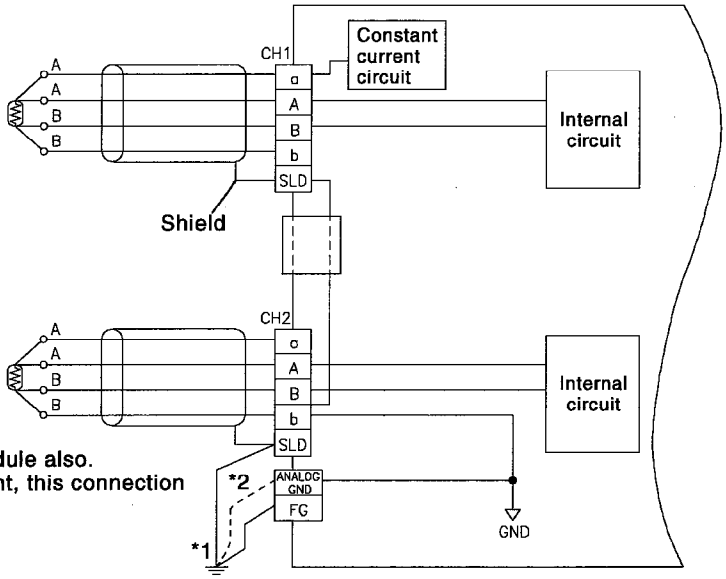
*1 Ground the FG of the power supply module also.
*2 Depending on the operation environment, this connection may give better results.

(2) A 2-wire or 4-wire Pt100 can also be connected to an A1S62RD3. The following shows the diagrams for connecting a 2-wire or 4-wire Pt100.



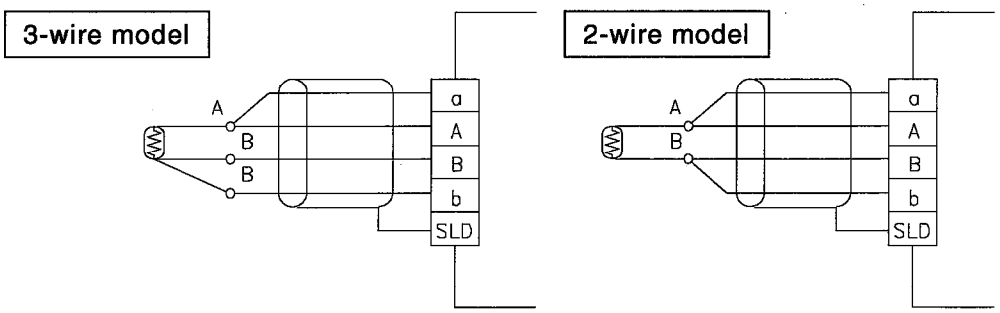
4.5.3 Connecting to an A1S62RD4

(1) The highest measurement accuracy is obtained by using a 4-wire Pt100. An example of connection of a 4-wire Pt100 to an A1S62RD4 is shown below.



*1 Ground the FG of the power supply module also.
*2 Depending on the operation environment, this connection may give better results.

(2) A 3-wire or 4-wire Pt100 can also be connected to an A1S62RD4. The following shows the diagrams for connecting a 3-wire or 2-wire Pt100.



Cautions when connecting a Pt100 to an A1S62RD4

The precautions to take when connecting an A1S62RD4 to a Pt100 are explained below.

IMPORTANT

(1) Connect terminals a1 and b2 of A1S62RD4 (see Fig. 1 below).

(2) Skip a terminal between a and b terminals of an unused channel (see Fig. 2 below).

When using all channels

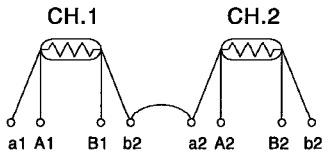


Fig. 1

When using only channel 1

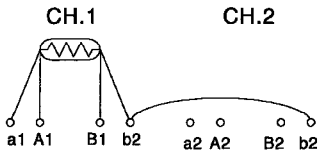


Fig. 2

POINT

Make sure to specify a channel that a Pt100 is not connected to for conversion disabled.

When specifying a channel that a Pt100 is not connected to for conversion enabled, the disconnection-detected flag is set, even if there is no disconnection between the channel in which a Pt100 is connected.

5. PROGRAMMING

The following explains the programming to use with the A1S62RD.

5.1 Programming Procedure

Figure 5.1 shows the procedure for writing a program to execute data write/read between a PC CPU and an A1S62RD.

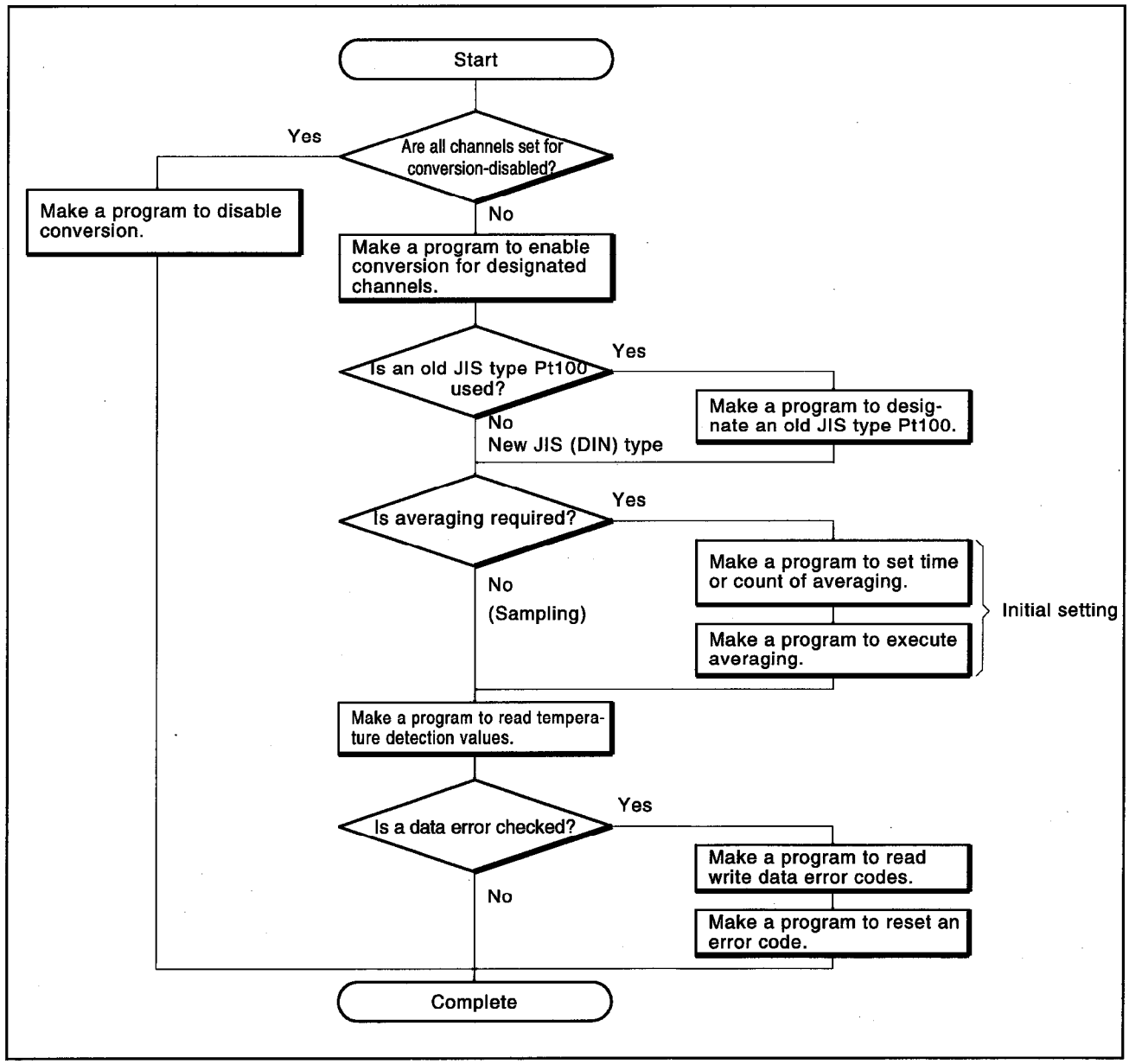


Fig. 5.1 Programming Procedure

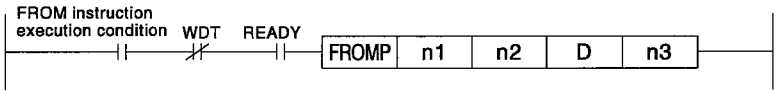
POINT

Initial setting must be done as indicated in Figure 5.1. If average processing is designated before setting the time or count of averaging, a write data error may sometimes occur. It is recommended that the initial setting be executed by a batch write instruction.

5.2 Basic Programming for Read/Write

(1) Read from an A1S62RD ..... FROM, FROMP, DFRO, and DFROP instructions

Format



Symbol	Contents	Usable Devices
n1	The higher two digits when the head I/O number allocated to an A1S62RD is represented in three hexadecimal digits.	K, H
n2	The head address of the buffer where data is stored.	K, H
D	The head number of devices which store read data.	T, C, D, W, and R
n3	The number of words of data to be read.	K, H

Example

To allocate A1S62RD's inputs to X130 to 14F and outputs to Y130 to 14F, and to read one word of data from the buffer address 10 to D0:

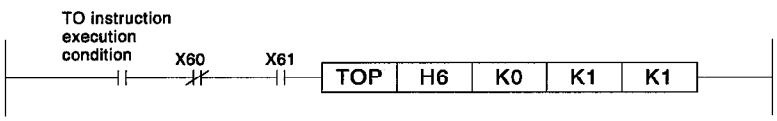
(2) Write to an A1S62RD ..... TO, TOP, DTO, and DTOP instructions

Format

Symbol	Contents	Usable Devices
n1	Higher two digits when the head I/O number allocated to an A1S62RD is represented in three hexadecimal digits.	K, H
n2	The head address of the buffer which stores data.	K, H
S	The head device number or constant of devices where data to be written is stored.	T, C, D, W, R, K, and H
n3	The number of words of data to be written.	K, H

Example

To allocate A1S62RD's inputs to X60 to 7F and outputs to Y60 to 7F, and to write data to buffer address 0:



5.3 Programming Example

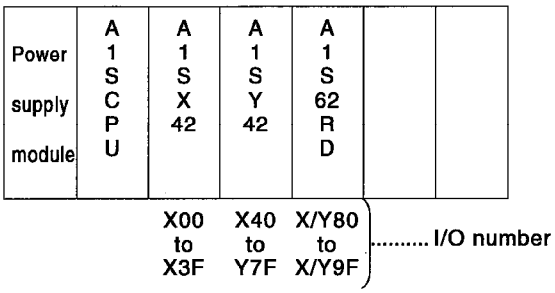
The following gives an example of programming to use an A1S62RD.

5.3.1 Program to read a detected temperature value

Time average processing of 500 ms is done in channel 1 using an old JIS-type Pt100. The detected temperature value is read after the conversion completion.

(A program for reading write data error codes and doing error code reset is included.)

[System configuration]



[Specifications]

(1) Commands that can be executed

(a) Write command of specified type of platinum temperature-measuring resistor : X0

(b) Write command of the specified conversion-enabled channel and the time average processing specification : X1

(c) Read command of a conversion-completed flag and detected temperature values : X2

(d) Positive and negative distinguishing command of a detected temperature value : X3

(e) Read command of a write data error code : X82
(Write data error flag)

(f) Error code reset command : X4

(2) Output when a detected temperature value is negative : Y70

(3) Output of a detected temperature value (4 digits of BCD numbers) : Y40 to Y4F

(4) Output of a write data error code (2 digits of BCD numbers) : Y50 to Y57

(5) Storage register of a conversion-enabled channel specification : D0

(6) Storage register of time average processing specification : D1

(7) Storage register of averaging time : D2

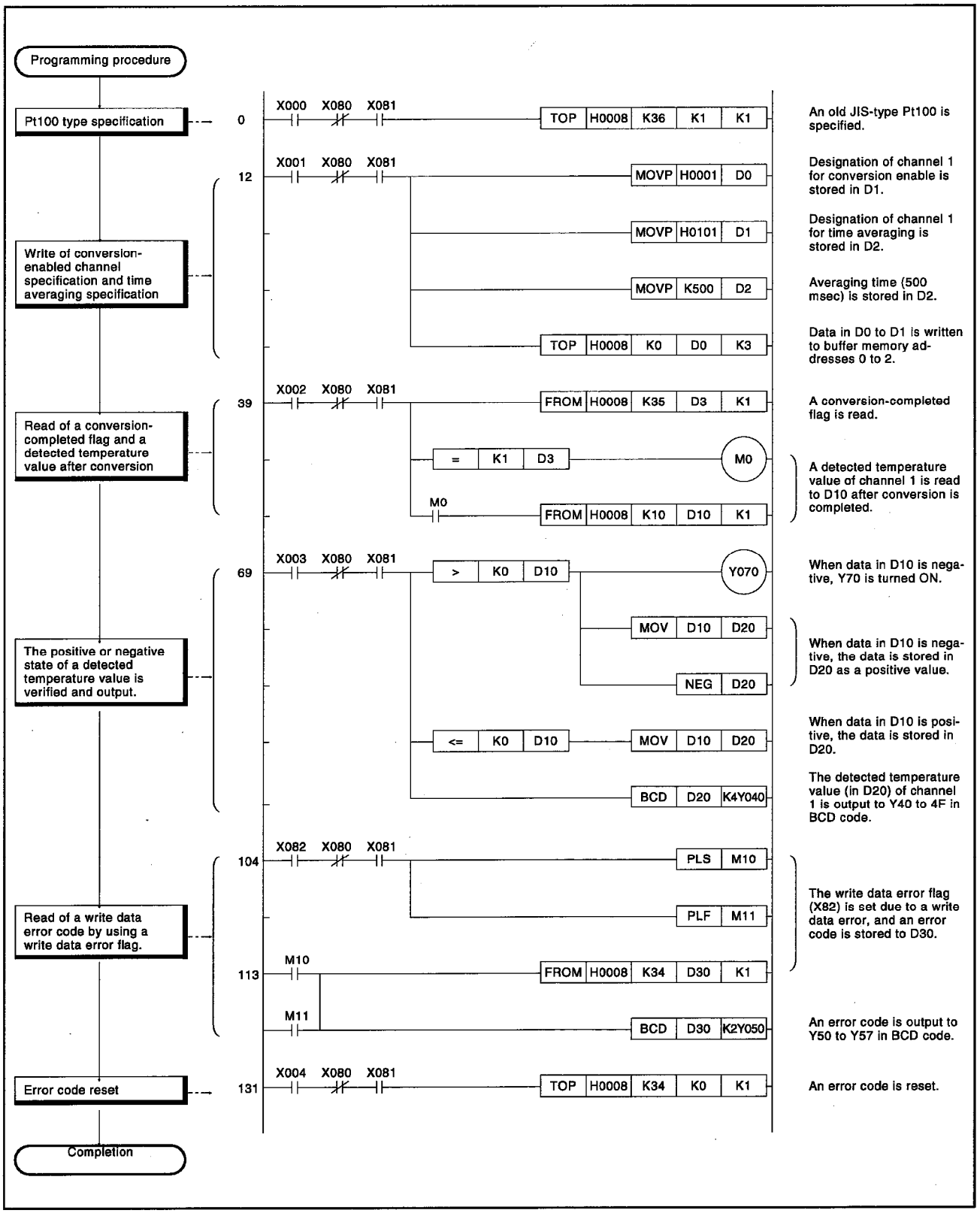
(8) Storage register of a conversion-completed flag : D3

(9) Storage register of a read detected temperature value : D10

(10) Storage register of a detected temperature value after positive/negative verification : D20

(11) Storage register of a write data error code : D30

[Sample program]



6. TROUBLESHOOTING

This section gives lists of error codes, causes, and corrective actions for the errors which may occur when an A1S62RD is in operation.

6.1 Error Code List

Any of the following error codes are stored in the buffer address 34 of an A1S62RD if an error occurs (the RUN LED flashes) when data is written from a PC CPU to the A1S62RD.

Table 6.1 Error Code List

Error Code	Cause	Corrective Action
102	• Data write was attempted to the read-only areas (addresses 10, 11, 18 to 21, and 35).	Correct the program so that it does not execute data write to read-only areas.
[ ] [0 to 4]	• The values set for the averaging time values are not within the 80 to 32000 ms range. • [ ] indicates the number of the channel where an error occurred. • Numbers [0.to 4] do not have any particular meaning. They indicate the averaging time setting errors.	Correct the averaging time setting so that the set values are within the 80 to 32000 ms range.
[ ] [5 to 8]	• The set values of the averaging count are no within the 1 to 800 times range. • [ ] indicates the number of the channel where an error occurred. • Numbers [5 to 8] do not have any particular meaning. They indicate averaging count setting errors.	Correct the averaging count setting so that the values set are within the 1 to 800 times range.

(1) If more than one error has occurred, only the first error code will be stored.

