MITSUBISHI ELECTRIC

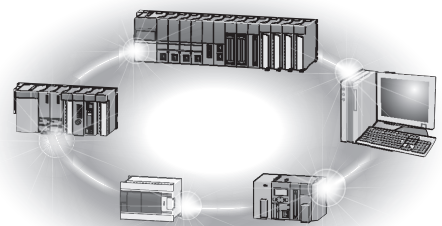## Mitsubishi Programmable Controller

Analog-Digital Converter Module Type
AJ65SBT2B-64AD
User's Manual

●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.

The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.

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.

Observe the precautions of both levels because they are important for personal and system safety.

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 and configure an interlock circuit in the sequence program to ensure that the entire system will operate safely.

● Do not use any "use prohibited" signals as a remote input or output signal. These signals are reserved for system use. If they are turned on/off by a user, correct operation of the module cannot be guaranteed.

⚠ CAUTION

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

[Installation Precautions]

⚠ CAUTION
● Use the module 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.   ● Do not directly touch any conductive part of the module.   Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠ WARNING
● Shut off the external power supply (all phases) used in the system before wiring.   Failure to do so may result in malfunction or damage to the product.

⚠ CAUTION
● Ground the FG terminal to the protective ground conductor dedicated to the programmable controller.   Failure to do so may result in electric shock or malfunction.   ● Tighten any unused terminal screws within the specified torque range (0.42 to 0.50N•m). Failure to do so may cause a short circuit.   ● 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.   ● Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly.   Applying a voltage or inputting a current that exceeds the absolute maximum input of the module, connecting a power supply with a different voltage rating, or wiring the cables incorrectly may cause a fire or failure.   ● Tighten the terminal screw within the specified torque range.   Undertightening can cause short circuit, fire, or malfunction.   Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

[Wiring Precautions]

⚠ CAUTION
● Prevent foreign matter such as dust or wire chips from entering the module. 　Such foreign matter can cause a fire, failure, or malfunction. ● 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. ● Do not install the control lines or communication cables together with the main circuit lines or power cables. 　Doing so may result in malfunction due to noise. ● 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]

⚠ WARNING
● Do not touch any terminal while power is on. 　Doing so will cause electric shock or malfunction. ● Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws or module mounting screws. 　Failure to do so may cause the module to fail or malfunction. 　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.

[Startup and Maintenance Precautions]

⚠ CAUTION
● Do not disassemble or modify the module. Doing so may cause failure, malfunction, injury, or a fire. ● Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm away in all directions from the module. Failure to do so may cause malfunction. ● 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 installing or removing a module to/from a control 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). Exceeding the limit of 50 times may cause malfunction. ● 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.

[Disposal Precaution]

⚠ CAUTION
● When disposing of this product, treat it as 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

Print date	*Manual number	Revision
May, 2011	SH(NA)-080979ENG-A	First edition
Oct., 2014	SH(NA)-080979ENG-B	Correction MANUALS, COMPLIANCE WITH THE EMC AND LOW VOLTAGE DIRECTIVES, Section 2.2, 3.1, 4.3, Appendix 1 addition GENERIC TERMS AND ABBREVIATIONS, Section 2.4

INTRODUCTION

Thank you for purchasing the Mitsubishi programmable controllers.
Before using this product, please read this manual carefully and develop familiarity with the functions and performance of the programmable controller to handle the product correctly.

CONTENTS

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MANUALS

The manuals related to this product are listed below.
Please place an order as needed.

Relevant manuals

Manual name	Manual number (model name)
CC-Link System Master/Local Module Type AJ61BT11/A1SJ61BT11 User's Manual System configuration, performance specifications, functions, handling, wiring, and troubleshooting of the AJ61BT11 and A1SJ61BT11 (Sold separately)	IB-66721 (13J872)
CC-Link System Master/Local Module Type AJ61QBT11/A1SJ61QBT11 User's Manual System configuration, performance specifications, functions, handling, wiring, and troubleshooting of the AJ61QBT11 and A1SJ61QBT11 (Sold separately)	IB-66722 (13J873)
MELSEC-Q CC-Link System Master/Local Module User's Manual System configuration, performance specifications, functions, handling, wiring, and troubleshooting of the CC-Link module (Sold separately)	SH-080394E (13JR64)
MELSEC-L CC-Link System Master/Local Module User's Manual System configuration, performance specifications, functions, handling, wiring, and troubleshooting of the LCPU with built-in CC-Link and LJ61BT11 (Sold separately)	SH-080895ENG (13JZ41)
MELSEC iQ-R CC-Link System Master/Local Module User's Manual (Application) Functions, parameter settings, programming, troubleshooting, I/O signals, and buffer memory of the CC-Link system master/local module	SH-081270ENG (13JX19)
Type AnSHCPU/AnACPU/AnUCPU/QCPU-A (A Mode) Programming Manual (Dedicated Instructions) Instructions extended for the AnSHCPU/AnACPU/AnUCPU (Sold separately)	IB-66251 (13J742)
MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks) Instructions for the CPU module, dedicated instructions for the intelligent function modules, and standard functions/ function blocks	SH-081266ENG ---

COMPLIANCE WITH THE EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance

To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.
   • User's manual for the CPU module or head module used
   • Safety Guidelines
     (This manual is included with the CPU module, base unit, or head module.)
The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures

To ensure that this product maintains EMC and Low Voltage Directives, please refer to one of the manuals listed under (1).

GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, the following generic terms and abbreviations are used in this manual to describe the AJ65SBT2B-64AD analog-digital converter module.

Generic term/ abbreviation	Description
GX Developer	The product name of the software package for the MELSEC programmable controllers
GX Works2	
Programming tool	A generic term for GX Works2 and GX Developer
ACPU	A generic term for the following CPU modules: A0J2CPU, A0J2HCPU, A1CPU, A2CPU, A2CPU-S1, A3CPU, A1SCPU, A1SCPUC24-R2, A1SHCPU, A1SJCPU, A1SJCPU-S3, A1SJHCPU, A1NCPU, A2NCPU, A2NCPU-S1, A3NCPU, A3MCPU, A3HCPU, A2SCPU, A2SHCPU, A2ACPU, A2ACPU-S1, A3ACPU, A2UCPU, A2UCPU-S1, A2USCPU, A2USCPU-S1, A2USHCPU-S1, A3UCPU, and A4UCPU
QnACPU	A generic term for the following CPU modules: Q2ACPU, Q2ACPU-S1, Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASHCPU-S1, Q3ACPU, Q4ACPU, and Q4ARCPU
QCPU (A mode)	A generic term for the Q02CPU-A, Q02HCPU-A, and Q06HCPU-A
QCPU (Q mode)	A generic term for the following CPU modules: Q00JCPU, Q00UJCPU, Q00CPU, Q00UCPU, Q01CPU, Q01UCPU, Q02CPU, Q02HCPU, Q02PHCPU, Q02UCPU, Q03UDCPU, Q03UDECPU, Q03UDVCPU, Q04UDHCPU, Q04UDEHCPU, Q04UDVCPU, Q06HCPU, Q06PHCPU, Q06UDHCPU, Q06UDEHCPU, Q06UDVCPU, Q10UDHCPU, Q10UDEHCPU, Q12HCPU, Q12PHCPU, Q12PRHCPU, Q13UDHCPU, Q13UDEHCPU, Q13UDVCPU, Q20UDHCPU, Q20UDEHCPU, Q25HCPU, Q25PHCPU, Q25PRHCPU, Q26UDHCPU, Q26UDEHCPU, Q26UDVCPU, Q50UDEHCPU, and Q100UDEHCPU
LCPU	A generic term for the L02SCPU, L02SCPU-P, L02CPU, L02CPU-P, L06CPU, L06CPU-P, L26CPU, L26CPU-P, L26CPU-BT, and L26CPU-PBT
RCPU	A generic term for R04CPU, R08CPU, R16CPU, R32CPU, and R120CPU
Master station	A station that controls a data link system. One master station is required for one system.
Local station	A station that includes a CPU module and can communicate with the master station and other local stations
Remote I/O station	A station, such as AJ65BTB1-16D and AJ65SBTB1-16D, that exchanges I/O signals (bit data) with an external device
Remote device station	A station that exchanges I/O signals (bit data) and I/O data (word data) with an external device, and converts analog data into digital data
Remote station	A generic term for a remote I/O station and a remote device station
Intelligent device station	A station, such as the AJ65BT-R2N, that can perform transient transmission. Local stations are included.
Master module	A generic term for modules that can serve as a master station
SB	Link special relay (for CC-Link) Bit data that indicates the operating status and data link status of modules on the master and local stations
SW	Link special register (for CC-Link) Word data that indicates the operating status and data link status of modules on the master and local stations
RX	Remote input (for CC-Link) Bit data input from a remote station to the master station
RY	Remote output (for CC-Link) Bit data output from the master station to a remote station
RWw	Remote register (write area for CC-Link) Word data output from the master station to a remote device station

Generic term/ abbreviation	Description
RWr	Remote register (read area for CC-Link)
	Word data input from a remote device station to the master station

PACKING LIST

The following items are included in the package of this product.

Product	Quantity
AJ65SBT2B-64AD analog-digital converter module	1
Analog-Digital Converter Module User's Manual (Hardware) Type AJ65SBT2B-64AD	1

Memo

CHAPTER 1   OVERVIEW

This user's manual explains the specifications, operations, and programming method of the AJ65SBT2B-64AD analog-digital converter module (hereafter abbreviated as AJ65SBT2B-64AD) used as a remote device station of a CC-Link system.

The AJ65SBT2B-64AD changes analog values (voltage or current) to digital values (16-bit signed binary).

1.1   Features

This section describes the features of the AJ65SBT2B-64AD.

(1) A/D conversion by one module with 4 channels
One module enables an A/D conversion with 4 channels.

(2) Input range setting for each channel
I/O conversion characteristics can be changed by setting an analog input range in each channel.

(3) Response by high-speed conversion
High-speed conversion of 200μs/channel is achieved.

(4) High resolution
In all analog input ranges, high resolution of 1/16000 is achieved.

(5) High accuracy
The module performs an A/D conversion in accuracy of ±0.2%[1] at the maximum digital output value when the operating ambient temperature is within 0 to 55°C.
   * 1   Except when receiving noise influence.

(6) Selecting the conversion method
A conversion processing method for each channel can be selected from the sampling processing, time average processing, count average processing or moving average processing.

(7) Saving man-hour

   (a) Since the module has a built-in terminating resistor (110Ω), a terminating resistor is not necessary when the module is used on the network terminal. In addition, one operation with a switch can make the built-in terminating resistor invalid.

   (b) The transmission speed need not be set by the user since it is automatically determined according to the transmission speed set in a master station.

   (c) The offset/gain setting can be configured by simple operations without the connection to the master module.

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(8) Connection with up to 42 modules

A master station can connect with up to 42 AJ65SBT2B-64ADs.

(9) Easy maintenance

The structure of the two-piece terminal block enables the user to remove a terminal block with wiring unchanged for easy maintenance.

CHAPTER 2   SYSTEM CONFIGURATION

This chapter describes the system configuration when using the AJ65SBT2B-64AD.

2.1   Overall Configuration

The following Figure 2.1 shows an overall configuration when using the AJ65SBT2B-64AD.

CC-Link system master/local module (master station)   CC-Link system master/local module (local station)

Terminating resistor

CC-Link dedicated cable

(Remote I/O station)

(Intelligent device station)

(Remote device station)

Terminating resistor

AJ65SBT2B-64AD

(Remote device station)
Occupies one station.

Device to which a voltage is applied or
through which a current is passed
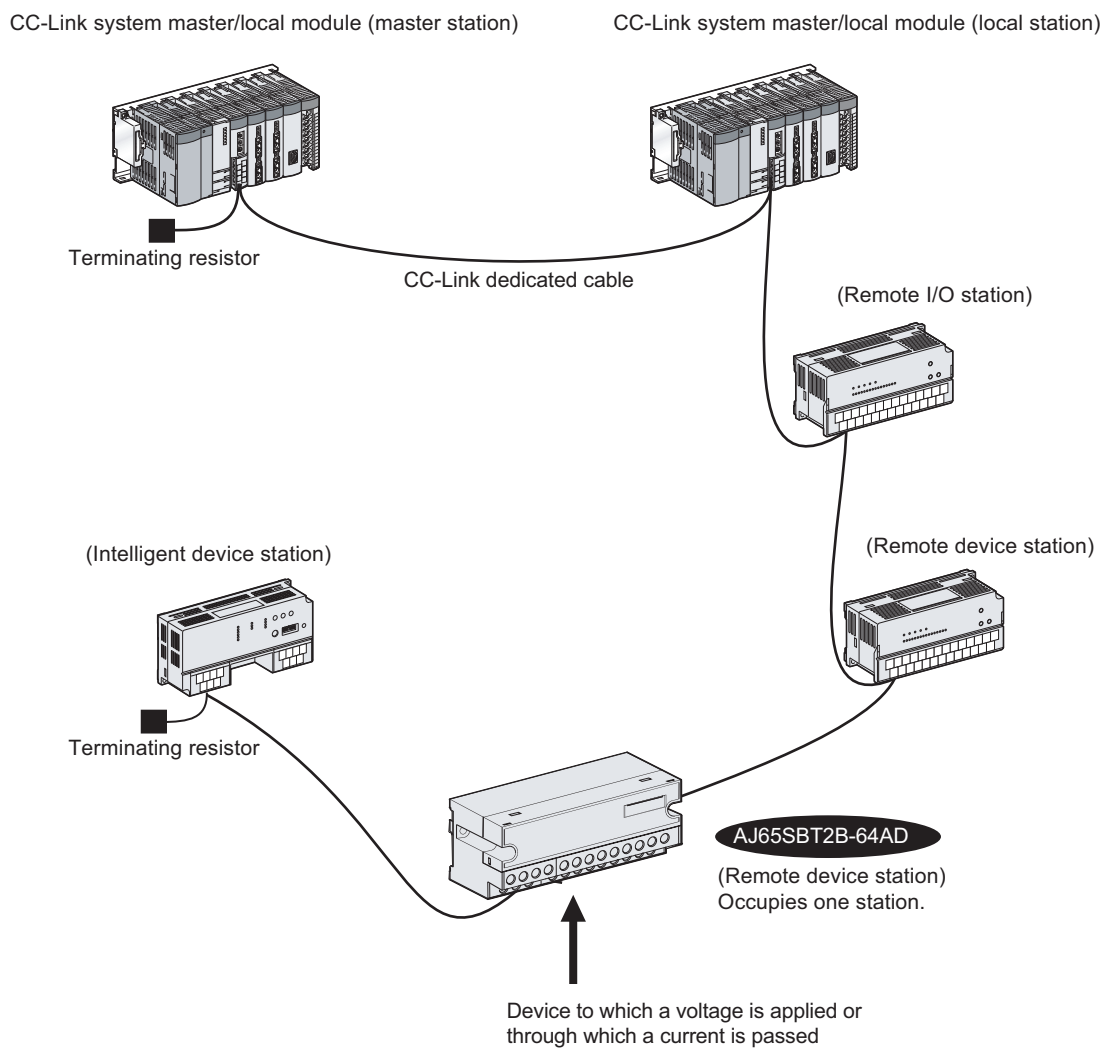
Figure 2.1 Overall configuration when using the AJ65SBT2B-64AD

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2.2 Applicable System

The applicable master modules are described in the website of CC-Link Partner Association (CLPA). Refer to the following URL for the website of CC-Link Partner Association (CLPA).

www.cc-link.org

Remark ·

Before using the module, check the specifications of the master module made by each manufacturer.

