

mitsubishi

AJ65BT-64AD Analog-Digital Converter Module

User's Manual



Mitsubishi Programmable Controller

• SAFETY PRECAUTIONS •

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

These precautions apply only to Mitsubishi equipment. Refer to the CPU module user's manual for a description of the programmable controller system safety precautions.

In this manual, the safety precautions are classified into two levels: "⚠ WARNING" and "⚠ CAUTION".



WARNING

Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



CAUTION

Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠ WARNING

- In the case of a communication failure in the network, data in the master module are held.
Check the communication status information (SB, SW) and configure an interlock circuit in the sequence program to ensure that the entire system will operate safely.

⚠ CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables.
Keep a distance of 100mm (3.94 inches) or more between them.
Failure to do so may result in malfunction due to noise.

[Installation Precautions]

CAUTION

- Use the programmable controller in an environment that meets the general specifications in this manual.
Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- For protection of the switches, do not remove the cushioning material before installation.
- Do not directly touch any conductive part of the module.
Doing so can cause malfunction or failure of the module.
- Securely fix the module with a DIN rail or mounting screws. Tighten the screws within the specified torque range.
Undertightening can cause drop of the screw, short circuit or malfunction.
Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

[Wiring Precautions]

CAUTION

- Shut off the external power supply for the system in all phases before wiring.
Failure to do so may result in damage to the product.
- Ground the FG terminals to the protective ground conductor dedicated to the programmable controller.
Failure to do so may result in malfunction.
- Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly.
Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Tighten the terminal screw within the specified torque range.
Undertightening can cause short circuit or malfunction.
Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Prevent foreign matter such as dust or wire chips from entering the module.
Such foreign matter can cause a fire, failure, or malfunction.
- Do not install the control lines or communication cables together with the main circuit lines or power cables. Failure to do so may result in malfunction due to noise.
- Place the cables in a duct or clamp them.
If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- When disconnecting the cable from the module, do not pull the cable by the cable part.
Loosen the screws of connector before disconnecting the cable.
Failure to do so may result in damage to the module or cable or malfunction due to poor contact.

[Startup and Maintenance Precautions]

CAUTION

- Do not touch the terminals before shutting off the external power supply for the system in all phases.
Doing so may cause malfunction.
- Do not change the setting jumper before shutting off the external power supply for the system in all phases.
Doing so may cause failure or malfunction.
- Shut off the external power supply for the system in all phases before cleaning the module or retightening the terminal screws.
Failure to do so may cause the module to fail or malfunction.
- Do not disassemble or modify the modules.
Doing so may cause failure, malfunction, injury, or a fire.
- Do not drop or apply strong shock to the module.
Doing so may damage the module.
- Shut off the external power supply for the system in all phases before mounting or removing the module to or from the panel.
Failure to do so may cause the module to fail or malfunction.
- After the first use of the product, do not mount/remove the terminal block to/from the module more than 50 times. (IEC 61131-2 compliant)
- Before handling the module, touch a grounded metal object to discharge the static electricity from the human body.
Failure to do so may cause the module to fail or malfunction.

[Startup and Maintenance Precautions]

CAUTION

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

• CONDITIONS OF USE FOR THE PRODUCT •

- (1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
- i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
 - ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

- (2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.

MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.

("Prohibited Application")

Prohibited Applications include, but not limited to, the use of the PRODUCT in;

- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTS are required. For details, please contact the Mitsubishi representative in your region.

Revisions

* The manual number is noted at the lower left of the back cover.

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Introduction

Thank you for choosing a Mitsubishi MELSEC-A Series General Purpose Programmable Controller.

Before using your new programmable controller, please read this manual thoroughly to gain an understanding of its functions so you can use it properly.

Please forward a copy of this manual to the end user.

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About this manual

The following are manuals related to this product.

Request for the manuals as needed according to the chart below.

Related Manuals

Manual Name	Manual No. (Type code)
CC-Link System Master/Local Module User's Manual type AJ61BT11/A1SJ61BT11 Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the AJ61BT11 and A1SJ61BT11. (Optionally available)	IB-66721 (13J872)
CC-Link System Master/Local Module User's Manual type AJ61QBT11/A1SJ61QBT11 Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the AJ61QBT11 and A1SJ61QBT11. (Optionally available)	IB-66722 (13J873)
CC-Link System Master/Local Module User's Manual type QJ61BT11N Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the QJ61BT11N. (Optionally available)	SH-080394E (13JR64)
MELSEC-L CC-Link System Master/Local Module User's Manual Describes the system configuration, Performance specifications, functions handling, wiring and troubleshooting of the L26CPU-BT and LJ61BT11. (Optionally available)	SH-080895ENG (13JZ41)

Compliance with the EMC and Low Voltage Directives

(1) For programmable controller system

To configure a system meeting the requirements of the EMC and Low Voltage Directives when incorporating the Mitsubishi programmable controller (EMC and Low Voltage Directives compliant) into other machinery or equipment, refer to the "EMC AND LOW VOLTAGE DIRECTIVES" chapter of the User's Manual for the CPU module used.

The CE mark, indicating compliance with the EMC and Low Voltage Directives, is printed on the rating plate of the programmable controller.

(2) For the product

For the compliance of this product with the EMC and Low Voltage Directives, refer to the "CC-Link module" section in the "EMC AND LOW VOLTAGE DIRECTIVES" chapter of the User's Manual for the CPU module used.

1. GENERAL DESCRIPTION

This user's manual describes the specification, handling, and programming methods for the AJ65BT-64AD analog-digital converter module (abbreviated as AJ65BT-64AD from here on), used as a CC-Link system remote device station.

The AJ65BT-64AD converts the analog signals (voltage or current input) from the programmable controller's external source to a 16-bit encoded binary data (data area: 12-bits) digital value.

1.1 Characteristics

The characteristics of the AJ65BT-64AD are described.

(1) A/D conversions are possible at four channels with one module

A/D conversions can be performed at four channels with one AJ65BT-64AD module.

Also, the voltage input/current input is selectable for each channel.

(2) The average processing is possible by specified time or number of times (for each channel)

(a) Sampling processing method which outputs digital value for every A/D conversion.

(b) A/D conversion is performed at the channel specified for the average processing for the set number of times or time.

The average processing method to output the average as a digital value can be selected for each channel.

(3) Conversion enable/prohibit setting is possible(for each channel)

The A/D conversion enable/prohibit setting is possible for every channel.

The conversion speed can be decreased by prohibiting the conversion execution at unused channels.

(4) Volumeless offset/gain adjustment is possible(for each channel)

The offset value and gain value can be set by simply entering the voltage or current to set and turning the setting switch on.

2. SYSTEM CONFIGURATION

(1) Applicable master modules

For available master modules, visit the CC-Link Partner Association (CLPA) website at:
<http://www.cc-link.org/>

REMARK

Check the specifications of the master module before use.

3. SPECIFICATION

The AJ65BT-64AD general specification, performance specification, and remote I/O signals to the master module are described.

3.1 General Specification

The general specification is shown in Table 3.1.

Table 3.1 General specification

Item	Specification					
Usage ambient temperature	0 to 55°C					
Storage ambient temperature	-20 to 75°C					
Usage ambient humidity	10 to 90%RH, no condensation					
Storage ambient humidity	10 to 90%RH, no condensation					
Vibration durability	Conforming with JIS B 3502 and IEC 61131-2	<div></div>	Frequency	Acceleration	Amplitude	Sweep count
			5 to 9Hz	—	3.5mm (0.14 inches)	10 times in each direction X, Y, Z
		9 to 150Hz	9.8 m/s ²	—		
		Under continuous vibration	5 to 9Hz	—	1.75mm (0.069 inches)	—
			9 to 150Hz	4.9m/s ²	—	
		Shock durability	Conforming to JIS B 3502, IEC 61131-2 (147m/s ² , 3 times each in 3 directions)			
Usage environment	No corrosive gas					
Usage height * ³	Less than 2000 m (less than 6562 ft.)					
Installation area	Within the control board					
Over-voltage category * ¹	Less than II					
Pollution level * ²	Less than 2					

*1 Indicates the location where the device is connected from the public cable network to the device structure wiring area.

Category II applies to the devices to which the power is supplied from a fixed equipment. Surge withstand voltage for devices with up to 300V of rated voltage is 2500V.

*2 This is an index which indicates the degree of conductive object generation in the environment. Pollution level 2 is when only non-conductive pollution occurs.

A temporary conductivity caused by condensation must be expected occasionally.

*3 Do not operate or store the programmable controller in the environment where the pressure applied is equal to greater than the atmospheric pressure at the altitude of 0m. Doing so may cause a malfunction. Please consult our branch office when the programmable controller is to be operated under pressure.

3.2 Performance Specification

The AJ65BT-64AD performance specification is described below.

Table 3.2 Performance specification

Item	Specification	
Analog input	Voltage: -10 to 0 to +10V DC (input resistance 1M Ω) <input type="checkbox"/> Selected by the input terminal Current: -20 to 0 to +20mA DC (input resistance 250 Ω) <input type="checkbox"/>	
Digital output	16-bit encoded binary (data area 12bits)	
I/O characteristics *1	Analog input value	Digital output value
	-10 to 10V or -20 to 20mA	0 to 4000 or -2000 to 2000
	0 to 10V or 0 to 20mA	0 to 4000 or -2000 to 2000
	0 to 5V or 0 to 20mA	0 to 4000 or -2000 to 2000
Maximum resolution	1 to 5V or 4 to 20mA	0 to 4000 or -2000 to 2000
	-10 to 10V or -20 to 20mA	5mV or 20 μ A
	0 to 10V or 0 to 20mA	2.5mV or 10 μ A
	0 to 5V or 0 to 20mA	1.25mV or 5 μ A
Total precision *2	1 to 5V or 4 to 20mA	1mV or 4 μ A
	$\pm 1\%$ (± 40)	
	1 ms/channel	
	Voltage ± 15 V, current ± 30 mA *3	
Maximum conversion speed	4 channels/module	
Absolute maximum input	Photo-coupler insulation between power supply/communication and analog input (not insulated between channels)	
Analog input points	Remote device station	
Insulation method	2 stations	
CC-Link station type	27-point terminal block	
Number of occupied stations	24VDC (18 to 30VDC)	
Connection terminal	0.75 to 2.00mm ²	
External power supply	M4 x 0.7 mm x 16mm or more (M4 x 0.028 inch x 0.63 inch) Can be installed with DIN rail.	
Supported cable size	TH35-7.5Fe, TH35-7.5Al, TH35-15Fe (conforming to JIS C 2812)	
Module installation screws	RAV 1.25-3.5, RAV 2-3.5	
Supported DIN rail	0.12A (at 24VDC)	
Supported solderless terminal	By a noise simulator with the following specification: Noise voltage at 500Vp-p, Noise width at 1 μ s, Noise frequency at 25 to 60Hz	
Internal consumption current	Between power supply/communication system batch and analog input batch:500VAC, 1minute	
Noise durability	Between power supply/communication system batch and analog input batch:500VAC, more than 10M Ω on insulation resistance tester.	
Dielectric withstand voltage	0.35kg (0.77lb)	
Insulation resistor		
Weight		

*1 Gain is set to 10V/20mA and the offset is set to 0V/4mA (setting pin A) at the time of factory shipment. However, when using for current, change the set pin B, and RYn1 (voltage/current selection) must be turned on.

*2 This is the accuracy in respect to the maximum digital output value (+4000).
The same value (+4000) applies for the current input and voltage input.

*3 Current value indicates value of instant input current that does not break module inner electrical resistance.

Point
The range for the analog input for conversion is as follows: Voltage : -10 to 0 to +10V Current : -20 to 0 to +20mA

3.3 I/O Conversion Characteristics

The I/O characteristics is the slope created by connecting the offset and gain values, with a straight line when converting the analog signals (voltage or current input) from an external source of the programmable controller to digital values.

The offset value is the analog input value (voltage or current) which yields the minimum digital output value.

The gain value is the analog input value (voltage or current) which yields the maximum digital output value.

The I/O conversion characteristics for the AJ65BT-64AD is shown in Figure 3.1.

Example) When the voltage input data format is from -2000 to 2000, offset value is -10V, and gain value is 10V:

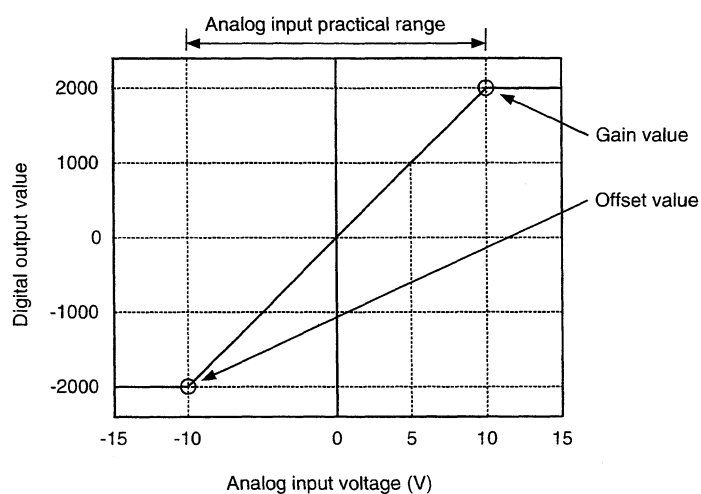


Figure 3.1 I/O conversion characteristics example

3.3.1 Voltage input characteristics

An example of the voltage input characteristics when the offset/gain setting is changed is shown in Figure 3.2.

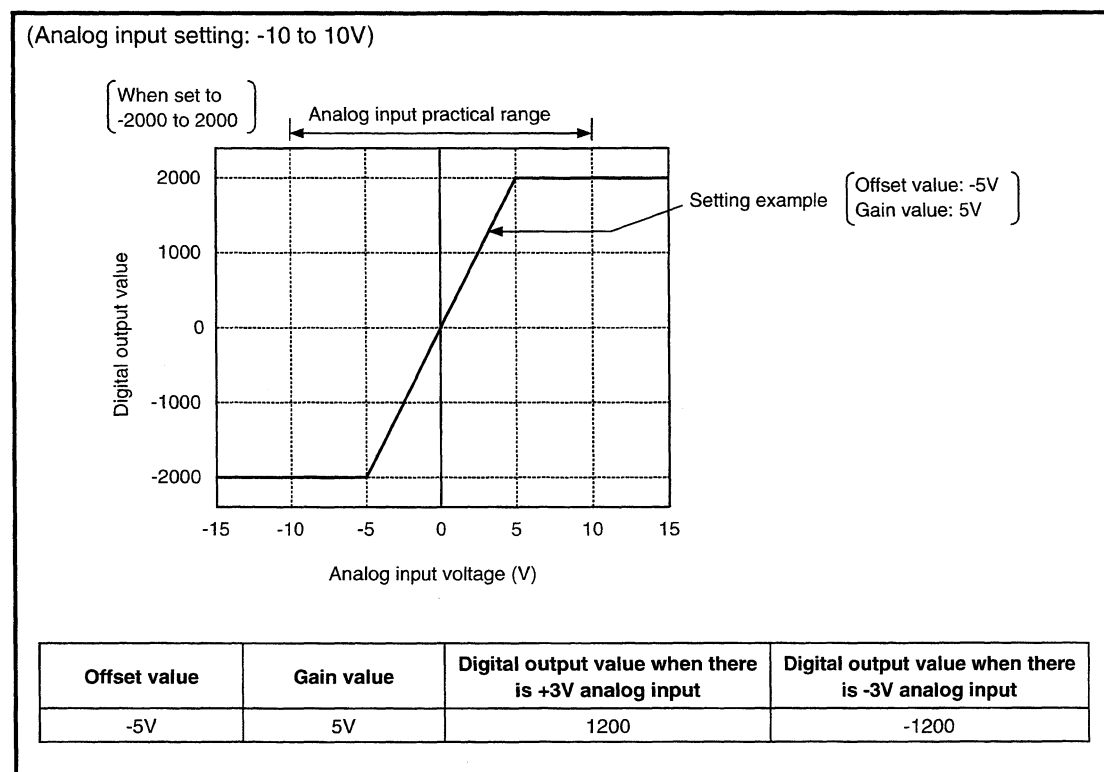


Figure 3.2 Voltage input characteristics

Point	
(1)	Do not input more than $\pm 15V$. The element may be damaged.
(2)	When a value which result in a digital output value exceeding the specified maximum (2000/4000) or minimum (-2000/0) digital-value is input, the digital output value remains constant at the maximum (2000/4000) or minimum (-2000/0) of the set resolution digital value.
(3)	Satisfy the condition below for the offset/gain setting. When a value which does not meet the condition is set, an error results.
	(a) Offset value, gain value setting range: -10V to 10V
	(b) (Gain)>(Offset)

3.3.2 Current input characteristics

An example graph showing the current input characteristics when the offset/gain setting is changed is indicated in Figure 3.3.