(2) An error code can be reset by writing "0" to the buffer address 34 or by setting an error code reset flag (Y12). (See Section 3.5.6.)

6.2 If the RUN LED Flashes or is Turned OFF

(1) Flashes

Check Item	Corrective Action
Is the write error flag set?	Follow the procedure given in Section 6.5.
Are the TEST terminals open?	Fix the error by opening the TEST terminals.

(2) Turned OFF

Check Item	Corrective Action
Is the 5 VDC power supplied?	• Check the power supply. • Connect the module securely to the base unit.
Is the WDT error flag set?	Follow the procedure given in Section 6.3.
Are the TEST terminals open?	Compensate error and open the TEST terminals.

6.3 If the WDT Error Flag is Set

Check Item	Corrective Action
Has a WDT error occurred?	Reset the PC CPU or turn the PC power OFF and ON. If the power is not restored, a hardware fault is probable. Consult your nearest Mitsubishi representative.

6.4 If the READY Flag is not Set

Check Item	Corrective Action
Is the WDT error flag set?	Follow the procedure given in Section 6.3.
Has an error occurred within the PC CPU?	Follow the procedure given in the A1SCPU User's Manual.

6.5 If the Write Data Error Flag is Set

Check Item	Corrective Action
Has a write data error occurred?	• Check the error code list in Section 6.1 and modify the sequence program. • Check the initial setting procedure given in Section 5.1 and modify the sequence program.

6.6 If the Disconnection-Detected Flag is Set

Check Item	Corrective Action
Is a channel that is not connected to a Pt100 designated for conversion-enabled?	Designate a channel that is not connected to a Pt100 for conversion-disabled.
Is there any disconnection?	A1S62RD3 Securely connect or replace the Pt100 of the corresponding channel.
	A1S62RD4 • Make the connection between terminals a1 and b2. • Securely connect or replace the Pt100

6.7 If a CPU Cannot Read Detected Temperature Values

Check Item	Corrective Action
Is the channel designated for conversion-enabled?	Designate the channel for conversion-enabled.
Is the RUN LED flashing or turned OFF?	Follow the procedure given in Section 6.2.
Is the RUN LED on the CPU flashing or turned OFF?	Check the contents of the error as given in the A1SCPU User's Manual.
Is the ERROR LED on the CPU flashing or turned OFF?	
Is a Pt100 securely connected or is there a disconnection within the Pt100?	Securely connect or replace the Pt100.
Has the error been fixed correctly?	Follow the procedure given in Section 4.4.

6.8 If the Temperature Input Values do not Correspond to the Temperature Detection Values

Check Item	Corrective Action
Does the designated type of Pt100 correspond to the actual Pt100 used?	Make sure the designated type corresponds to the actual Pt100 being used.
Is error compensation done correctly?	Follow the procedure given in Section 4.4.
Is the disconnection detection flag set?	Follow the procedure given in Section 6.6.
Is the CPU in the RUN state?	Set the CPU to the RUN state.

APPENDICES

APPENDIX 1 COMPARISON OF PERFORMANCE SPECIFICATIONS BETWEEN A1S62RD3, A1S62RD4, A68RD3, AND A68RD4

Table 1 Comparison of Performance Specifications

Item			A1S62RD3	A68RD3	A1S62RD4	A68RD4
Method of measurement			3-wire type		4-wire type	
Connectable temperature-measuring resistor			Pt100 (conforms to 1989 JIS and DIN) JPt100 (1981 JIS)			
Temperature input range		Pt100	−180°C to 600°C (27.08 Ω to 313.59 Ω)			
		JPt100	−180°C to 600°C (25.8 Ω to 317.28 Ω)			
Detected temperature value			16-bit signed binary −1800 to 6000 (value to the first decimal place x 10)			
			32-bit signed binary −180000 to 600000 (value to the third decimal place x 1000)			
Resolution			0.025 °C			
Overall accuracy			±1%			
Conversion speed			40 ms/channel			
Number of temperature input device points			2 channels/ module	8 channels/ module	2 channels/ module	8 channels/ module
Number of temperature input device points	Between an input terminal and PC CPU power		Photocoupler insulation			
	Between channels		No insulation			
Number of I/O device points			32			
Connection terminal block			20-point terminal block	38-point terminal block	20-point terminal block	38-point terminal block
Specifying channel to detect temperature			Specify conversion-enabled for each channel			
Disconnection detection			Detected at each channel		Detected at all channels by batch	
5 VDC internal current consumption (A)			0.54	0.94	0.44	0.75

APPENDIX 2 STANDARD RESISTANCE VALUE OF PLATINUM TEMPERATURE-MEASURING RESISTORS

2.1 New JIS/DIN Type (Pt100)

JIS C 1604-1989, DIN 43760-1980

Unit : Ω

–100	–0	Temperature °C	Temperature °C	0	100	200	300	400	500	600
60.25	100.00	–0	0	100.00	138.50	175.84	212.02	247.04	280.90	313.59
56.19	96.09	–10	10	103.90	142.29	179.51	215.57	250.48	284.22	
52.11	92.16	–20	20	107.79	146.06	183.17	219.12	253.90	287.53	
48.00	88.22	–30	30	111.67	149.82	186.82	222.65	257.32	290.83	
43.87	84.27	–40	40	115.54	153.58	190.45	226.17	260.72	294.11	
39.71	80.31	–50	50	119.40	157.31	194.07	229.67	264.11	297.39	
35.53	76.33	–60	60	123.24	161.04	197.69	233.17	267.49	300.65	
31.32	72.33	–70	70	127.07	164.76	201.29	236.65	270.86	303.91	
27.08	68.33	–80	80	130.89	168.46	204.88	240.13	274.22	307.15	
	64.30	–90	90	134.70	172.16	208.45	243.59	277.56	310.38	

2.2 Old JIS Type (JPt100)

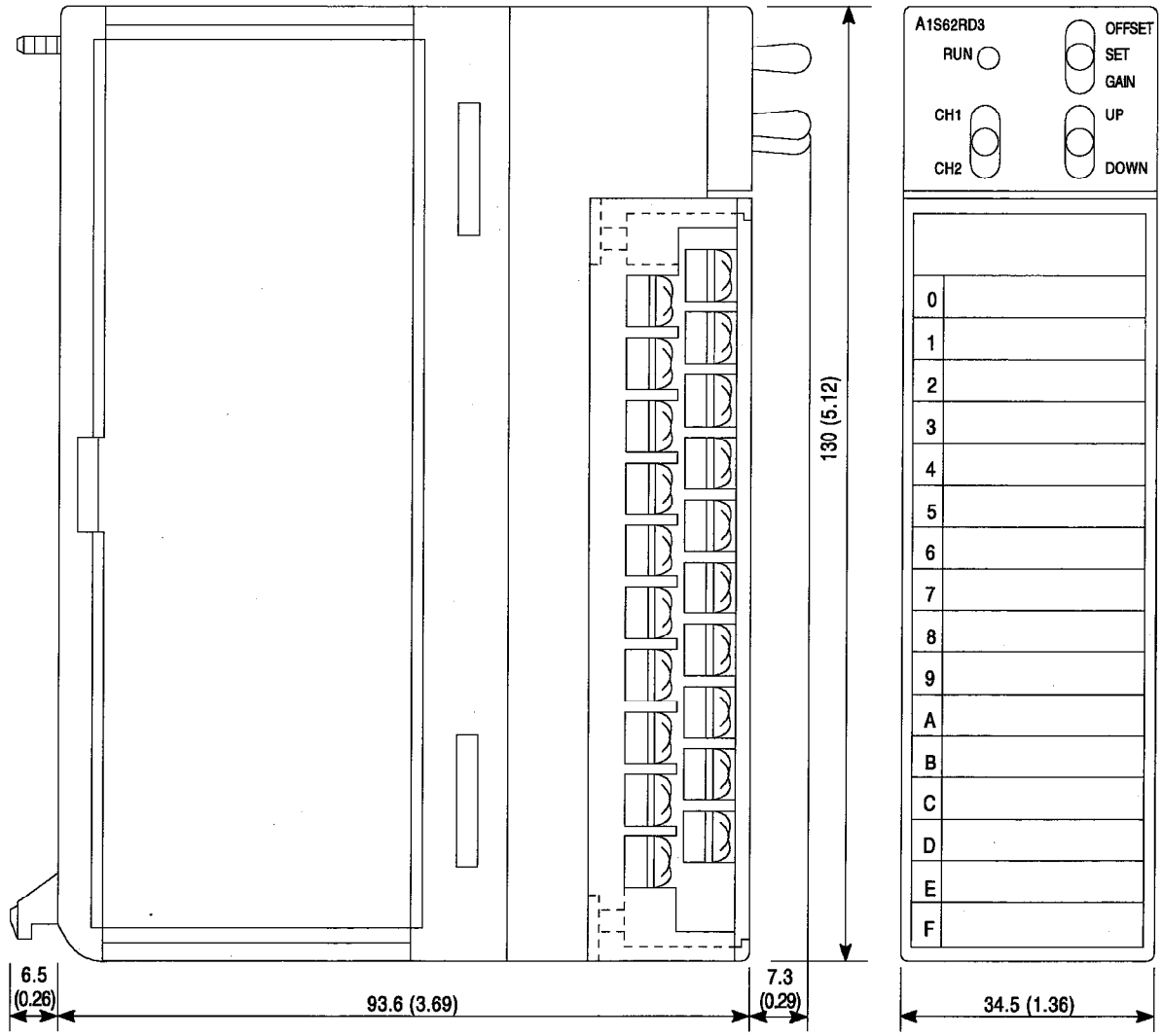
JIS C 1604-1981

Unit : Ω

–100	–0	Temperature °C	Temperature °C	0	100	200	300	400	500	600
59.57	100.00	–0	0	100.00	139.16	177.13	213.30	249.56	284.02	317.28
55,44	96.02	–10	10	103.97	143.01	180.86	217.54	253.06	287.40	
51.29	92.02	–20	20	107.93	146.85	184.58	221.15	256.55	290.77	
47.11	88.01	–30	30	111.88	150.67	188.29	224.74	260.02	294.12	
42.91	83.99	–40	40	115.81	154.49	191.99	228.32	263.49	297.47	
38.68	79.96	–50	50	119.73	158.29	195.67	231.89	266.94	300.80	
34.42	75.91	–60	60	123.64	162.08	199.35	235.45	270.38	304.12	
30.12	71.85	–70	70	127.54	165.86	203.01	238.99	273.80	307.43	
25.80	67.77	–80	80	131.42	169.63	206.66	242.53	277.22	310.72	
	63.68	–90	90	135.30	173.38	210.30	246.05	280.63	314.01	

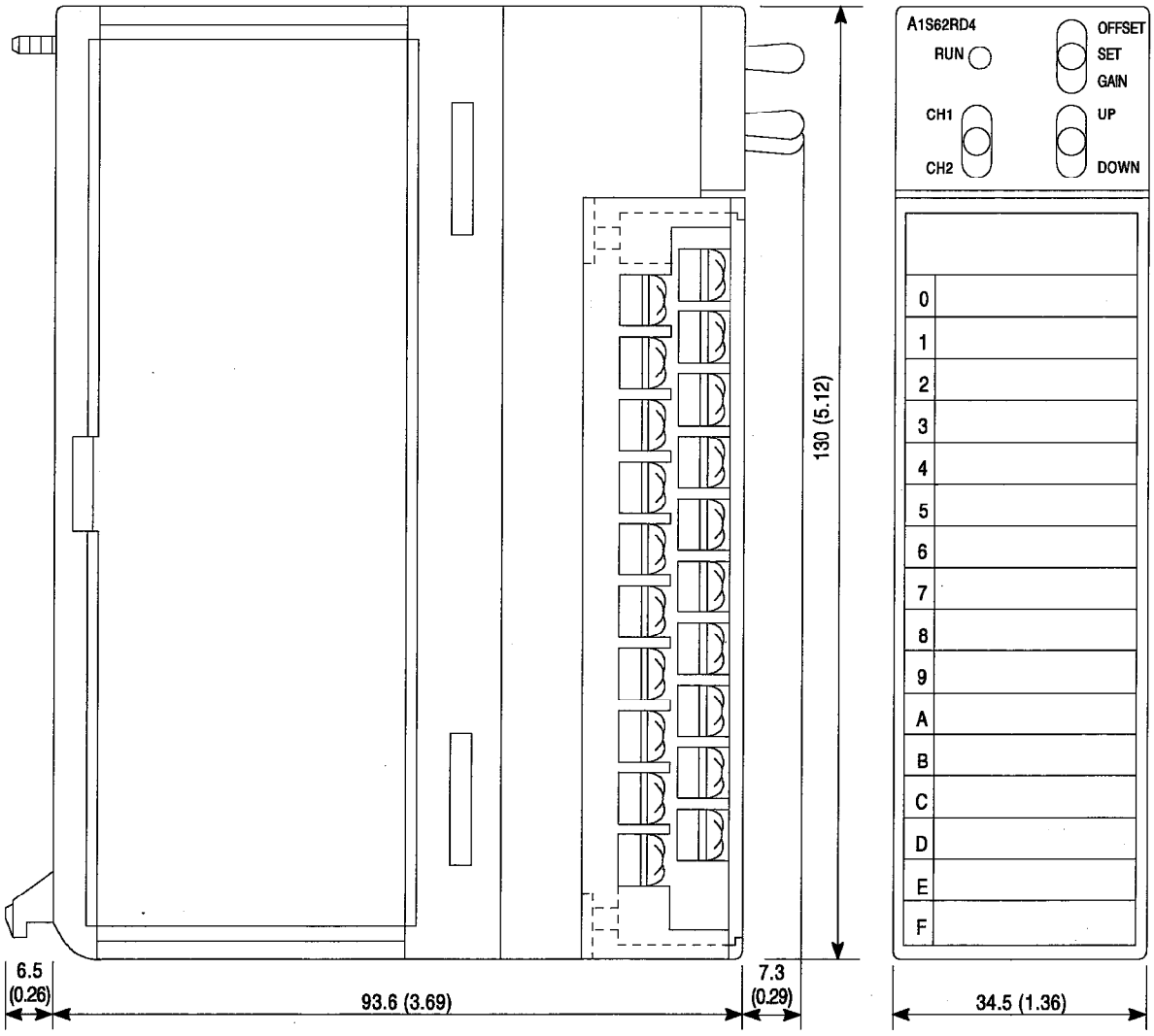
APPENDIX 3 OUTSIDE DIMENSIONS

3.1 A1S62RD3



Unit : mm (in)

3.2 A1S62RD4



Unit : mm (in)

MEMO

MEMO

MEMO

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

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

These precautions apply only to Mitsubishi equipment. Refer to the CPU module user's manual for a descriprion of the PC system safty precautions.

These ●**SAFETY PRECAUTIONS**● classifiy the safty 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 circumestances, procedures indicated by **CAUTION** may also be linked to serious results.

In many 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.

[System Design Precautions]

⚠ CAUTION

- Do not bundle control lines or communication wires together with main circuit or power lines, or lay them close to these lines.
  As a guide, separate the lines by a distance of at least 100 mm, otherwise malfunctions may occur due to noise.

[Cautions on Mounting]

⚠ CAUTION

- Use the PC in an environment that conforms to the general specifications in the manual.
  Using the PC in environments outside the ranges stated in the general specifications will cause electric shock, fire, malfunction, or damage to/deterioration of the product.
- Install so that the pegs on the bottom of the unit fit securely into the base unit peg holes.
  Not installing the unit correctly could result in erroneous operation, damage, or pieces of the product falling.

[Cautions on Wiring]

⚠ CAUTION

- Be sure to ground the FG and LG terminals, carrying out at least class 3 grounding work with a ground exclusive to the PC.
  Otherwise there will be a danger of electric shock and malfunctions.
- Carry out wiring to the PC 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.

[Cautions on Startup and Maintenance]

DANGER

- Do not touch terminals while the power is ON.
  This will cause malfunctions.
- Switch the power off externally for all phases before cleaning or re-tightening terminal screws, otherwise you may sustain electric shock.

CAUTION

- Do not disassemble or modify any module.
  This will cause failure, malfuntion, injuries, or fire.
- Turn the power off when removing a unit. Trying to remove the unit while the power is on could damage the unit or result in erroneous operation.

[Cautions on Disposal]

CAUTION

- Dispose of this product as industrial waste.

REVISIONS

*The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number	Revision
Sep., 1991	IB (NA) 66338-A	First edition
May, 1997	IB (NA) 66338-B	Correction Sections 3.1, 3.2, 4.2, 4.5.1, 4.5.2, 4.5.3, APPENDIX 3, APPENDIX 4 Addition Chapter 2, Section 3.3.3, 3.3.5, 4.4.2
Feb., 2000	IB (NA) 66338-C	Partial correction Sections 3.2 Addition WARRANTY

Japanese Manual Version SH-3529-B

INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-A Series of General Purpose Programmable Controllers. Please read this manual carefully so that the equipment is used to its optimum. A copy of this manual should be forwarded to the end User.