· ·

(1) Restrictions to use the dedicated instruction for CC-Link (RLPA, RRPA)

The dedicated instruction (RLPA, RRPA) for CC-Link may not be available depending on the CPU module or master module to be used.

Refer to the following manuals for details on restrictions:
- User's manual for an A series master module
- Type AnSHCPU/AnACPU/AnUCPU/QCPU-A(A Mode) Programming Manual (Dedicated Instructions)

Any dedicated instructions except RLPA or RRPA are not applicable for the AJ65SBT2B-64AD.

Refer to Section 5.6 for an example of the program using the dedicated instructions (RLPA and RRPA).

2 SYSTEM CONFIGURATION

2.3 Checking the Hardware Version

The hardware version of the AJ65SBT2B-64AD can be checked in the DATE section on the rating plate.
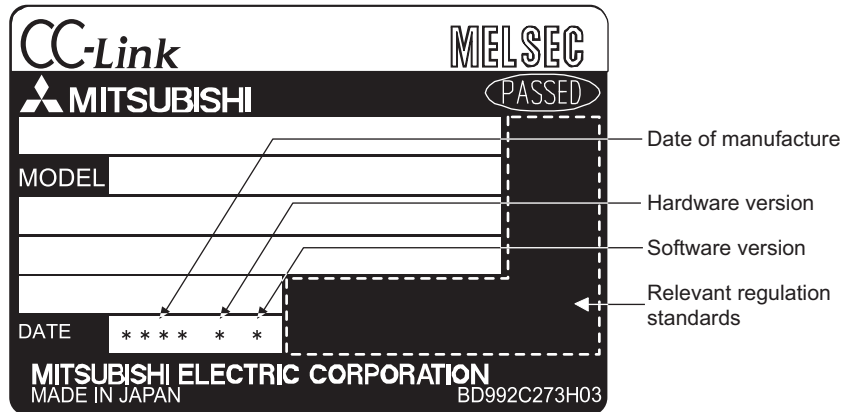
Figure 2.2 Checking the hardware version

2.4 Checking the Serial Number

The serial number of the AJ65SBT2B-64AD can be checked in the SERIAL section on the rating plate.
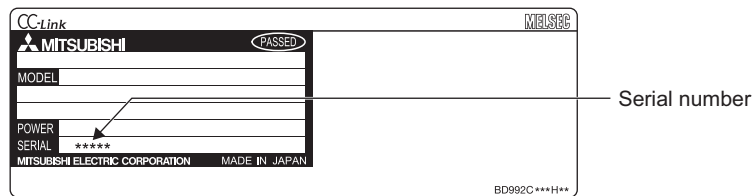
Figure 2.3 Checking the serial number

CHAPTER 3 SPECIFICATIONS

This chapter describes the specifications of the AJ65SBT2B-64AD.

3.1   General Specifications

This section lists the general specifications of the AJ65SBT2B-64AD.

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					
Vibration resistance	Compliant with JIS B 3502, IEC 61131-2		Frequency	Constant acceleration	Half amplitude	Sweep count
		Under intermittent vibration	5 to 8.4Hz	-	3.5mm	10 times each in X, Y, Z directions
			8.4 to 150Hz	9.8m/s^2	-	
		Under continuous vibration	5 to 8.4Hz	-	1.75mm	-
			8.4 to 150Hz	4.9m/s^2	-	
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147 m/s^2, 3 times each in 3 directions X, Y, Z)				
Operating atmosphere	No corrosive gases				
Operating altitude[*1]	0 to 2000m				
Installation location	Inside a control panel				
Overvoltage category[*2]	II or lower				
Pollution degree[*3]	2 or less				

* 1   Do not use or store the programmable controller under pressure higher than the atmospheric pressure of altitude 0m. Doing so may cause malfunction. When using the programmable controller under pressure, please consult your local Mitsubishi Electric representative.

* 2   This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises.
Category II applies to equipment for which electrical power is supplied from fixed facilities.
The surge voltage withstand level for up to the rated voltage of 300V is 2500V.

* 3   This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.
Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

3.2 Performance Specifications

This section lists the performance specifications of the AJ65SBT2B-64AD.

Table 3.2 Performance specifications

Item		AJ65SBT2B-64AD			
Analog input	Voltage	-10 to 10VDC (Input resistance: 1MΩ)			
	Current	0 to 20mADC (Input resistance: 250Ω)			
Digital output		16-bit signed binary (-16384 to 16383)			
I/O characteristics, resolution, accuracy (accuracy at the maximum digital output value)			Analog input range	Digital output value	Accuracy[1] (ambient temperature: 0 to 55°C)	Resolution
		Voltage	-10 to 10V	-16000 to 16000	±0.2% (±32 digits)	0.625mV
			User range setting 1 (-10 to 10V)			0.5mV[2]
			User range setting 2 (-5 to 5V)			0.25mV[2]
			0 to 5V	0 to 16000		0.3125mV
			1 to 5V			0.25mV
		Current	0 to 20mA	0 to 16000		1.25µA
			4 to 20mA			1µA
			User range setting 2	-16000 to 16000		1µA[2]
Conversion speed		200µs/channel			
Absolute maximum input		Voltage: ±15V Current: ±30mA[3]			
Number of analog input points		4 channels			
Number of offset/gain setting times[4]		Max. 10,000 times			
CC-Link version		CC-Link Ver.1.10			
CC-Link station type		Remote device station			
Number of occupied stations		1 station			
Connection cable		CC-Link dedicated cable			
Withstand voltage		500VAC for 1 minute between all power supply and communication system terminals and all analog input terminals			
Insulation method		Between communication system terminal and all analog input terminals: Photocoupler isolation Between power supply system terminal and all analog input terminals: Transformer insulation Between input channels: Non-insulation			
Noise immunity		Noise voltage 500Vp-p, noise width 1µs, noise frequency 25 to 60Hz (DC type noise simulator condition)			
Built-in terminating resistor		Provided (110Ω)			
External connection system	Communication part, module power supply part	7-point two-piece terminal block M3 × 5.2 screw (tightening torque range: 0.59 to 0.88N•m) Applicable solderless terminal: 2 or less			
	I/O part	18-point two-piece terminal block M3 × 5.2 screw (tightening torque range: 0.59 to 0.88N•m) Applicable solderless terminal: 2 or less			
Applicable wire size		0.3 to 2.0mm²			

Table 3.2 Performance specifications

Item	AJ65SBT2B-64AD
Applicable solderless terminal	•RAV1.25-3 (compliant with JIS C 2805) [Applicable wire size: 0.3 to 1.25mm^2] •V2-MS3, RAP2-3SL, TGV2-3N [Applicable wire size: 1.25 to 2.0mm^2]
Module mounting screw	M4 screw × 0.7mm × 16mm or more (tightening torque range: 0.78 to 1.08 N•m) Mountable with a DIN rail
Applicable DIN rail	TH35-7.5Fe, TH35-7.5Al (compliant with IEC 60715)
External power supply	24VDC (20.4 to 28.8VDC)
	Inrush current: 16A, 4.0ms or less
	Current consumption: 0.12A (24VDC)
Weight	0.25kg

* 1 Except when receiving noise influence.
* 2 These values indicate the maximum resolution with user range setting.
* 3 This value indicates a momentary input current value at which the built-in resistor will not be broken.
* 4 The number of times that the SELECT/SET switch is set to SET in test mode.

3.3 I/O Conversion Characteristics

The I/O conversion characteristics are the gradient of a straight line connecting an offset value and a gain value when an analog signal (voltage or current input) from outside the programmable controller is converted to a digital value.

The offset value is an analog input value (voltage or current) which turns 0 as a digital output value after conversion.

The gain value is an analog input value (voltage or current) which turns 16000 as a digital output value after conversion.

3 SPECIFICATIONS

3.3.1 Voltage input characteristics

Figure 3.1 shows the graph of the voltage input characteristics.
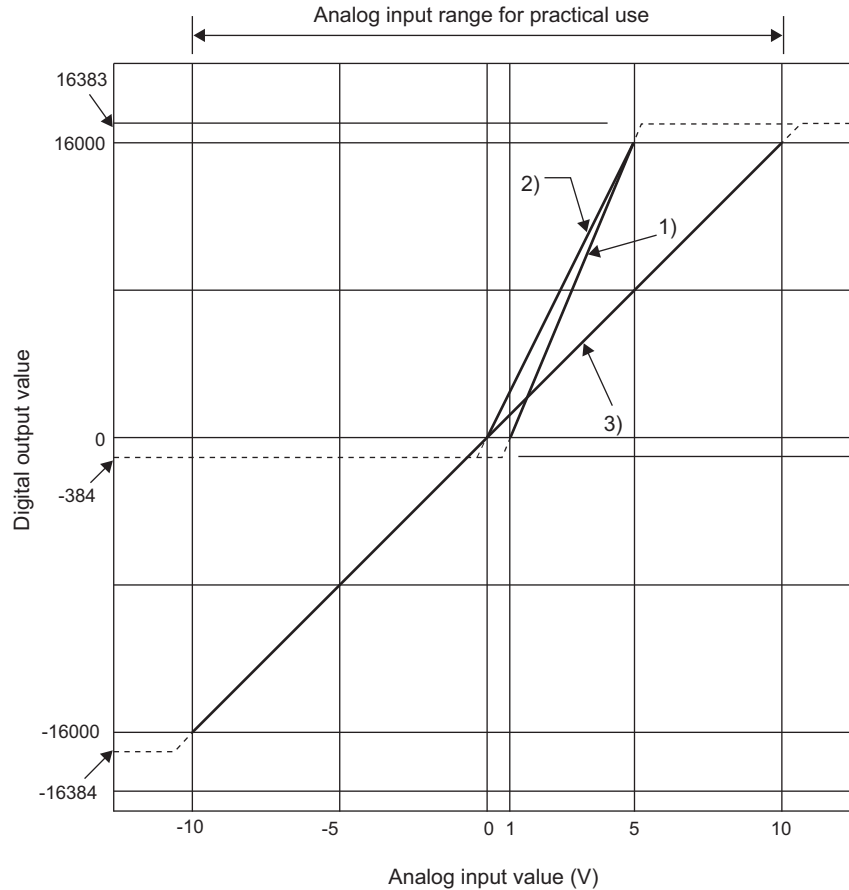
Figure 3.1 Voltage input characteristics diagram

Table 3.3 Voltage input characteristics table

No.	Analog input range setting	Offset value	Gain value	Digital output value	Resolution
1)	1 to 5V	1V	5V	0 to 16000	0.25mV
2)	0 to 5V	0V	5V		0.3125mV
3)	-10 to 10V	0V	10V	-16000 to 16000	0.625mV
-	User range setting 1 (-10 to 10V)	-	-		0.5mV[*1]
-	User range setting 2 (-5 to 5V)	-	-		0.25mV[*1]

* 1   These values indicate the maximum resolution with user range setting.

⊠**POINT**

(1) When values are within the analog input range and the digital output range, the resolution and accuracy are maintained within the range of performance specifications.
If the values exceed these ranges, the resolution and the accuracy of performance specifications may not be maintained. (Avoid using the values on the doted lines in Figure 3.1.)

(2) Do not input ±15V or more. Doing so may damage the elements.

(3) Set the offset and gain values of the user range setting 1 or 2 within the range satisfying the following conditions.

[User range setting 1]

(a) The setting range of the offset value and gain value: -10 to 10V[*1]

(b) (Gain value) > (Offset value)[*2]

(c) (Gain value) - (Offset value) > 8V[*3]

*1   For the analog input range of -5 to 5V, use the user range setting 2. Less variation of the digital output values can be acquired, compared with the case using the user setting range 1.

*2   In case of (Gain value) ≤ (Offset value), RUN LED flashes at intervals of 0.5s. After turning on Error reset request flag (RY(n+1)A) to reset the error, set values again.

*3   Setting values within the range of (Gain value) - (Offset value) ≤ 8V may cause large variations in the digital output values.

[User range setting 2][*4]

(a) The setting range of the offset value or gain value: -5 to 5V.

(b) (Gain value) > (Offset value)[*5]

(c) (Gain value) - (Offset value) > 4V[*6]

*4   In the user range setting 2, either current or voltage can be used by changing the wiring. To use the voltage in the user range setting 2, set "I" of the offset/gain adjustment LED.

*5   In case of (Gain value) ≤ (Offset value), RUN LED flashes at intervals of 0.5s. After turning on Error reset request flag (RY(n+1)A) to reset the error, set values again.

*6   Setting values within the range of (Gain value) - (Offset value) ≤ 4V may cause large variations in the digital output values.

(4) When the analog input exceeds the range of digital output values in Table 3.3, the digital output value is fixed to the maximum or minimum value.