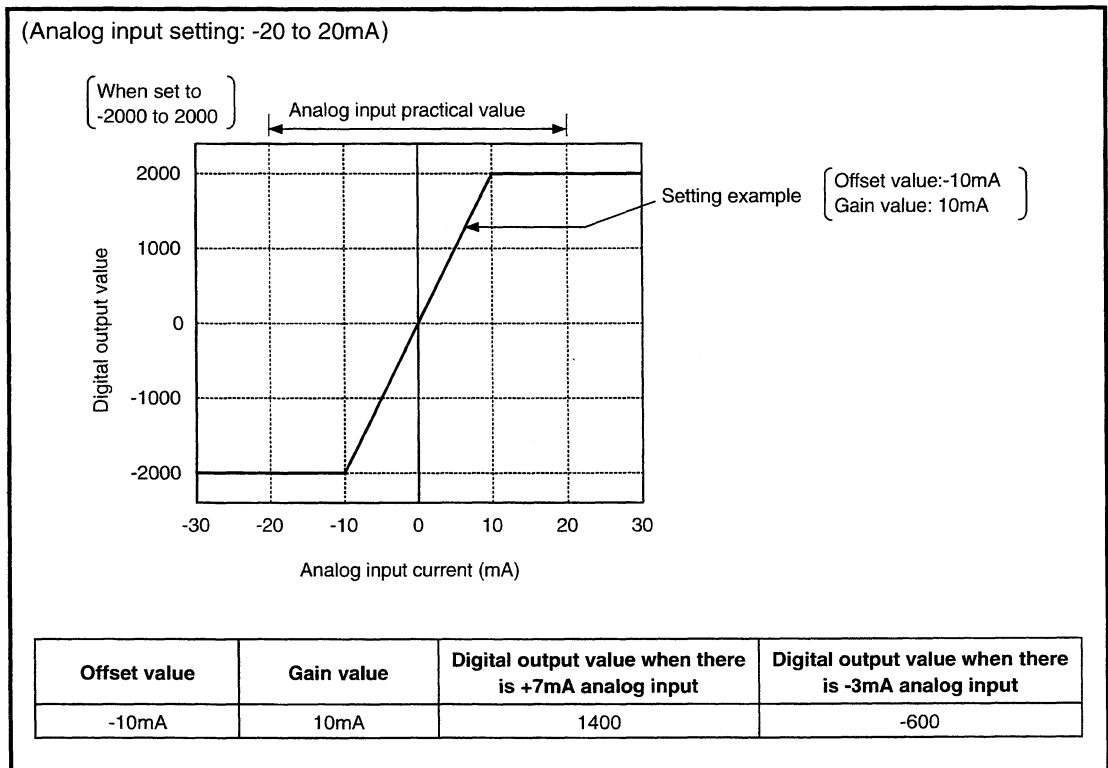


Figure 3.3 Current input characteristics

Point

- (1) Do not input more than $\pm 30\text{mA}$. A breakdown may result due to heat increase.
- (2) When a value which result in a digital output value exceeding the specified maximum (2000/4000) or minimum (-2000/0) digital-value is input, the digital output value remains constant at the maximum (2000/4000) or minimum (-2000/0) of the set resolution digital value.
- (3) Satisfy the condition below for the offset/gain setting. When a value which does not meet the condition is set, an error results.
 - (a) Offset value, gain value setting range: -20 to 20mA
 - (b) (Gain)>(Offset)

3.3.3 Relationship between the offset/gain setting and digital output value

The relationship between the offset/gain setting and digital output value is described.

(1) Resolution

The resolution is obtained by the following formula:

- For the voltage input:

$$\text{Resolution} = \frac{(\text{Gain value}) - (\text{Offset value})}{4000} \times 1000\text{mV}$$

- For the current input:

$$\text{Resolution} = \frac{(\text{Gain value}) - (\text{Offset value})}{4000} \times 1000\mu\text{A}$$

(2) Relationship between the maximum resolution and digital output value

The maximum resolution of the AJ65BT-64AD is as indicated in the performance specification.

If the following is satisfied from the offset/gain setting, the digital output value does not increase/decrease by one.

$$\frac{(\text{Gain value}) - (\text{Offset value})}{4000} \times 1000 < \text{Maximum resolution}$$

(3) Total precision

The total precision is a precision for the maximum digital output value.

Even if the I/O characteristics is changed by modifying the offset/gain setting, the total precision does not change, and is maintained within the range in the performance list.

Example) When the data format is from -2000 to 2000, offset value is -10V, and gain value is 10V

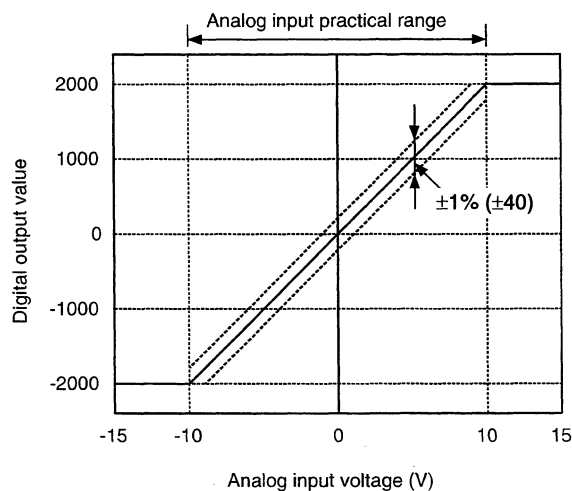
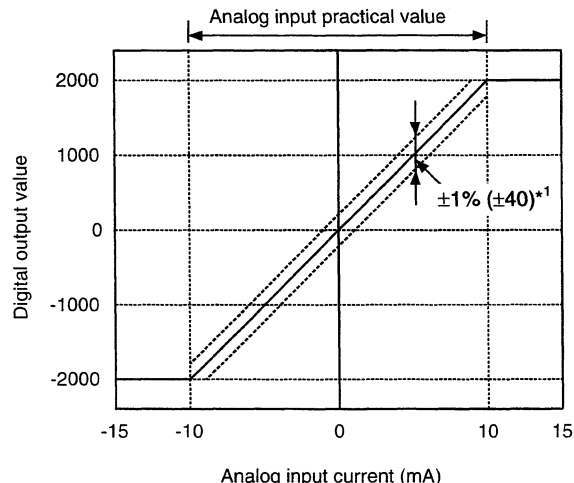


Figure 3.4 Total precision of the voltage input characteristic

Example) When the data format is from -2000 to 2000, offset value is -10mA, and gain value is 10mA



*¹ 4000 will be the maximum digital output value even for the current input.

Figure 3.5 Total precision of the current input characteristic

3.4 Function List

The AJ65BT-64AD function list is shown in table 3.3.

Table 3.3 AJ65BT-64AD function list

Item	Description	Reference section
A/D conversion enable/prohibit setting	<ul style="list-style-type: none"> Specifies whether to enable(yes) / prohibit(no) the A/D conversion for each channel. (Default... prohibit for all channels) By prohibiting the conversion for the channels which are not used, the sampling time can be shortened. 	Section 3.7.4
Offset/gain setting	<ul style="list-style-type: none"> The offset/gain setting can be performed volumeless for each channel, and the I/O conversion characteristics can be changed. 	Section 3.3.3
Average processing specification	<ul style="list-style-type: none"> The A/D conversion for each channel is performed for the set number of times or for a set time, the average is calculated for the A/D conversion data obtained during that period, and stores the average value in the remote register as a digital output value. 	Section 3.7.2
Sampling processing specification	<ul style="list-style-type: none"> The A/D conversion for each channel is performed for the set number of times or for a set time, and stores the remote register as a digital output value. 	Section 3.7.2

3.5 Maximum Conversion Speed

The time from when the channel is switched until when the digital value after the A/D conversion is stored in the remote register is called conversion speed.
The maximum conversion speed is explained below.

3.5.1 Conversion speed for one channel

The conversion speed for one channel of AJ65BT-64AD is 1 ms.

When using multiple channels, (1 ms × number of conversion enabled channels) is the sampling processing time.

3.6 Remote I/O Signals

The I/O signal allocations and the functions are described.

3.6.1 Remote I/O signal list

The AJ65BT-64AD uses 32 points for input and 32 points for output for the data Communication with the master module.*1

Table 3.4 indicates the I/O signal allocation and signal names.

Device RX indicates input signals from the AJ65BT-64AD to the master module. Device RY indicates output signals from the master module to the AJ65BT-64AD.

*1 Although the number of occupied stations for the AJ65BT-64AD is 2, inputs, RX (n+2) 0 to RX (n+3) F, and outputs, RY (n+2) 0 to RY (n+3) F, are not used.

However, devices for inputs, RX (n+2) 0 to RX (n+3) F, and outputs, RY (n+2) 0 to RY (n+3) F, are reserved in the master module or CPU module.

When creating a program, pay attention to device allocation.

Table 3.4 Remote I/O signal list

Signal direction: AJ65BT-64AD→Master module		Signal direction: Master module→AJ65BT-64AD	
Device No.	Signal name	Device No.	Signal name
RXn0	CH.1 A/D conversion completion flag	RYn0	Offset/gain value selection
RXn1	CH.2 A/D conversion completion flag	RYn1	Voltage/current selection
RXn2	CH.3 A/D conversion completion flag	RYn2 to RY(n+1)7	Unusable
RXn3	CH.4 A/D conversion completion flag		
RXn4 to RX(n+1)7	Unusable		
RX(n+1)8	Initial data processing request flag	RY(n+1)8	Initial data processing completion flag
RX(n+1)9	Initial data setting completion flag	RY(n+1)9	Initial data setting request flag
RX(n+1)A	Error status flag	RY(n+1)A	Error reset request flag
RX(n+1)B	Remote READY	RY(n+1)B to RX(n+3)F	Unusable
RX(n+1)C to RX(n+3)F	Unusable		

n: Address allocated to the master module by the station number setting.

Point

The functions as the AJ65BT-64AD cannot be guaranteed if the unusable device is turned on/off from the sequence program.

3.6.2 Remote I/O signal functions

Description of each I/O signal function for the AJ65BT-64AD is shown in Table 3.5.

Table 3.5 Remote I/O signal details

Device No.	Signal name	Description
Rxn0 to RXn3	CH.□ A/D Conversion completion flag	<p>The A/D conversion completion flag turns on when each channel's A/D conversion is complete, after turning on or resetting the power.</p> <p>The A/D conversion completion flag processing is processed only once when the A/D conversion enable/prohibit setting is changed.</p> <ul style="list-style-type: none"> When changing the A/D conversion from prohibit to enable: When the average processing is specified, the flag turns on after completing the average processing of the number of times or time, and storing the A/D conversion digital value in the remote register. When changing the A/D conversion from enable to prohibit: The corresponding channel's A/D conversion completion flag turns off.
RX(n+1)8	Initial data processing request flag	<p>After the power supply is turned on, a hardware reset, or the test mode operation, the initial data processing request flag is turned on by the AJ65BT-64AD to request for the initial data setting.</p> <p>Also, after the initial data processing is complete (initial data processing completion flag RY (n+1)8 ON), the flag is turned off.</p>
RX(n+1)9	Initial data setting completion flag	<p>When the initial data setting request (RY(n+1)9 ON) is made, the flag turns on after the initial data setting completion is done.</p> <p>Also, after the initial data setting is complete, the initial setting completion flag turns off when the initial data setting request flag turns off.</p>
RX(n+1)A	Error status flag	<p>The flag turns on when the AJ65BT-64AD results in an error other than the watchdog timer error.</p>
RX(n+1)B	Remote READY	<p>After turning the power supply on, a hardware reset, or the test mode operation, the initial data setting is completed, all conversions at the A/D conversion enabled channels are complete, then the flag turns on. When all channels are prohibited for the A/D conversion, the flag does not turn on. This is used as an interlock when performing read/write for the master module.</p> <p>Turns off in the test mode.</p>
RYn0	Offset/gain value selection	<p>This selects the offset/gain value between "user setting" and "factory default setting."</p> <p>OFF: User setting ON: Factory default setting</p> <p>When using both the voltage input and current input, select OFF (user setting). (Refer to Section 4.4)</p>
RYn1	Voltage/current selection	<p>Selects between voltage and current when the offset/gain value is set to "factory default setting."</p> <p>OFF : Voltage ON : Current</p>
RY(n+1)8	Initial data processing completion flag	<p>After turning the power supply on, a hardware reset, or test mode operation, this flag turns on when the initial data processing is complete, during the initial data processing request.</p>
RY(n+1)9	Initial data setting request flag	<p>Turns on when setting or changing the initial data.</p> <p>Make sure to turn on the initial data setting request flag and set the data again after perform the test mode operation.</p>
RY(n+1)A	Error reset request flag	<p>When the error reset request flag is turned on, the error status flag (RX(n+1)A) turns off and the remote register error code (address RWr+4) is cleared (to 0000H).</p>

n: Address allocated to the master module by the station number setting.

3.7 Remote Register

The AJ65BT-64AD has a remote register for data communication with the master module. The remote register allocation and data structures are described.

3.7.1 Remote register allocation

The remote register allocation is shown in Table 3.6.

Table 3.6 Remote register allocation

Communication direction	Address	Description	Default value	Reference section
Master→Remote	RWwm	Average processing specification	0	Section 3.7.2
	RWwm+1	CH1 average time, number of times	0	Section 3.7.2
	RWwm+2	CH2 average time, number of times		
	RWwm+3	CH3 average time, number of times		
	RWwm+4	CH4 average time, number of times		
	RWwm+5	Data format	0	Section 3.7.3
	RWwm+6	A/D conversion enable/prohibit specification	0	Section 3.7.4
	RWwm+7	Unusable	—	—
Remote→Master	RWrm	CH1 digital output value	0	Section 3.7.5
	RWrm+1	CH2 digital output value		
	RWrm+2	CH3 digital output value		
	RWrm+3	CH4 digital output value		
	RWrm+4	Error code	0	Section 3.7.6
	RWrm+5	Unusable	—	—
	RWrm+6			
	RWrm+7			

m, n: Address allocated to the master module by the station number setting.

Point

Do not read/write to unusable remote registers. If read/write is performed, the functions the AJ65BT-64AD are not guaranteed.

3.7.2 Sampling processing/average processing setting

(1) Digital value output method in sampling processing and average processing

(a) Sampling processing

The A/D conversion is performed successively for the analog input, and the converted digital output values are stored in the remote register.

The processing time to store the digital output value into the remote register after the sampling processing differs depending on the number of A/D conversion enabled channels.

$$(\text{Processing time}) = (\text{Number of A/D conversion enabled channels}) \times \underset{\substack{\uparrow \\ \text{Maximum conversion speed}}}{1} \text{ (ms)}$$

[Example] When three channels, channels 1, 2, and 3 are enabled for conversion:

$$3 \times 1 = 3 \text{ (ms)}$$

(b) Average processing

The AJ65BT-64AD performs A/D conversion to the channel(s) for the average processing specified by the programmable controller CPU for the set number of times or for the set time. The average is then obtained from the total value excluding the maximum and minimum values, and stored in the remote register. When the number of processing is two times or less, the sampling processing is performed.

When the A/D conversion enable/prohibit setting is performed, the average processing is initialized.

① When the average processing specification is made for time

- Set the time in 1 ms modules.
- The number of times for processing for the set time depends on the number of A/D conversion enabled channels.

$$(\text{Number of times for processing}) = \frac{\text{Set time}}{(\text{Number of A/D conversion enabled channels}) \times \underset{\substack{\uparrow \\ \text{Maximum conversion speed}}}{1} \text{ (ms)}}$$

[Example] When the number of A/D conversion enabled channels is two, and the set time is 1000 ms:

$$1000 / (2 \times 1) = 500 \text{ times}$$

② When the average processing specification is made for the number of times

The processing time to store the average value (average of number of times) into the remote register depends on the number of A/D conversion enabled channels.