Contents

WARRANTY

Please confirm the following product warranty details before starting use.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the dealer or Mitsubishi Service Company. Note that if repairs are required at a site overseas, on a detached island or remote place, expenses to dispatch an engineer shall be charged for.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found to not be the responsibility of Mitsubishi or the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not possible after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of chance loss and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, chance losses, lost profits incurred to the user by failures in Mitsubishi products, damages and secondary damages caused from special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damages to products other than Mitsubishi products and other duties.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

(1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi general-purpose programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for each Japan Railways company or the Department of Defense shall be excluded from the programmable logic controller applications.

Note that even with these applications, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.

When considering use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected and for which a particularly high reliability is required fin terms of safety and control system, please consult with Mitsubishi and discuss the required specifications.

1. INTRODUCTION

This manual explains the specifications and methods for manipulating and programming the A1S62RD3 platinum temperature-measuring resistor Pt100 temperature input module (hereafter called the A1S62RD3) and the A1S62RD4 platinum temperature-measuring resistor Pt100 temperature input module (hereafter called the A1S62RD4), which are used with an A1SCPU of the MELSEC-A series.

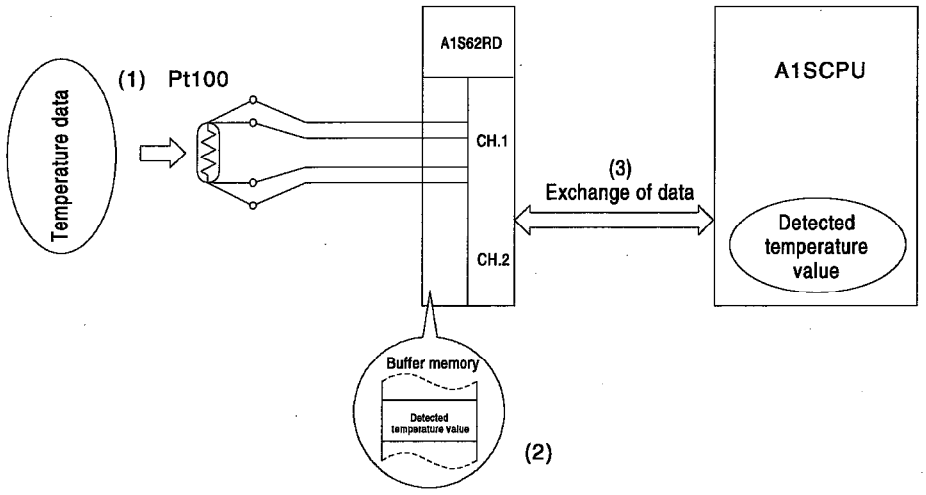
A1S62RD3 is a platinum temperature-measuring resistor for 3-wire-type connections.

A1S62RD4 is a platinum temperature-measuring resistor for 4-wire-type connections.

(Hereafter A1S62RD3 and A1S62RD4 are abbreviated as A1S62RD.)

The A1S62RD converts temperature data from a platinum temperature-measuring resistor JPt100 or Pt100 (hereafter called the Pt100) to either 16 or 32 bits of signed binary data. The sixteen (16) bits of signed binary data are expressed to the first decimal place. The thirty-two (32) bits of signed binary data are expressed to the third decimal place.

Temperature-Measuring Process



(1) A change in the ambient temperature of the Pt100 changes the resistance value.
(2) Temperature data is stored as a detected temperature value and is stored in the buffer memory of the A1S62RD.
(3) A detected temperature value stored in the buffer memory of the A1S62RD is read from A1SCPU.

1.1 Features

(1) The A1S62RD can read temperature data by connecting either an old JIS, a new JIS, or a DIN platinum temperature-measuring resistor directly to the A1S62RD.

(2) The value to the first or third decimal place of the input temperature data can be stored.

Example:

Temperature data: 150.125 [°C] <
- 150.1 [°C] ..... Value to the first decimal place is stored.
- 150.125 [°C] ..... Value to the third decimal place is stored.

(3) One module can be connected to two (2) Pt100s.

(4) Three conversion processing methods (sample processing, time-average processing, and number of times of average processing) can be selected.

(5) Pt100 or cable disconnections can be detected.

- A1S62RD3 : Detection by each channel.
- A1S62RD4 : Joint detection by all channels.

(6) Each channel can set the conversion enable/disable.

REMARK

1* : The old JIS, the new JIS, and the DIN platinum temperature-measuring resistors are as follows:

- Old JIS : JIS C1604-1981
- New JIS : JIS C1604-1989
- DIN : DIN 43760-1980

2. SYSTEM CONFIGURATIONS

(1) Applicable CPU
- A1SJCPU(S3)
- A1SCPU
- A2SCPU
- A2ASCPU(S1)
- A52GCPU(T21B)

(2) Number of Installation Modules
There are no restrictions on the number of modules to be installed as long as the occupied number of I/O points is within the range of number of I/O points of the applicable CPU.

(3) Installation Slots
A module can be installed in any slot in a base unit with an exception of the following cases.
If a module is installed in an extension base (A1S52B, A1S55B, A1S58B) which does not have a power supply module, sufficient power may not be supplied.
When installing an A1S62RD in an extension base which is not equipped with a power supply module, select a power supply module, a base unit, an extension base unit and an extension cable by taking the following into consideration.
1) Current capacity of the power supply module in the base unit
2) Voltage drop at the base unit
3) Voltage drop at the extension unit
4) Voltage drop at the extension cable

(4) Data Link System
In the data link system, the module can be installed at any of the master station, local station, and remote I/O station. For an example of program at the remote I/O station, refer to MELSECNET, MELSECNET/B data link system Reference manual.

REMARK

For the calculation of the range of I/O points and voltage drop, refer to the following manuals.

- A1SJCPU User's manual ..... IB(NA)66446
- A1S/A1SC24-R2/A2SCPU(S1) User's manual ..... IB(NA)66320
- A2ASCPU(S1) User's manual ..... IB(NA)66536
- A52GCPU(T21B) Reference manual ..... IB(NA)66420
- Q2AS(H)CPU(S1) User's manual ..... SH(NA)3599

3. SPECIFICATIONS

This chapter describes the general specifications, performance specifications, and I/O conversion characteristics of the A1S62RD.

3.1 General Specifications

Table 3.1 shows the general specifications of the A1S62RD.

Table 3.1 General Specifications

Item	Specifications				
Operating ambient temperature	0 to 55°C				
Storage ambient temperature	–20 to 75°C				
Operating ambient humidity	10 to 90%RH, non-condensing				
Storage ambient humidity	10 to 90%RH, non-condensing				
Vibration resistance	Conforms to **JIS C 0911	**Frequency**	**Acceleration**	**Amplitude**	**Sweep Count**
		10 to 55 Hz	–	0.075 mm (0.003 inch)	10 times
		55 to 150 Hz	9.8 m/s^2 (1 g)	–	*(1 octave/minute)
Shock resistance	Conforms to **JIS C 0912 (10 g x 3 times in directions)				
Noise Durability	By noise simulator of 1500 Vpp noise voltage, 1 μs noise width and 25 to 60 Hz noise frequency.				
Dielectric withstand voltage	500 VAC for 1 minute across DC external terminals and ground				
Insulation resistance	5 MΩ or larger by 500 VDC insulation resistance tester across AC external terminals and ground				
Operating ambience	Free of corrosive gases. Dust should be minimal.				
Cooling method	Self-cooling				

REMARK

One octave marked * indicates a change from the initial frequency to either half or double the frequency. For example, any of the changes from 10Hz to 20Hz, from 20Hz to 40Hz, from 40Hz to 20Hz, and 20Hz to 10Hz are referred to as one octave.

**JIS: Japanese Industrial Standard

3.2 Performance Specifications

The following table gives the performance specifications of the A1S62RD.

Table 3.2 Performance Specifications

Item	A1S62RD3	A1S62RD4
Method of measurement	3-wire type	4-wire type
Connectable temperature-measuring resistor	Pt100 (conforms to JIS C1604-1989 and DIN 43760-1980)	
	JPt100 (conforms to JIS C1604-1981)	
Output current for detecting temperature	4.2 mA (MIN), 4.7 mA (MAX)	
Temperature input range	Pt100 : −180 [°C] to 600 [°C] (27.08 Ω to 313.59 Ω)	
	JPt100 : −180 [°C] to 600 [°C] (25.8 Ω to 317.28 Ω)	
Detected temperature value	16 bit signed binary −1800 to 6000 (value to the first decimal place x 10)	
	32 bit signed binary −180000 to 600000 (value to the third decimal place x 1000)	
Resolution	0.025 °C	
Overall accuracy	± 1% (accuracy for full scale)	
Conversion speed	40 ms/1 channel	
Number of temperature input device points	2 channels/1 module	
Insulation method	Between channels: No insulation Between an input terminal and PC CPU power: Photocoupler insulation	
Number of I/O device points	32	
Connection terminal block	20-point terminal block	
Applicable wire gauge	0.75 to 2 mm^2 (Applicable tightening torque 7 kg-cm)	
Cable between A1S62RD and Pt100	See Section 3.2.1.	
Applicable solderless terminal	V1.25-3, V1.25-YS3A, V2-S3, V2-YS3A	
5 VDC internal current consumption (A)	0.54	0.44
Weight (kg)	0.29	0.28

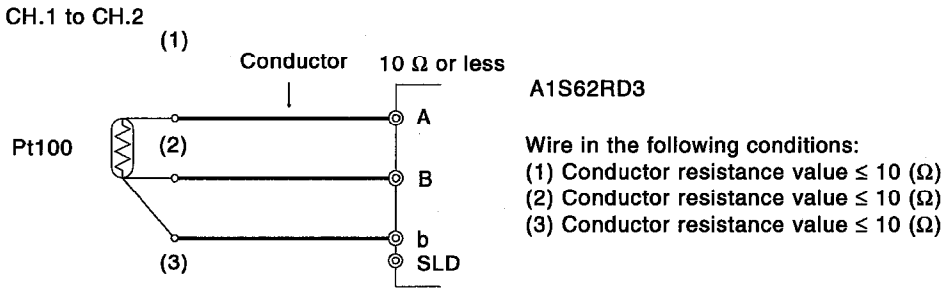
3.2.1 Specifications when connecting with a platinum temperature-measuring resistor

The following specifications apply when an A1S62RD3/A1S62RD4 is connected with a platinum temperature-measuring resistor.

(1) A1S62RD3

Set the conductor resistance value between Pt100 and A1S62RD3 to 10 Ω or less per wire.

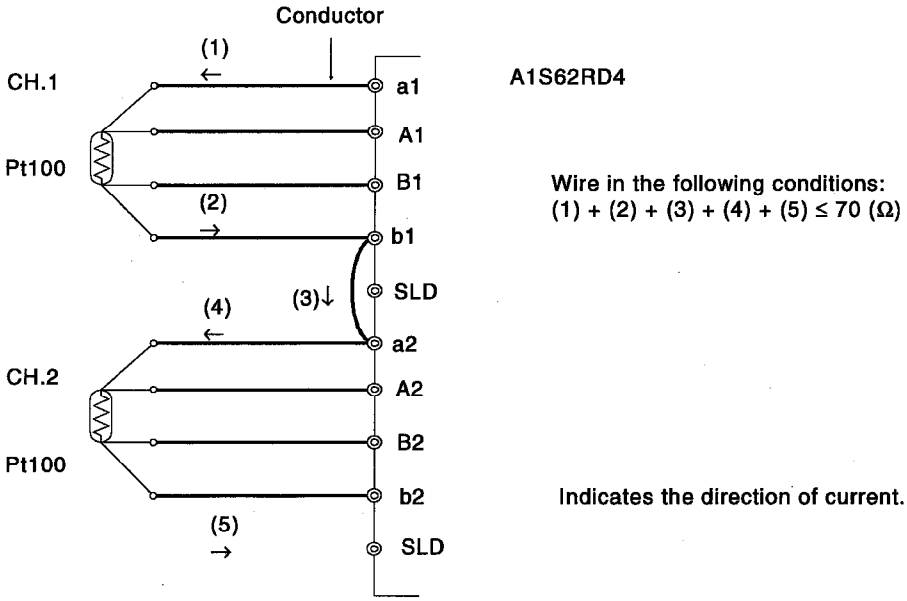
The specifications are common to CH.1 and CH.2.



(2) A1S62RD4

Set the total resistance value of the conductor where the current runs to 70 Ω or less.

Example: Connecting Pt100 to CH.1 and CH.2



3.3 Functions

This section explains the various functions of the A1S62RD

3.3.1 Functions list

The following table lists the functions of the A1S62RD.

Table 3.3 List of Functions

Item	Description	Section Reference
Conversion enable/disable setting of each channel	Temperature detection enable/disable is set.	3.3.2
Sampling/average processing setting	The detected temperature is processed according to the set processing method. The result is stored in buffer memory. There are three kinds of processing methods: • Sample processing • Time-average processing • Count-average processing	3.3.3
Storage of a detected temperature value	Values to the first and third decimal places are given. • Value to the first decimal place (16-bit signed binary) Example: 53.8 [°C] → 538 • Value to the third decimal place (32-bit signed binary) Example: 216.025 [°C] → 216025	3.3.4
Disconnection detection	Disconnection of Pt100 or cable is detected. • A1S62RD3 A disconnection at a channel is detected and the disconnection-detected flag (X3 and X4) that corresponds to that channel is set. • A1S62RD4 If either channel disconnects, it is detected and the disconnection-detected flag (X3) is set.	3.3.5
Setting of a platinum temperature-measuring resistor	The type of platinum temperature-measuring resistor to be used is set. There are two kinds of platinum temperature-measuring resistors: • Pt100: new JIS and DIN type (JIS C1604-1989, DIN 43760-1980) • JPt100: old JIS type (JIS C1604-1981)	3.3.6

3.3.2 Conversion enable/disable channel setting

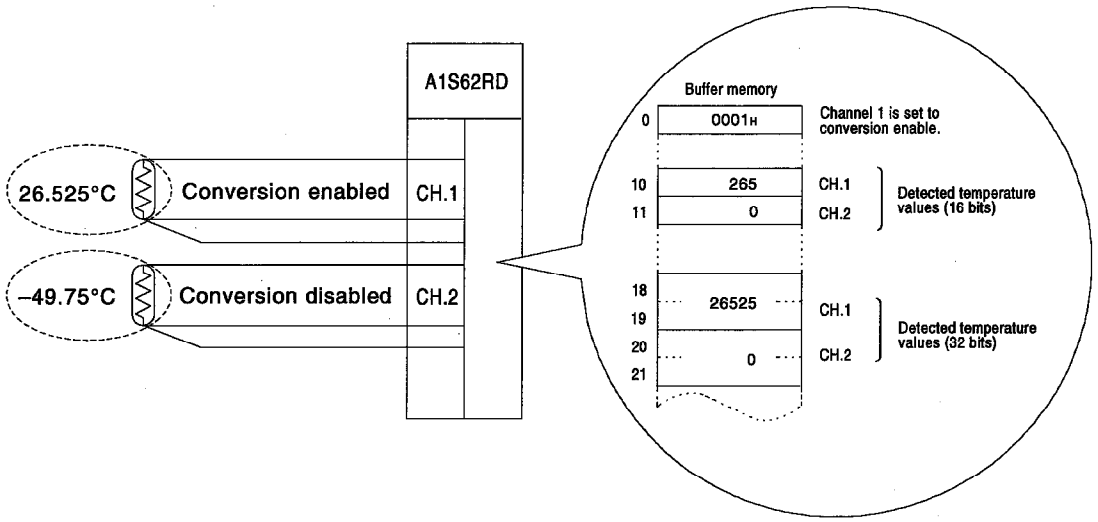
(1) Temperature detection enable/disable is set for each channel.

- Conversion enable : The external temperature is received, and disconnection detection is done.
- Conversion disable : The external temperature is not received, and disconnection detection is not done.

(2) All channels are set to the default conversion disable.

Set the channel to the buffer memory (address 0) for conversion enable/disable setting to convert to the conversion enable. (See section 3.5.2)

Example: When channel 1 is set to conversion enable



(3) The unused channel is set to conversion disable to shorten the sampling time.

Example:

1) When channels 1 and 2 are set to conversion enable

   Sampling time = 2 x 40 ms = 80 ms

2) When channel 1 is set to conversion enable

   Sampling time = 1 x 40 ms = 40 ms

(4) When the conversion enable is switched to conversion disable, the following processing is executed.

(a) Buffer memory (address 35) to store the conversion completed flag of channels 1 and 2 is reset.

(b) Disconnection-detected flag is reset.

POINT

The detected temperature value stored in the buffer memory holds data before writing a conversion enable/disable setting.

REMARKS

(1) Section 3.5 gives details about the buffer memory.