Table 3.4 The digital output values when the analog input exceeds the range of digital output values

Analog input range setting	Digital output value	
	Minimum	Maximum
1 to 5V	-384	16383
0 to 5V		
-10 to 10V	-16384	16383
User range setting 1 (-10 to 10V)		
User range setting 2 (-5 to 5V)		

3.3.2 Current input characteristics

Figure 3.2 shows the graph of the voltage input characteristics.
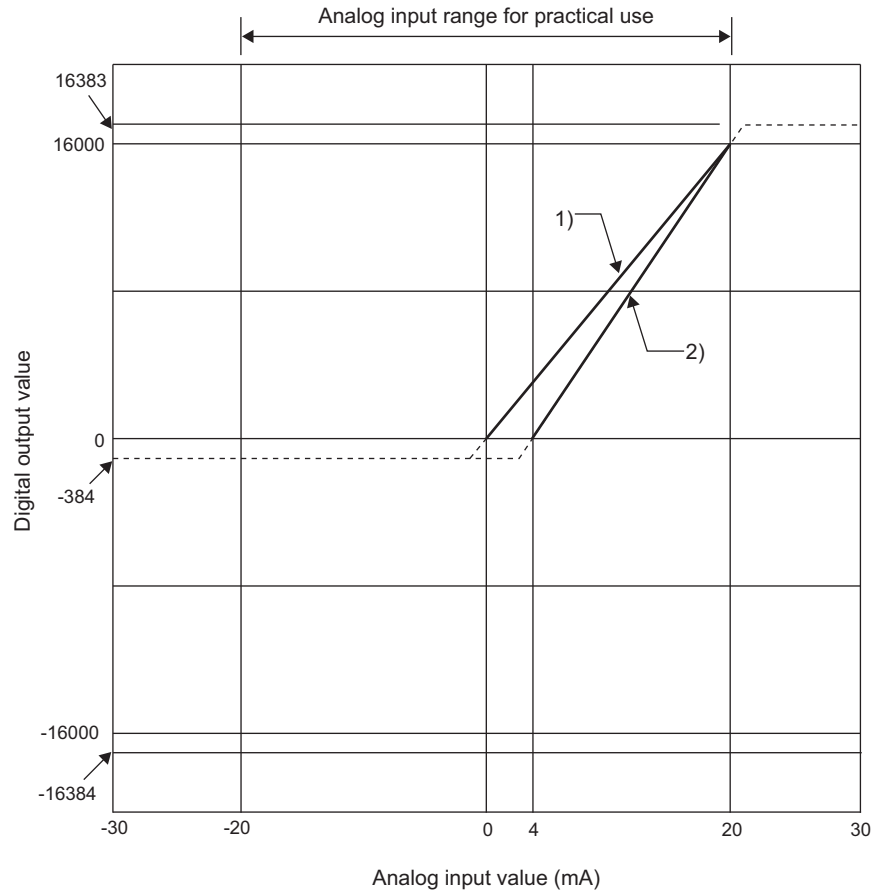
Figure 3.2 Current conversion characteristics diagram

Table 3.5 Current conversion characteristics table

No.	Analog input range setting	Offset value	Gain value	Digital output value	Resolution
1)	0 to 20mA	0mA	20mA	0 to 16000	1.25µA
2)	4 to 20mA	4mA	20mA		1µA
-	User range setting 2	-	-	-16000 to 16000	1µA[*1]

* 1   This value indicates the maximum resolution with user range setting.

⊠**POINT**

(1) When values are within the analog input range and the digital output range, the resolution and accuracy are maintained within the range of performance specifications.
   If the values exceed these ranges, the resolution and the accuracy of performance specifications may not be maintained. (Avoid using the values on the doted lines in Figure 3.2.)

(2) Do not input ±30mA or more. Doing so may damage the elements.

(3) Set the offset and gain values of the user range setting 2 within the range satisfying the following conditions.

   [User range setting 2]

   (a) The setting range of the offset value or gain value: -20 to 20mA.

   (b) (Gain value) > (Offset value)[*1]

   (c) (Gain value) - (Offset value) > 16mA[*2]

   *1   In case of (Gain value) ≤ (Offset value), RUN LED flashes at intervals of 0.5s. After turning on Error reset request flag (RY(n+1)A) to reset the error, set values again.

   *2   Setting values within the range of (Gain value) - (Offset value) ≤ 16mA may cause large variations in the digital output values.

(4) When the analog input exceeds the range of digital output values in Table 3.5, the digital output value is fixed to the maximum or minimum value.

Table 3.6 The digital output values when the analog input exceeds the range of digital output values

Analog input range setting	Digital output value	
	Minimum	Maximum
0 to 20mA	-384	16383
4 to 20mA		
User range setting 2	-16384	

3.3.3 Accuracy

The accuracy of A/D conversion is measured for the maximum digital output value. Even when the input characteristics are changed by modifying the offset/gain setting or the input range, the accuracy remains the same and maintained within the range described in the performance specifications in Section 3.2.

Figure 3.3 shows a variation range of the accuracy when using the -10 to 10V range. When the operating ambient temperature is 0 to 55°C, a digital value is output with the accuracy within ±0.2% (±32digit). (Except when receiving noise influence.)
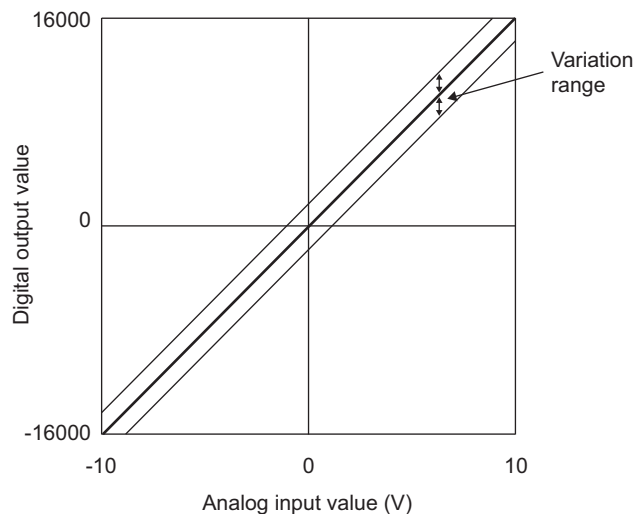
Figure 3.3 Accuracy in -10 to 10V range

3.3.4 Conversion speed

The conversion speed of the AJ65SBT2B-64AD is 200μs/channel. The conversion speed is the time for taking in an analog input value and converting it to a digital output value. However, the CC-Link system requires additional time for data link processing. Therefore, the time of the cycle to store the value in CH□ Digital output value (RWrn to RWrn+3) is calculated by the following formula.

[Formula[1]]

Data link processing time = SM + LS × 1 + Remote device station processing time [ms]

> **SM: Scan time of master station sequence program**
> **LS: Link scan time**
> **Remote device station processing time: 1ms**

 * 1   This formula is applicable for the data link processing time (normal value) when the master module is the QJ61BT11N and it is in asynchronous mode.

For details on the data link processing time, refer to the user's manual of the master module used.

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3.4   Functions

This section describes the functions of the AJ65SBT2B-64AD.

3.4.1   Function list

This section lists the functions of the AJ65SBT2B-64AD.

Table 3.7 Function list of the AJ65SBT2B-64AD

Item	Description	Reference
A/D conversion enable/disable function	The A/D conversion can be enabled or disabled for each channel using this function. By setting A/D conversion disabled for unnecessary channels, the conversion cycle shortens.	Section 3.4.2
Sampling processing/average processing specification	The sampling processing or average processing (count average/time average/moving average) can be specified using this function.	Section 3.4.3
Input range setting function	The analog input range to be used can be set from factory default ranges (4 to 20mA, 0 to 20mA, 1 to 5V, 0 to 5V, -10 to 10V) and user ranges (user range settings) using this function. Use this function to change the input conversion characteristics.	Section 3.4.4
Offset/gain setting	The digital output value error can be correct using this function.	Section 4.8
Transmission speed auto-tracking function	When the AJ65SBT2B-64AD is powered on, the transmission speed is set automatically according to the setting in the master module.	-

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3.4.2 A/D conversion enable/disable function

The A/D conversion can be enabled or disabled for each channel using this function.
By setting A/D conversion disabled for unnecessary channels, the conversion cycle shortens.
The conversion cycle is calculated with "Conversion speed (200µs) × Number of conversion-enabled channels".
By default, the A/D conversion is disabled for all channels.

(1) Setting method
Set the A/D conversion enable/disable function in CH□ A/D conversion enable/disable setting (RYn0 to RYn3).
After the setting is completed, turn Initial data setting request flag (RY(n+1)9) from off to on to reflect the setting contents.

Table 3.8 A/D conversion enable/disable setting

Setting item	Description
CH□ A/D conversion enable/disable setting (RYn0 to RYn3)	ON: A/D conversion enabled
	OFF: A/D conversion disabled

(2) Process after the change of A/D conversion enable/disable setting

(a) A/D conversion disabled → A/D conversion enabled
- The conversion starts in the enabled channel.
- When the first A/D conversion is completed after the A/D conversion enable setting, the digital output value in the corresponding channel is stored in the CH□ Digital output value (RWrn to RWrn+3). After the digital output value is stored, CH□ A/D conversion completion flag (RXn0 to RXn3) is turned on in the corresponding channel.

(b) A/D conversion enabled → A/D conversion disabled
- The conversion stops in the disabled channel. The digital output value stored in CH□ Digital output value (RWrn to RWrn+3) in the corresponding channel is cleared to "0".
- CH□ A/D conversion completion flag (RXn0 to RXn3) in the corresponding channel is turned off.

3.4.3 Sampling processing/average processing specification

The conversion method can be specified from sampling processing/count average/time average/moving average for each channel in AJ65SBT2B-64AD.

Specify the conversion method with the lower 8 bit in the CH□ Average processing setting (RWwm to RWwm+3). Then, in the specified conversion method, set the count average/ time average/moving average with the upper 8 bit.
After the setting is completed, turn Initial data setting request flag (RY(n+1)9) from off to on to reflect the setting contents.

The default average processing is the sampling processing (0000_H).

	b15	to	b8	b7	to	b0
CH□ Average processing setting (RWwm to RWwm+3)						

Count average/time average/moving average setting[*1]	
Conversion method	**Setting range**
Sampling processing	00_H (fixed)
Count average	04_H to FF_H (4 to 255 times)
Time average	00_H to FF_H ((0 to 255) × 0.1ms)
Moving average	00_H (4 times), 01_H (8 times), 02_H (16 times), 03_H (32 times), 04_H (64 times), 05_H (128 times)

Conversion method setting	
Conversion method	**Setting value[*2]**
Sampling processing	00_H
Count average	01_H
Time average	02_H
Moving average	03_H

* 1 If the sampling processing is set for the channel where the value is set, the value is ignored.
* 2 When setting the value of 04_H or higher, Error flag (RX(n+1)A) turns on.
  In this case, the conversion method previously set is applicable to the operation.

Figure 3.4 Sampling processing/average processing specification

(1) Sampling processing

A/D conversion is performed on analog input values sequentially at every cycle, and the digital output values are stored in a remote register.

> ⊠**POINT**
>
> The conversion cycle is calculated with "Conversion speed (200μs) × Number of conversion-enabled channels". The A/D conversion can be enabled or disabled for each channel. By disabling the A/D conversion at unused channels, the conversion cycle shortens.
> (Example 1) Conversion cycle when A/D conversion is enabled at all channels
> 200μs × 4 channels = 800μs
>
> (Example 2) Conversion cycle when A/D conversion is enabled at only one channel
> 200μs × 1 channel = 200μs

(2) Count average processing

The A/D conversion is performed the number of times specified. The total of the converted values except the maximum value and the minimum value is averaged. Then, the average value is stored in the remote register.
The number of conversion-enabled channels determines the time taken to store the average value acquired by the count average processing in the remote register

$$\text{Processing time} = \text{Preset count} \times \left(\text{Number of conversion-enabled channels} \times \text{Conversion speed} \right)$$

The count (for averaging) can be configured within the range of 04_H to FF_H (4 to 255 times).

(Example) The processing time with the following settings
- Number of conversion-enabled channels: 4 channels
- Count (for averaging): 5 times (05_H)
- Conversion speed: 0.2ms (200μs)

$5 \times (4 \times 0.2) = 4$ (ms) $\rightarrow$ The average value is output every 4ms.

> ⊠**POINT**
>
> The count average processing needs the total of at least two values except the maximum and minimum. Therefore, the set number of times should be four or more. When setting the count (for averaging) with less than four times, no error occurs. Instead, the processing is performed as sampling processing (1 time).

(3) Time average processing

The A/D conversion is performed for the duration of the set time. The total of the converted values except a maximum value and a minimum value is averaged. Then, the average value is stored in the remote register.

The number of conversion-enabled channels determines the processing times within the setting time.

$$\frac{\text{Number of}}{\text{processing times}} = \frac{\text{Setting time}}{\text{Number of conversion-enabled channels} \times 200\mu s}$$

The setting time for averaging can be configured within the range of 00_H to FF_H ((0 to 255) × 0.1ms).

The setting time should be configured by 0.1ms. (Set 50_H (80) for the setting time of 8.0ms.)

(Example) The number of processing with the following settings
- Number of conversion-enabled channels: 4 channels
- Setting time: 3.2ms (20_H)
- Conversion speed: 0.2ms (200μs)

$$\frac{3.2}{4 \times 0.2} = 4 \text{ (times)}$$

☒ POINT

For the time average processing, "4 times (minimum processing times) × Conversion speed × Number of channels used" is valid as the minimum value for setting. If the number of processing is less than four times by setting time, no error occurs. Instead, the processing is performed as sampling processing.

(4) Moving average processing

The module averages digital output values of the set number of times that are taken in for each sampling cycle. Then the module stores the averaged value in the remote register. The latest digital output value can be obtained since averaging processing is performed every sampling cycle.

Select the count (for averaging) from 4 (00_H), 8 (01_H), 16 (02_H), 32 (03_H), 64 (04_H), and 128 (05_H) times.

Operation example (set number of times: 4 times)

Data transition in remote register

1st storage	2nd storage	3rd storage
$\dfrac{1) + 2) + 3) + 4)}{4}$	$\dfrac{2) + 3) + 4) + 5)}{4}$	$\dfrac{3) + 4) + 5) + 6)}{4}$
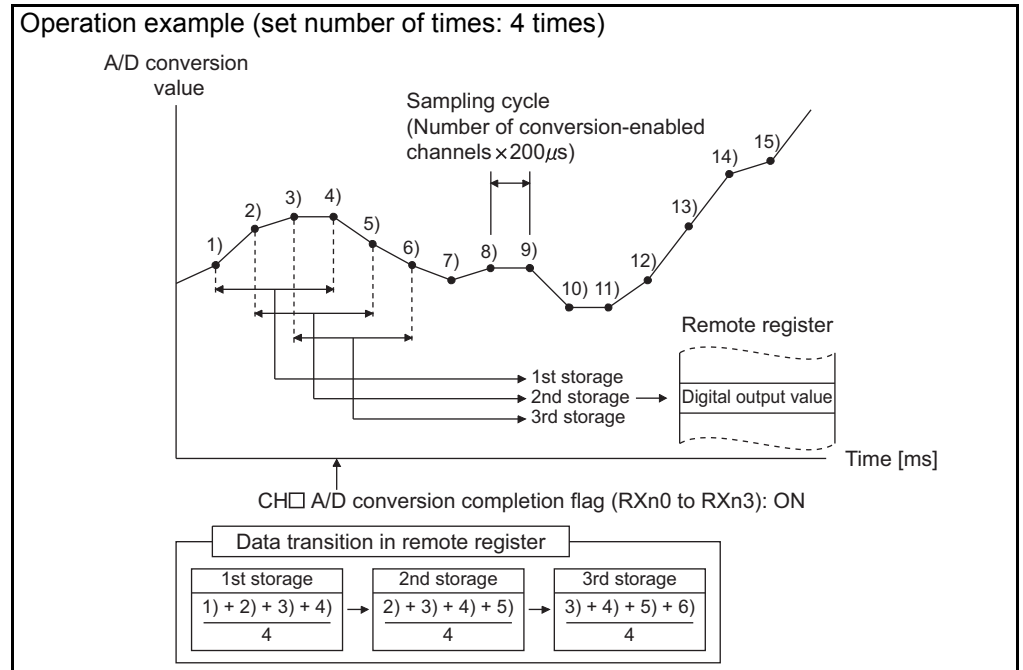
⊠POINT

When setting the count (for averaging) of the moving average processing to 06_H or higher, Error flag (RX(n+1)A) turns on and the RUN LED flashes at intervals of 0.5s.