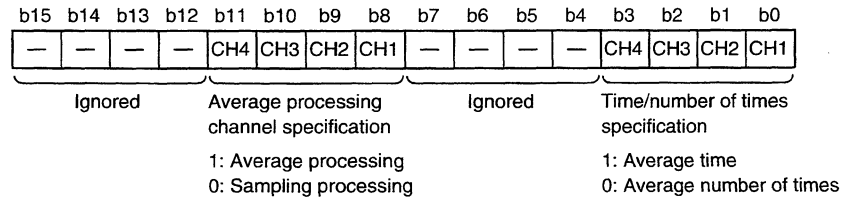
$$(\text{Processing time}) = (\text{Set number of times}) \times (\text{Number of A/D conversion enabled channels}) \times \underset{\substack{\uparrow \\ \text{Maximum conversion speed}}}{1} \text{ (ms)}$$

[Example] When two channels, channels 1 and 3 are A/D conversion enabled, and the set number of times is 500:

$$500 \times 2 \times 1 = 1000 \text{ (ms)}$$

(2) Specifying average processing and selecting average time/average number of times

- (a) When turning power supply on and the AJ65BT-64AD remote signal is on, the system performs sampling processing at all channels.
- (b) Selects between sampling processing and average processing selection and when average processing is selected, the processing method is specified.

**Point**

- (1) When performing an average processing specification, the average number of processing or time must be set.
- (2) When the average processing specification is not performed, the sampling processing is performed regardless of the time/number of times setting.

(3) Average time/average number of times specification

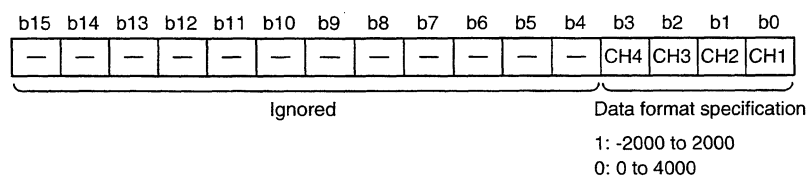
- (a) For each channel where the average processing was specified, the average time or average number of times is written to the address corresponding to the remote register address RWwm+1 to RWwm+4 channels.
The average time or average number of times when the power supply is turned on is 0.
- (b) The setting range is as shown below:
Average processing by the number of times: 1 to 10000
Average processing by time: 4 to 10000 ms

Point

When a set value other than the range specified above is written, a setting error results. In this case, the remote register value is not changed, and the AJ65BT-64AD performs the A/D conversion processing with the average time or number of times before the error occurred.

3.7.3 Data format setting

The data format of the A/D conversion digital value at each channel is written to the remote register address RWwm+5 for each channel.



3.7.4 A/D conversion enable/prohibit setting

The A/D conversion enable/prohibit setting for each channel of AJ65BT-64AD can be made by writing "1" (enable) or "0" (prohibit) at each channel for the remote register address RWwm+6.

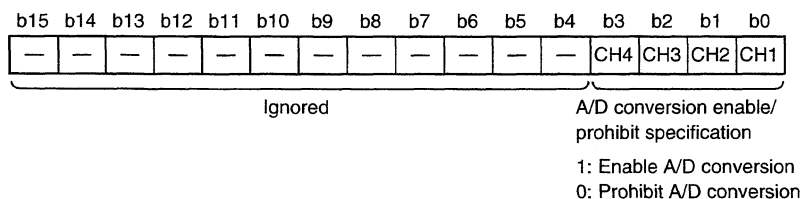
By setting the unused channels to conversion prohibit, the sampling cycle can be shortened. (The default is A/D conversion prohibit for all channels.)

Example) The sampling cycle when only channels 1 and 3 are set to A/D conversion enabled:

$$2(\text{Number of channels enabled}) \times 1\text{ms}(\text{Conversion speed at one channel})=2\text{ms}$$

(1) Conversion enable/prohibit setup method

Set the conversion enable/prohibit for each channel.



(2) AJ65BT-64AD processing when conversion is enabled/prohibited

(a) Average processing initialization

The data in the work area stored by the AJ65BT-64AD system to perform the average processing is initialized.

The digital value stored in the remote register keeps data before setting the conversion enable/prohibit.

For example, at a channel with the average processing specification at 50 times, if the conversion enable/prohibit is set after having completed sampling for 30 times, the 30 sampling data is all cleared, and then the average processing is performed from the initial state.

(b) A/D conversion completion flag processing

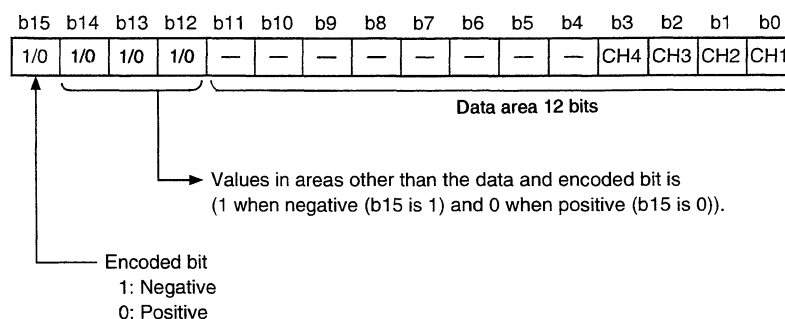
The A/D conversion completion flag processing is performed only once when the A/D conversion enable/prohibit setting is changed.

- When changed the A/D conversion from prohibit to enabled:
When the average processing is specified, the flag turns on after performing the average processing for the number of time or time and storing the A/D conversion digital value in the remote register.
- When changed the A/D conversion from enabled to prohibited:
The A/D conversion completion flag for the corresponding channel is turned off.

3.7.5 Digital output value

The digital value after the A/D conversion is stored in the remote register address from RW_n to RW_n+3 for each channel.

The digital output value is expressed in a 16-bit encoded binary.
(negative digital value is expressed in a complement value of 2.)



3.7.6 Write data error codes

- (1) When the setting data is written by the programmable controller CPU to the AJ65BT-64AD, the data range check is performed only once. When the value is out of range, an error code is stored in 16-bit binary to the remote register RW_n+4.
Refer to Section 6.3 for the details of the error code.
- (2) When an error occurs, the RUN LED flashes.
When the average number of times or average time is out of setup range, the LED flashes at 0.5s. intervals, and the A/D conversion is performed with the previous data.
When there is an offset/gain value setup error, the LED flashes at 0.1s. intervals. The A/D conversion is not performed.
- (3) When multiple errors occur, the error code for the first error occurred with the AJ65BT-64AD is stored. Other error codes are not stored.
- (4) To reset the error code, turn on RY(n+1)A.

4. SETUP AND PREPARATION BEFORE OPERATION

4.1 Precautions When Handling

The precautions when handling the AJ65BT-64AD are described below:



CAUTION

- Do not touch any terminal while power is on.
Doing so may cause malfunction.
- Prevent foreign matter such as dust or wire chips from entering the module.
Such foreign matter can cause a fire, failure, or malfunction.
- Do not disassemble or modify the modules.
Doing so may cause failure, malfunction, injury, or a fire.
- Do not directly touch any conductive part of the module.
Doing so can cause malfunction or failure of the module.
- Do not drop or apply strong shock to the module.
Doing so may damage the module.
- Tighten the terminal screw within the specified torque range.
Undertightening can cause short circuit or malfunction.
Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- When disposing of this product, treat it as industrial waste.
- Use the programmable controller in an environment that meets the general specifications in this manual.
Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- For protection of the switches, do not remove the cushioning material before installation.
- Securely fix the module with a DIN rail or mounting screws. Tighten the screws within the specified torque range.
Undertightening can cause drop of the screw, short circuit or malfunction.
Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Shut off the external power supply for the system in all phases before mounting or removing the module to or from the panel.
Failure to do so may cause the module to fail or malfunction.

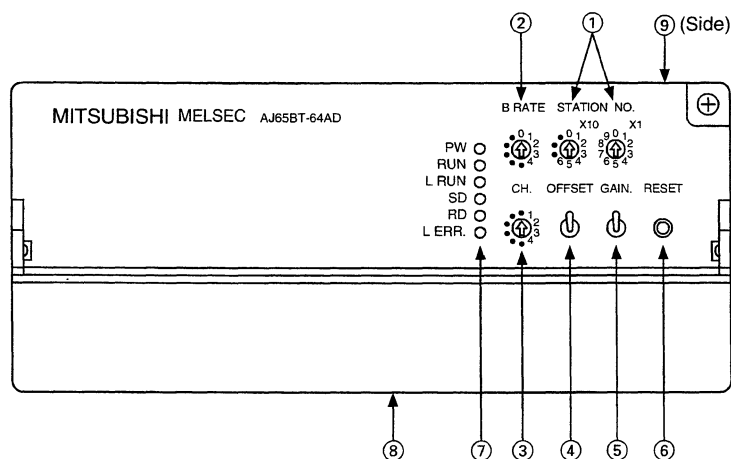
- (1) Perform the tightening of the module installation screws in the following range.

Screw Location	Tightening Torque Range
Module mounting screw (M4 screw)	0.78 to 1.18N·m
Terminal block terminal screw (M3.5 screw)	0.59 to 0.88N·m
Terminal block mounting screw (M4 screw)	0.78 to 1.18N·m

- (2) When using the DIN rail adapter, install the DIN rail by making sure of the following:
- (a) Applicable DIN rail models (conforming to the JIS C 2812)
 - TH35-7.5Fe
 - TH35-7.5Al
 - TH35-15Fe
 - (b) DIN rail installation screw interval
When installing the DIN rail, tighten the screws with less than 200mm (7.87 inch) pitches.
- (3) Refer to the Master Module user's manual for the name, specification, and manufacturers of supported cables for the use with AJ65BT-64AD.

4.2 Name of Each Part

The name of each part in the AJ65BT-64AD is shown.



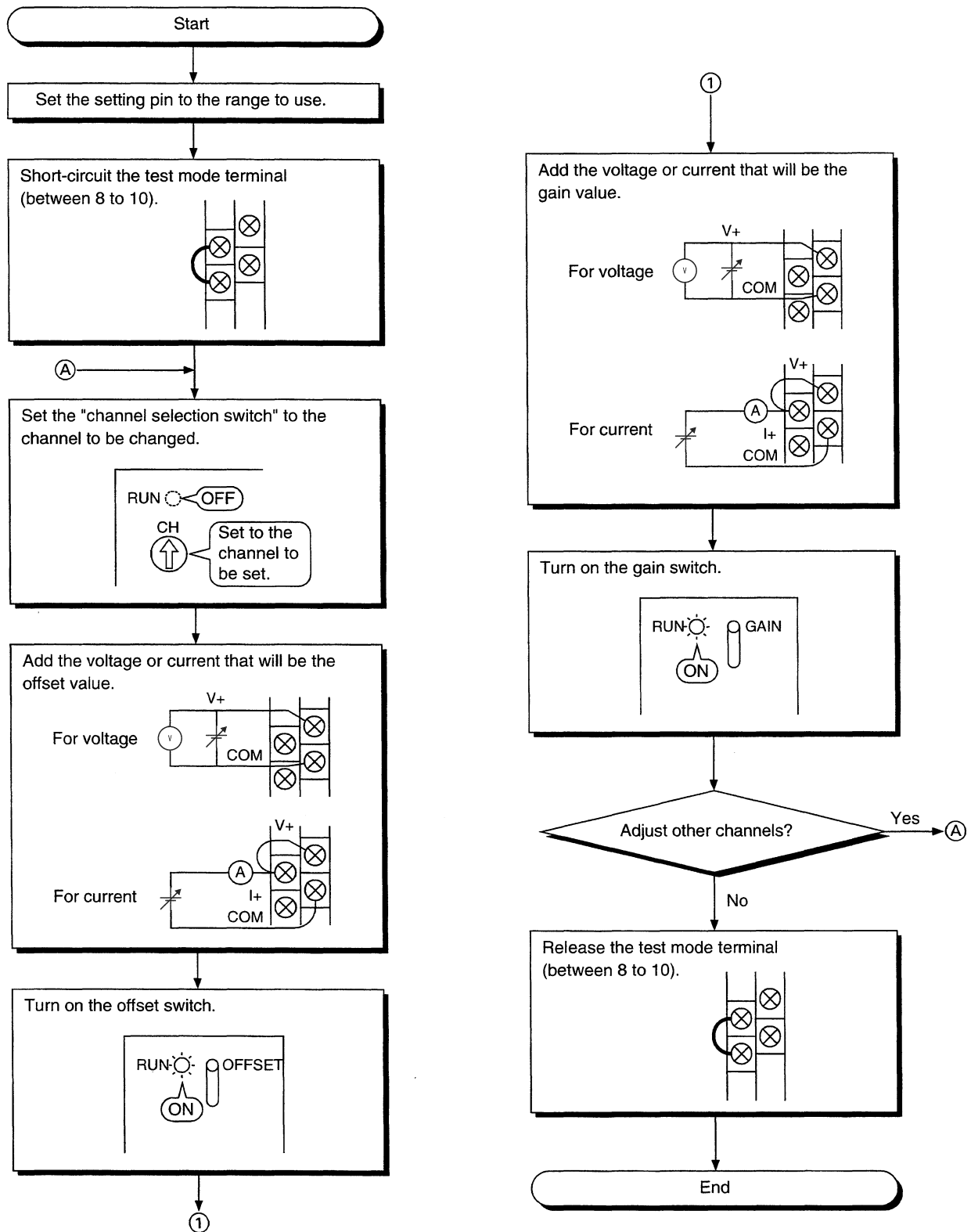
Number	Name and appearance	Description	
①	Station number setting switch	①×10 — The station number for the AJ65BT-64AD is set in the range 1 to 64. ①×1 — (factory default: 00)	
②	Transmission baud rate setting switch	Setting number	Transmission baud rate
		0	156kbps (factory default)
		1	625kbps
		2	2.5Mbps
		3	5Mbps
		4	10Mbps
		Other than 0 to 4	Unusable. (The L ERR. LED turns on, and results in a communication error.)
③	Channel selection switch	Selects the channel (1 to 4) to perform the offset and gain adjustment. When a value other than 1 to 4 is selected, no processing is performed. (factory default: 1)	
④	OFFSET switch	By turning this switch on during the test mode, the analog input value at that time is stored in the AJ65BT-64AD as an offset value.	
⑤	GAIN switch	By turning this switch on during the test mode, the analog input value at that time is stored in the AJ65BT-64AD as a gain value.	
⑥	RESET switch	The initialization of the I/O signals, remote register, and operation processing is performed for the AJ65BT-64AD. By turning this switch on, the AJ65BT-64AD initial data processing request flag turns on.	