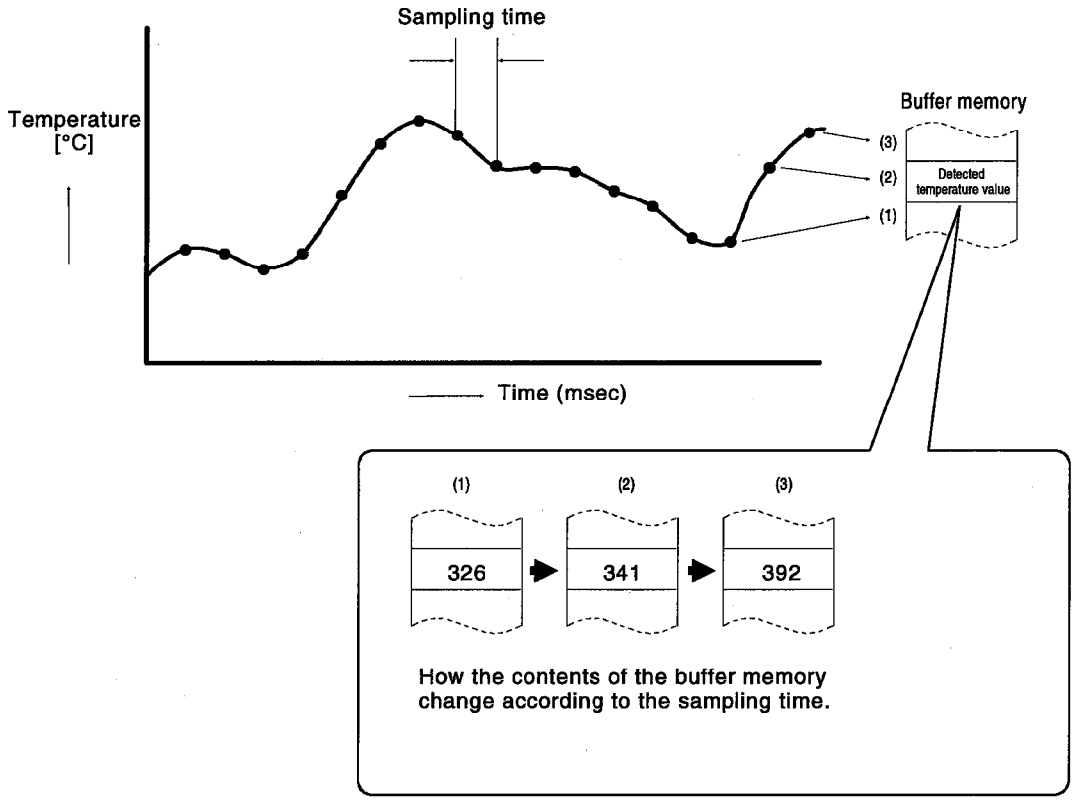
(2) Section 3.3.5 gives details about the disconnection detection, and Section 3.4 gives details about the disconnection-detected flag.

3.3.3 Sampling and time-average processing

Designation of sampling processing or time-average processing is made by buffer memory (address 1) where averaging processing is designated.

(1) Sampling

Data in a channel is converted according to the sampling time set in the PC CPU. The detected temperature values are stored in the buffer memory.



REMARKS

(1) The sampling time varies according to the number of channels.

Sampling time = number of channels to be used x 40 msec (msec)

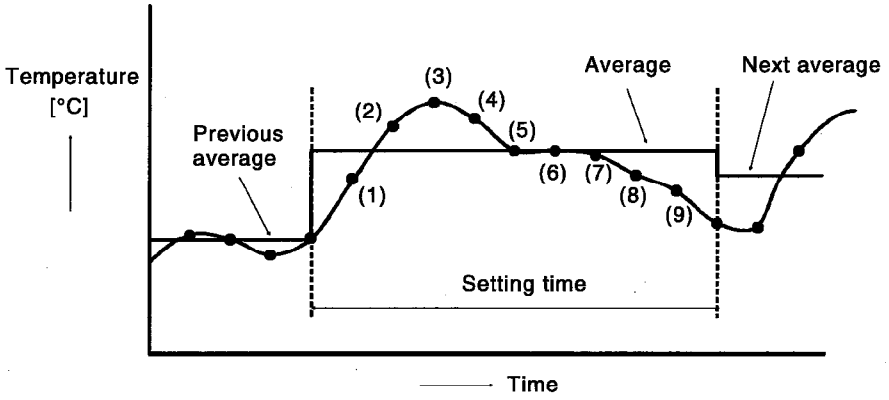
Example: When channel 1 is used
1 x 40 = 40 [ms]

(2) Section 3.5 gives details about the buffer memory.

(2) Time-average processing time

Data conversion in the channel is done in the time that is set in the PC CPU for average processing.

A detected temperature value is read per sampling time in the range of setting time (80 to 32000 ms) and the average of the remaining values (except for maximum and minimum values) is stored in buffer memory.



Data

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
180	210	220	215	205	200	195	180	170

Maximum value

Minimum value

$$\text{Average} = \frac{180 + 210 + 215 + 205 + 200 + 195 + 180}{7} = 198$$

Stored in buffer memory.

The previous average is stored in buffer memory until the average of the new detected temperature value is stored.

REMARKS

(1) The sampling count at a specified time varies with the number of channels.

$$\text{Sampling count} = \frac{\text{setting time}}{\text{number of channels used} \times 40 \text{ ms [ms]}}$$

Example: When channels 1 and 2 are used, and the setting time is 60 msec

$$\text{Sampling count} = \frac{600 \text{ ms}}{2 \times 40 \text{ ms}} = 7.5$$

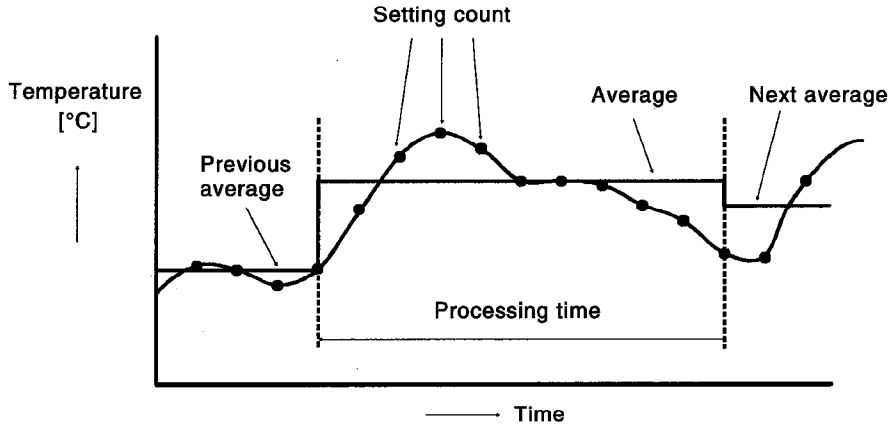
The sampling count is rounded down to 7.

(2) Section 3.5 gives the buffer memory to store a detected temperature value.

(3) Count average processing

Data conversion in the channel is done in the time set in the PC CPU for average processing.

A detected temperature value is read per the sampling time in the range of (1 to 800 times) and the average of the remaining values (except for maximum and minimum values) is stored in buffer memory.



The previous average is stored in the buffer memory until the average of the newly detected temperature value is stored.

REMARKS

(1) The sampling time at a specified count varies with the number of channels.

Sampling time = setting count x number of channels used x 40 ms [ms]

Example When channels 1 and 2 are used, the setting count is 10 and 15, and the sampling time is as follows:

Channel	Setting Count	Sampling Time
CH. 1	10	10 times x 2 x 40 ms = 800 [ms]
CH. 2	15	15 times x 2 x 40 ms = 1200 [ms]

(2) Section 3.5 gives the detected temperature value to store to the buffer memory .

3.3.4 Storage of a detected temperature value

Temperature can be detected with the A1S62RD within the range of –180 °C to 600 °C.

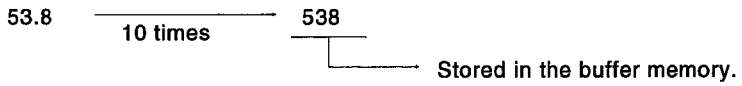
Detected temperature values to the first and third decimal places are stored in the buffer memory.

(1) Values to the first decimal place:

Values to the first decimal place are multiplied by 10 and expressed as 16-bit signed binary values.

The data within the range of –1800 to 6000 is stored.

Example: 53.8 °C

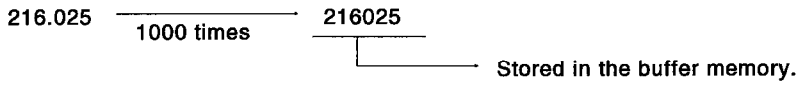


(2) Values to the third decimal place:

Values to the third decimal place are multiplied by 1000, and expressed as 32-bit signed binary values.

The data within the range of –180000 to 600000 is stored.

Example: 216.025 °C



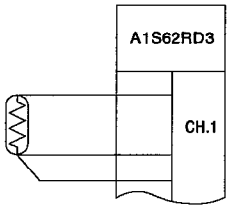
3.3.5 Disconnection detection

Disconnection of a Pt100 or cable is detected.

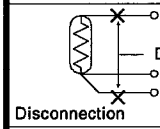
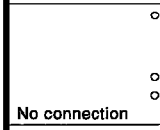
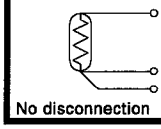
(1) A1S62RD3 (3-wire type)

Disconnection at each channel is detected and the disconnection-detected flag (X3 to X4) that corresponds to that channel is set.

However, this applies only in channels specified for conversion enabled.



Connections between CH1 and a Pt100

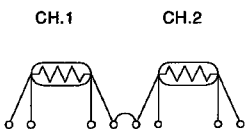
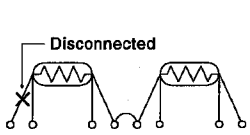
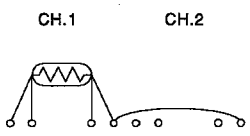
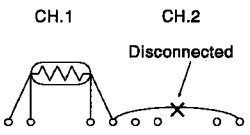
Connection Example	Conversion-Enabled/Disabled Specification	Disconnection-Detected (X3)
 Disconnected; Disconnection	Conversion enabled	ON
	Conversion disabled	OFF
 No connection	Conversion enabled	ON
	Conversion disabled	OFF
 No disconnection	Conversion enabled	OFF
	Conversion enabled	

(2) A1S62RD4 (4-wire type)

Disconnection at each channel is detected and the Σ disconnection-detected flag (X3) is set.

However, if all channels are specified for conversion disabled, disconnections are not detected.

If at least one channel is specified for conversion enabled, disconnections are detected.

	Σ Disconnection-Detected Flag (X3)			
	All Channels are Used		CH.1 is Used	
Connection example	 CH.1 CH.2; No disconnection	 Disconnected; Disconnection	 CH.1 CH.2; No disconnection	 CH.1 CH.2 Disconnected; Disconnection
CH.1 and CH.2 are enabled.	OFF	ON		
CH.1 is enabled.	OFF	ON	OFF	ON
CH.2 is enabled.	OFF	ON		
CH.1 and CH.2 are disabled.	OFF			

POINTS

(1) Be sure to set the channel which is not connected to or used by the Pt100 to conversion disabled. If it is set to conversion enabled, the disconnected-detected flag is set.

(2) Section 3.4.4 gives details about disconnection-detected flags.

(3) Section 4.5 gives details about Pt100 connections.

3.3.6 Specifying platinum temperature-measuring resistors

Two types of platinum temperature-measuring resistor - the JPt100 (new JIS type C1604-1989 and DIN type 43760-1980) or the Pt100 (old JIS type C1604-1981) - can be used in the A1S62RD.

Specifying the type of platinum temperature-measuring resistor by using buffer memory (address 36) sets all channels to a specified type.

(The type is set to Pt100 when power is turned ON or the CPU is reset.)

POINT

Two different types of platinum temperature-measuring resistors cannot be used simultaneously in one module. If two types are used, the correct temperature detection cannot be achieved in the channel which has a different platinum temperature-measuring resistor than the one specified.

REMARKS

(1) Appendix 2 gives details about the standard resistance values of the platinum temperature-measuring resistors.

(2) Section 3.5 gives details about the buffer memory.

3.4 CPU I/O Signal

This section explains the functions of I/O signals that control the A1S62RD and the PC CPU.

X devices refer to input signals from the A1S62RD to the CPU.

Y devices refer to output signals from the CPU to the A1S62RD.

The device signals (X and Y) shown in this section are used when the A1S62RD is loaded into slot 0 of the main base unit.

Table 3.4 A1S62RD3 I/O Signals

Signal Direction: A1S62RD3 → CPU		Signal Direction: CPU → A1S62RD3	
Device No.	Description	Device No.	Description
X0	WDT error flag	Y0 to Y11	Unusable
X1	READY flag		
X2	Write data error flag		
X3	CH.1: Disconnection-detected flag		
X4	CH.2: Disconnection-detected flag		
X5 to X1F	Unusable	Y12	Error code reset flag
		Y13 to Y1F	Unusable

Table 3.5 A1S62RD4 I/O Signals

Signal Direction: A1S62RD4 → CPU		Signal Direction: CPU → A1S62RD4	
Device No.	Description	Device No.	Description
X0	WDT error flag	Y0 to Y11	Unusable
X1	READY flag		
X2	Write data error flag		
X3	Σ disconnection-detected flag (CH.1 and CH.2)		
X4 to X1F	Unusable	Y12	Error code reset flag
		Y13 to Y1F	Unusable

3.4.1 WDT (watch dog timer) error flag (X0)

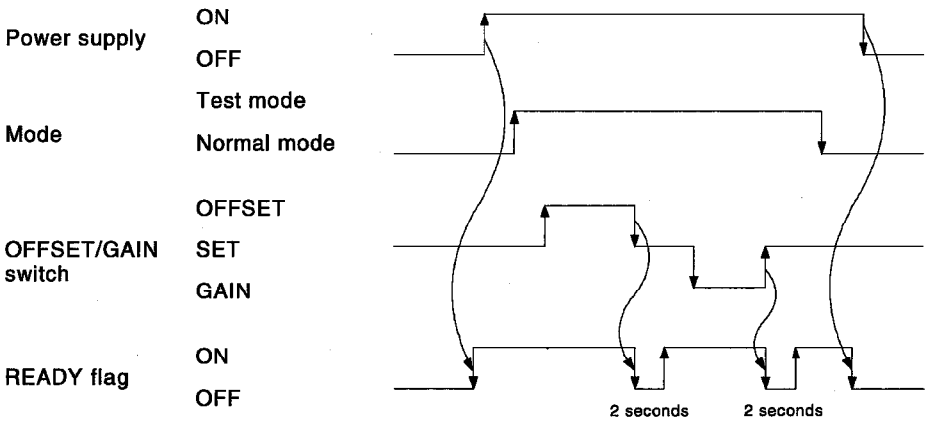
This flag is set when the self-diagnosis function of the A1S62RD detects a WDT error.

While the error flag is set, the conversion of the A1S62RD does not RUN. If the error flag (X0) is set, hardware malfunctions may occur.

3.4.2 READY flag (X1)

This flag is set when the conversion is ready after turning ON or resetting the CPU in the normal mode (*1).

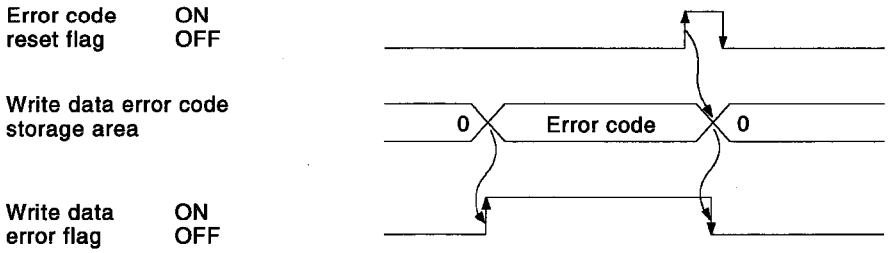
This flag is reset in the test mode (*2) when the OFFSET/GAIN switch is set to SET.



3.4.3 Write data error flag (X2) and error code reset flag (Y12)

This flag is set when an error other than the watchdog timer error occurs in the A1S62RD and the error code is stored in the buffer memory error code storage area (address 34).

If "0" is written to the setting value check code storage area or the error reset flag is set with a sequence program, the error code is reset.



REMARKS

(1) Section 3.5.6 gives details about write data error code.

(2) *1:Normal mode refers to the state of terminals 1 and 3 when the A1S62RD is disconnected.

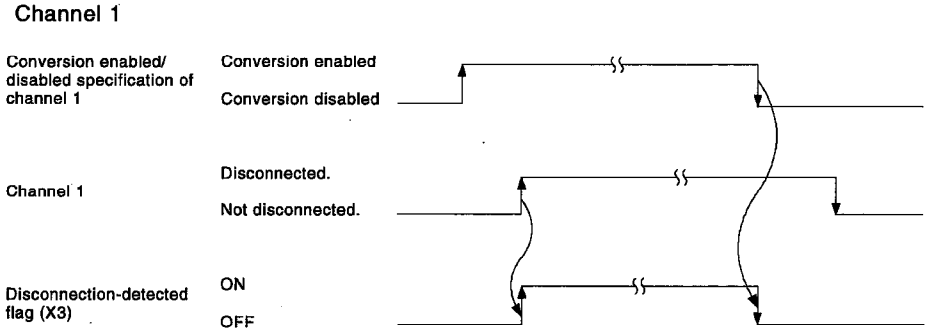
(3) *2:Test mode refers to the state of terminals 1 and 3 when the A1S62RD is connected.
Additionally, an error can be compensated in the test mode.