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3.4.4　Input range setting function

The analog input range to be used in each channel can be set using this function.

(1) Setting method

Set an analog input range by combining ON/OFF of three remote output signals for each channel. (For CH1, set the range within CH1 Input range setting (0th bit) (RYn4) to CH1 Input range setting (2nd bit) (RYn6).)
For the combinations of settings, refer to Table 3.9.
After the setting is completed, turn Initial data setting request flag (RY(n+1)9) from off to on to reflect the setting contents.

The default analog input range is -10 to 10V.

Table 3.9 Analog input range setting

Analog input range	CH□ Input range setting (RYn4 to RYnF)											
	CH4			CH3			CH2			CH1		
	RYnF	RYnE	RYnD	RYnC	RYnB	RYnA	RYn9	RYn8	RYn7	RYn6	RYn5	RYn4
-10 to 10V	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
0 to 5V	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	ON
1 to 5V	OFF	ON	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	ON	OFF
0 to 20mA	OFF	ON	ON	OFF	ON	ON	OFF	ON	ON	OFF	ON	ON
4 to 20mA	ON	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF
User range setting 1 (-10 to 10V)	ON	OFF	ON	ON	OFF	ON	ON	OFF	ON	ON	OFF	ON
User range setting 2 (-5 to 5V) or (Current)	ON	ON	OFF	ON	ON	OFF	ON	ON	OFF	ON	ON	OFF

(2) Error check method

If all signals in CH□ Input range setting (RYn4 to RYnF) are ON, Error flag (RX(n+1)A) turns on, which indicates an error.
When an error occurs, the RUN LED flashes at intervals of 0.1s. Set the analog input range again.

3.5 Remote I/O Signals

This section describes the assignments of remote I/O signals and their functions.

3.5.1 List of remote I/O signals

Remote input (RX) indicates the input signal from the AJ65SBT2B-64AD to a master module. Remote output (RY) indicates the output signal from a master module to the AJ65SBT2B-64AD.
The AJ65SBT2B-64AD uses 32 points of Remote input (RX) and 32 points of Remote output (RY) in communication with a master station.

Table 3.10 List of remote I/O signals

Signal direction: AJ65SBT2B-64AD → Master module		Signal direction: Master module → AJ65SBT2B-64AD	
Remote input (RX)	Name	Remote output (RY)	Name
RXn0	CH1 A/D conversion completion flag	RYn0	CH1 A/D conversion enable/disable setting
RXn1	CH2 A/D conversion completion flag	RYn1	CH2 A/D conversion enable/disable setting
RXn2	CH3 A/D conversion completion flag	RYn2	CH3 A/D conversion enable/disable setting
RXn3	CH4 A/D conversion completion flag	RYn3	CH4 A/D conversion enable/disable setting
RXn4	Reserved	RYn4	CH1 Input range setting (0th bit)
RXn5		RYn5	CH1 Input range setting (1st bit)
RXn6		RYn6	CH1 Input range setting (2nd bit)
RXn7		RYn7	CH2 Input range setting (0th bit)
RXn8		RYn8	CH2 Input range setting (1st bit)
RXn9		RYn9	CH2 Input range setting (2nd bit)
RXnA	Hardware error flag	RYnA	CH3 Input range setting (0th bit)
RXnB	User range read error flag	RYnB	CH3 Input range setting (1st bit)
RXnC	Flash memory write error flag	RYnC	CH3 Input range setting (2nd bit)
RXnD	Number of offset/gain settings excess flag	RYnD	CH4 Input range setting (0th bit)
RXnE	Reserved	RYnE	CH4 Input range setting (1st bit)
RXnF	Test mode flag	RYnF	CH4 Input range setting (2nd bit)
RX(n+1)0	Reserved	RY(n+1)0	Reserved
RX(n+1)1		RY(n+1)1	
RX(n+1)2		RY(n+1)2	
RX(n+1)3		RY(n+1)3	
RX(n+1)4		RY(n+1)4	
RX(n+1)5		RY(n+1)5	
RX(n+1)6		RY(n+1)6	
RX(n+1)7		RY(n+1)7	
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 flag	RY(n+1)A	Error reset request flag
RX(n+1)B	Remote ready	RY(n+1)B	Reserved
RX(n+1)C	Reserved	RY(n+1)C	
RX(n+1)D		RY(n+1)D	
RX(n+1)E		RY(n+1)E	
RX(n+1)F		RY(n+1)F	

n: The address assigned to the master station by station number setting

☒POINT

The system uses the Reserved devices described in Table 3.10. These devices are not available for users. If they are turned on or off by the user, the function as the AJ65SBT2B-64AD is not guaranteed.

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3.5.2 Details on each remote I/O signal

This section describes the function of each remote I/O signal of the AJ65SBT2B-64AD.

(1) CH□ A/D conversion completion flag (RXn0 to RXn3)
CH□ A/D conversion completion flag (RXn0 to RXn3) in the corresponding channel turns on under the following sequential conditions:
  • The power is turned on.
  • Initial data setting request flag (RY(n+1)9) is turned from off to on.
  • As the first A/D conversion is completed in the channel where A/D conversion is enabled, the digital output value is stored in the remote register.
For an average processing, the flag turns on when the first average processing is completed and the digital output value is stored in the remote register.

(2) Hardware error flag (RXnA)
This flag turns on when the AJ65SBT2B-64AD detects a hardware failure. Error reset request flag (RY(n+1)A) cannot reset (turn off) this flag.

(3) User range read error flag (RXnB)
This flag turns on when the user range setting 1 or 2 is configured in the input range setting and each user range setting value read from a flash memory has an error.
This flag can be reset with Error reset request flag (RY(n+1)A). Turn on Error reset request flag (RY(n+1)A) and perform the offset/gain setting for all channels that use the user range setting.

(4) Flash memory write error flag (RXnC)
This flag turns on if the write to the flash memory is failed when configuring the offset/gain setting.
Error reset request flag (RY(n+1)A) cannot reset (turn off) this flag since it indicates the failure of the AJ65SBT2B-64AD (hardware failure).

(5) Number of offset/gain settings excess flag (RXnD)
This flag turns on when the number of offset/gain setting times exceeds the maximum of the guaranteed value (10,000 times).
Error reset request flag (RY(n+1)A) can reset (turn off) this flag. However, after this flag turns on, the setting value acquired by the offset/gain setting is not guaranteed.

(6) Test mode flag (RXnF)
This flag turns on when the module moves onto test mode for the offset/gain setting.
This flag turns off when the module moves from test mode to normal mode.
Before performing the offset/gain setting, confirm that this flag is ON.

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(7) Initial data processing request flag (RX(n+1)8)

After power-on, this flag turns ON for the AJ65SBT2B-64AD to request an initial data. When Initial data processing completion flag (RY(n+1)8) is turned on, this flag turns off.

Initial data processing request flag
RX(n+1)8

Initial data processing completion flag
RY(n+1)8

Initial data setting completion flag
RX(n+1)9

Initial data setting request flag
RY(n+1)9

Remote ready
RX(n+1)B

CH□ A/D conversion completion flag
RXn0 to RXn3

───▶ : Executed by sequence program :
──▷ : Performed by the AJ65SBT2B-64AD
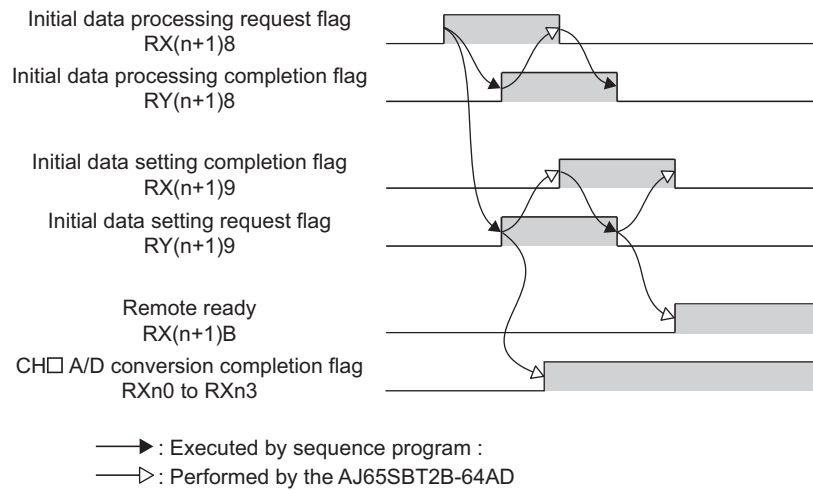
Figure 3.5 Operation at initial data setting

(8) Initial data setting completion flag (RX(n+1)9)

If Initial data setting request flag (RY(n+1)9) is turned on, this flag turns on after the initial data setting is completed.

If Initial data setting request flag (RY(n+1)9) is turned off when the initial data setting is completed, this flag also turns off.

For the timing of turning on/off the remote I/O signal for the initial data setting, refer to Figure 3.5.

(9) Error flag (RX(n+1)A)

This flag turns on in the following conditions.

- The average processing setting value is outside the range.
- An analog input range setting is outside the range.
- Hardware error flag (RXnA) is ON.
- User range read error flag (RXnB) is ON.
- Flash memory write error flag (RXnC) is ON.

This flag does not turn on when a watchdog timer error occurs. (At this time, the RUN LED turns off.)

When Error reset request flag (RY(n+1)A) is turned on, this flag turns off. The following flags are reset (turned off) by turning on Error reset request flag (RY(n+1)A). However, an error cannot be resolved. For corrective actions on each error, refer to CHAPTER 6 .

- User range read error flag (RXnB)
- Number of offset/gain settings excess flag (RXnD)

Error flag
RX(n+1)A

Error reset request flag
RY(n+1)A

→ : Executed by sequence program
⇒ : Performed by the AJ65SBT2B-64AD
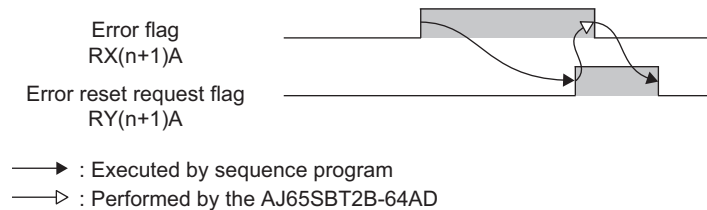
Figure 3.6 Operation at error occurrence and reset

(10) Remote ready (RX(n+1)B)

After power-on, when the test mode ends or Initial data setting completion flag (RX(n+1)9) turns off after the initial data setting is completed, this flag turns ON.

This flag is used for an interlock to read/write data from/to the master module.

(11) CH□ A/D conversion enable/disable setting (RYn0 to RYn3)

The A/D conversion enable/disable is set for each channel.

By setting A/D conversion disabled for unnecessary channels, the conversion cycle shortens.

ON: A/D conversion enabled
OFF: A/D conversion disabled

For A/D conversion enable/disable setting, refer to Section 3.4.2.

(12) CH□ Input range setting (RYn4 to RYnF)

The analog input range is set for each channel.

For the analog input range setting contents, refer to Section 3.4.4.

(13)Initial data processing completion flag (RY(n+1)8)

After power-on, or when requesting the initial data processing after the test mode operation, initial data processing is started. After completion of the processing, this flag is turned on.

For the timing of turning on/off the remote I/O signal for the initial data setting, refer to Figure 3.5.

(14)Initial data setting request flag (RY(n+1)9)

When performing or changing the initial data setting, this flag is turned on.

The following setting contents become valid by turning this flag from off to on.

- CH□ A/D conversion enable/disable setting (RYn0 to RYn3)
- CH□ Input range setting (RYn4 to RYnF)
- CH□ Average processing setting (RWwm to RWwm+3)

For the timing of turning on/off the remote I/O signal for the initial data setting, refer to Figure 3.5.

(15)Error reset request flag (RY(n+1)A)

The following flags are reset (turned off) by turning on this flag.

- User range read error flag (RXnB)
- Number of offset/gain settings excess flag (RXnD)
- Error flag (RX(n+1)A)

When Hardware error flag (RXnA) or Flash memory write error flag (RXnC) is ON, these flags cannot be reset (turned off).

3.6 Remote Register

The AJ65SBT2B-64AD has a remote register for data communication with the master module.

This section describes the assignment of the remote register.

3.6.1 List of remote register assignments

Table 3.11 shows the remote register assignments.

Table 3.11 Remote register assignments

Communication direction	Address	Description	Default value
Master → Remote	RWwm	CH1 Average processing setting	0
	RWwm+1	CH2 Average processing setting	0
	RWwm+2	CH3 Average processing setting	0
	RWwm+3	CH4 Average processing setting	0
Remote → Master	RWrn	CH1 Digital output value	0
	RWrn+1	CH2 Digital output value	0
	RWrn+2	CH3 Digital output value	0
	RWrn+3	CH4 Digital output value	0

m, n: The address assigned to the master station by a station number setting

3.6.2 Details of remote register

(1) CH□ Average processing setting (RWwm to RWwm+3)

Specify a conversion method from the sampling processing/count average/time average/moving average in the lower 8 bit for each channel. Set the count (for averaging) or time (for averaging) in the upper 8 bit within the setting range of the specified conversion method.

For details on the specifying method, refer to Section 3.4.3.