Number	Name and appearance	Description																																																																																											
⑦	Operation status display LED	LED Name	Description																																																																																										
		PW LED	On : Power supply on Off : Power supply off																																																																																										
		RUN LED	Normal mode	On : Normal operation Flashing : Read/write data error occurred. Off : 24VDC power supply shutoff or watchdog timer error occurred.																																																																																									
			Test mode	On : Offset switch or gain switch is on. Off : offset switch or gain switch is off.																																																																																									
		L RUN LED	On : Normal communication Off : Communication cutoff (time expiration error)																																																																																										
		SD LED	On during data transmission																																																																																										
		RD LED	On during data receive																																																																																										
		L ERR. LED	On : Communication data error Flashing : Communication data error Off : Normal communication																																																																																										
⑧	Terminal module	<table><tr><td></td><td>1</td><td>3</td><td>5</td><td>7</td><td>9</td><td>11</td><td>13</td><td>15</td><td>17</td><td>19</td><td>21</td><td>23</td><td>25</td><td>27</td></tr><tr><td></td><td>DA</td><td>DG</td><td>+24V</td><td>24G</td><td></td><td>CH1</td><td>COM</td><td>CH2</td><td>COM</td><td>CH3</td><td>SLD</td><td>CH4</td><td>SLD</td><td>FG1</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>V+</td><td></td><td>V+</td><td></td><td>I+</td><td></td><td>I+</td><td></td><td></td></tr><tr><td></td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td><td>20</td><td>22</td><td>24</td><td>26</td><td></td></tr><tr><td></td><td>DB</td><td>SLD</td><td>(FG)</td><td>TEST</td><td>TEST</td><td>CH1</td><td>SLD</td><td>CH2</td><td>CH3</td><td>COM</td><td>CH4</td><td>COM</td><td>AG</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>I+</td><td></td><td>I+</td><td>V+</td><td></td><td>V+</td><td></td><td></td><td></td></tr></table> <p>Test mode setting terminal: By short-circuiting between the terminals, the test mode is started.</p>			1	3	5	7	9	11	13	15	17	19	21	23	25	27		DA	DG	+24V	24G		CH1	COM	CH2	COM	CH3	SLD	CH4	SLD	FG1							V+		V+		I+		I+				2	4	6	8	10	12	14	16	18	20	22	24	26			DB	SLD	(FG)	TEST	TEST	CH1	SLD	CH2	CH3	COM	CH4	COM	AG								I+		I+	V+		V+			
	1	3	5	7	9	11	13	15	17	19	21	23	25	27																																																																															
	DA	DG	+24V	24G		CH1	COM	CH2	COM	CH3	SLD	CH4	SLD	FG1																																																																															
						V+		V+		I+		I+																																																																																	
	2	4	6	8	10	12	14	16	18	20	22	24	26																																																																																
	DB	SLD	(FG)	TEST	TEST	CH1	SLD	CH2	CH3	COM	CH4	COM	AG																																																																																
						I+		I+	V+		V+																																																																																		
⑨	Analog input range setting pin	<p>Set the analog input range.</p> <table><tr><th></th><th>Voltage</th><th>Current</th></tr><tr><td>A</td><td>0 to 10V</td><td>(0 to 20mA)*</td></tr><tr><td>B</td><td>1 to 5V</td><td>4 to 20mA</td></tr><tr><td>C</td><td>-10 to 10V</td><td>-20 to 20mA</td></tr><tr><td>D</td><td>0 to 5V</td><td>0 to 20mA</td></tr></table> <p>(factory default: A)</p>			Voltage	Current	A	0 to 10V	(0 to 20mA)*	B	1 to 5V	4 to 20mA	C	-10 to 10V	-20 to 20mA	D	0 to 5V	0 to 20mA																																																																											
	Voltage	Current																																																																																											
A	0 to 10V	(0 to 20mA)*																																																																																											
B	1 to 5V	4 to 20mA																																																																																											
C	-10 to 10V	-20 to 20mA																																																																																											
D	0 to 5V	0 to 20mA																																																																																											

* When using in the range 0 to 20mA, use D.

4.3 Offset/Gain Setting

When changing the I/O conversion characteristics, follow the procedure below.



Point
(1) Set the offset and gain values in the actual usage state.
(2) The offset and gain values are stored in the AJ65BT-64AD, and are not erased even the power supply is shut off.
(3) Perform the offset/gain setting when the programmable controller CPU is stopped. When in the test mode, A/D conversion is stopped for all channels, so use the remote READY signals as an interlock.
(4) Perform the offset/gain setting in the range from -10 to 10VDC or from -20 to 0 to 20mA. When the setting exceeds this range, the maximum resolution or total precision may not be in the range indicated in the performance specification.
(5) When the grounding indicated in Section 4.8.2 *5 is changed (not performed → perform, or performed to removed), repeat the offset/gain setting from the start.

4.4 Settings when Using Both Voltage Input and Current Input

When using both the voltage input and current input, set the offset/gain value selection signal (RYn0) to OFF and select "user setting".

If this signal is turned ON and "factory default setting" is selected, the voltage input and current input cannot be used together. (All channels will be dedicated for voltage input or current input.)

The setting method for using both the voltage input and current input is shown below.

- (1) Set the analog input range setting pin to the input device's specifications. (Refer to Section 4.2.)
- (2) Input the voltage for the voltage input channel and input the current for the current input channel, and set the offset/gain setting. (Refer to Section 4.3.)
- (3) Set the offset/gain value selection signal (RYn0) to OFF and select "user setting".
When RYn0 is turned OFF, the voltage/current selection signal RYn1 will be invalidated, so there is no need to make settings in the sequence program.

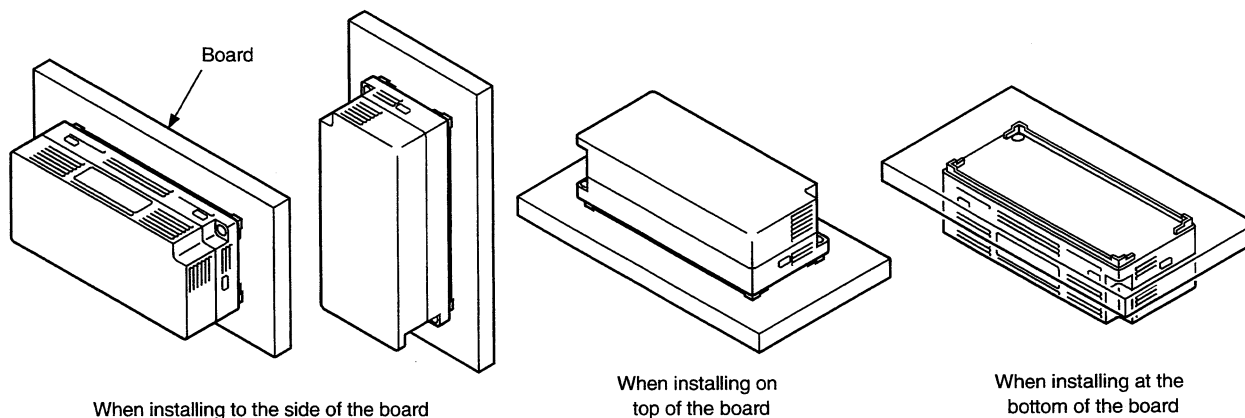
4.5 Station Number Setting

By the AJ65BT-64AD station number setting, the addresses to store the control I/O signal data and read/write data are determined.

For details, refer to the AJ61BT11/A1SJ61BT11 CC-Link System Master/Local Module User's Manual or AJ61QBT11/A1SJ61QBT11 CC-Link System Master/Local Module User's Manual.

4.6 Facing Direction of the Module Installation

There are no restrictions in the AJ65BT-64AD module installation facing directions.

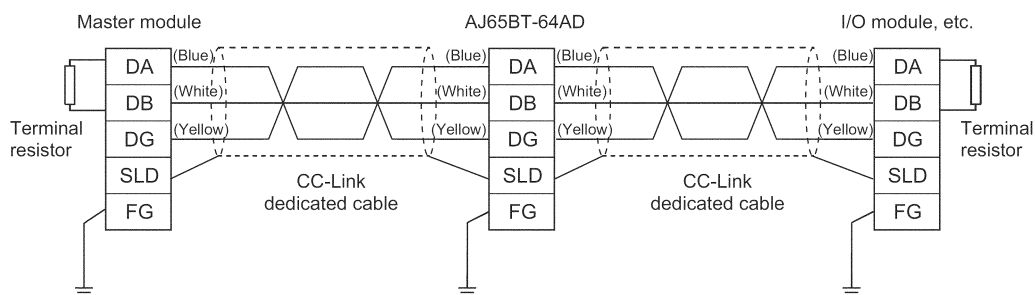


4.7 Data Link Cable Wiring

The wiring of the CC-Link dedicated cable which connects the AJ65BT-64AD and the master module is described.

4.7.1 CC-Link dedicated cable connections

The CC-Link dedicated cable connections between the AJ65BT-64AD and master module are as follows:



4.8 Wiring

The precautions and module connection example for wiring are described.

4.8.1 Wiring precautions

To obtain maximum performance from the functions of AJ65BT-64AD and improve the system reliability, an external wiring with high durability against noise is required.

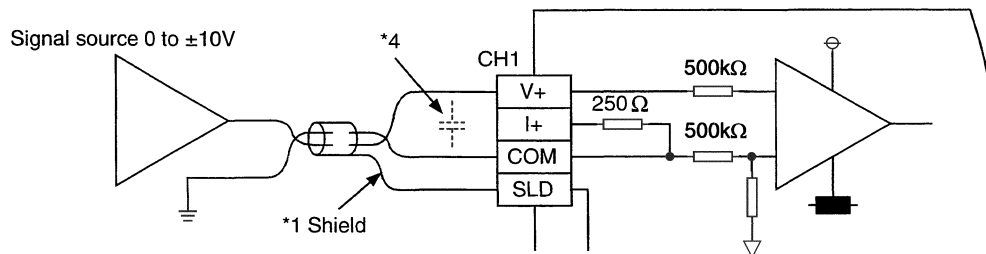
The precautions when performing external wiring are as follows:

- (1) Use separate cables for the AC and AJ65BT-64AD external input signals, in order not to be affected by the AC side surge or conductivity.
- (2) Do not bundle or place with load carrying wires other than the main circuit line, high voltage line or programmable controller. Noises, surges, or conductivity may affect the system.
- (3) Place a one-point grounding on the programmable controller side for the shielded line or shielded cable. However, depending on the external noise conditions, it may be better have a grounding externally.

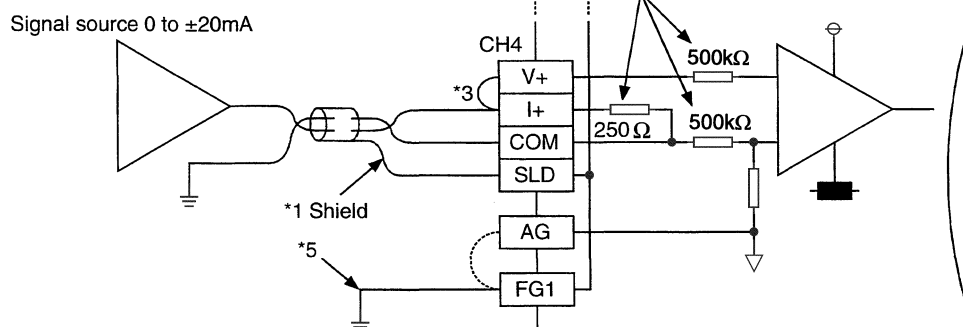
4.8.2 Module connection example

The connection examples for voltage input and current input are shown below:

(1) For voltage input



(2) For current input



*1 Use a two-core twisted shield line for the power cable.

*2 Indicates the AJ65BT-64AD input resistor.

*3 For the current input, be sure to connect the (V+) and (I+) terminals.

*4 When noise or ripple occurs with the external cable, connect a condenser with about 0.1 to 0.47 μ F25WV between the terminal V and COM.

*5 Always perform grounding for FG1. When there is a lot of noise, it may be better ground AG as well.

If the grounding wiring (grounding yes/no) is changed after the offset and gain are set, perform the setting of the offset/gain values again.

Point

- In an unused channel, if terminals remain open, an erratic digital value may be output. To prevent this, take any of the following measures.
1. Select Prohibit in the A/D conversion enable/prohibit setting for the unused channel.
Note that changing the setting from Enable to Prohibit will reduce the sampling cycle.
 2. Short-circuit the input terminals (terminal V+ and COM) of the unused channel.
 3. Connect the AG terminal to the GND terminal of the external device.

4.9 Maintenance and Inspection

There are no special inspection items for the AJ65BT-64AD module, but follow the inspections items describes in the programmable controller CPU User's Manual so that the system can always be used in the best condition.

5. PROGRAMMING

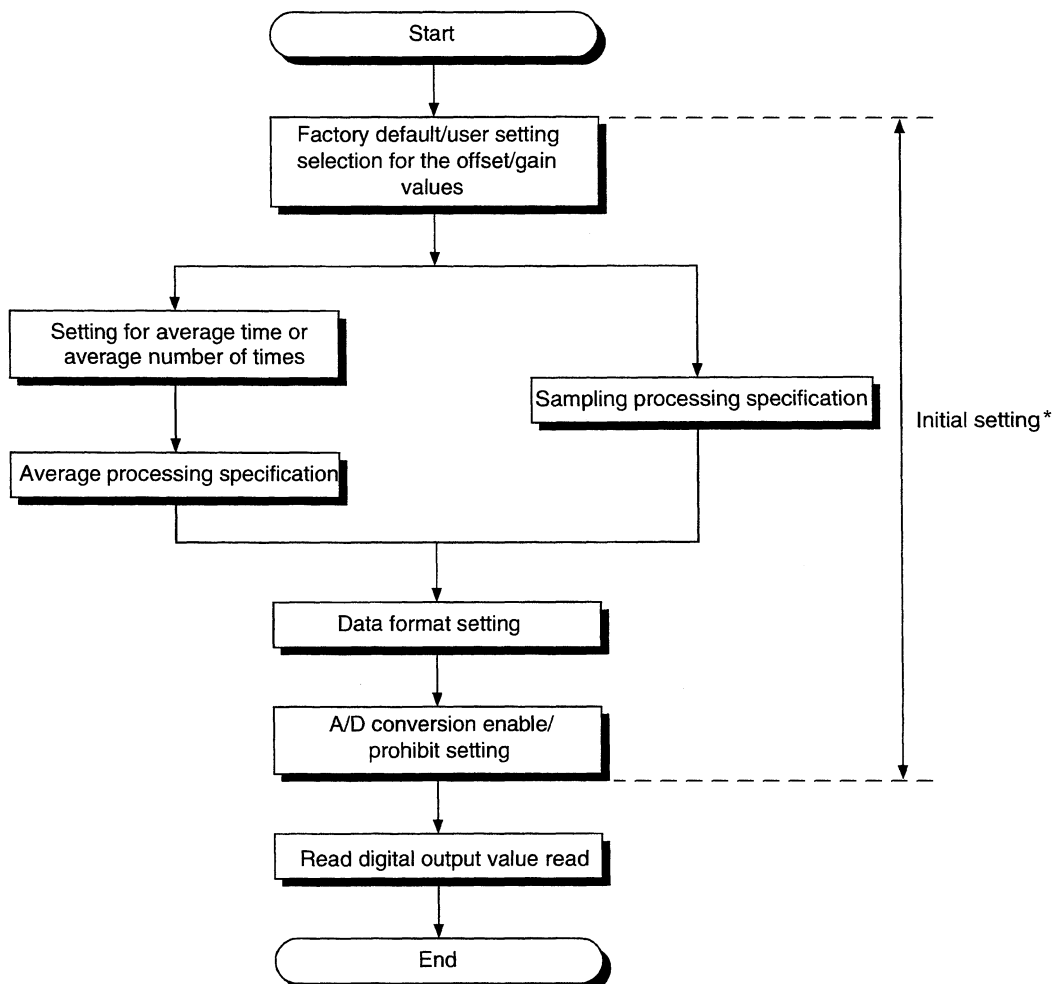
The programming procedure, basic read/write programs, and program examples for the AJ65BT-64AD are described.

When utilizing the program example introduced in this chapter for an actual system, fully verify that there are no problems in controllability in the target system.

Refer to the user's manual of the master module used for the master module, to Section 3.6 for the remote registers, and to the AnSHCPU/AnACPU/AnUCPU Programming Manual (Dedicated Instructions) for details of the dedicated instructions.

5.1 Programming Procedure

Create a program which executes the AJ65BT-64AD analog/digital conversion by following the procedure below:

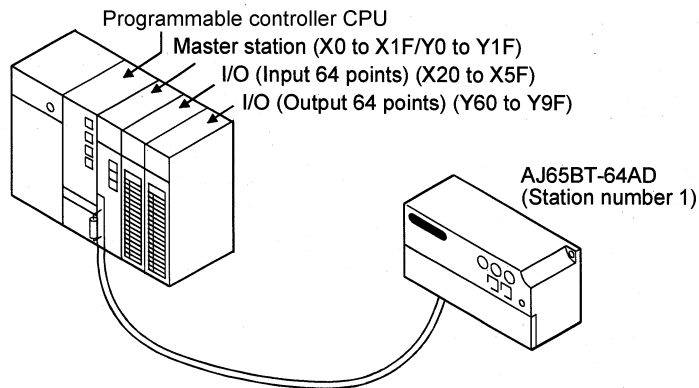


* When using the QCPU (Q mode), you can use the remote device station initialization procedure registration function to make settings. When using the ACPU, QCPU (A mode) or QnACPU, use the sequence program to make settings.