3.4.4 Disconnection-detected flag

(1) A1S62RD3

When a channel set to conversion enabled is disconnected, the disconnection-detected flag (X3 and X4) of its channel is set.

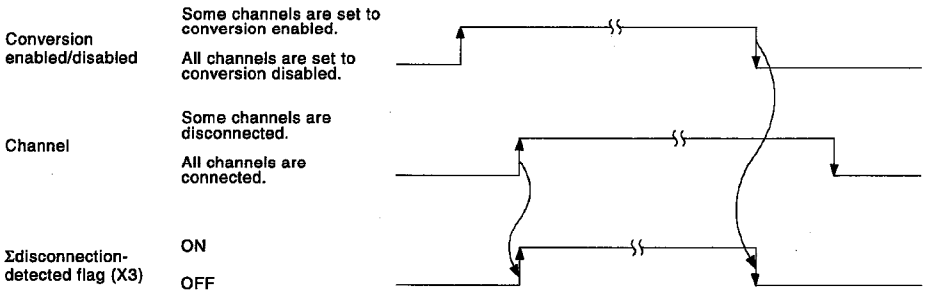
If a channel is set to conversion disabled, the disconnection-detected flag is always reset.



(2) A1S62RD4

When some of the channels are set to conversion enabled, and any of the channels are disconnected, the Σdisconnection-detected flag (X3) is set.

When all of the channels are set to conversion disabled, the disconnection-detected flag (X3) is always reset.



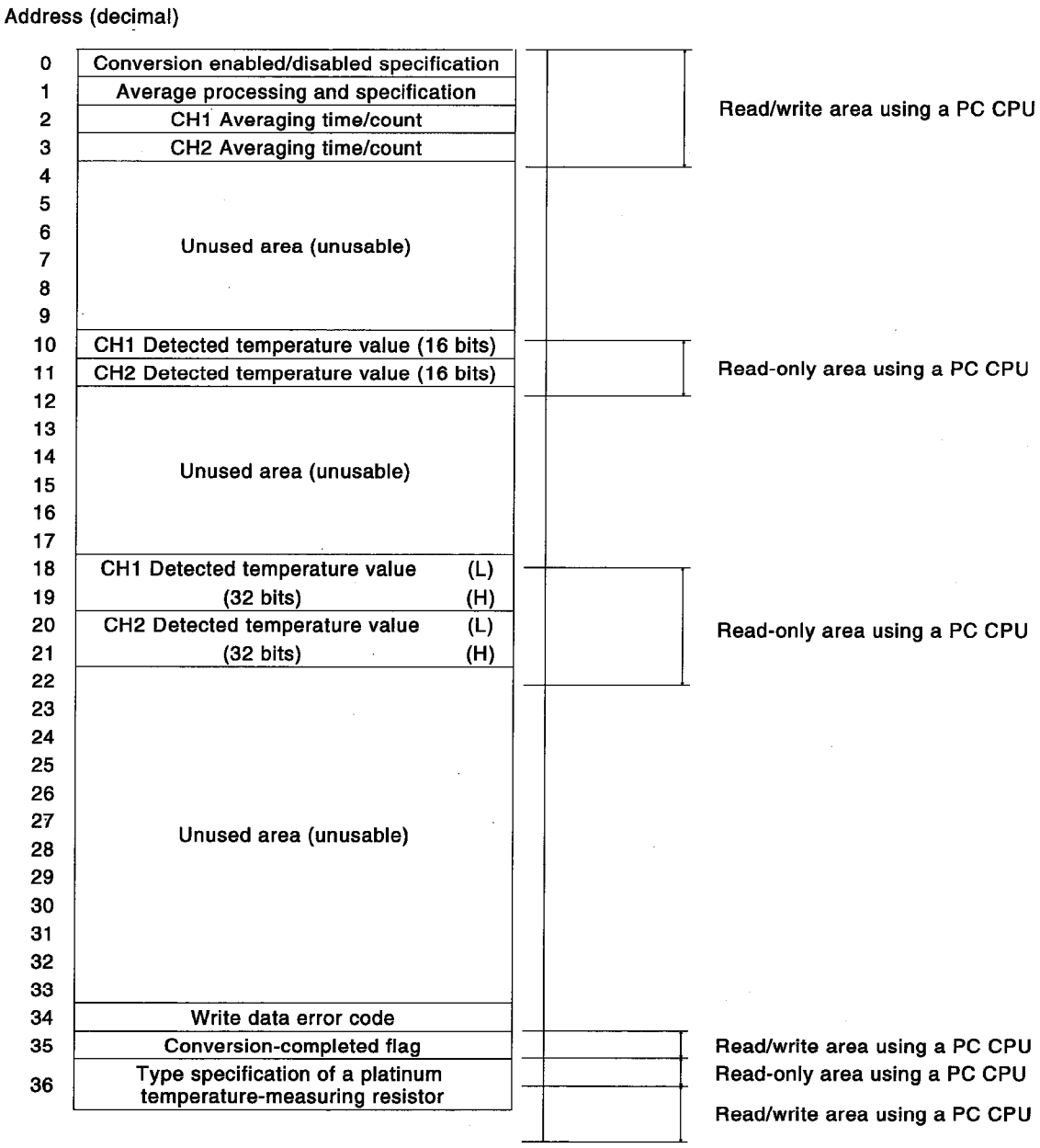
REMARK

Section 3.3.5 gives details of disconnection detection.

3.5 Buffer Memory

3.5.1 Buffer memory allocation

The following describes the buffer memory allocation (not battery-backed) of an A1S62RD.



POINT

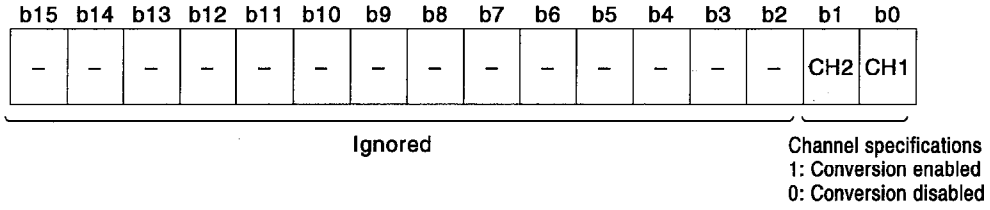
When using a PC CPU, the buffer memory addresses 10, 11, 18 to 21, and 35 are read areas. Therefore, never write with a PC CPU because the A1S62RD always overwrites a detected temperature value. Thus, even when only writing, the buffer memory data is cleared.

3.5.2 Buffer for conversion enabled/disabled specifications (Address 0)

This area is used to set the temperature detection.

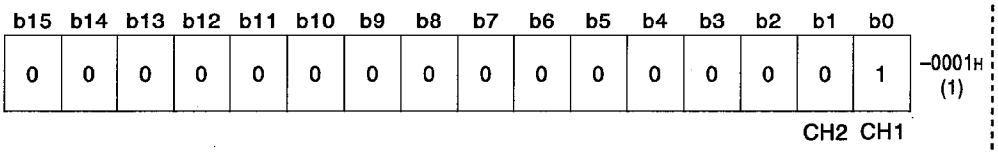
(1) When the power is turned ON, the channel specification is set at "0000H(0)" for conversion disabled for all channels.

(2) Conversion enabled/disabled can be changed with the sequence program to reduce the sampling time.



Example: To specify channel 1 for conversion

By writing 0001H(1) to specify the channels for conversion enabled/disabled, the sampling time is obtained as 40 ms x 1 = 40 ms.



REMARK

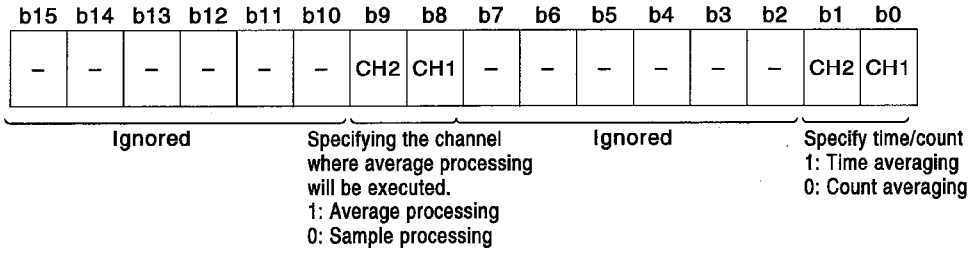
Section 3.3.2 gives conversion enabled/disabled specifications

3.5.3 Buffer for average processing specifications (Address 1)

This area is used to set the sample processing or average processing.

(1) When the power is turned ON and the READY flag of the A1S62RD is set, all of the channels are set for sample processing.

(2) Use the buffer memory address 1 for selection of sample processing or average processing and the specification of the processing method (time average/count average).



POINT

When the average processing is not specified, sample processing is set without regard to the time/count specification.

REMARK

Section 3.3.3 gives sample processing and average processing-details.

3.5.4 Buffer for averaging time/count (Addresses 2 and 3)

(1) When the power is turned ON, the averaging time and averaging count are set to 0.

(2) The setting ranges are as indicated below:

Average processing in terms of time : 80 to 32000 ms

Average processing in terms of count : 1 to 800 times

POINT

If a value outside of the above range has been written, a setting error occurs and the buffer memory for averaging time/count is rewritten.

However, the A1S62RD performs conversion processing at the averaging time or count previously set.

REMARK

(1) Section 3.3.3 gives averaging time/count-details.

3.5.5 Buffer for detected temperature value (Addresses 10, 11, 18 to 21)

Two types of detected temperature storing areas are provided depending on the bit size of the data - 16-bit data storing area and 32-bit data storing area.

(1) For 16 bit data (addresses 10 and 11)

Ten (10) times the value of a detected temperature is stored in the range from –1800 to 6000 as a 16-bit signed binary value.

If a detected temperature value is negative, this is stored as a complement of 2.

Example 1: If a detected temperature value is 123.025°C, 1230 is stored.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	1	0	0	1	1	0	0	1	1	1	0

Example 2: If a detected temperature value is –123.025 °C, –1230 is stored.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
1	1	1	1	1	0	1	1	0	0	1	1	0	0	1	0

(2) For 32 bit data (addresses 18 to 21)

One-thousand (1000) times the value of a detected temperature value is stored in the range from –180000 to 600000 as a 32-bit signed binary value.

If a detected temperature value is negative, this is stored as a complement of 2.

Example 1: If a detected temperature value is 123.025 °C, 123025 is stored.

b31	to	b24	b23	to	b16	b15	to	b8	b7	to	b0
0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0			0 1 1 1 1 0 0 0			0 1 0 0 1 0 0 0			1

Example 2: If a detected temperature value is –123.025 °C, –123025 is stored.

b31	to	b24	b23	to	b16	b15	to	b8	b7	to	b0
1 1 1 1 1 1 1 1		1 1 1 1 1 1 1 1			1 0 0 0 0 1 1 1			1 0 1 1 0 1 1 1			1

REMARK

Section 3.3.4 gives detected temperature value-details.

3.5.6 Buffer for write data error code (Address 34)

This area is used to check whether data written to an A1S62RD from a CPU has been written to the WRITE area within the setting range.

(1) When data is read from the PC CPU, the A1S62RD checks the following:

- Data range check for the averaging count and averaging time.
- Data check for writing to the read-only area.

If any value is outside the specified range or if data is written to the read-only area, the A1S62RS stores the error code as a 16-bit binary value. Section 6.1 gives error code details.

(2) If there is more than one error code, the first data error code detected by the A1S62RD will be stored. The others are not stored.

(3) To reset an error code, write 0 from the PC CPU.

If an error is reset without correcting the error, the data error code is set to 0 and the RUN LED of A1S62RD stops flashing.

POINTS

(1) When a value other than "0" is written, the error code is not reset.

(2) Error code reset can be done by setting the error reset flag (Y12). (See Section 3.4.3.)

3.5.7 Buffer for conversion-completed flag (Address 35)

This area is used to check whether the channel specified for conversion-enabled can detect the temperature correctly.

(1) After power ON, the processing of the conversion-completed flag is performed only once, when the channel specification for conversion enabled/disabled (address 0) is changed.

- Conversion enabled/disabled specification change from 0 to 1:

  After setting conversion enabled and storing a detected temperature value in buffer memory, the conversion-completed flag of its corresponding channel is set to 1.
- Conversion enabled/disabled specification change from 1 to 0:

  The conversion-completed flag of its corresponding channel is set to 0.

(2) A conversion-completed flag is provided to each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	CH2	CH1

Conversion-completed flag
1: Conversion completed
2: Conversion not completed

(3) The conversion-completed flag can be used for the interlock when reading the detected temperature value of the channel where average processing is executed.

3.5.8 Buffer for the type of specifications for a platinum temperature-measuring resistor (Address 36)

(1) When the power supply is turned ON, the type is set to new JIS/DIN.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
															1/0

Ignored

Type specifications of a platinum temperature-measuring resistor
1: Old JIS type
0: New JIS/DIN type

(2) All channels correspond to a specified type.

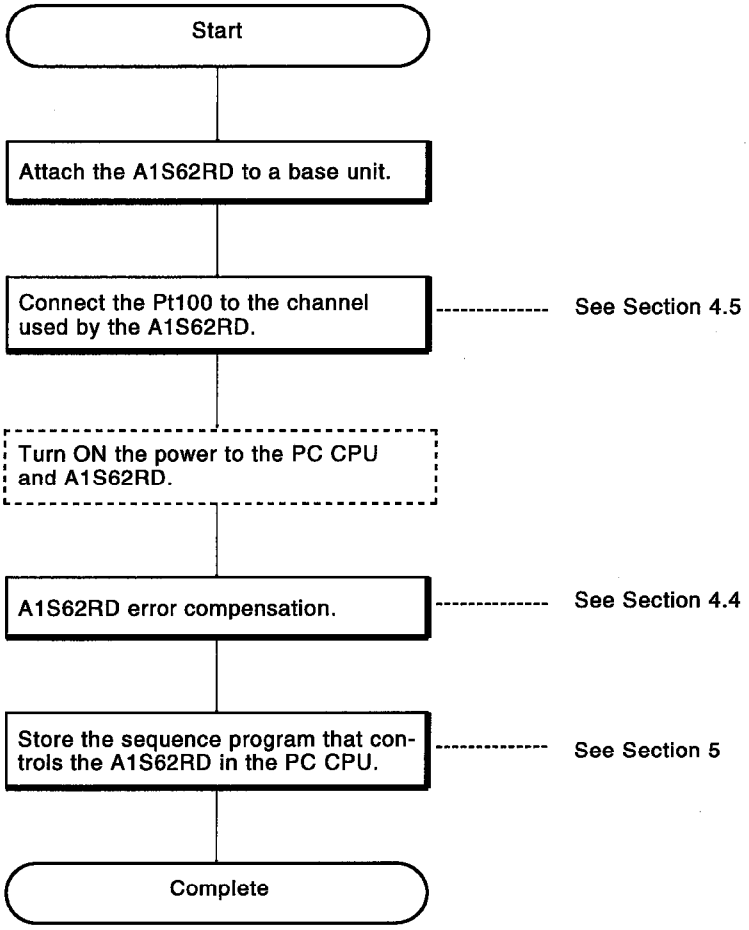
REMARK

Section 3.3.6 gives platinum temperature-measuring resistor-details.

4. PRE-OPERATION SETTINGS AND PROCEDURES

4.1 Pre-Operation Procedures

The pre-operation settings and procedures of the A1S62RD are given below.



4.2 Handling Instructions

The following explains the handling instructions for the A1S62RD.

(1) Since the case and terminal block of the module are plastic, do not drop the module. Hard impacts must not be applied, either.

(2) Do not remove the printed circuit boards from their housing. Otherwise, it will cause fault.

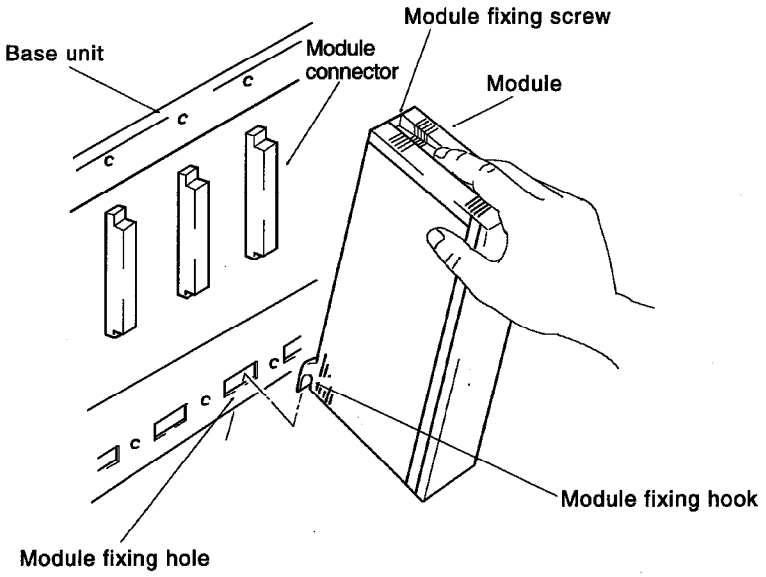
(3) Make sure that no conductive debris can enter the module. If it does, make sure that it is removed.