(2) CH□ Digital output value (RWrn to RWrn+3)

This register stores the digital output values after A/D conversion for each channel. The digital output values are stored with 16-bit signed binary.
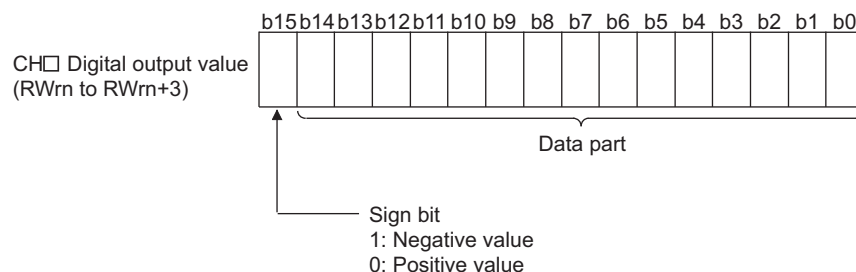
Figure 3.7 CH□ Digital output value (RWrn to RWrn+3)

CHAPTER 4   SETTINGS AND THE PROCEDURE BEFORE OPERATION

4.1   The Procedure Before Operation

This section describes the procedure before operation of the AJ65SBT2B-64AD.
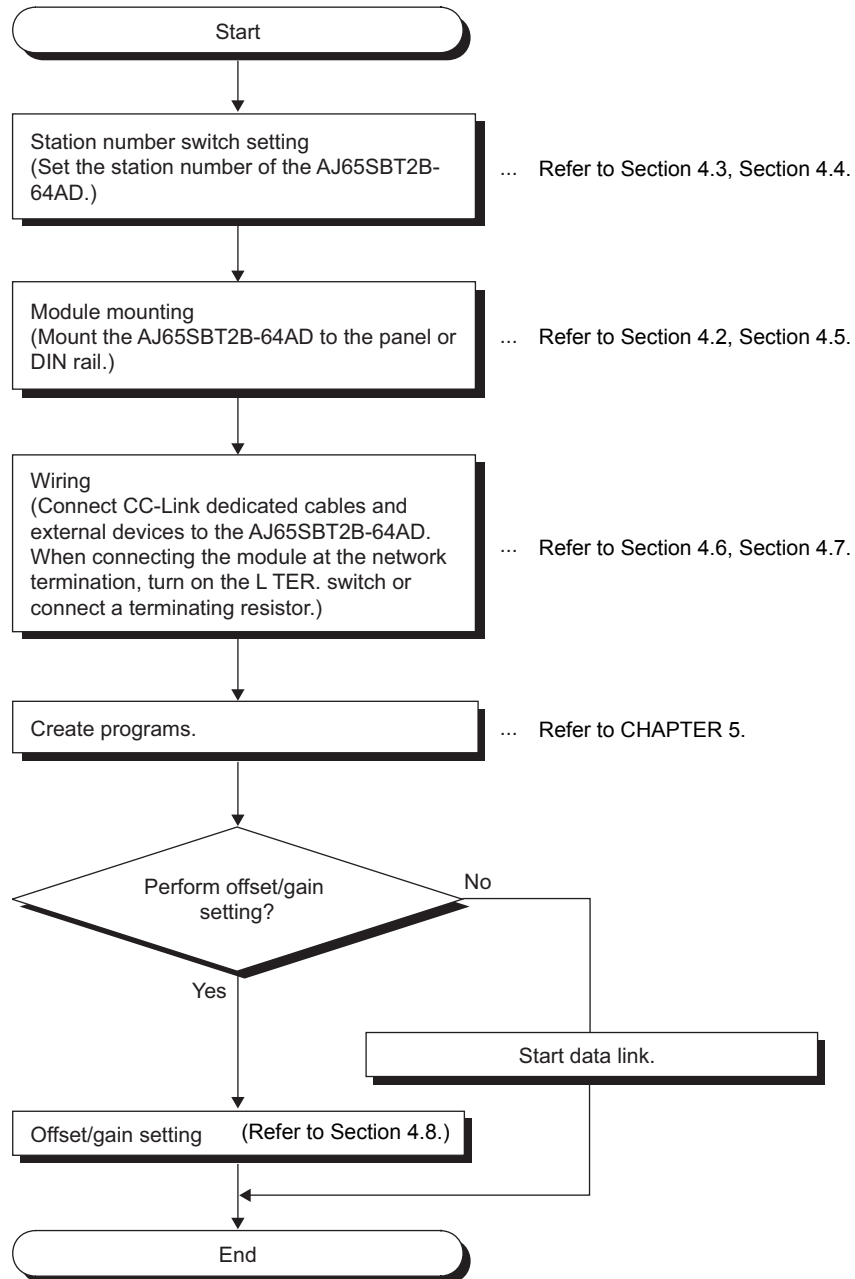
Figure 4.1 The procedure before operation

4.2 Handling Precautions

This section describes precautions for handling the AJ65SBT2B-64AD.

⚠ **WARNING**

● Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.

⚠ **CAUTION**

● 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 module.
  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.
● Use the module 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.
● When disposing of this product, treat it as industrial waste.
● 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 installing or removing a module to/from a control panel. Failure to do so may cause the module to fail or malfunction.
● 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.

(1) Tighten the module mounting screws and terminal block screws within the
tightening torque range specified in Table 4.1.

Table 4.1 Tightening torque range

Screw	Tightening torque range
Module mounting screw (M4)	0.78 to 1.08N•m
Terminal block terminal screw (M3)	0.59 to 0.88N•m
Terminal block mounting screw (M3.5)	0.68 to 0.98N•m

(2) When using a DIN rail, pay attention to the following:

(a) Applicable DIN rail (compliant with IEC 60715)
   TH35-7.5Fe
   TH35-7.5Al

(b) Installation screw intervals
   Tighten the screws at intervals of 200mm or less.

(3) When mounting the AJ65SBT2B-64AD to a DIN rail, push in the DIN rail hook
until it clicks.

DIN rail

DIN rail hook
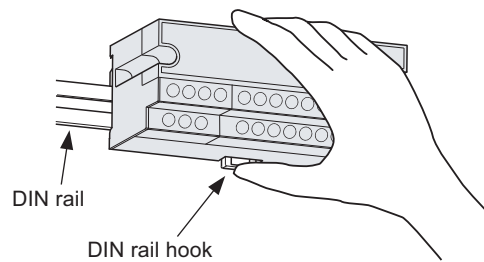
Figure 4.2 Mounting a module to a DIN rail

(4) For names, specifications, and manufacturers of applicable cables, refer to
the user's manual for the master module used.

4.3 Part Names

This section describes the part names of the AJ65SBT2B-64AD.
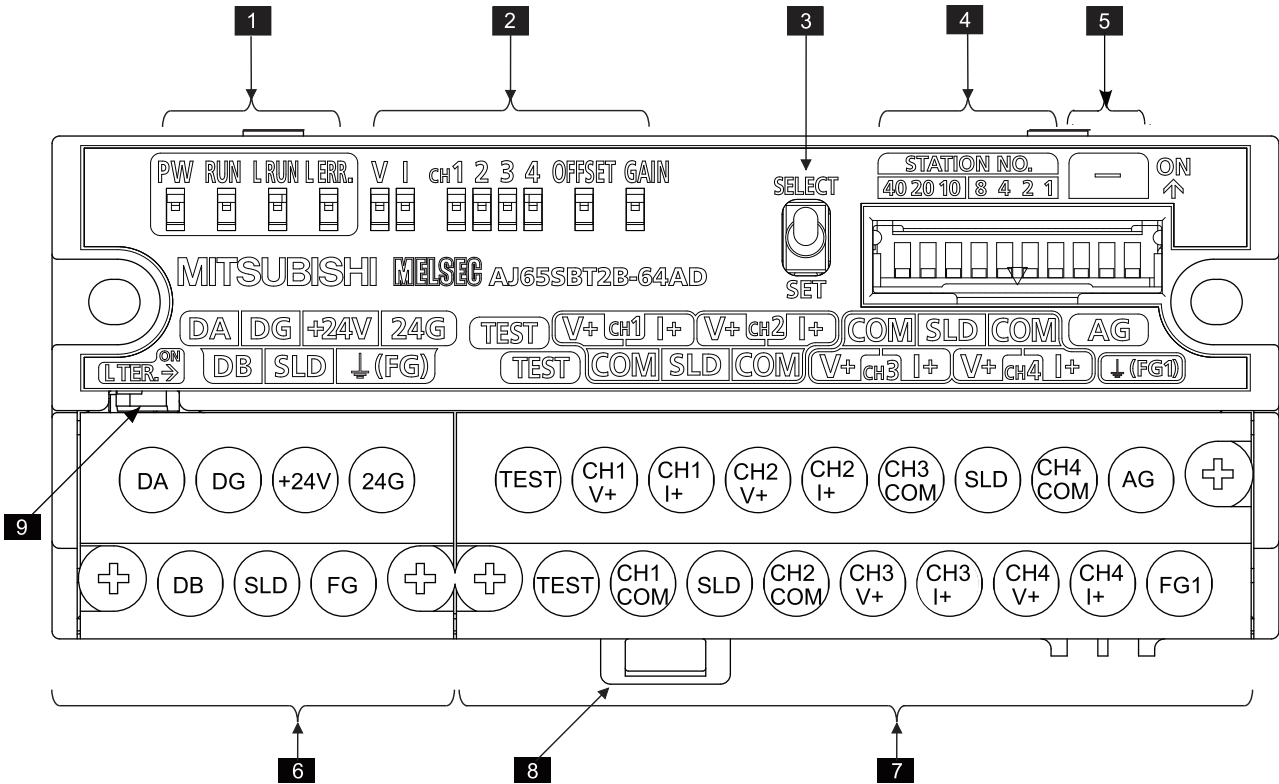
Figure 4.3 Appearance of the AJ65SBT2B-64AD

Table 4.2 Part names

No.	Name	Description			
1	Operation status indicator LED	PW LED	On: Power supply on Off: Power supply off		
		RUN LED	Normal mode	On: Normal operation Flashing: 0.1s intervals: Any of the following occurs: An analog value outside the analog input range is input. A user range read error occurs. Hardware failure occurs. 0.5s intervals: An out of averaging processing setting range error occurs. Off: The 24VDC power supply is shut off or a watchdog timer error occurs.	
			Test mode	On: The SELECT/SET switch is in the SET position. Flashing: Any of the following occurs: The offset/gain setting has been configured outside the range. A flash memory write error occurs. Hardware failure occurs. Off: The SELECT/SET switch is in the SELECT or center position.	
		L RUN LED	On: Normal communication Off: Communication is cut off. (timeout error)		
		L ERR. LED[*1]	On: The station number outside the range is set. Flashing regularly: The station number was changed from that at power-on.[*2] Flashing irregularly: The module or the CC-Link dedicated cable is affected by noise. The L TER. switch status and the installation status of the terminating resistor are inconsistent. (Refer to Section 6.1 (6).) Off: Normal communication		
2	Offset/gain adjustment LED[*3]	V LED I LED CH□ LED OFFSET LED GAIN LED	LEDs for checking the conditions for which the offset/gain setting is configured in test mode		
			Normal mode	Always off	
			Test mode	The on/off status of the LEDs changes whenever the SELECT/SET switch is set to SELECT. (Refer to Section 4.8.)	
3	SELECT/SET switch	A switch for configuring the offset/gain setting in test mode			

Table 4.2 Part names

No.	Name	Description
4	Station number setting switch	With the STATION NO. "10", "20", and "40" switches, the tens place of the station number is set. With the STATION NO. "1", "2", "4", and "8" switches, the ones place of the station number is set. These switches are all set to off at default. A station number must be set within 1 to 64. Setting any number other than that will result in an error, and the L ERR. LED will turn on. The same station number cannot be set to several stations.
5	Use prohibited	All switches must be set to off.
6	Terminal block for transmission and module power supply lines	A terminal block for transmission and module power supply lines
7	Terminal block for analog input signal	A terminal block for connecting input signals
8	DIN rail hook	A hook to mount the module to a DIN rail
9	L TER. (Line Termination) switch	This switch is turned on to enable the built-in terminating resistor. This switch is used when the AJ65SBT2B-64AD is connected at the network termination. Its factory default setting is off.

Station number table (No. 4):

Station number	Tens place			Ones place			
	40	20	10	8	4	2	1
1	OFF	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	OFF	ON	ON
4	OFF	OFF	OFF	OFF	ON	OFF	OFF
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
10	OFF	OFF	ON	OFF	OFF	OFF	OFF
11	OFF	OFF	ON	OFF	OFF	OFF	ON
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
64	ON	ON	OFF	OFF	ON	OFF	OFF

(Example) To specify "32" for a station number, set the switches as shown below.

Station number	Tens place			Ones place			
	40	20	10	8	4	2	1
1	OFF	ON	ON	OFF	OFF	ON	OFF

Terminal block for transmission and module power supply lines (No. 6):

Terminal	Description
DA	Terminals for connecting CC-Link dedicated cables
DB	
DG	
SLD	
FG	A terminal for grounding to the protective ground conductor
+24V	Terminals for connecting an external power supply
24G	

Terminal block for analog input signal (No. 7):

Terminal	Description
CH□V+	Terminals for connecting external input signal cables and shielded twisted pair cables
CH□I+	
CH□COM	
SLD	
TEST	A terminal for short in test mode
AG	A ground terminal (spare) (For application, refer to Section 4.7.2.)
FG1	A terminal for grounding to the protective ground conductor

* 1 This LED may turn on for a moment when the power is turned on; though the AJ 65SBT2B-64AD operates normally.

* 2 When station number setting switch setting is changed while communication is disconnected, the LED will start flashing irregularly.

* 3 When using the user range setting 2 (-5 to 5V) in test mode, set "I" for the offset/gain adjustment LED.

4.3.1 Transmission speed auto-tracking function

The transmission speed is automatically set depending on the master module setting; therefore, it does not need to be set on the AJ65SBT2B-64AD side.

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4.4 Station Number Setting

The station number setting of the AJ65SBT2B-64AD determines the buffer memory addresses of the master module in which remote I/O signals and read/write data are to be stored.
For details, refer to the user's manual for the master module used.

4.5 Module Mounting Direction

The AJ65SBT2B-64AD can be mounted in 6 directions.
Mounting with DIN rail is also available.

Downward installation

DIN rail

Horizontal installation

Vertical installation

Horizontal installation (upside down)

Upward installation
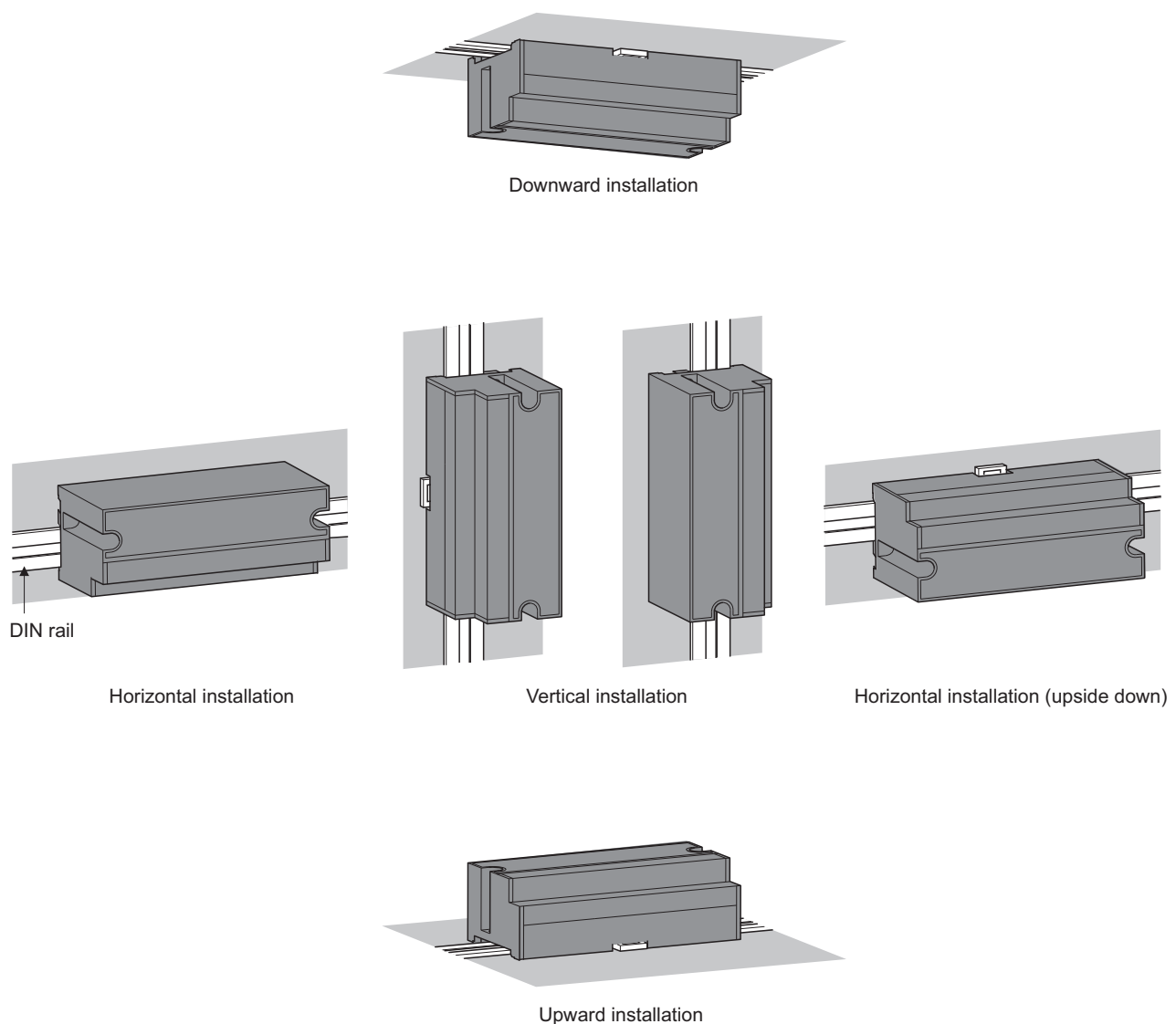
Figure 4.4 Module mounting direction

4.6 Wiring of Data Link Cables

This section describes the wiring of CC-Link dedicated cables when connecting the AJ65SBT2B-64AD to a CC-Link system.