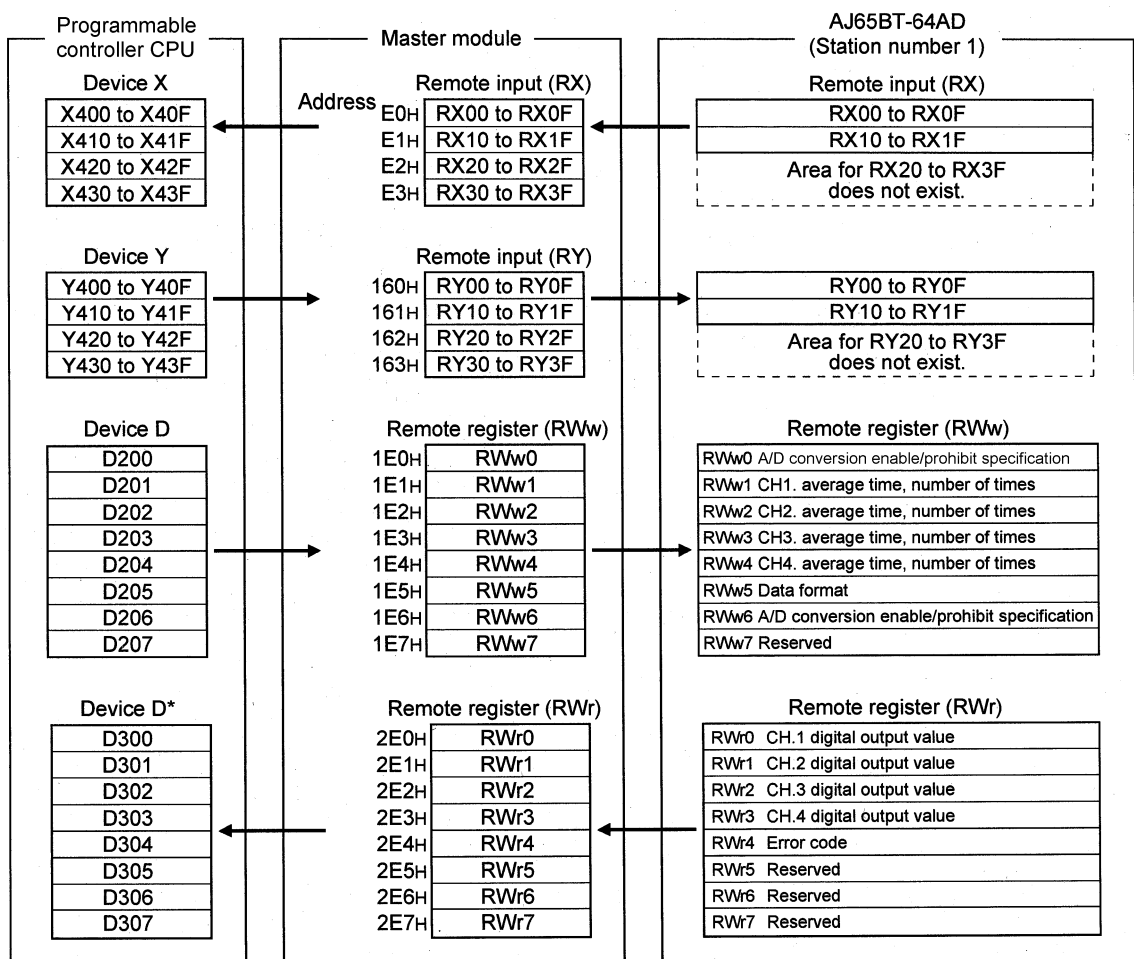
5.2 Conditions of Program Example

The program examples in this chapter are created under the following conditions.

(1) System configuration



(2) Relationships between programmable controller CPU, master module and AJ65BT-64AD



* In the program example (refer to Section 5.5) that uses the RRPA instruction (automatic refresh parameter setting) with the ACPU/QCPU (A mode), RWr0 to RWr3 are assigned to D456 to D463.

Point

Some CPU modules may not accept the devices used in the program example in this chapter. For the setting ranges of the devices, refer to the user's manual of the CPU module used.

For the A1SHCPU, for example, devices X100, Y100 and later are unusable. Use such devices as B and M.

(3) Initial settings

Setting Item	Settings
Offset/gain value selection (RY00)	Factory Setting
Voltage/Current selection (RY01)	Current
Average procedure specification (RWw0)	CH1: Sampling specification CH2: Average processing (Average number of times) CH3: Average processing (Average time)
CH2 Average time, number of times (RWw2)	Average number of times: 50times
CH3 Average time, number of times (RWw3)	Average time: 1000ms
Data format (RWw5)	-2000 to 2000
A/D conversion enable/prohibit specification (RWw6)	A/D conversion enable channel: CH1, CH2, CH3

5.3 Program Example for Use of the QCPU (Q mode)

The program examples in this section are created under the following conditions.
 GX Developer is used to set the network and automatic refresh parameters.
 Using the remote device station initialization procedure registration function facilitates initial settings.

(1) Parameter setting

(a) Network parameter setting

Start I/O No	1
Operational setting	Operational settings
Type	Master station
Master station data link type	PLC parameter auto start
Mode	Remote net(Ver.1 mode)
All connect count	1
Remote input(RX)	
Remote output(RY)	
Remote register(RW/r)	
Remote register(RW/w)	
Ver.2 Remote input(RX)	
Ver.2 Remote output(RY)	
Ver.2 Remote register(RW/r)	
Ver.2 Remote register(RW/w)	
Special relay(SB)	
Special register(SW)	
Retry count	3
Automatic reconnection station count	1
Stand by master station No.	
PLC down select	Stop
Scan mode setting	Asynchronous
Delay information setting	0
Station information setting	Station information
Remote device station initial setting	Initial settings
Interrupt setting	Interrupt settings

Station No.	Station type	Expanded cyclic setting	Exclusive station count	Remote station points	Reserve/invalid station select	Intelligent buffer select(word)		
1/1	Remote device station	single	Exclusive station 2	64 points	No setting	Send	Receive	Automatic

(b) Automatic refresh parameter setting

Start I/O No	1
Operational setting	Operational settings
Type	Master station
Master station data link type	PLC parameter auto start
Mode	Remote net(Ver.1 mode)
All connect count	1
Remote input(RX)	X400
Remote output(RY)	Y400
Remote register(RW/r)	D300
Remote register(RW/w)	D200
Ver.2 Remote input(RX)	
Ver.2 Remote output(RY)	
Ver.2 Remote register(RW/r)	
Ver.2 Remote register(RW/w)	
Special relay(SB)	S80
Special register(SW)	SW0
Retry count	3
Automatic reconnection station count	1
Stand by master station No.	
PLC down select	Stop
Scan mode setting	Asynchronous
Delay information setting	0
Station information setting	Station information
Remote device station initial setting	Initial settings
Interrupt setting	Interrupt settings

(2) Initial setting by remote device station initialization procedure registration

(a) Setting the target station number

Set the station number to which initial setting will be made.

Set the target station number to "1".

Remote device station initial setting: Target station number setting: Module 1						
	Target station No.	No. of registered procedures			Target station No.	No. of registered procedures
1	1	0	Regist procedure	9		Regist procedure
2			Regist procedure	10		Regist procedure

(b) Setting the procedure registration

When the initial data processing request flag (RX18) turns on and the remote device station initialization procedure registration (SB0D) is set, the following data are registered to the AJ65BT-64AD.

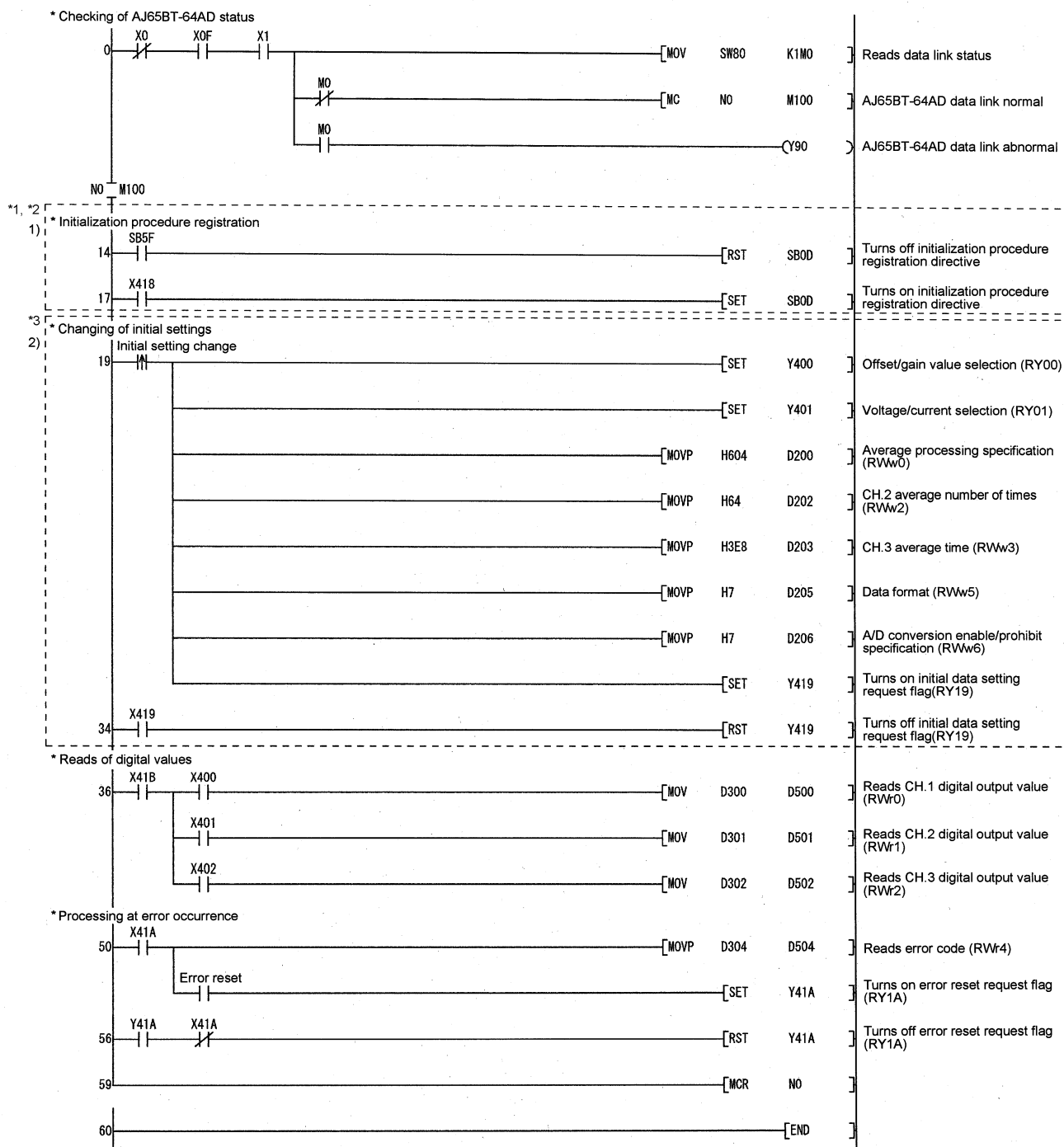
Procedure Execution Condition	Execution
Initial data processing request flag (RX18) turns on	Set Factory default for the offset/gain value selection. (RY00: ON)
	Set Current for the voltage/current selection. (RY01: ON)
	For the average processing specification, set to Channel 1: Sampling processing, Channel 2: Average processing (count averaging), and Channel 3: Average processing (time averaging). (RWw0: 0604H)
	Set 50 as the averaging count for channel 2. (RWw2: 32H)
	Set 1000ms as the averaging time for channel 3. (RWw3: 3E8H)
	Set -2000 to 2000 for the data format. (RWw5: 0007H)
	Set Enable to channels 1, 2 and 3 in the A/D conversion enable/disable specification. (RWw6: 0007H)
	Initial data processing completion flag (RY18) is turned on.
	Initial data setting request flag (RY19) is turned on.
Initial data processing request flag (RX18) turns off	Initial data processing completion flag (RY18) is turned off.
Initial data setting completion flag (RX19) turns on	Initial data setting request flag (RY19) is turned off.

(c) Setting results

The setting results are shown below.

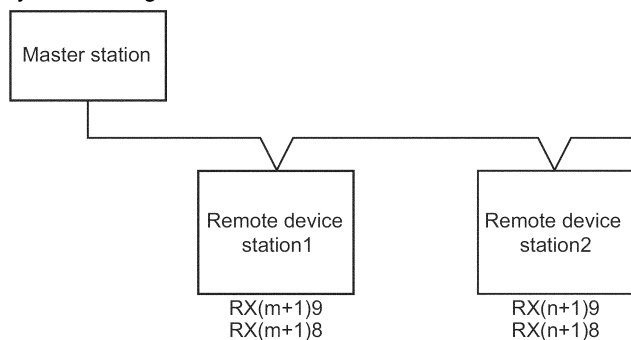
Remote device station initial setting: Procedure registration module 1: Target station 1									
Input format		HEX							
Execute Flag	Operational condition	Executorial condition			Details of execution				
		Condition	Device	Execute	Write	Device	Write		
			Number	Condition	Device	Number	Data		
Execute	Set new	RX	18	ON	RY	00	ON		
Execute	Same as prev.set	RX	18	ON	RY	01	ON		
Execute	Same as prev.set	RX	18	ON	RWw	00	0604		
Execute	Same as prev.set	RX	18	ON	RWw	02	0032		
Execute	Same as prev.set	RX	18	ON	RWw	03	03E8		
Execute	Same as prev.set	RX	18	ON	RWw	05	0007		
Execute	Same as prev.set	RX	18	ON	RWw	06	0007		
Execute	Same as prev.set	RX	18	ON	RY	18	ON		
Execute	Same as prev.set	RX	18	ON	RY	19	ON		
Execute	Set new	RX	18	OFF	RY	18	OFF		
Execute	Set new	RX	19	ON	RY	19	OFF		

(3) Program example

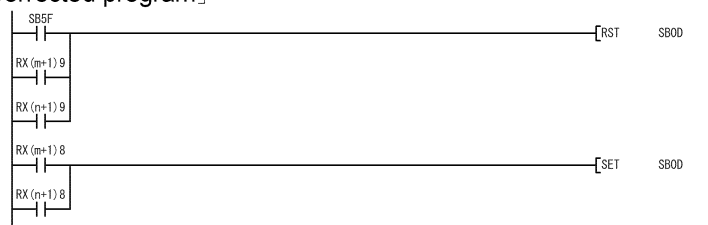


*1 When making remote device station initialization procedure registration to multiple stations, correct the program within the dotted line 1) as shown below.

[System configuration]



[Corrected program]



- RX(m+1)9 and RX(n+1)9 are initial data setting completion flags.
- RX(m+1)8 and RX(n+1)8 are initial data processing request flags.

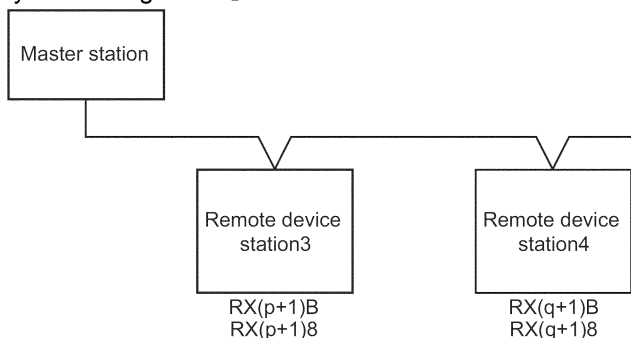
Insert the remote READY and initial data processing request flags for all the stations, to which the remote device station initialization procedure registration has been made, into the program.