(4) Tighten the terminal screws as specified below:

Screw	Tightening Torque Range (kg·cm) (lb·in)
I/O terminal block terminal screws (M3.5)	6 (5.19) to 9 (7.80)
I/O terminal block installation screws (M4)	8 (6.93) to 12 (10.39)
Module mounting screw (M4)	8 (6.93) to 12 (10.39)

(5) To install a module to the base unit, insert the module fixing hook into the module fixing hole on the base unit and tighten the module fixing screw.

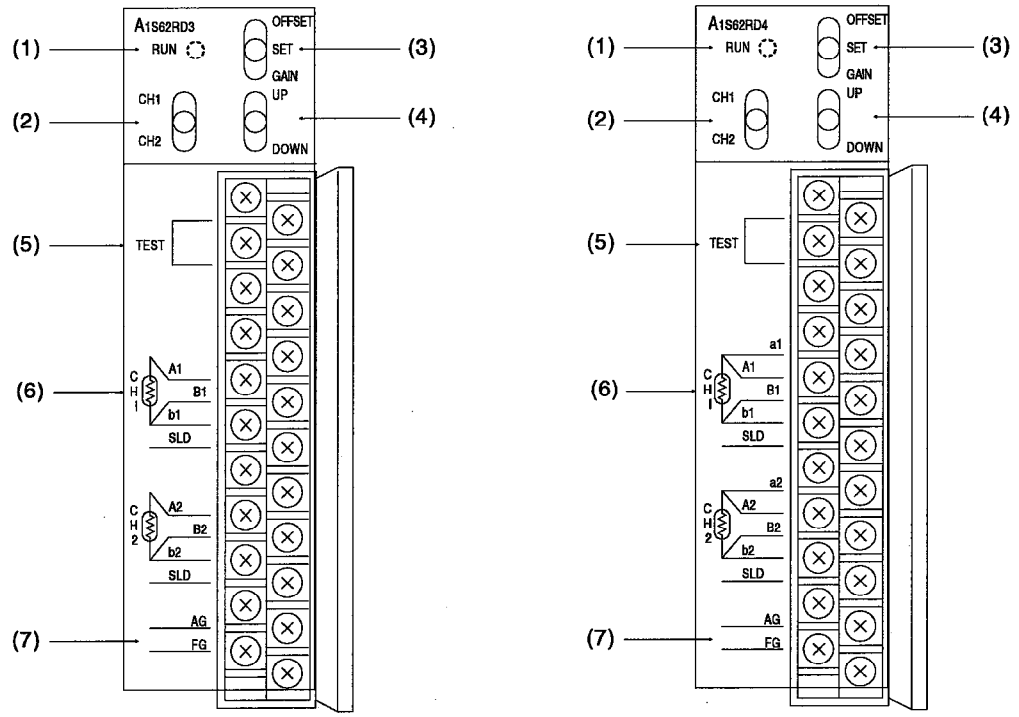
To remove a module, loosen the module fixing screw, and pull the module fixing hook out of the module fixing hole.



4.3 Nomenclature

The following gives the nomenclature of each part of the A1S62RD3 and A1S62RD4.

Table 4.1 Nomenclature



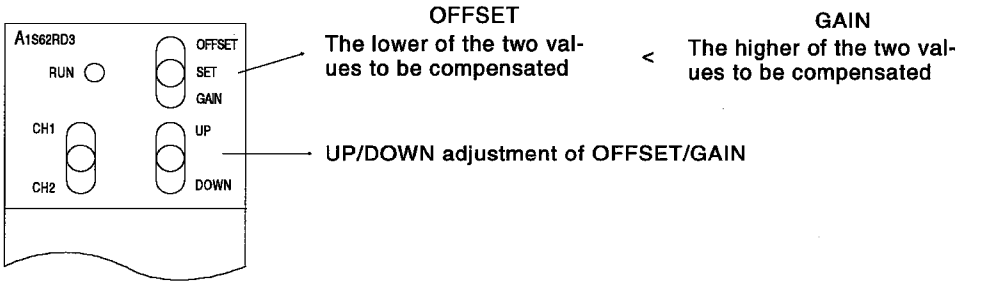
A1S62RD3 A1S62RD4

No.	Description	Application	
(1)	Operating status display LED (RUN LED)	Normal mode	ON : Normal operation Flash : Write data error OFF : 5 VDC power OFF or WDT error
		Test mode	ON : When the offset/gain select switch is set to either OFFSET or GAIN, this LED flashes every 0.5 s. OFF : OFFSET and GAIN switches are set to the SET position.
(2)	Channel select switch	Used for an offset and gain adjustment when error compensation is selected.	
(3)	OFFSET/GAIN setting switch	Used to set the offset and gain values in the test mode. (1) OFFSET Position : The calibration mode of an offset value (2) GAIN Position : The calibration mode of a gain value (3) SET Position : Storage mode of an offset/gain value When a switch is changed from OFFSET/GAIN to SET, the detected temperature value is stored in the internal memory of the A1S62RD as an offset/gain value.	
(4)	UP/DOWN switch	Increases or decreases the offset/gain value of a channel to be used at the following rate: (1) ON (Less than 1.5 s) : The value increases or decreases every time in units of 0.025 °C. (2) ON (1.5 s or more) : The value increases or decreases 0.1 °C every 0.04 s.	
(5)	Test mode terminals	During error compensation, terminals 1 and 3 are shorted.	
(6)	Pt100 connecting terminal	Used to connect a Pt100. (See Section 4.5.)	
(7)	Analog/ground terminals	Grounding should be provided when necessary.	

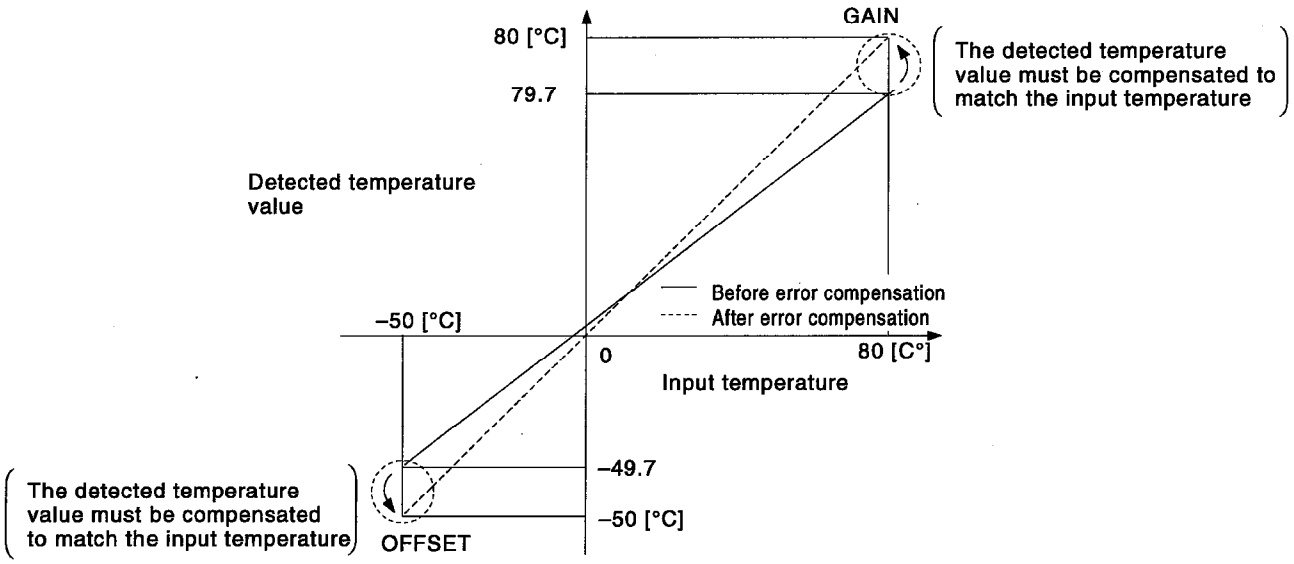
4.4 Error Compensation

Error compensation is done (a) when starting up a system, or (b) when a correct detected temperature value cannot be obtained.

Error compensation is done by reading a detected temperature value from the buffer memory with a sequence program, and monitoring it with a peripheral device.



The characteristics of the detected temperature value for an input temperature are indicated below. Compensate detected temperature values so that the detection value corresponds to the input temperature.



* Error compensation can be done using a standard resistor instead of inputting a direct temperature to the Pt100.

Resistance value of a standard resistor = Standard resistance value of Pt100 for an input temperature that is an offset/gain value (see Appendix 2).

POINTS

(1) Complete the error compensation at the highest and lowest temperatures of the available range. Doing so yields a high-precision offset/gain value.

(2) To set an offset/gain value, read the detected temperature value with a sequence program. However, provide interlock to read a detected temperature value when the READY flag (X1) is set.

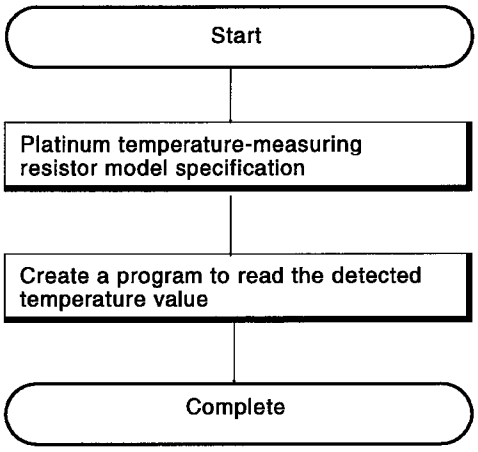
(3) The offset/gain value must be within the input temperature range.

(4) The offset/gain value is stored in the A1S62RD.
Even if the power supply is turned OFF, this data is not cleared from memory.

(5) If error compensation is executed in test mode, error is occurred within the overall accuracy (±1 %) after the mode is changed to the normal mode.

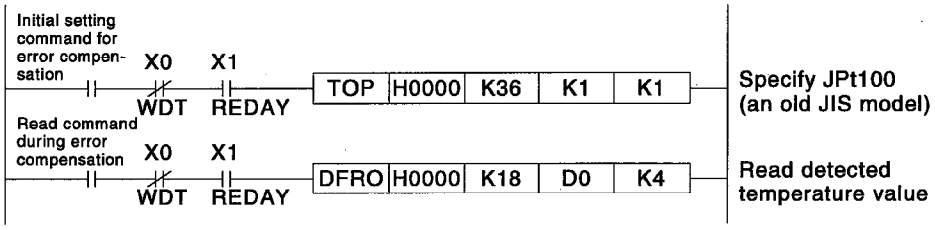
4.4.1 Initial setting

The initial setting procedure shown below must be used for error compensation.



Sample program

When channels 1 and 2 are set to JPt100 (old JIS)



POINT

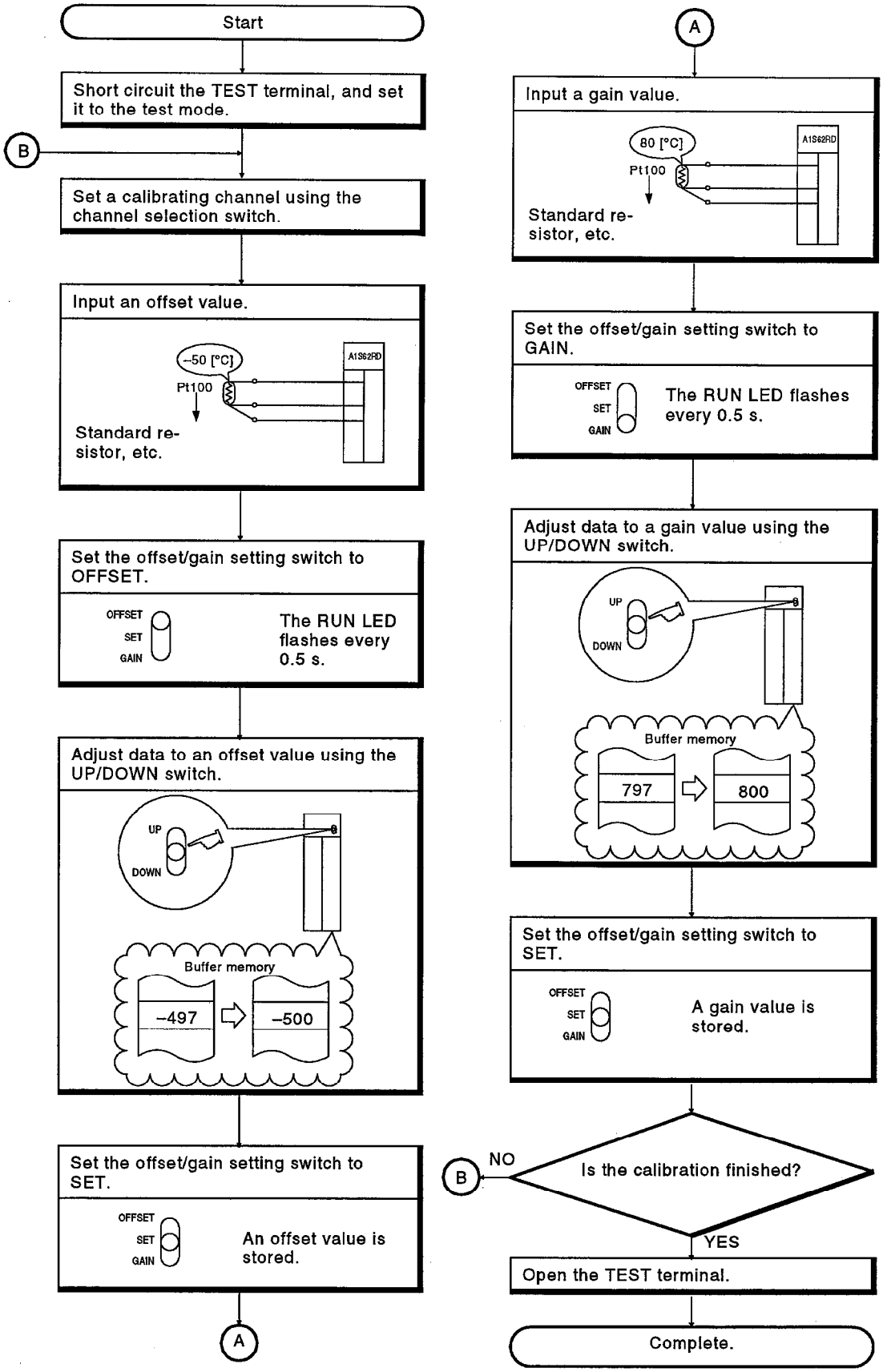
Before setting the test mode, do the initial setting for error compensation in the normal mode.

REMARK

Section 5.2 and the ACPU Programming Manual (common instruction) gives TOP and DFRO instructions.

4.4.2 Error compensation procedure

The error compensation procedure is shown below.



POINTS

(1) If the offset/gain setting switch is returned back to the OFFSET position after setting the offset/gain in the test mode, the set offset value cannot be checked. The set value is retained.

(2) After operating the module in the normal mode with the offset/gain set in the test mode, the set offset and gain values cannot be checked even if the mode is changed back to the test mode. The set values are retained.

4.5 Connecting a Platinum Temperature-Measuring Resistor

The method for connecting a Pt100 to a 3-wire (A1S62RD3) or 4-wire (A1S62RD4) model is explained below

4.5.1 Cautions on connection

To design the reliable system allowing the A1S62RD to operate at its full performance, it is necessary to design the external wiring so that it is not influenced by noise.
The cautions that require your careful attention are indicated below.

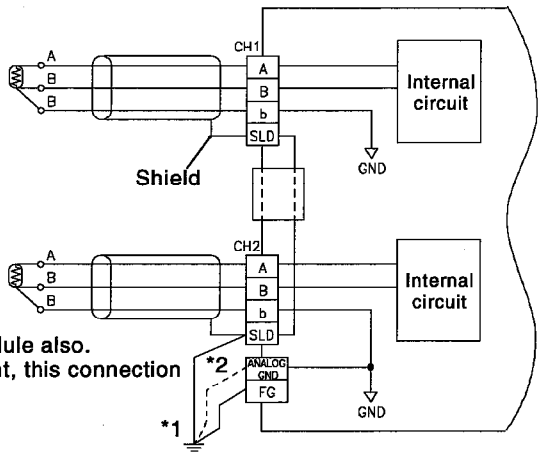
(1) Use separate cable for external input signals of A1S62RD from the cable that carries AC power so that the signals will not be influenced by AC surge and induction.

(2) Do not run the external wiring cables with or near the cables such as main circuit cable, high-voltage cable, and cables carrying load from other than the programmable controller.