4.6.1 Wiring precautions

Communication terminal blocks differ between the AJ65SBT-64AD and the AJ65SBT2B-64AD. When replacing the AJ65SBT-64AD with the AJ65SBT2B-64AD, rewire the system using a communication terminal block for the AJ65SBT2B-64AD.

4.6.2 Connecting modules using CC-Link dedicated cables

Figure 4.5 shows how to connect the AJ65SBT2B-64AD to a master module and an I/O module using CC-Link dedicated cables.
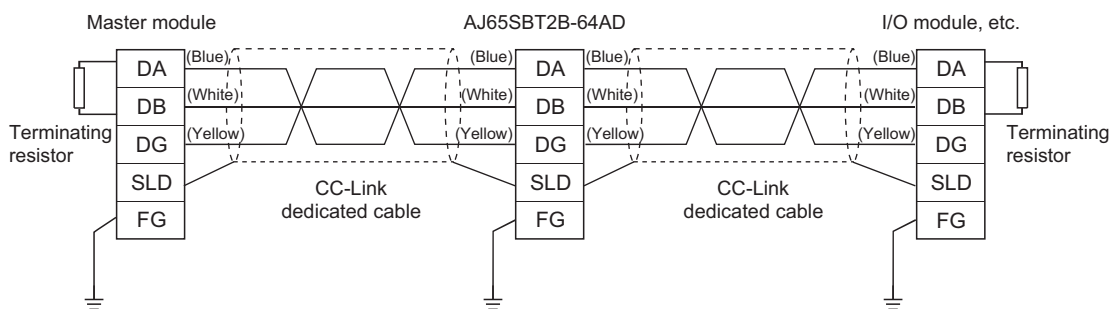
Figure 4.5 Connecting modules using CC-Link dedicated cables

4.6.3 Connecting terminating resistors

The AJ65SBT2B-64AD has a built-in terminating resistor of 110Ω. There is no need to connect a terminating resistor externally. When using the AJ65SBT2B-64AD at the network termination, turn on the L TER. switch. The factory default setting of the switch is off.

(1) Precautions

    (a) Move the L TER. switch until it clicks.

    (b) The built-in terminating resistor cannot be used in the following cases.
- There is a possibility that the AJ65SBT2B-64AD will be replaced during data link.
- A CC-Link system is configured using CC-Link dedicated cables of 130Ω.

4.7 Wiring with External Devices

This section explains wiring precautions and wiring with external devices of the AJ65SBT2B-64AD.

4.7.1 Wiring precautions

To obtain the maximum performance from the functions of the AJ65SBT2B-64AD and improve the system reliability, an external wiring with high durability against noise is required.
Precautions for external wiring are as follows:

(a) Use separate cables for the AC control circuit and the external input signals of the AJ65SBT2B-64AD to avoid the influence of the AC side surges or induction.

(b) Do not install cables together with the main circuit lines, high voltage lines, or power cables for equipment other than the programmable controller. Noise, surges, or induction may affect the system.

(c) Ground the shielded wires or shielded cables at one point on the programmable controller side.
However, depending on the external noise conditions, it may be better to ground them externally.

4.7.2　Wiring with external devices

(1) For voltage input

Signal source 0 to ±10VDC

(2) For current input

Signal source 0 to ±20mA
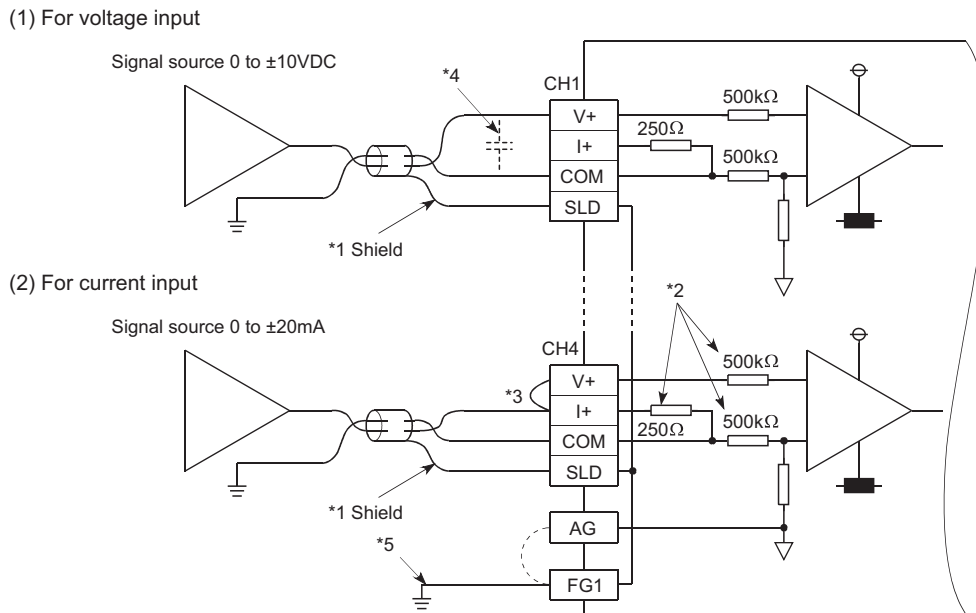
Figure 4.6 Wiring with external devices

* 1　Use shielded twisted pair cables.
* 2　Input resistors of the AJ65SBT2B-64AD
* 3　For the current input, wire between the V+ and I+ terminals.
* 4　If there is noise or ripples in the external wiring, connect a 0.1 to 0.47μF capacitor (25V or higher voltage-resistant product) between the V+ and COM terminals.
* 5　Ground the FG1 terminal without fail. If there is much noise, it may be better to ground the AG terminal as well.
　　If the grounding status of the AG terminal is changed after the offset/gain values are set, set the values again.

4.8 Offset/gain Setting

When correcting errors of digital output values in the user range setting 1 and 2, follow the procedure described in Figure 4.7. On the AJ65SBT2B-64AD, the offset/gain setting can be configured without communication with the master station. In such case, follow the procedure described in Figure 4.8.

(1) Configuring the offset/gain setting with communication with the master station

Start

Power on the module.

Start data link.

Short the TEST terminals to enter test mode.

Check that the "RUN" LED is off.

A

Whenever the SELECT/SET switch is set to the SELECT position, the indication of the offset/gain adjustment LEDs change as shown below.

User range setting 1 (-10 to 10V)
- CH1 Offset value setting
- CH1 Gain value setting
- CH2 Offset value setting
- CH2 Gain value setting
- CH3 Offset value setting
- CH3 Gain value setting
- CH4 Offset value setting
- CH4 Gain value setting

User range setting 2 (-5 to 5V) or (current)
- CH1 Offset value setting
- CH1 Gain value setting
- CH2 Offset value setting
- CH2 Gain value setting
- CH3 Offset value setting
- CH3 Gain value setting
- CH4 Offset value setting
- CH4 Gain value setting

Switch the indication of the offset/gain adjustment LEDs with the SELECT/SET switch and check that the LED of the target channel and the "OFFSET" LED turn on.

Apply a voltage or pass a current generating an offset value for one second or more. CH□ A/D conversion completion flag (RXn0 to RXn3) turns on.
For voltage / For current

Switch the SELECT/SET switch to the SET position. Check that the "RUN" LED turns on[1] and release the switch.

Switch the indication of the offset/gain adjustment LEDs with the SELECT/SET switch and check that the LED of the target channel and the "GAIN" LED turn on.

Apply a voltage or pass a current generating a gain value for one second or more. CH□ A/D conversion completion flag (RXn0 to RXn3) turns on.
For voltage / For current

Switch the SELECT/SET switch to the SET position. Check that the "RUN" LED turns on[1] and release the switch.

Adjust other channels? — YES → A

NO

Open the TEST terminals.

Power off the module.

End

Figure 4.7 Procedure to configure the offset/gain setting with communication with the master station

* 1 When the RUN LED does not turn on, the possible cause is a failure of the hardware. For details, refer to Section 3.5.2.

(2) Configuring the offset/gain setting without communication with the master station

Start

Short the TEST terminals to enter test mode.

Power on the module.

Check that the "RUN" LED is off and the offset/gain adjustment LEDs (V, CH1, and OFFSET) are on.

A →

Whenever the SELECT/SET switch is set to the SELECT position, the indication of the offset/gain adjustment LEDs change as shown below.

User range setting 1 (-10 to 10V)

	V I	CH 1 2 3 4	OFFSET GAIN
CH1 Offset value setting	■ □	■ □ □ □	■ □
CH1 Gain value setting	■ □	■ □ □ □	□ ■
CH2 Offset value setting	■ □	□ ■ □ □	■ □
CH2 Gain value setting	■ □	□ ■ □ □	□ ■
CH3 Offset value setting	■ □	□ □ ■ □	■ □
CH3 Gain value setting	■ □	□ □ ■ □	□ ■
CH4 Offset value setting	■ □	□ □ □ ■	■ □
CH4 Gain value setting	■ □	□ □ □ ■	□ ■

User range setting 2 (-5 to 5V) or (current)

	V I	CH 1 2 3 4	OFFSET GAIN
CH1 Offset value setting	□ ■	■ □ □ □	■ □
CH1 Gain value setting	□ ■	■ □ □ □	□ ■
CH2 Offset value setting	□ ■	□ ■ □ □	■ □
CH2 Gain value setting	□ ■	□ ■ □ □	□ ■
CH3 Offset value setting	□ ■	□ □ ■ □	■ □
CH3 Gain value setting	□ ■	□ □ ■ □	□ ■
CH4 Offset value setting	□ ■	□ □ □ ■	■ □
CH4 Gain value setting	□ ■	□ □ □ ■	□ ■

Switch the indication of the offset/gain adjustment LEDs with the SELECT/SET switch and check that the LED of the target channel and the "OFFSET" LED turn on.

V I CH 1 2 3 4 OFFSET GAIN
■ □ ■ □ □ □ ■ □
ON ON ON

Apply a voltage or pass a current generating an offset value for one second or more.

For voltage For current

Switch the SELECT/SET switch to the SET position. Check that the "RUN" LED turns on[1] and release the switch.

RUN SELECT
ON SET

Switch the indication of the offset/gain adjustment LEDs with the SELECT/SET switch and check that the LED of the target channel and the "GAIN" LED turn on.

V I CH 1 2 3 4 OFFSET GAIN
■ □ ■ □ □ □ □ ■
ON ON ON

Apply a voltage or pass a current generating a gain value for one second or more.

For voltage For current

Switch the SELECT/SET switch to the SET position. Check that the "RUN" LED turns on[1] and release the switch.

RUN SELECT
ON SET

Adjust other channels? — YES → A

NO

Power off the module.

Open the TEST terminals.

End

Figure 4.8 Procedure to configure the offset/gain setting without communication with the master station

* 1   When the RUN LED does not turn on, the possible cause is a failure of the hardware. For details, refer to Section 3.5.2.

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⊠**POINT**

(1) Configure the offset/gain setting in accordance with the actual use situation.

(2) The offset value and gain value are memorized in a flash memory of the AJ65SBT2B-64AD when the SET switch is pressed, and are not deleted even when the power supply is shut off.

(3) When the test mode is started by short-circuiting the test terminals, the A/D conversion of the specified channel starts.
To confirm the AJ65SBT2B-64AD is in test mode, check that Test mode flag (RXnF) is ON. When the offset/gain setting is being configured without communication with the master station, check that the RUN LED is OFF and the offset/gain adjustment LEDs (V, CH1, OFFSET) are ON.

(4) To configure the offset/gain setting without communication with the master station, short-circuit the TEST terminals before turning on the power. If the TEST terminals are short-circuited after turning on the power, the AJ65SBT2B-64AD cannot move onto test mode.

(5) Configure the offset/gain setting within the range as shown in Section 3.3.1 or Section 3.3.2. If the setting values exceed this range, the resolution or accuracy may be out of the range indicated in the performance specifications. When the RUN LED flashes at intervals of 0.5s after configuring the offset/ gain setting, turn on Error reset request flag (RY(n+1)A) to reset an error. Then set values again. When the offset/gain setting is being configured without communication with the master station, an error is reset when the SET switch is pressed after configuring the offset/gain setting again.

(6) In the user range setting 2, either current or voltage can be used by changing the wiring. To use the voltage in the user range setting 2, set "I" for the offset/ gain adjustment LED.

4.9 Maintenance and Inspection

The AJ65SBT2B-64AD has no special item to be inspected. However, to maintain the best condition of the system, perform the inspection in accordance with the items described in the user's manual of the CPU module used.

CHAPTER 5   PROGRAMMING

This chapter describes the programming procedure, basic programs for read and write, and program examples of the AJ65SBT2B-64AD.
When diverting the program examples introduced in this chapter to the actual system, thoroughly verify that there is no control problem with the target system.
For the master module, refer to the user's manual for the master module used.