[Usage in combination with other remote device stations]

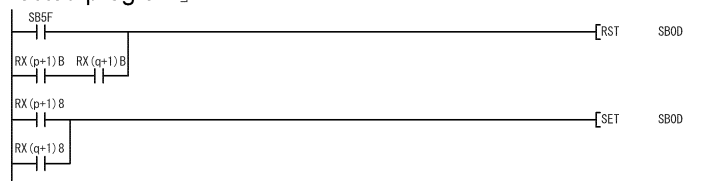
(1) Depending on the remote device stations to be used, the program enclosed by the dotted line 1) has two programming patterns as shown in the above and the below figures.

(To check which pattern can be used, refer to the manual for the remote device to be used.)

[System configuration]



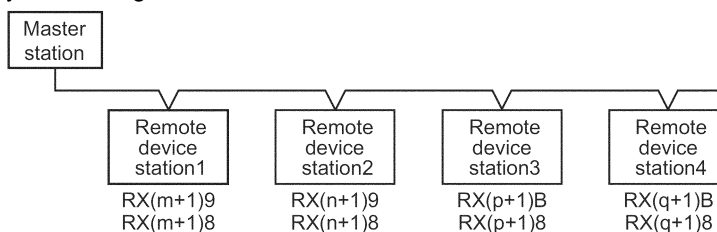
[Corrected program]



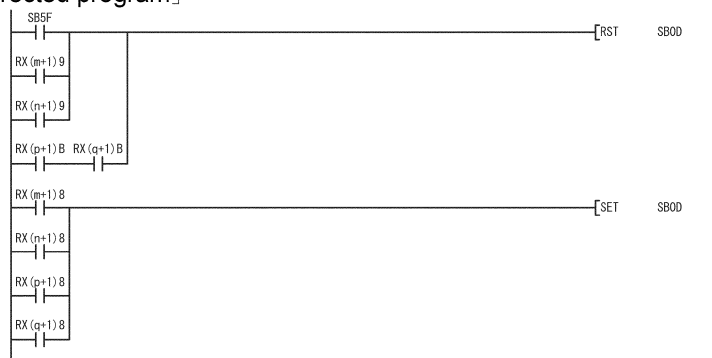
- RX(p+1)9 and RX(q+1)B are remote READY.
- RX(p+1)8 and RX(q+1)8 are initial data processing request flags.

(2) When using the program enclosed by the dotted line 1) in combination with other remote device stations, correct the program as shown below.

[System configuration]



[Corrected program]



Note that the master module can register the initialization procedure of only the specified station out of the multiple remote device stations.

The master module supporting this function is the QJ61BT11N which serial No's first 5 digits is 08032 or later.

For details, refer to the CC-Link System Master/Local Module User's Manual, "CHAPTER 4 FUNCTIONS"

*2 Before the communication program is executed with remote device stations, the program enclosed by the dotted line 1) enables the initial setting by using the SB0D (remote device station initialization procedure registration instruction) and SB5F (completion status of remote device station initialization procedure). Initialization processing can't be made only by the parameter setting of GX Developer.

*3 The program enclosed by the dotted line 2) is necessary only when the initial settings are changed.

5.4 Program Example for Use of the QnACPU

GX Developer is used to set the network and automatic refresh parameters.

(1) Parameter setting

(a) Network parameter setting

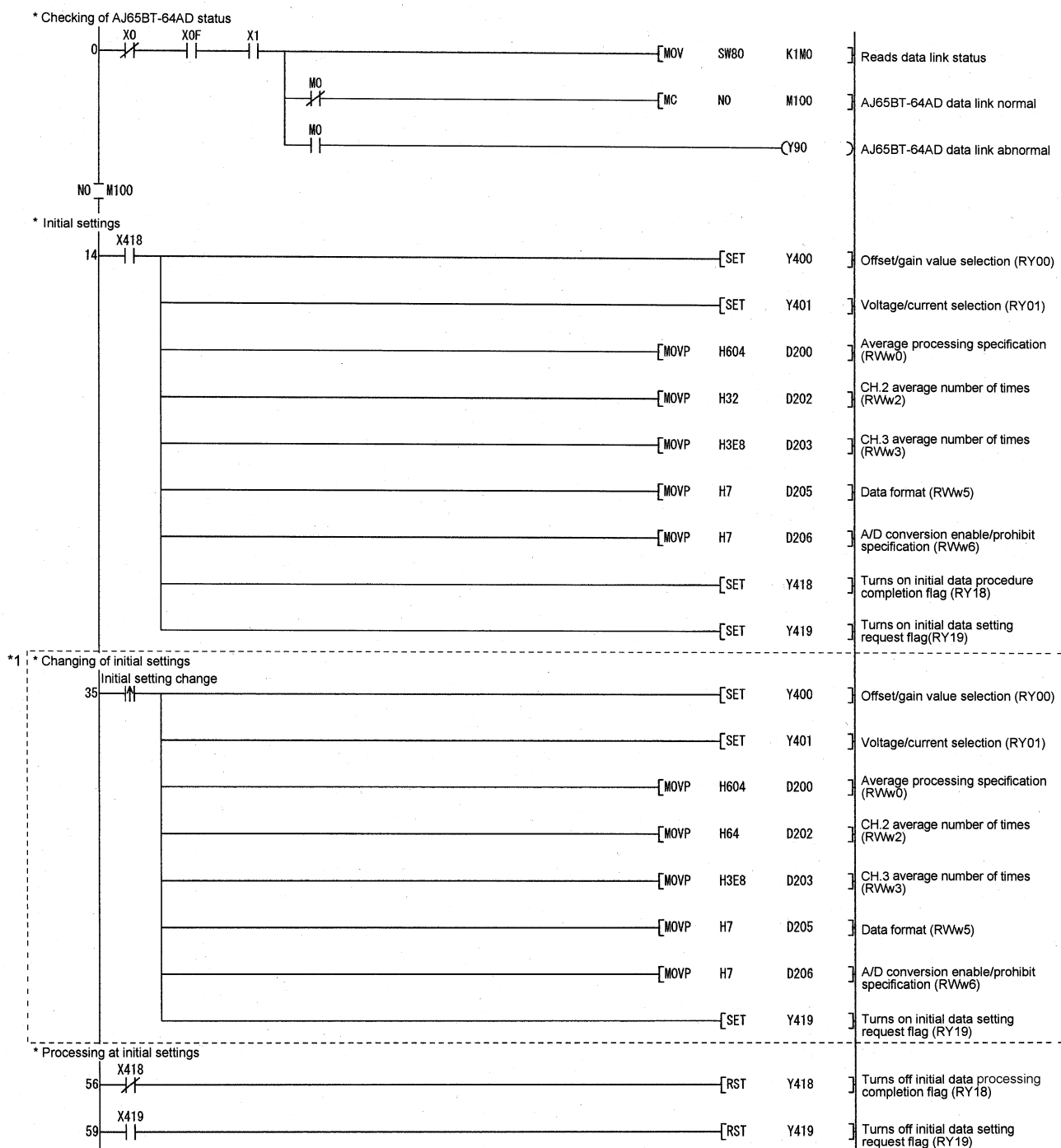
	1
Start I/O No.	0000
Type	Master station ▼
All connect count	1
Remote input(RX)	
Remote output(RY)	
Remote register(RW/r)	
Remote register(RWw)	
Special relay(SB)	
Special register(SW)	
Retry count	3
Automatic reconnection station count	1
Wait master station No.	0
PLC down select	Stop ▼
Scan mode setting	Asynchronously ▼
Delay information setting	0
Station information setting	Station information

StationNo.	Station type	Exclusive station count	Reserve/invalid station select	Intelligent buffer select(word) ▲		
				Send	Receive	Automatic
1/1	Remote device station ▼	Exclusive station 2 ▼	No setting ▼			

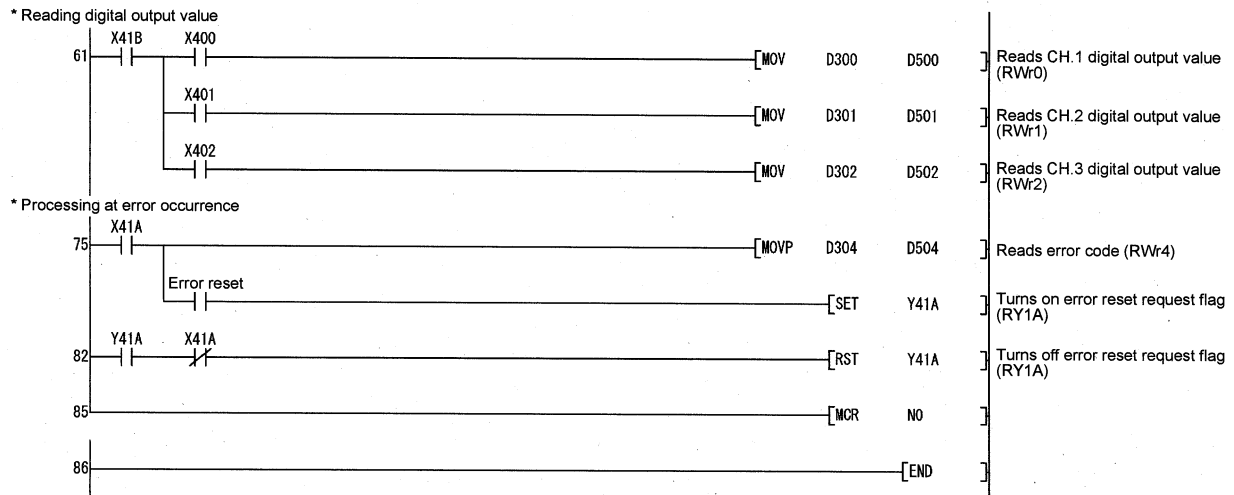
(b) Automatic refresh parameter setting

	1
Start I/O No.	0000
Type	Master station ▼
All connect count	1
Remote input(RX)	X400
Remote output(RY)	Y400
Remote register(RW/r)	D300
Remote register(RWw)	D200
Special relay(SB)	B0
Special register(SW)	W0
Retry count	3
Automatic reconnection station count	1
Wait master station No.	0
PLC down select	Stop ▼
Scan mode setting	Asynchronously ▼
Delay information setting	0
Station information setting	Station information

(2) Program example



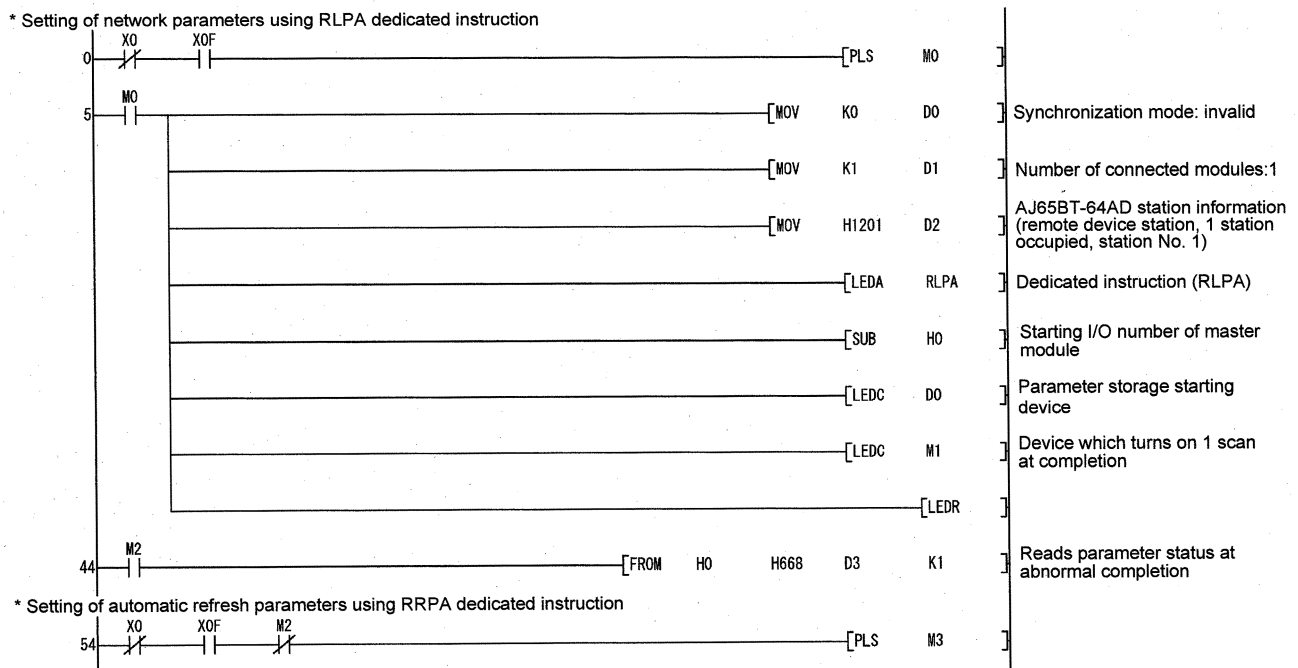
*1 The program enclosed by the dotted line is necessary only when the initial settings are changed.