(3) The shield of the shielded wire or cable must be grounded at the programmable controller side (one-point grounding). There are cases the shield should be grounding externally depending on external noise condition.

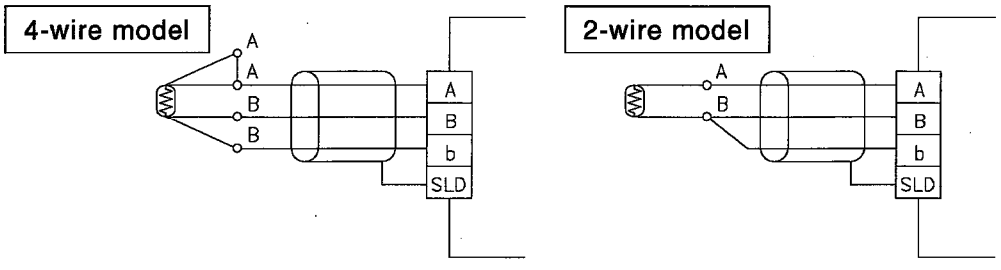
4.5.2 Connecting to an A1S62RD3

(1) The highest measurement accuracy is obtained by using a 3-wire Pt100. An example of connection of a 3-wire Pt100 to an A1S62RD3 is shown below.



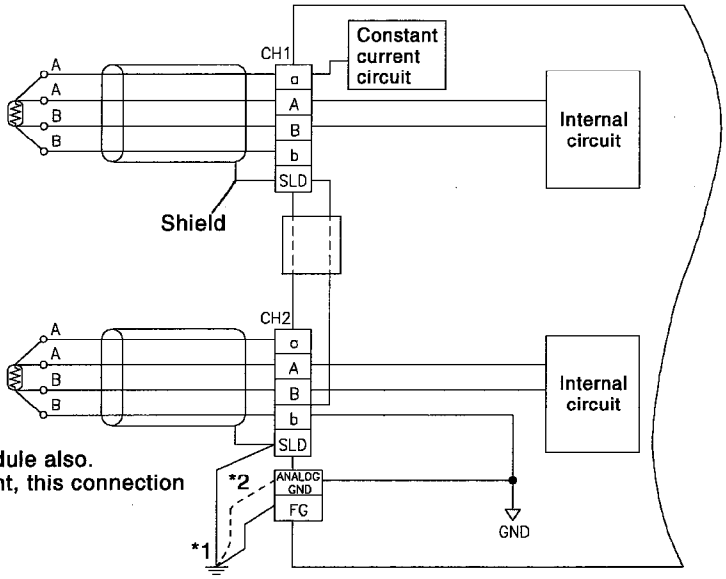
*1 Ground the FG of the power supply module also.
*2 Depending on the operation environment, this connection may give better results.

(2) A 2-wire or 4-wire Pt100 can also be connected to an A1S62RD3. The following shows the diagrams for connecting a 2-wire or 4-wire Pt100.



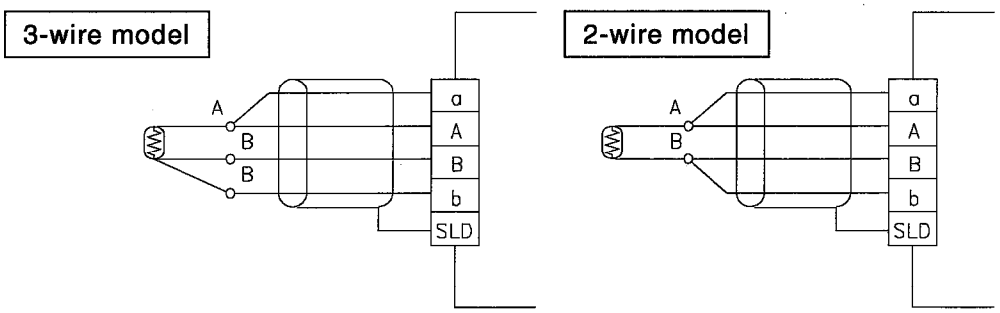
4.5.3 Connecting to an A1S62RD4

(1) The highest measurement accuracy is obtained by using a 4-wire Pt100. An example of connection of a 4-wire Pt100 to an A1S62RD4 is shown below.



*1 Ground the FG of the power supply module also.
*2 Depending on the operation environment, this connection may give better results.

(2) A 3-wire or 4-wire Pt100 can also be connected to an A1S62RD4. The following shows the diagrams for connecting a 3-wire or 2-wire Pt100.



Cautions when connecting a Pt100 to an A1S62RD4

The precautions to take when connecting an A1S62RD4 to a Pt100 are explained below.

IMPORTANT

(1) Connect terminals a1 and b2 of A1S62RD4 (see Fig. 1 below).

(2) Skip a terminal between a and b terminals of an unused channel (see Fig. 2 below).

When using all channels

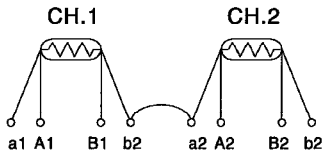


Fig. 1

When using only channel 1

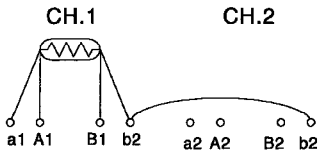


Fig. 2

POINT

Make sure to specify a channel that a Pt100 is not connected to for conversion disabled.

When specifying a channel that a Pt100 is not connected to for conversion enabled, the disconnection-detected flag is set, even if there is no disconnection between the channel in which a Pt100 is connected.

5. PROGRAMMING

The following explains the programming to use with the A1S62RD.

5.1 Programming Procedure

Figure 5.1 shows the procedure for writing a program to execute data write/read between a PC CPU and an A1S62RD.

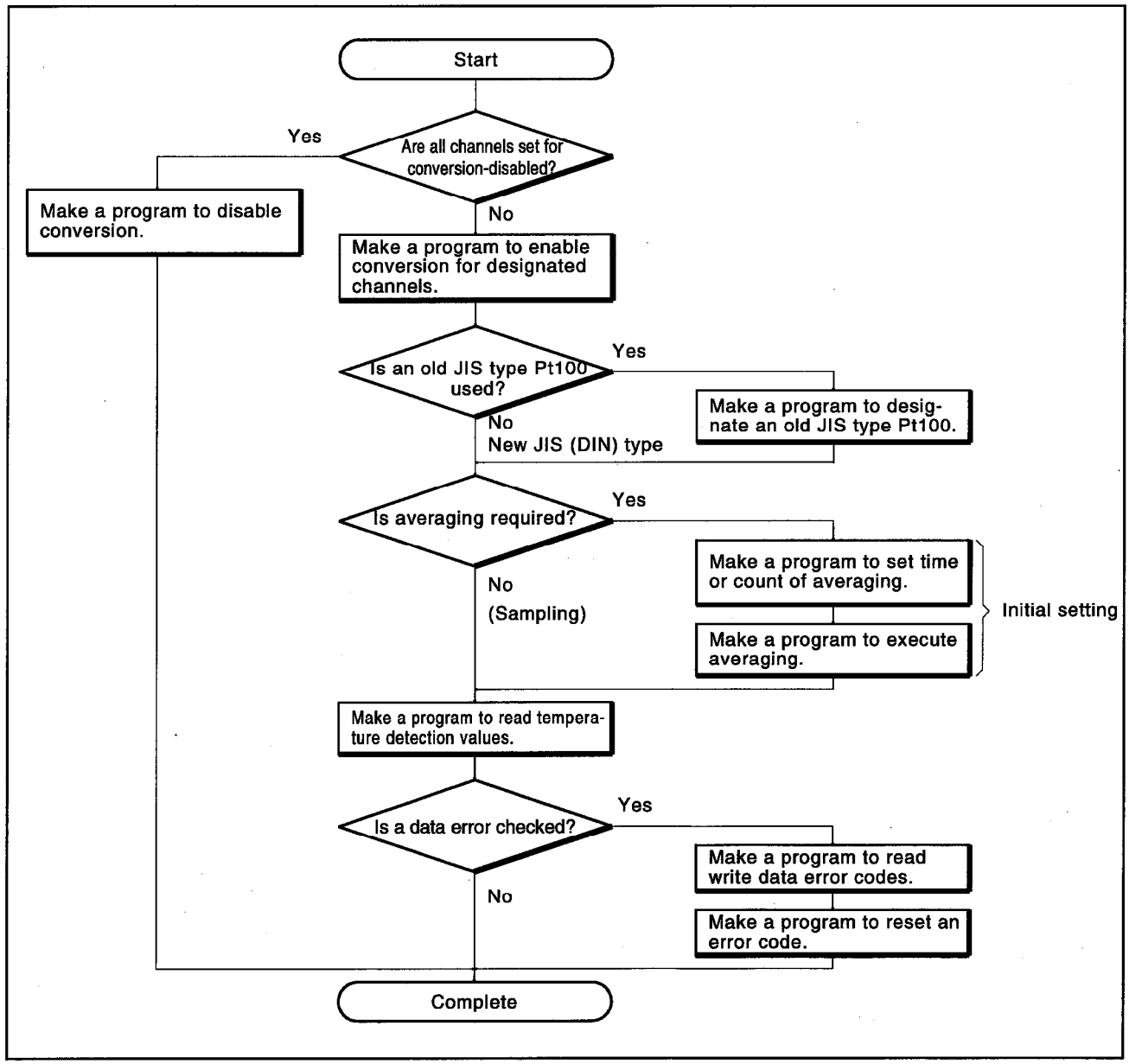


Fig. 5.1 Programming Procedure

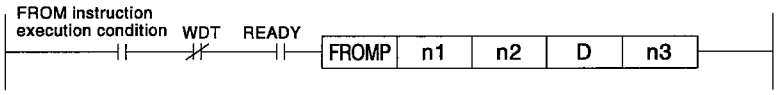
POINT

Initial setting must be done as indicated in Figure 5.1. If average processing is designated before setting the time or count of averaging, a write data error may sometimes occur. It is recommended that the initial setting be executed by a batch write instruction.

5.2 Basic Programming for Read/Write

(1) Read from an A1S62RD ..... FROM, FROMP, DFRO, and DFROP instructions

Format



Symbol	Contents	Usable Devices
n1	The higher two digits when the head I/O number allocated to an A1S62RD is represented in three hexadecimal digits.	K, H
n2	The head address of the buffer where data is stored.	K, H
D	The head number of devices which store read data.	T, C, D, W, and R
n3	The number of words of data to be read.	K, H

Example

To allocate A1S62RD's inputs to X130 to 14F and outputs to Y130 to 14F, and to read one word of data from the buffer address 10 to D0:

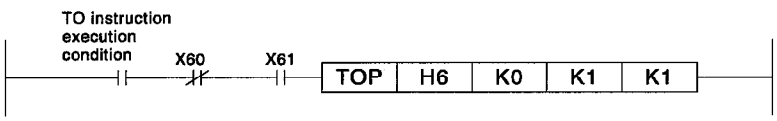
(2) Write to an A1S62RD ..... TO, TOP, DTO, and DTOP instructions

Format

Symbol	Contents	Usable Devices
n1	Higher two digits when the head I/O number allocated to an A1S62RD is represented in three hexadecimal digits.	K, H
n2	The head address of the buffer which stores data.	K, H
S	The head device number or constant of devices where data to be written is stored.	T, C, D, W, R, K, and H
n3	The number of words of data to be written.	K, H

Example

To allocate A1S62RD's inputs to X60 to 7F and outputs to Y60 to 7F, and to write data to buffer address 0:



5.3 Programming Example

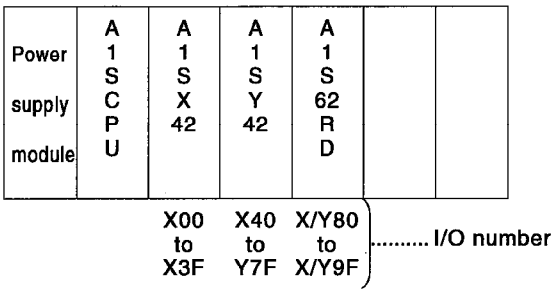
The following gives an example of programming to use an A1S62RD.

5.3.1 Program to read a detected temperature value

Time average processing of 500 ms is done in channel 1 using an old JIS-type Pt100. The detected temperature value is read after the conversion completion.

(A program for reading write data error codes and doing error code reset is included.)

[System configuration]



[Specifications]

(1) Commands that can be executed

(a) Write command of specified type of platinum temperature-measuring resistor : X0

(b) Write command of the specified conversion-enabled channel and the time average processing specification : X1

(c) Read command of a conversion-completed flag and detected temperature values : X2

(d) Positive and negative distinguishing command of a detected temperature value : X3

(e) Read command of a write data error code : X82
(Write data error flag)

(f) Error code reset command : X4

(2) Output when a detected temperature value is negative : Y70

(3) Output of a detected temperature value (4 digits of BCD numbers) : Y40 to Y4F

(4) Output of a write data error code (2 digits of BCD numbers) : Y50 to Y57

(5) Storage register of a conversion-enabled channel specification : D0

(6) Storage register of time average processing specification : D1

(7) Storage register of averaging time : D2

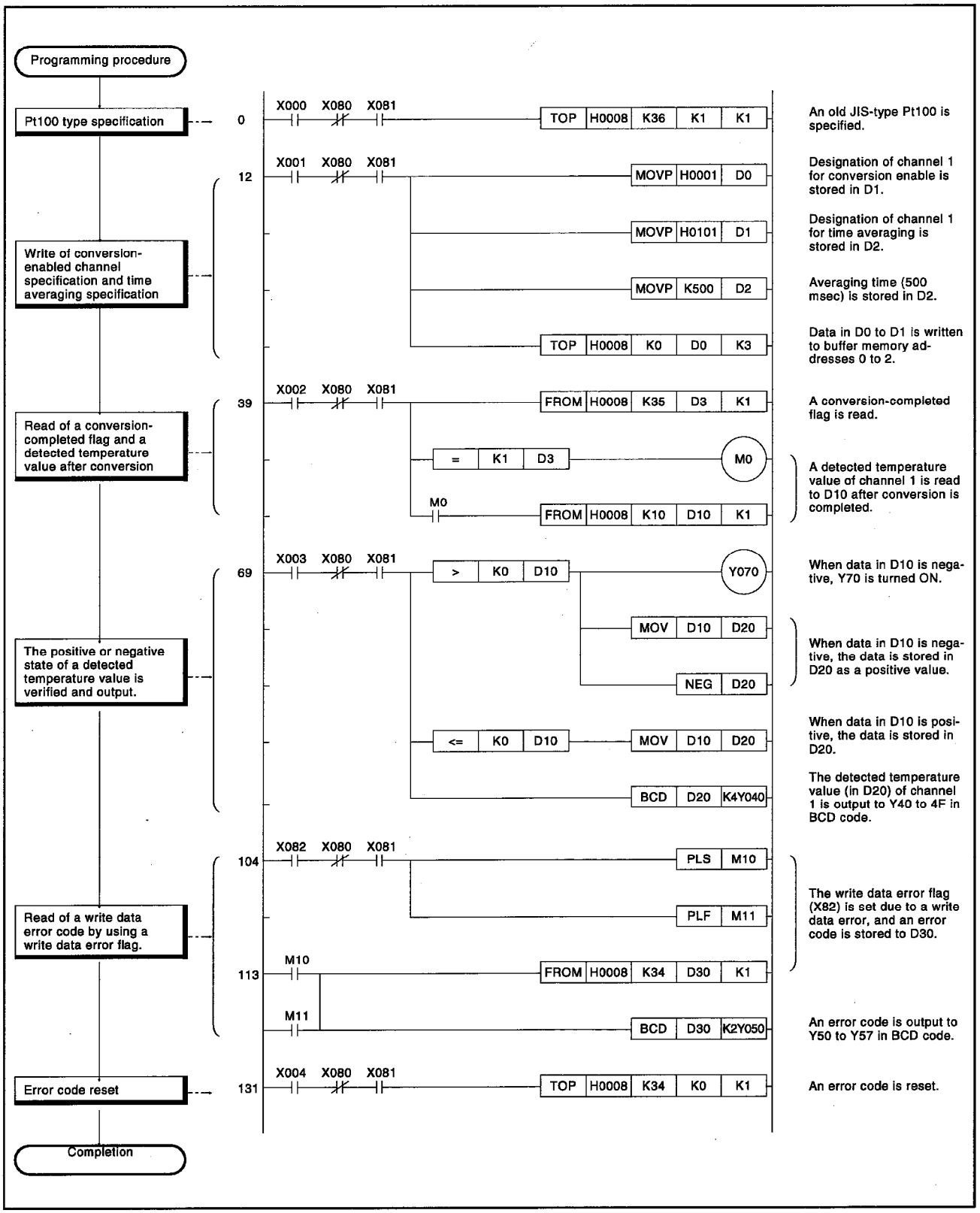
(8) Storage register of a conversion-completed flag : D3

(9) Storage register of a read detected temperature value : D10

(10) Storage register of a detected temperature value after positive/negative verification : D20

(11) Storage register of a write data error code : D30

[Sample program]



6. TROUBLESHOOTING

This section gives lists of error codes, causes, and corrective actions for the errors which may occur when an A1S62RD is in operation.