5.1   Programming Procedure

Create a program to perform the A/D conversion in the AJ65SBT2B-64AD, according to the procedure in Figure 5.1.
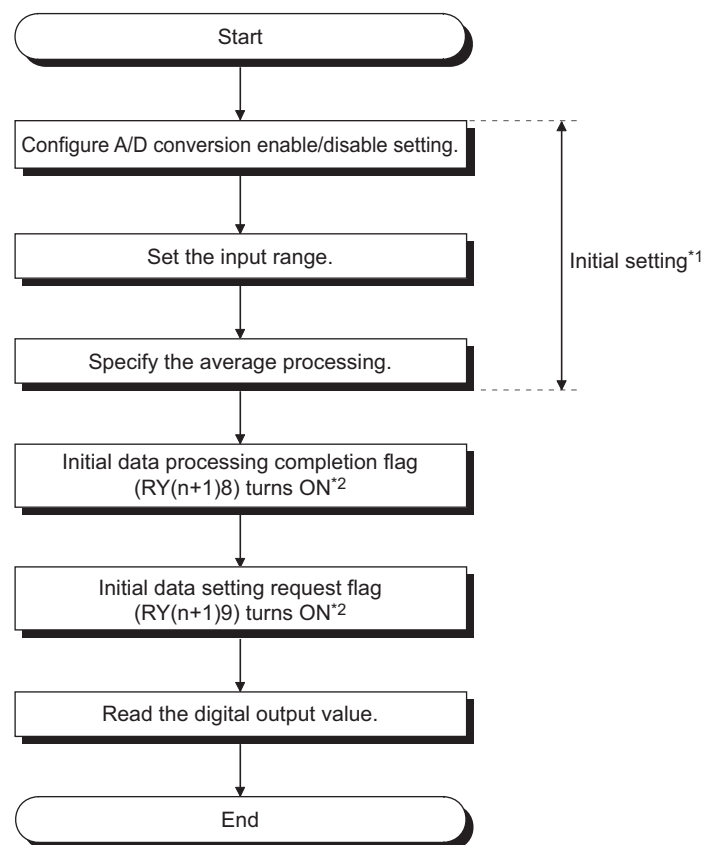
Figure 5.1 Programming procedure

* 1   The initial settings cannot be configured with the "remote device station initialization procedure registration function". Configure it with a sequence program.
* 2   For the ON/OFF timing of Initial data processing completion flag (RY(n+1)8) and Initial data setting request flag (RY(n+1)9), refer to Section 3.5.2 (7).

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5.2 Conditions of Program Examples

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

(1) Use conditions of the AJ65SBT2B-64AD
- Channels to be used: CH1, CH2
- Analog input range: -10 to 10V for CH1, 0 to 5V for CH2
- Average processing setting: Moving average for CH1 (16 times), count average for CH2 (16 times)
- An error is notified by an external output.

(2) System configuration
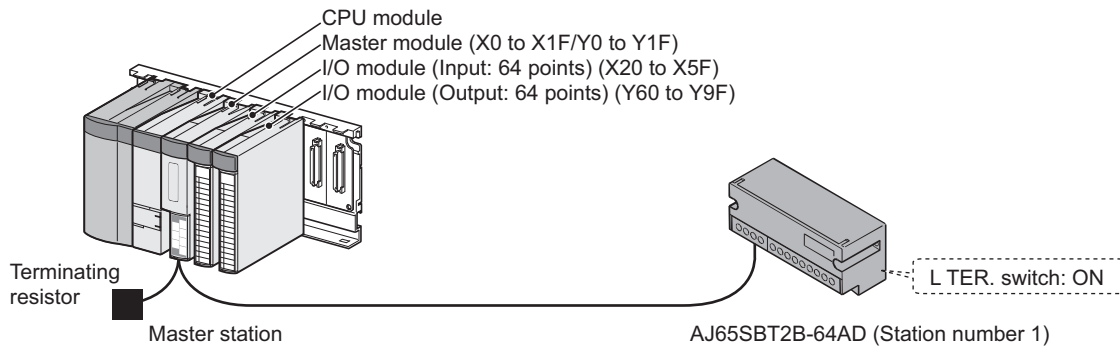
Figure 5.2 System configuration and wiring diagram

(3) Assignment relationship between remote I/O signals and remote registers

(a) For the QCPU (Q mode), LCPU, and QnACPU
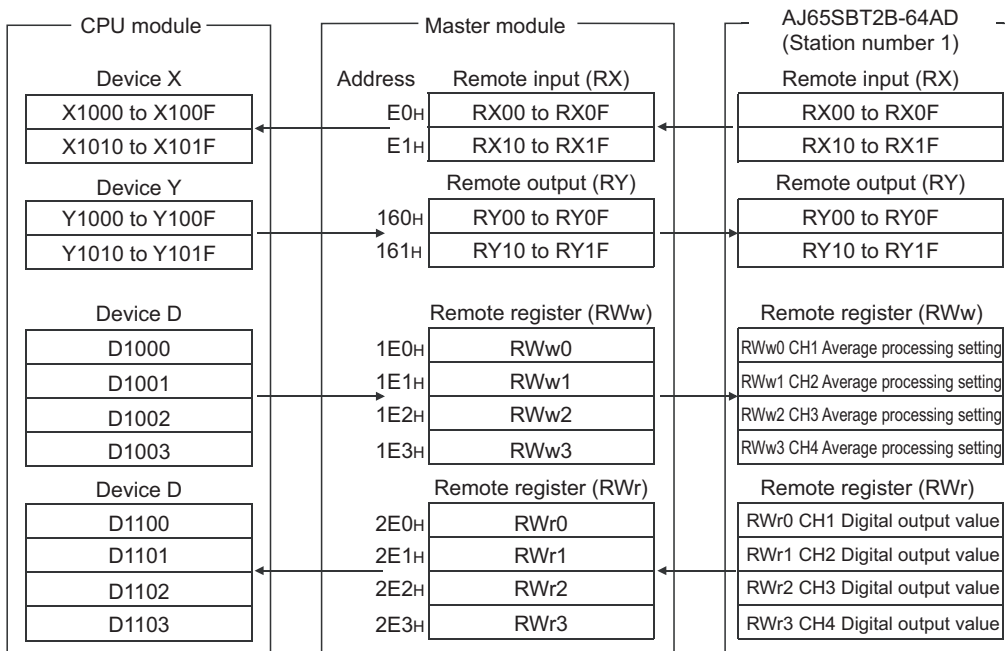
Figure 5.3 Update overview of the CPU module, master module, and AJ65SBT2B-64AD (For the QCPU (Q mode), LCPU, QnACPU)

(b) For the ACPU and QCPU (A mode)

CPU module	Master module	AJ65SBT2B-64AD (Station number 1)
Device X	Address / Remote input (RX)	Remote input (RX)
X100 to X10F	E0H / RX00 to RX0F	RX00 to RX0F
X110 to X11F	E1H / RX10 to RX1F	RX10 to RX1F
Device Y	Remote output (RY)	Remote output (RY)
Y100 to Y10F	160H / RY00 to RY0F	RY00 to RY0F
Y110 to Y11F	161H / RY10 to RY1F	RY10 to RY1F
Device D	Remote register (RWw)	Remote register (RWw)
D200	1E0H / RWw0	RWw0 CH1 Average processing setting
D201	1E1H / RWw1	RWw1 CH2 Average processing setting
D202	1E2H / RWw2	RWw2 CH3 Average processing setting
D203	1E3H / RWw3	RWw3 CH4 Average processing setting
Device D	Remote register (RWr)	Remote register (RWr)
D300	2E0H / RWr0	RWr0 CH1 Digital output value
D301	2E1H / RWr1	RWr1 CH2 Digital output value
D302	2E2H / RWr2	RWr2 CH3 Digital output value
D303	2E3H / RWr3	RWr3 CH4 Digital output value

**Figure 5.4 Update overview of the CPU module, master module, and AJ65SBT2B-64AD
(For the ACPU/QCPU (A mode))**

* In a program example with the RRPA instruction (auto refresh parameter setting) for the ACPU/ QCPU (A mode) (refer to Section 5.6), RWr0 to RWr3 are assigned to D456 to D459.

⊠POINT

The devices used in the examples in this chapter may not be available depending on the CPU module used.
For the available device setting range, refer to the user's manual for the CPU module used.
For example, X100 or Y100 and the subsequent devices are not available for the A1SCPU. Use other devices such as B and M.

5.3 Program Example When Using the QCPU (Q mode)

Set parameters in "Network Parameter" of GX Works2.

(1) Parameter settings

    (a) Network parameter setting
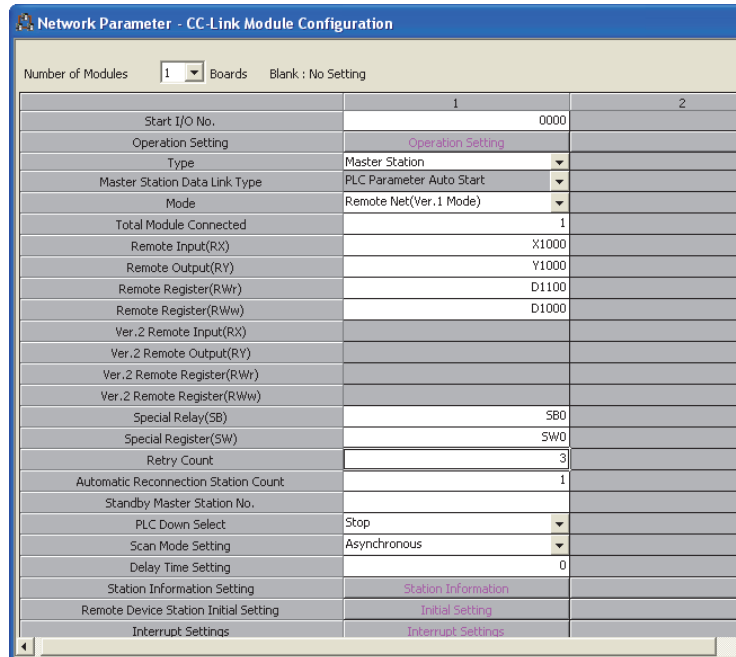
Figure 5.5 "CC-Link Module Configuration" dialog box (when using the QCPU (Q mode))

Table 5.1 "CC-Link Module Configuration" dialog box setting (when using the QCPU (Q mode))

Setting item	Setting value
Number of Modules	1 (Boards)
Start I/O No.	0000
Type	Master Station
Mode	Remote Net (Ver.1 Mode)
Total Module Connected	1 (module)
Remote Input(RX)	X1000
Remote Output(RY)	Y1000
Remote Register(RWr)	D1100
Remote Register(RWw)	D1000
Special Relay(SB)	SB0
Special Register(SW)	SW0
Retry Count	3 (Times)
Automatic Reconnection Station Count	1 (module)
Standby Master Station No.	No Setting
PLC Down Select	Stop
Scan Mode Setting	Asynchronous
Delay Time Setting	0
Station Information Setting	Refer to (1)(b) in this section.
Remote Device Station Initial Setting	No Setting
Interrupt Settings	No Setting

(b) Station information setting
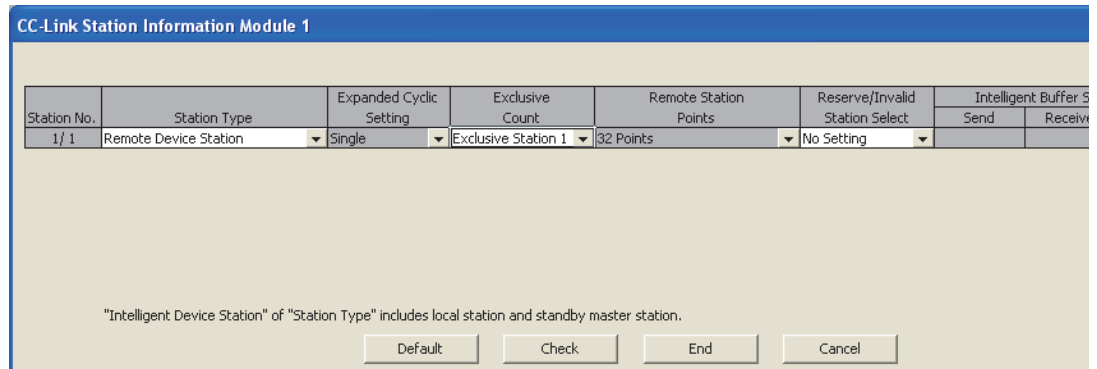
Figure 5.6 "Station Information Module 1" dialog box (when using the QCPU (Q mode))

Table 5.2 "Station Information Module 1" dialog box setting (when using the QCPU (Q mode))

Setting item	Setting value
Station Type	Remote Device Station
Exclusive Count	Exclusive Station 1
Reserve/Invalid Station Select	No Setting

(2) List of devices used in the program example

Table 5.3 List of devices used in the program example (when using the QCPU (Q mode))

Device	Description
X0	Module error
X1	Host data link status
XF	Module ready
X21	Signal which is turned on to reset Error flag
X22	Signal which is turned on to change the initial settings
X1000	CH1 A/D conversion completion flag
X1001	CH2 A/D conversion completion flag
X100F	Test mode flag
X1018	Initial data processing request flag
X1019	Initial data setting completion flag
X101A	Error flag
X101B	Remote ready
Y60	Signal which is output when a data link error occurs
Y63	Signal which is output when an error occurs
Y1000 to Y101A	Signal for various settings of the AJ65SBT2B-64AD

M0	Signal where the data link status of the AJ65SBT2B-64AD is stored
	  0 (OFF): Data link is normal
	  1 (ON): Data link is error

M31	Reset command pulse signal for Error flag
M100	Master control (MC) contact
D500	Device which reads CH1 Digital output value (starts to read the value after CH1 A/D conversion completion flag turns on)
D501	Device which reads CH2 Digital output value (starts to read the value after CH2 A/D conversion completion flag turns on)
D1000	CH1 Average processing setting
D1001	CH2 Average processing setting
D1100	CH1 Digital output value
D1101	CH2 Digital output value
SW80	Other station data link status

(3) Program example

Checking the connection status of the AJ65SBT2B-64AD

Ladder	Instruction	Description
X0 X0F X1	[MOV SW80 K1M0]	Reads the data link status
M0	[MC N0 M100]	Turns on MC contact (M100) when the data link is normal
M0	(Y60)	Turns on Y60 when a data link error occurs

N0 ─ M100

Initial setting

Ladder	Instruction	Description
X1018	[SET Y1000]	CH1 A/D conversion enable/disable setting (RY00): A/D conversion enable
	[SET Y1001]	CH2 A/D conversion enable/disable setting (RY01): A/D conversion enable
	[RST Y1004]	
	[RST Y1005]	CH1 Input range setting (RY04 to RYn6): 0 (-10 to 10V)
	[RST Y1006]	
	[SET Y1007]	
	[RST Y1008]	CH2 Input range setting (RY07 to RY09): 1 (0 to 5V)
	[RST Y1009]	
	[MOV H203 D1000]	CH1 Average processing setting (RWw0): Moving average (16 times)
	[MOV H1001 D1001]	CH2 Average processing setting (RWw1): Count average (16 times)
	[SET Y1018]	Initial data processing completion flag (RY18): ON
	[SET Y1019]	Initial data setting request flag (RY19): ON

*1 Changing the initial setting

Ladder	Instruction	Description
X22	[RST Y1000]	CH1 A/D conversion enable/disable setting (RY00): A/D conversion disable
	[RST Y1001]	CH2 A/D conversion enable/disable setting (RY01): A/D conversion disable
	[SET Y1019]	Initial data setting request flag (RY19): ON

Processing on completion of the initial setting

Ladder	Instruction	Description
X1018	[RST Y1018]	Initial data processing completion flag (RY18): OFF
X1019	[RST Y1019]	Initial data setting request flag (RY19): OFF

Reading a digital output value

Ladder	Instruction	Description
X101B X1000	[MOV D1100 D500]	Reads CH1 Digital output value (RWr0) to D500
X100F X1001	[MOV D1101 D501]	Reads CH2 Digital output value (RWr1) to D501

Processing in case of an error

Ladder	Instruction	Description
X21	[PLS M31]	

Figure 5.7 Program example (when using the QCPU (Q mode)) 1/2

* 1   The program enclosed by the dotted line is required only when changing the initial settings.