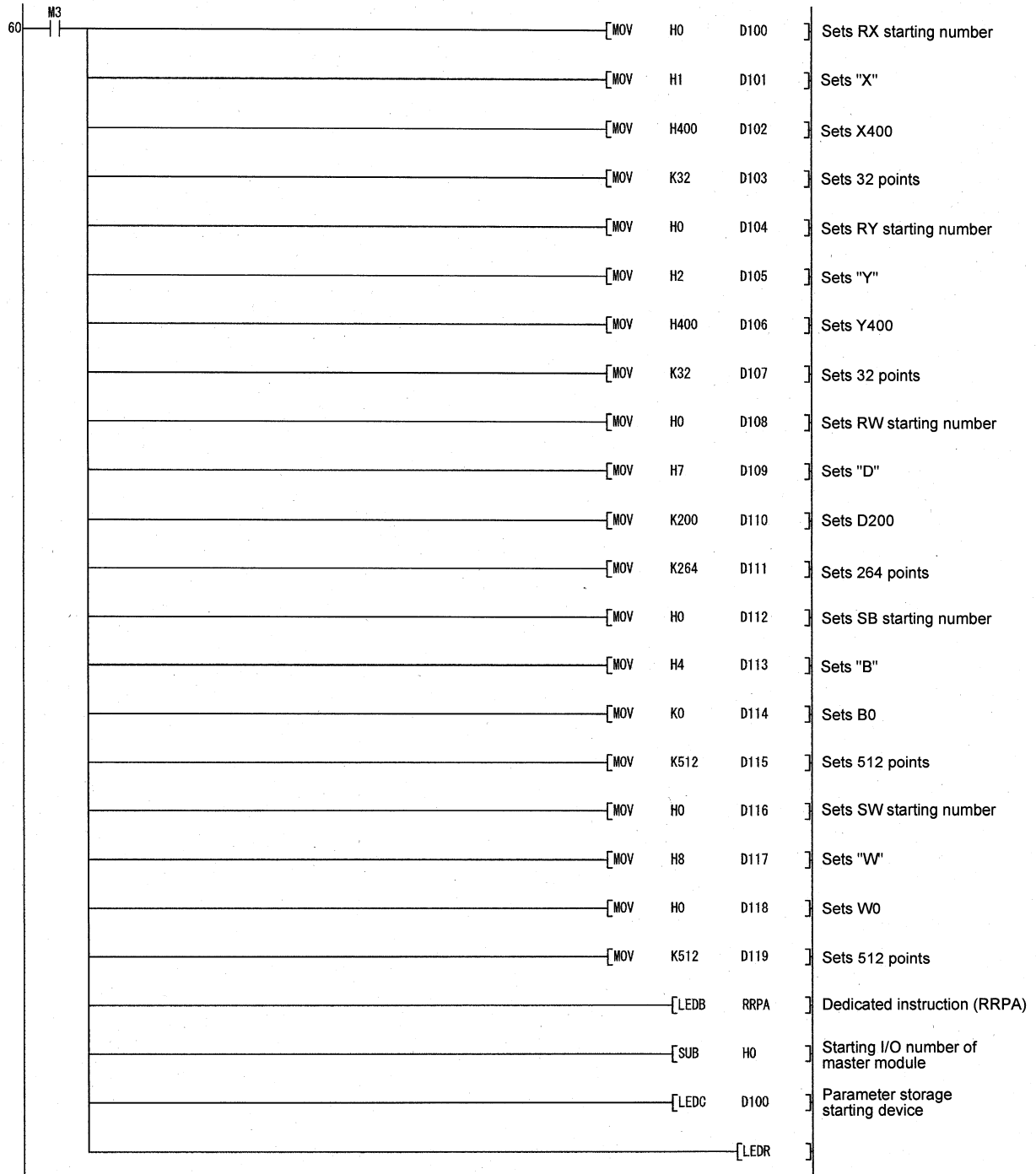


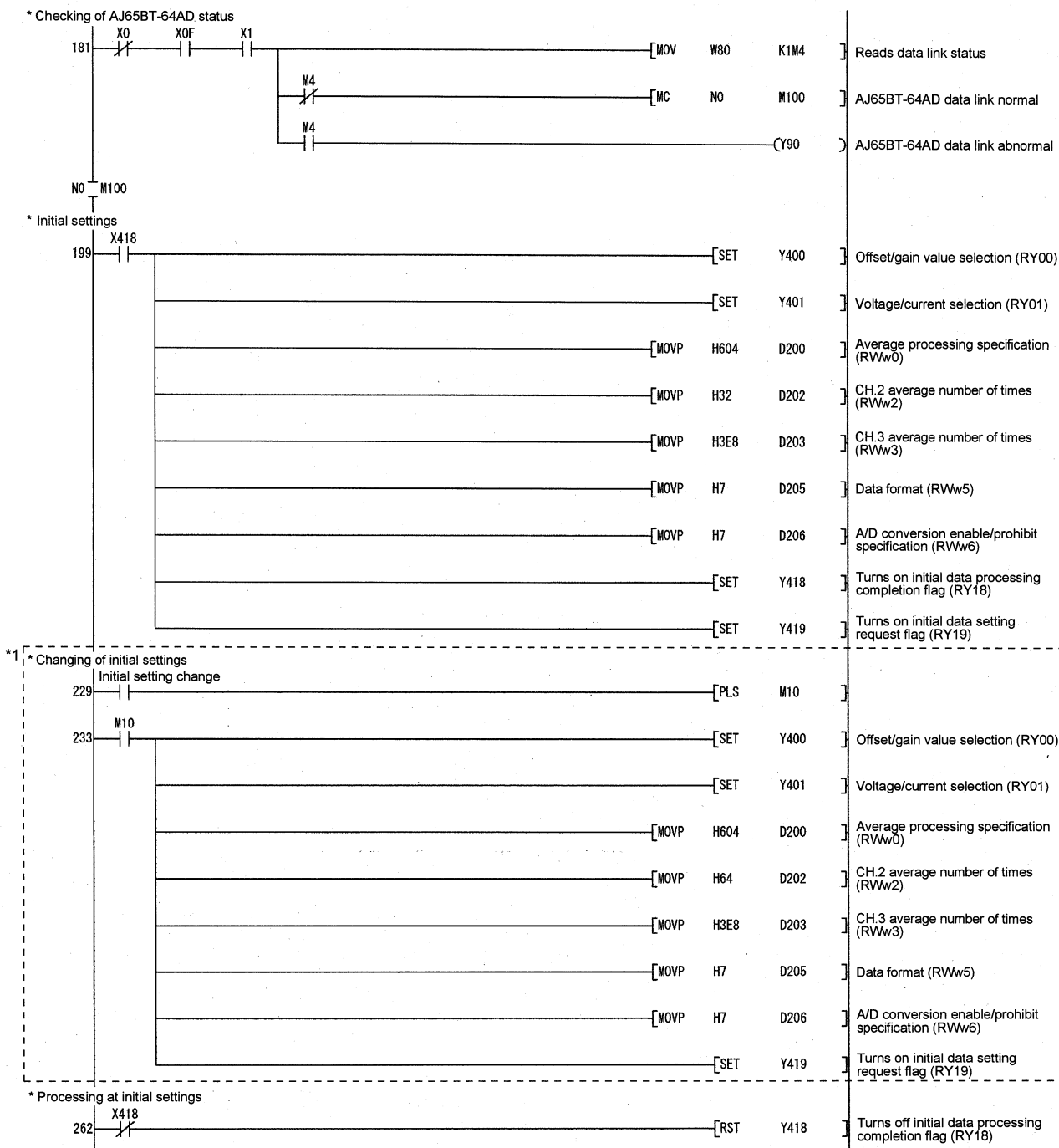
5.5 Program Example for Use of the ACPU/QCPU (A mode) (dedicated instructions)

A sequence program is used to set the network and automatic refresh parameters.

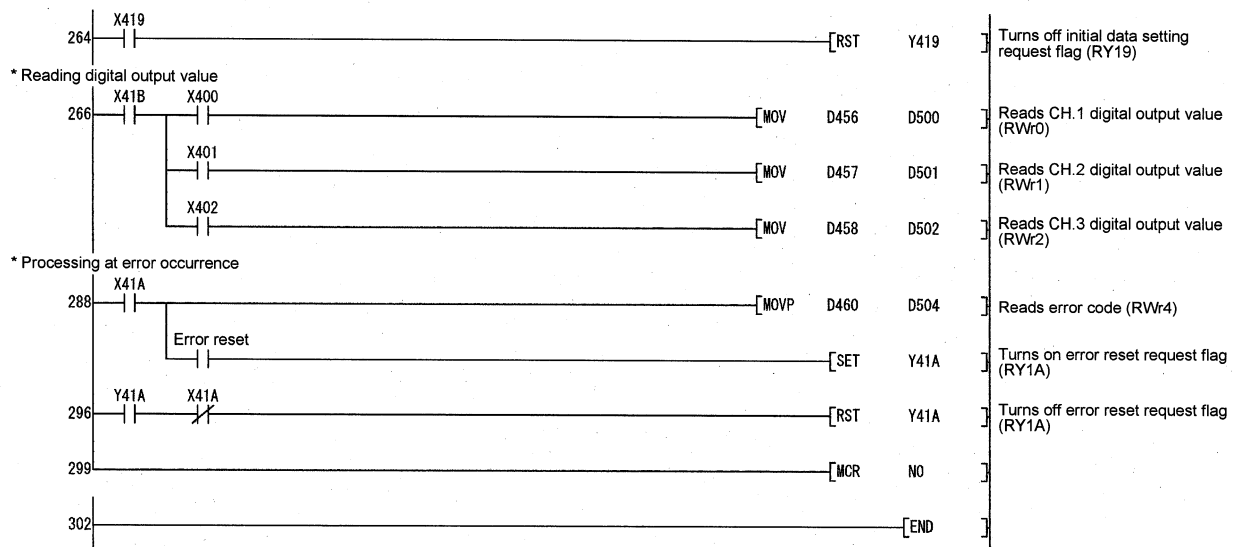
(1) Program example







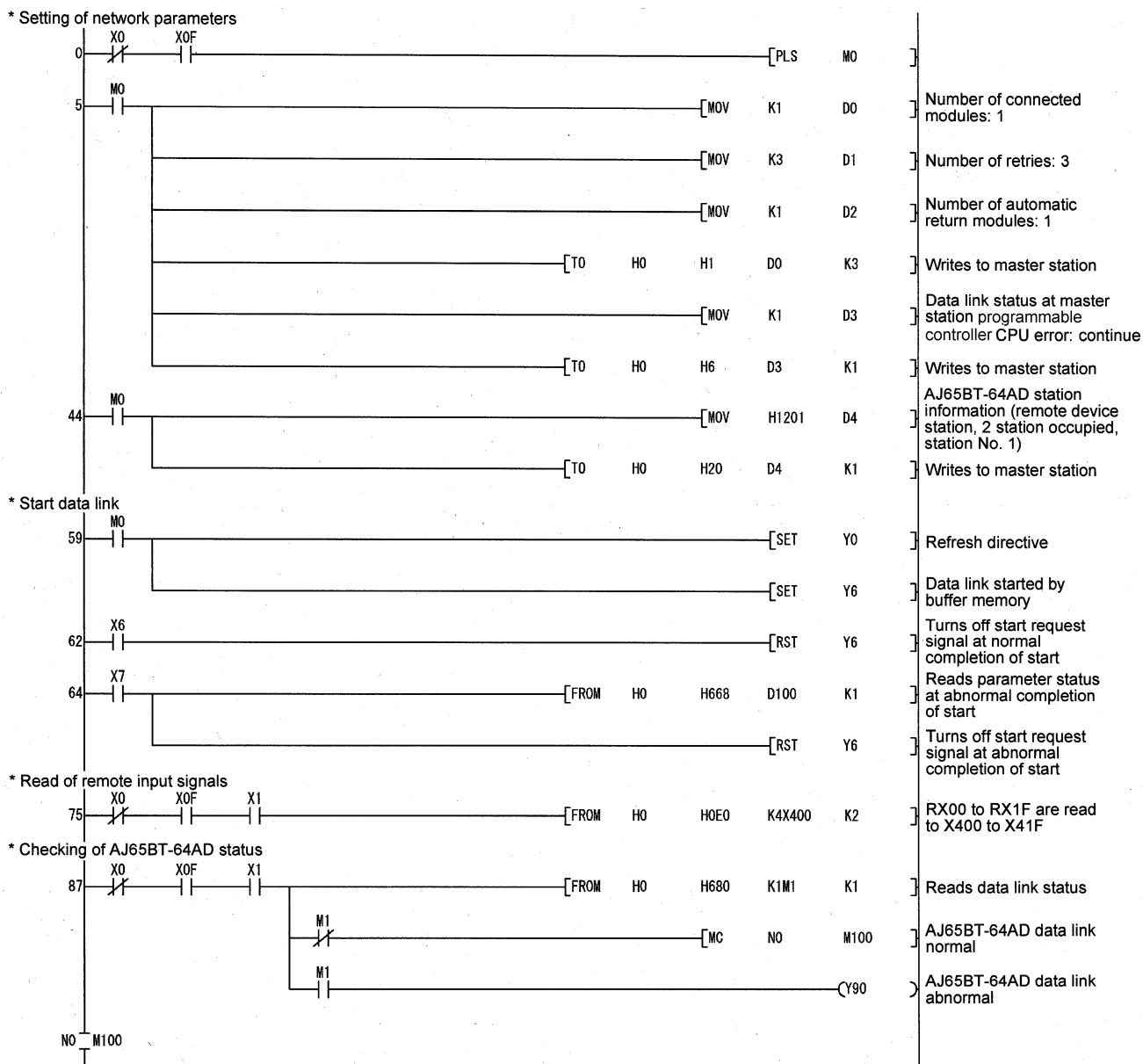
*1 The program enclosed by the dotted line is necessary only when the initial settings are changed.

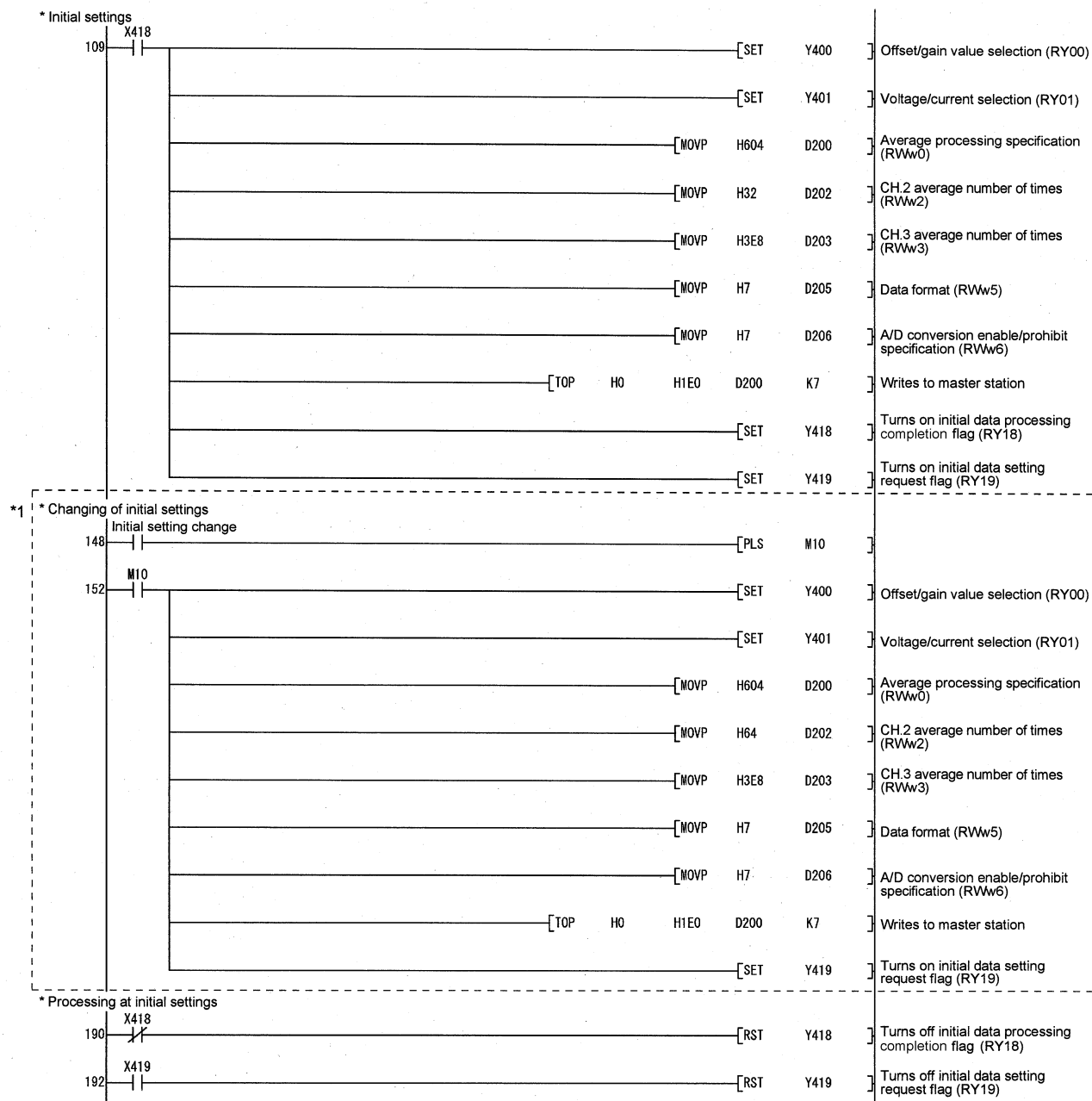


5.6 Program Example for Use of the ACPU/QCPU (A mode) (FROM/TO instructions)

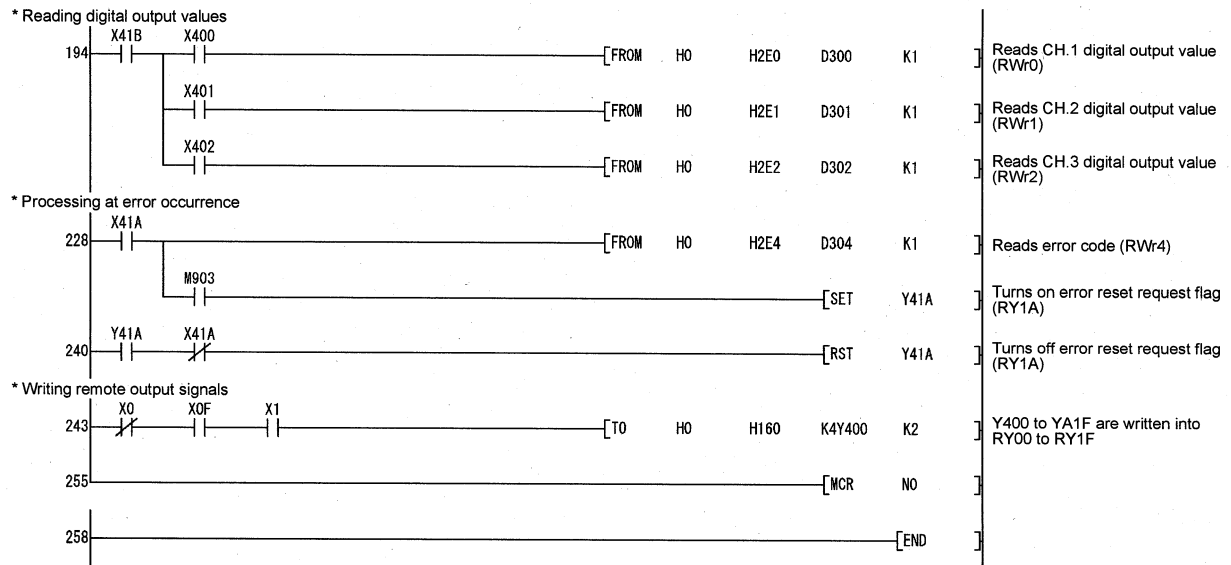
A sequence program is used to set the network parameters.