6.1 Error Code List

Any of the following error codes are stored in the buffer address 34 of an A1S62RD if an error occurs (the RUN LED flashes) when data is written from a PC CPU to the A1S62RD.

Table 6.1 Error Code List

Error Code	Cause	Corrective Action
102	• Data write was attempted to the read-only areas (addresses 10, 11, 18 to 21, and 35).	Correct the program so that it does not execute data write to read-only areas.
[ ] [0 to 4]	• The values set for the averaging time values are not within the 80 to 32000 ms range. • [ ] indicates the number of the channel where an error occurred. • Numbers [0.to 4] do not have any particular meaning. They indicate the averaging time setting errors.	Correct the averaging time setting so that the set values are within the 80 to 32000 ms range.
[ ] [5 to 8]	• The set values of the averaging count are no within the 1 to 800 times range. • [ ] indicates the number of the channel where an error occurred. • Numbers [5 to 8] do not have any particular meaning. They indicate averaging count setting errors.	Correct the averaging count setting so that the values set are within the 1 to 800 times range.

(1) If more than one error has occurred, only the first error code will be stored.

(2) An error code can be reset by writing "0" to the buffer address 34 or by setting an error code reset flag (Y12). (See Section 3.5.6.)

6.2 If the RUN LED Flashes or is Turned OFF

(1) Flashes

Check Item	Corrective Action
Is the write error flag set?	Follow the procedure given in Section 6.5.
Are the TEST terminals open?	Fix the error by opening the TEST terminals.

(2) Turned OFF

Check Item	Corrective Action
Is the 5 VDC power supplied?	• Check the power supply. • Connect the module securely to the base unit.
Is the WDT error flag set?	Follow the procedure given in Section 6.3.
Are the TEST terminals open?	Compensate error and open the TEST terminals.

6.3 If the WDT Error Flag is Set

Check Item	Corrective Action
Has a WDT error occurred?	Reset the PC CPU or turn the PC power OFF and ON. If the power is not restored, a hardware fault is probable. Consult your nearest Mitsubishi representative.

6.4 If the READY Flag is not Set

Check Item	Corrective Action
Is the WDT error flag set?	Follow the procedure given in Section 6.3.
Has an error occurred within the PC CPU?	Follow the procedure given in the A1SCPU User's Manual.

6.5 If the Write Data Error Flag is Set

Check Item	Corrective Action
Has a write data error occurred?	• Check the error code list in Section 6.1 and modify the sequence program. • Check the initial setting procedure given in Section 5.1 and modify the sequence program.

6.6 If the Disconnection-Detected Flag is Set

Check Item	Corrective Action
Is a channel that is not connected to a Pt100 designated for conversion-enabled?	Designate a channel that is not connected to a Pt100 for conversion-disabled.
Is there any disconnection?	A1S62RD3 Securely connect or replace the Pt100 of the corresponding channel.
	A1S62RD4 • Make the connection between terminals a1 and b2. • Securely connect or replace the Pt100

6.7 If a CPU Cannot Read Detected Temperature Values

Check Item	Corrective Action
Is the channel designated for conversion-enabled?	Designate the channel for conversion-enabled.
Is the RUN LED flashing or turned OFF?	Follow the procedure given in Section 6.2.
Is the RUN LED on the CPU flashing or turned OFF?	Check the contents of the error as given in the A1SCPU User's Manual.
Is the ERROR LED on the CPU flashing or turned OFF?	
Is a Pt100 securely connected or is there a disconnection within the Pt100?	Securely connect or replace the Pt100.
Has the error been fixed correctly?	Follow the procedure given in Section 4.4.

6.8 If the Temperature Input Values do not Correspond to the Temperature Detection Values

Check Item	Corrective Action
Does the designated type of Pt100 correspond to the actual Pt100 used?	Make sure the designated type corresponds to the actual Pt100 being used.
Is error compensation done correctly?	Follow the procedure given in Section 4.4.
Is the disconnection detection flag set?	Follow the procedure given in Section 6.6.
Is the CPU in the RUN state?	Set the CPU to the RUN state.

APPENDICES

APPENDIX 1 COMPARISON OF PERFORMANCE SPECIFICATIONS BETWEEN A1S62RD3, A1S62RD4, A68RD3, AND A68RD4

Table 1 Comparison of Performance Specifications

Item			A1S62RD3	A68RD3	A1S62RD4	A68RD4
Method of measurement			3-wire type		4-wire type	
Connectable temperature-measuring resistor			Pt100 (conforms to 1989 JIS and DIN) JPt100 (1981 JIS)			
Temperature input range		Pt100	−180°C to 600°C (27.08 Ω to 313.59 Ω)			
		JPt100	−180°C to 600°C (25.8 Ω to 317.28 Ω)			
Detected temperature value			16-bit signed binary −1800 to 6000 (value to the first decimal place x 10)			
			32-bit signed binary −180000 to 600000 (value to the third decimal place x 1000)			
Resolution			0.025 °C			
Overall accuracy			±1%			
Conversion speed			40 ms/channel			
Number of temperature input device points			2 channels/ module	8 channels/ module	2 channels/ module	8 channels/ module
Number of temperature input device points	Between an input terminal and PC CPU power		Photocoupler insulation			
	Between channels		No insulation			
Number of I/O device points			32			
Connection terminal block			20-point terminal block	38-point terminal block	20-point terminal block	38-point terminal block
Specifying channel to detect temperature			Specify conversion-enabled for each channel			
Disconnection detection			Detected at each channel		Detected at all channels by batch	
5 VDC internal current consumption (A)			0.54	0.94	0.44	0.75

APPENDIX 2 STANDARD RESISTANCE VALUE OF PLATINUM TEMPERATURE-MEASURING RESISTORS

2.1 New JIS/DIN Type (Pt100)

JIS C 1604-1989, DIN 43760-1980

Unit : Ω

–100	–0	Temperature °C	Temperature °C	0	100	200	300	400	500	600
60.25	100.00	–0	0	100.00	138.50	175.84	212.02	247.04	280.90	313.59
56.19	96.09	–10	10	103.90	142.29	179.51	215.57	250.48	284.22	
52.11	92.16	–20	20	107.79	146.06	183.17	219.12	253.90	287.53	
48.00	88.22	–30	30	111.67	149.82	186.82	222.65	257.32	290.83	
43.87	84.27	–40	40	115.54	153.58	190.45	226.17	260.72	294.11	
39.71	80.31	–50	50	119.40	157.31	194.07	229.67	264.11	297.39	
35.53	76.33	–60	60	123.24	161.04	197.69	233.17	267.49	300.65	
31.32	72.33	–70	70	127.07	164.76	201.29	236.65	270.86	303.91	
27.08	68.33	–80	80	130.89	168.46	204.88	240.13	274.22	307.15	
	64.30	–90	90	134.70	172.16	208.45	243.59	277.56	310.38	

2.2 Old JIS Type (JPt100)

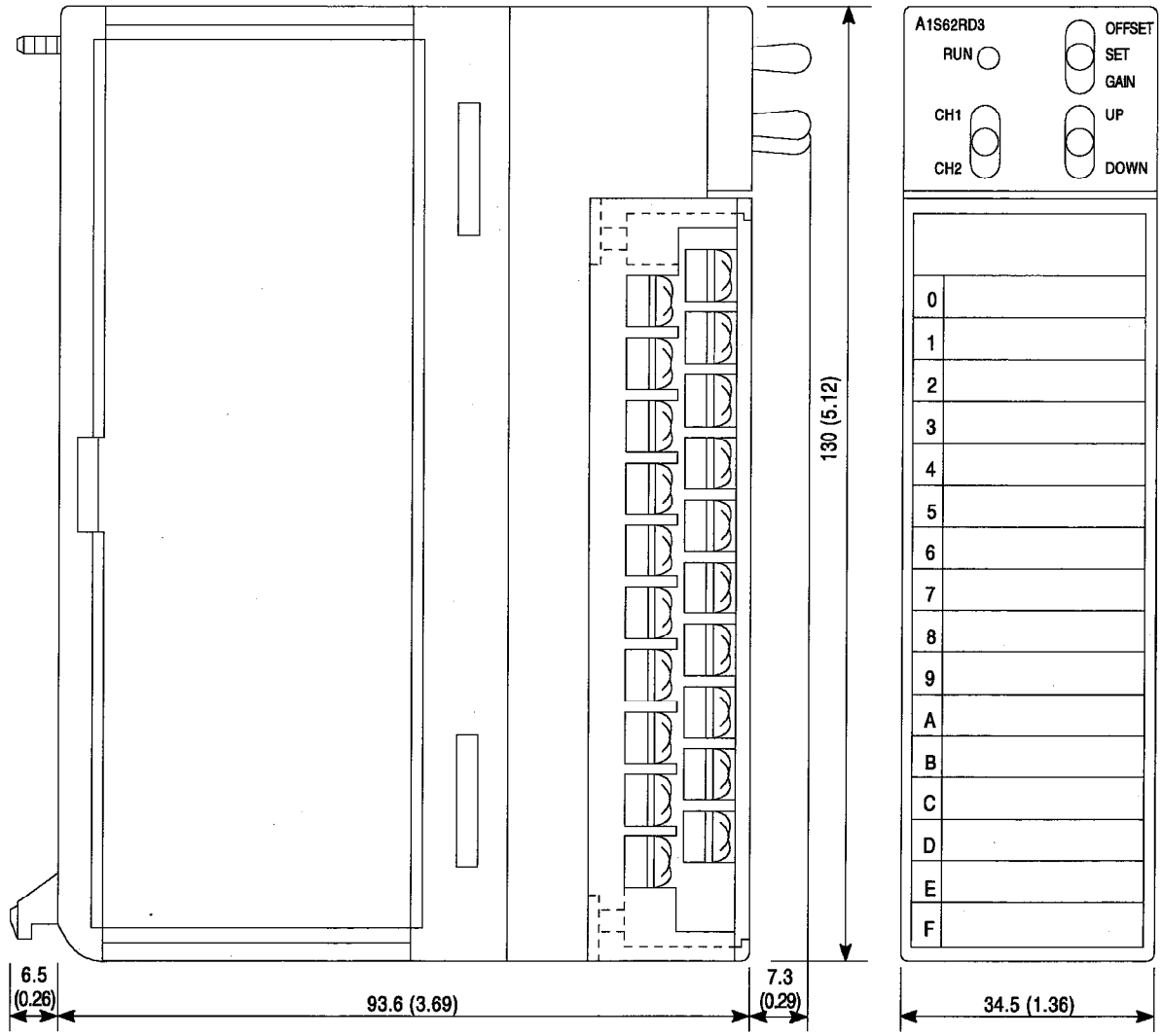
JIS C 1604-1981

Unit : Ω

–100	–0	Temperature °C	Temperature °C	0	100	200	300	400	500	600
59.57	100.00	–0	0	100.00	139.16	177.13	213.30	249.56	284.02	317.28
55,44	96.02	–10	10	103.97	143.01	180.86	217.54	253.06	287.40	
51.29	92.02	–20	20	107.93	146.85	184.58	221.15	256.55	290.77	
47.11	88.01	–30	30	111.88	150.67	188.29	224.74	260.02	294.12	
42.91	83.99	–40	40	115.81	154.49	191.99	228.32	263.49	297.47	
38.68	79.96	–50	50	119.73	158.29	195.67	231.89	266.94	300.80	
34.42	75.91	–60	60	123.64	162.08	199.35	235.45	270.38	304.12	
30.12	71.85	–70	70	127.54	165.86	203.01	238.99	273.80	307.43	
25.80	67.77	–80	80	131.42	169.63	206.66	242.53	277.22	310.72	
	63.68	–90	90	135.30	173.38	210.30	246.05	280.63	314.01	

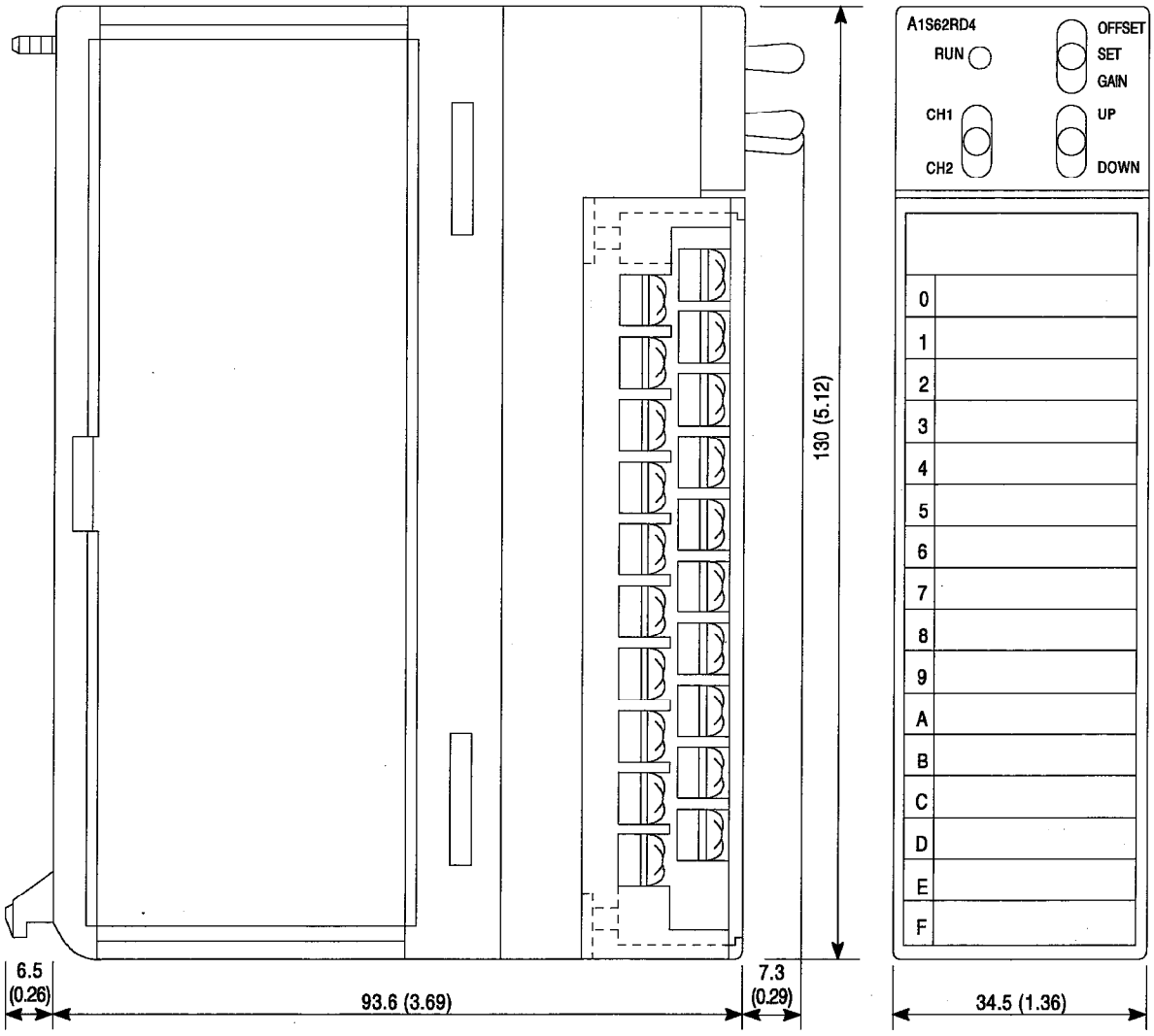
APPENDIX 3 OUTSIDE DIMENSIONS

3.1 A1S62RD3



Unit : mm (in)

3.2 A1S62RD4



Unit : mm (in)

MEMO

MEMO

MEMO

WARRANTY

Please confirm the following product warranty details before starting use.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the dealer or Mitsubishi Service Company. Note that if repairs are required at a site overseas, on a detached island or remote place, expenses to dispatch an engineer shall be charged for.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found to not be the responsibility of Mitsubishi or the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not possible after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of chance loss and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, chance losses, lost profits incurred to the user by failures in Mitsubishi products, damages and secondary damages caused from special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damages to products other than Mitsubishi products and other duties.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

(1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi general-purpose programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for each Japan Railways company or the Department of Defense shall be excluded from the programmable logic controller applications.

Note that even with these applications, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.

When considering use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected and for which a particularly high reliability is required fin terms of safety and control system, please consult with Mitsubishi and discuss the required specifications.

Pt100 input module type A1S62RD3/4

User's Manual

MODEL	A1S62RD3/4-USER-E
MODEL CODE	13J675
IB(NA)66338-C(0002)MEE	

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : MITSUBISHI DENKI BLDG MARUNOUCHI TOKYO 100-8310 TELEX : J24532 CABLE MELCO TOKYO
NAGOYA WORKS : 1-14 , YADA-MINAMI 5 , HIGASHI-KU, NAGOYA , JAPAN