(1) Program example





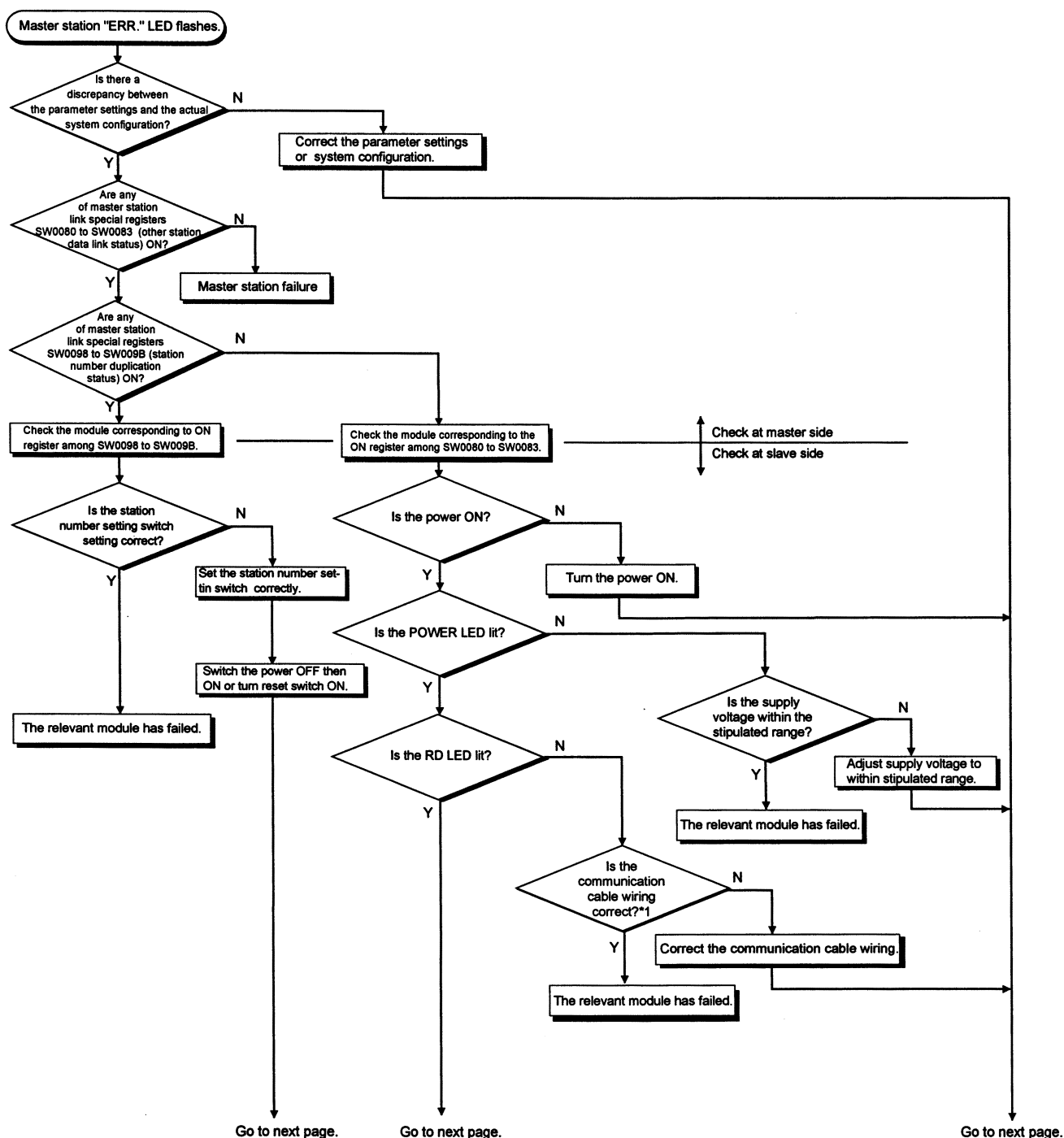
*1 The program enclosed by the dotted line is necessary only when the initial settings are changed.

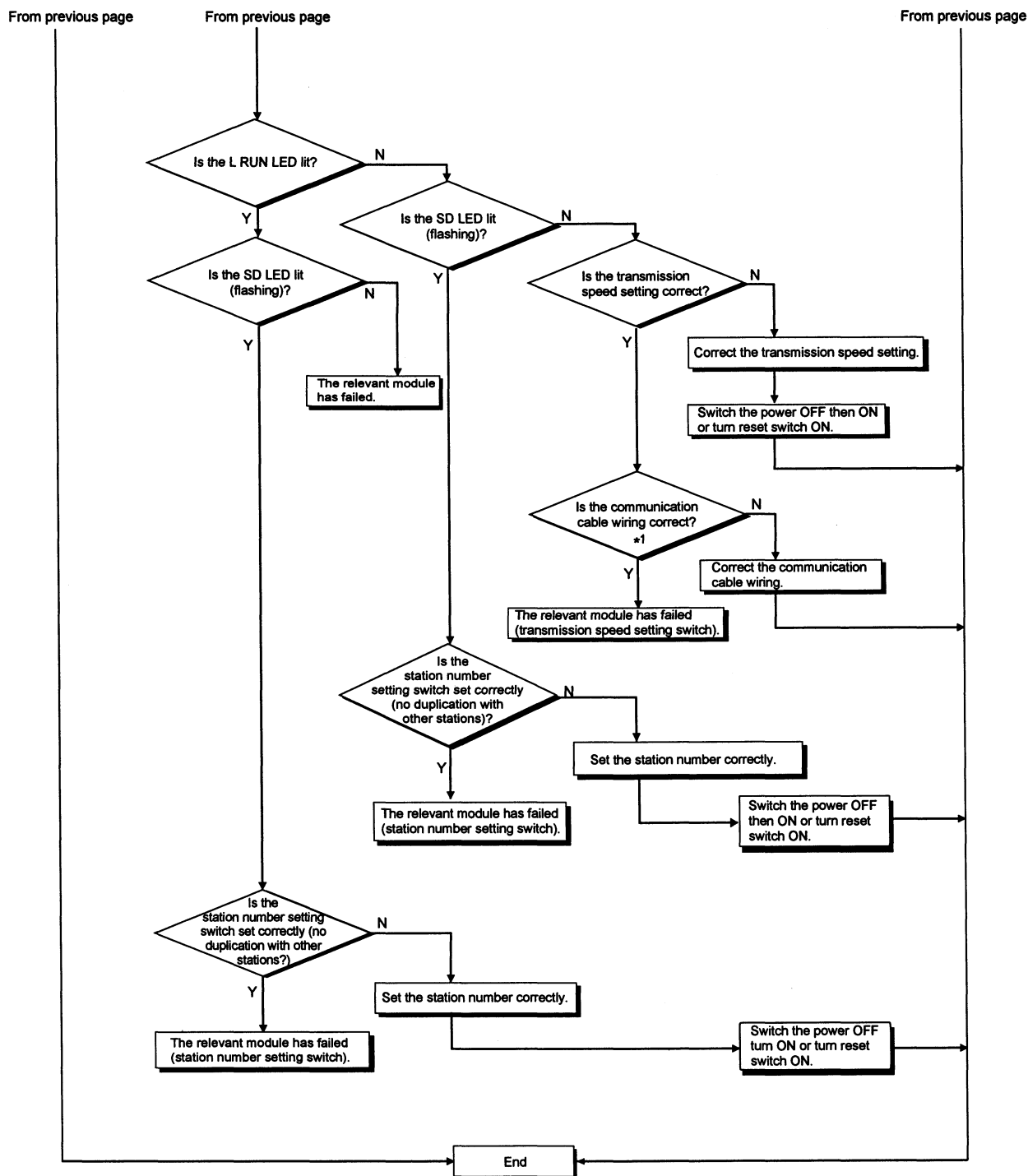


6. Troubleshooting

The details of the errors which may occur when using the AJ65BT-64AD and troubleshooting are described.

6.1 Troubleshooting when Master Station "ERR." LED is Flickering





*1 Points to check: short circuit, reversed connections, disconnection, terminal resistors, FG connections, overall distance, station-to-station distance.

6.2 Troubleshooting

Simple troubleshooting methods when using the AJ65BT-64AD are described.

Refer to the programmable controller CPU and master module user's manual for issues regarding the programmable controller CPU and master module.

6.2.1 When the AJ65BT-64AD RUN LED is flashing

Check item	Corrective action
Error in the write data.	Check the cause of error with the error code, and correct the sequence program.
Offset/gain value set in the test mode was set as offset value \geq gain value.	Correct the offset/gain values for the channel where the error occurred so that the gain value > offset value.

6.2.2 When the AJ65BT-64AD RUN LED is off

Check item	Corrective action
Is the 24VDC power supply supplied?	Check the power supply.
Is the voltage for the 24VDC power supply within the regulated value?	Adjust the voltage within 18 to 30V.
Is the TEST terminal released?	Release the TEST terminal after the offset/gain adjustment.

6.2.3 When the AJ65BT-64AD LINK RUN LED is off

Refer to the section for the master module troubleshooting.

6.2.4 When the AJ65BT-64AD LINK ERR LED is flashing

Check item	Corrective action
Was the station number or baud rate changed during normal operation?	Set the station number and baud rate back for normal operation.

6.2.5 When the AJ65BT-64AD LINK ERR LED is on

Check item	Corrective action
Is the station number or baud rate setting correct?	Set to the correct station number or baud rate.

6.2.6 When the digital output value cannot be read

Check item	Corrective action
Is the RUN LED flashing or off?	Troubleshoot according to Sections 6.2.1 and 6.2.2.
Is the LINK RUN LED off?	Troubleshoot according to Section 6.2.3.
Is the LINK ERR LED flashing or off?	Check the error details according to the master module user's manual.
Is the CPU RUN LED flashing or off?	Check the error details according to the CPU user's manual.
Is the master module RUN LED off?	Check the error details according to the master module user's manual.
Is the master module RD/SD LED on?	Check the error details according to the master module user's manual.
Is the analog input signal line disconnected, cut off, or any errors?	Check the error area by checking the signal line visually or by conductive check.
Remove the AJ65BT-64AD analog input cable. Apply the test voltage (stable power supply or battery) to this module's terminal, and measure the digital output value.	If the AJ65BT-64AD module digital output value is normal, the effects are being received by noise from an external wiring. So check the wiring and grounding method. Lift the AJ65BT-64AD from the system, and remove the grounding circuit. (install to the DIN rail.)

6.3 Error Code List

At the start of the module, when the data is written from the programmable controller CPU to the master module, or an error occurs (AJ65BT-64AD RUN LED flashes) when setting the offset/gain is being set, the error code is stored to the AJ65BT-64AD remote register RW_{rn}+4.

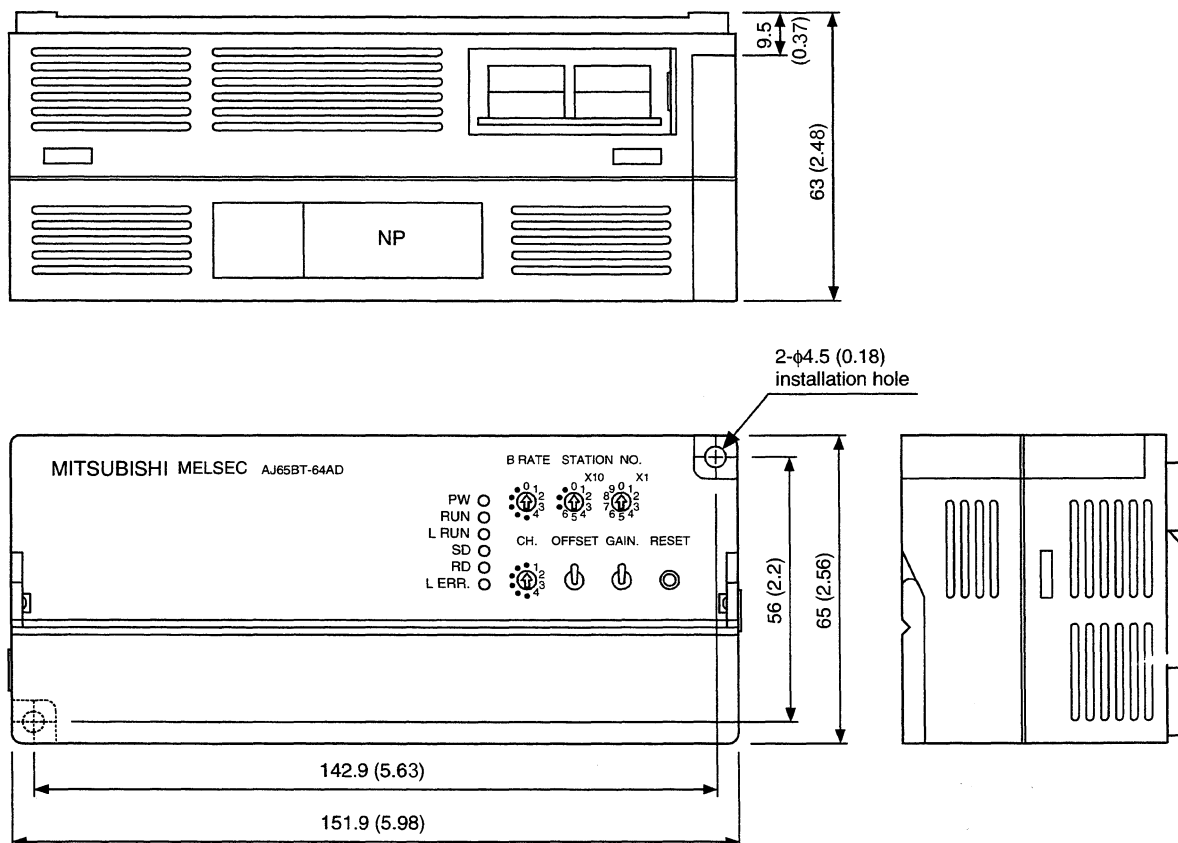
Table 6.1 Error code list (error detected by the AJ65BT-64AD)

Error code	Cause	Corrective action
10□	Value not in the range 1 to 10000 was set as the average number of times set value. <ul style="list-style-type: none"> □ indicates the channel number where the error occurred. 	Correct the average number of times setup value to a value in the range 1 to 10000.
11□	Value not in the range 4 to 10000 ms was set as the average time setup value. <ul style="list-style-type: none"> □ indicates the channel number where the error occurred. 	Correct the average time setup value to a value in the range 4 to 10000 ms.
12□	The offset and gain values set in the test mode was offset ≥ gain value. <ul style="list-style-type: none"> □ indicates the channel number where the error occurred. 	Correct the offset/gain values so that the gain value > offset value.
999	Offset/gain values stored in E ² PROM became abnormal.	Turn on/off AJ65BT-64AD again. When another error occurs, the module may be faulty. Consult your local servicing company, dealer or our branch office.

- (1) When multiple errors occur, the error code for the first error is stored, and other errors are not stored.
- (2) The error code is reset by turning the error reset request flag RY(n+1)A (refer to Section 3.6) on. However, when the error code is "999", it cannot be reset because of a hardware trouble of the module.

APPENDIX

Appendix 1 External dimension diagram



WARRANTY

Please confirm the following product warranty details before using this product.

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 sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[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 not to be the responsibility of Mitsubishi or that admitted not to be so by 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 available 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 loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

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

AJ65BT-64AD Analog-Digital Converter Module

User's Manual

MODEL	AJ65BT-64AD-U-S-E
MODEL CODE	13J893
SH(NA)-3614-F(1009)MEE	



HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS : 1-14 , YADA-MINAMI 5-CHOME , HIGASHI-KU, NAGOYA , JAPAN

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

Specifications subject to change without notice.