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```
        X101A
        ─┤├───────────────────────────────────────────────(Y63    )   Turns on Y63 when an error occurs
           M31
           ─┤├──────────────────────────────────────────[SET    Y101A  ]   Error reset request flag (RY1A): ON
Resetting Error reset request flag
        Y101A  X101A
        ─┤├────┤/├────────────────────────────────────[RST    Y101A  ]   Error reset request flag (RY1A): OFF

                                                       [MCR    N0     ]

                                                       [END           ]
```

Figure 5.8 Program example (when using the QCPU (Q mode)) 2/2

5.4 Program Example When Using the LCPU

The program example when using the QCPU can also be used for the LCPU. Set parameters according to the description in this section and use the program example in Section 5.3 (3).

Set parameters in "Network Parameter" of GX Works2.

(1) Parameter settings

(a) PLC parameter
Change the I/O assignment setting of the built-in I/O function according to the program example for the QCPU. From "I/O Assignment" of "PLC Parameter", set the I/O assignment not used in the system. Figure 5.9 shows an example of "I/O Assignment" for the L02CPU.
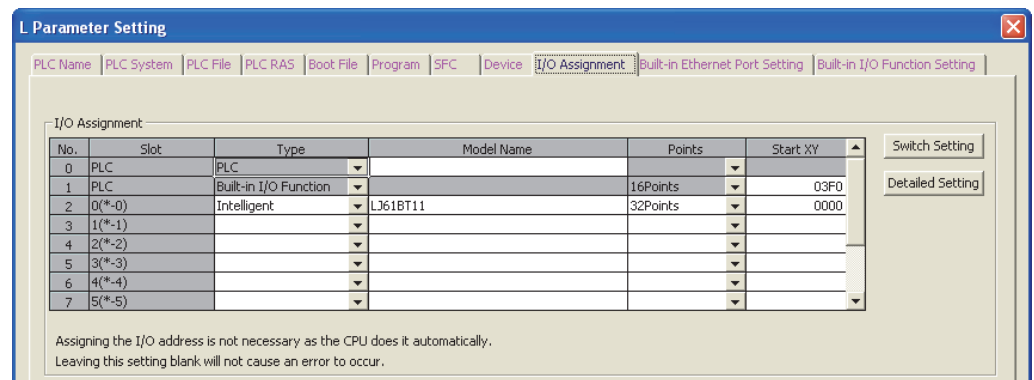
Figure 5.9 "PLC Parameter" dialog box (when using the L02CPU)

When using the LCPU with the built-in CC-Link function, set the I/O assignment of the built-in CC-Link function to 0000, and set the start I/O No. of the built-in I/O function to the I/O assignment which is not used in the system.

(b) Network parameter setting
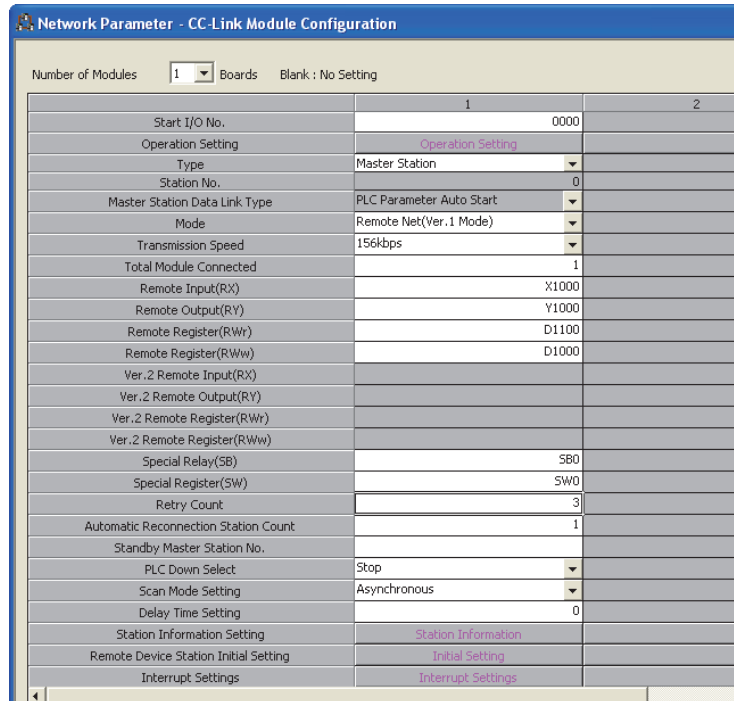
Figure 5.10 "CC-Link Module Configuration" dialog box (when using the LCPU)

Table 5.4 "CC-Link Module Configuration" dialog box setting (when using the LCPU)

Setting item	Setting value
Number of Modules	1 (Boards)
Start I/O No.	0000
Type	Master Station
Mode	Remote Net (Ver.1 Mode)
Transmission Speed	156kbps
Total Module Connected	1 (module)
Remote Input(RX)	X1000
Remote Output(RY)	Y1000
Remote Register(RWr)	D1100
Remote Register(RWw)	D1000
Special Relay(SB)	SB0
Special Register(SW)	SW0
Retry Count	3 (Times)
Automatic Reconnection Station Count	1 (module)
Standby Master Station No.	No Setting
PLC Down Select	Stop
Scan Mode Setting	Asynchronous
Delay Time Setting	0
Station Information Setting	Refer to (1)(c) in this section.
Remote Device Station Initial Setting	No Setting
Interrupt Settings	No Setting

(c) Station information setting
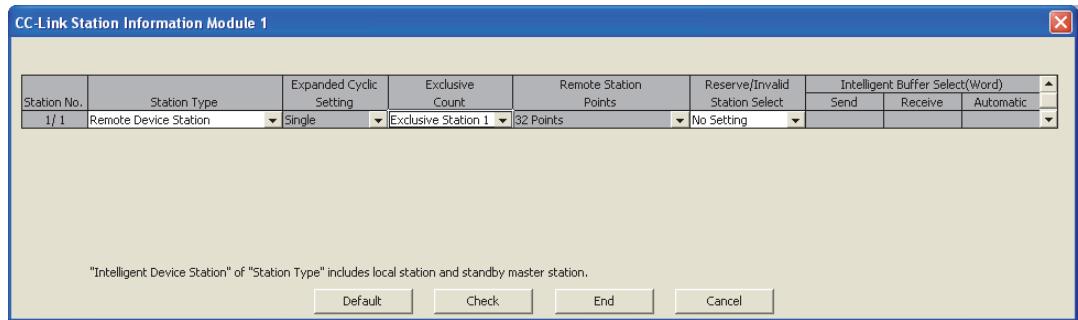
Figure 5.11 "Station Information Module 1" dialog box (when using the LCPU)

Table 5.5 "Station Information Module 1" dialog box setting (when using the LCPU)

Setting item	Setting value
Station Type	Remote Device Station
Exclusive Count	Exclusive Station 1
Reserve/Invalid Station Select	No Setting

(2) Program example
Refer to Section 5.3 (2) and Section 5.3 (3), and use the program example for the QCPU.

Remark •

To configure the system with the default I/O assignment of the LCPU, change some devices of the program example in Section 5.3 (3) to the ones indicated in Table 5.6.

Table 5.6 List of devices used in the program example (when using the LCPU)

Device	Changed to	Description
X0	X10	Module error
X1	X11	Host data link status
XF	X1F	Module ready
X21	X31	Signal which is turned on to reset Error flag
X22	X32	Signal which is turned on to change the initial settings

• •

5.5 Program Example When Using the QnACPU

Set parameters in "Network parameters" of GX Developer.

(1) Parameter settings

(a) Network parameter setting
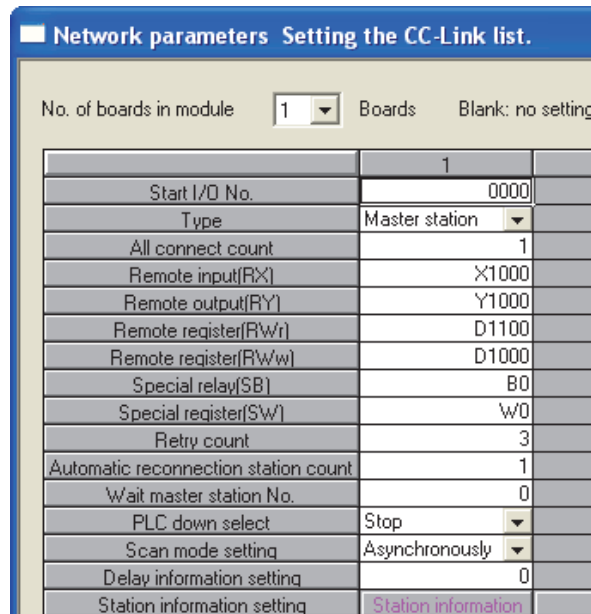
Figure 5.12 "Setting the CC Link List" dialog box (when using the QnACPU)

Table 5.7 "Setting the CC Link List" dialog box setting (when using the QnACPU)

Setting item	Setting value
No. of boards in module	1 (Boards)
Start I/O No.	0000
Type	Master station
All connect count	1 (module)
Remote input(RX)	X1000
Remote output(RY)	Y1000
Remote register(RWr)	D1100
Remote register(RWw)	D1000
Special relay(SB)	B0
Special register(SW)	W0
Retry count	3 (Times)
Automatic reconnection station count	1 (module)
Wait master station No.	0
PLC down select	Stop
Scan mode setting	Asynchronously
Delay information setting	0
Station information setting	Refer to (1)(b) in this section.

(b) Station information setting
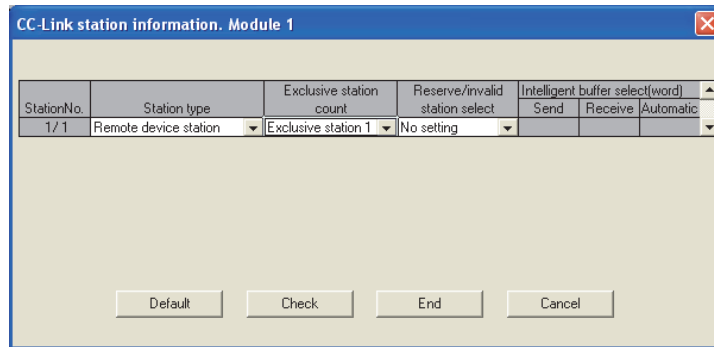
Figure 5.13 "station Information. Module 1" dialog box (when using the QnACPU)

Table 5.8 "station Information. Module 1" dialog box setting (when using the QnACPU)

Setting item	Setting value
Station type	Remote device station
Exclusive station count	Exclusive station 1
Reserve/invalid station select	No setting

(2) List of devices used in the program example

Table 5.9 List of devices used in the program example (when using the QnACPU)

Device	Description
X0	Module error
X1	Data link status at host station
XF	Module ready
X21	Signal which is turned on to reset Error flag
X22	Signal which is turned on to change the initial settings
X1000	CH1 A/D conversion completion flag
X1001	CH2 A/D conversion completion flag
X100F	Test mode flag
X1018	Initial data processing request flag
X1019	Initial data setting completion flag
X101A	Error flag
X101B	Remote ready
Y60	Signal which is output when a data link error occurs
Y63	Signal which is output when an error occurs
Y1000 to Y101A	Signal for various settings of the AJ65SBT2B-64AD
M0	Signal where the data link status of the AJ65SBT2B-64AD is stored 0 (OFF): Data link is normal 1 (ON): Data link is error
M31	Reset command pulse signal for Error flag
M100	Master control (MC) contact
D500	Device which reads CH1 Digital output value (starts to read the value after CH1 A/D conversion completion flag turns on)
D501	Device which reads CH2 Digital output value (starts to read the value after CH2 A/D conversion completion flag turns on)
D1000	CH1 Average processing setting
D1001	CH2 Average processing setting
D1100	CH1 Digital output value
D1101	CH2 Digital output value
W80	Other station data link status

(3) Program example

Checking the connection status of the AJ65SBT2B-64AD

X0	X0F	X1		[MOV	W80 K1M0]	Reads the data link status
	MO			[MC	N0 M100]	Turns on MC contact (M100) when the data link is normal
	MO				(Y60)	Turns on Y60 when a data link error occurs

N0 — M100

Initial setting

X1018

[SET Y1000] — CH1 A/D conversion enable/disable setting (RY00): A/D conversion enable

[SET Y1001] — CH2 A/D conversion enable/disable setting (RY01): A/D conversion enable

[RST Y1004]

[RST Y1005] — CH1 Input range setting (RY04 to RYn6): 0 (-10 to 10V)

[RST Y1006]

[SET Y1007] — CH2 Input range setting (RY07 to RY09): 1 (0 to 5V)

[RST Y1008]

[RST Y1009]

[MOV H203 D1000] — CH1 Average processing setting (RWw0): Moving average (16 times)

[MOV H1001 D1001] — CH2 Average processing setting (RWw1): Count average (16 times)

[SET Y1018] — Initial data processing completion flag (RY18): ON

[SET Y1019] — Initial data setting request flag (RY19): ON

*1

Changing the initial setting

X22

[RST Y1000] — CH1 A/D conversion enable/disable setting (RY00): A/D conversion disable

[RST Y1001] — CH2 A/D conversion enable/disable setting (RY01): A/D conversion disable

[SET Y1019] — Initial data setting request flag (RY19): ON

Processing on completion of the initial setting

X1018

[RST Y1018] — Initial data processing completion flag (RY18): OFF

X1019

[RST Y1019] — Initial data setting request flag (RY19): OFF

Reading a digital output value

X101B X1000

[MOV D1100 D500] — Reads CH1 Digital output value (RWr0) to D500

X100F X1001

[MOV D1101 D501] — Reads CH2 Digital output value (RWr1) to D501

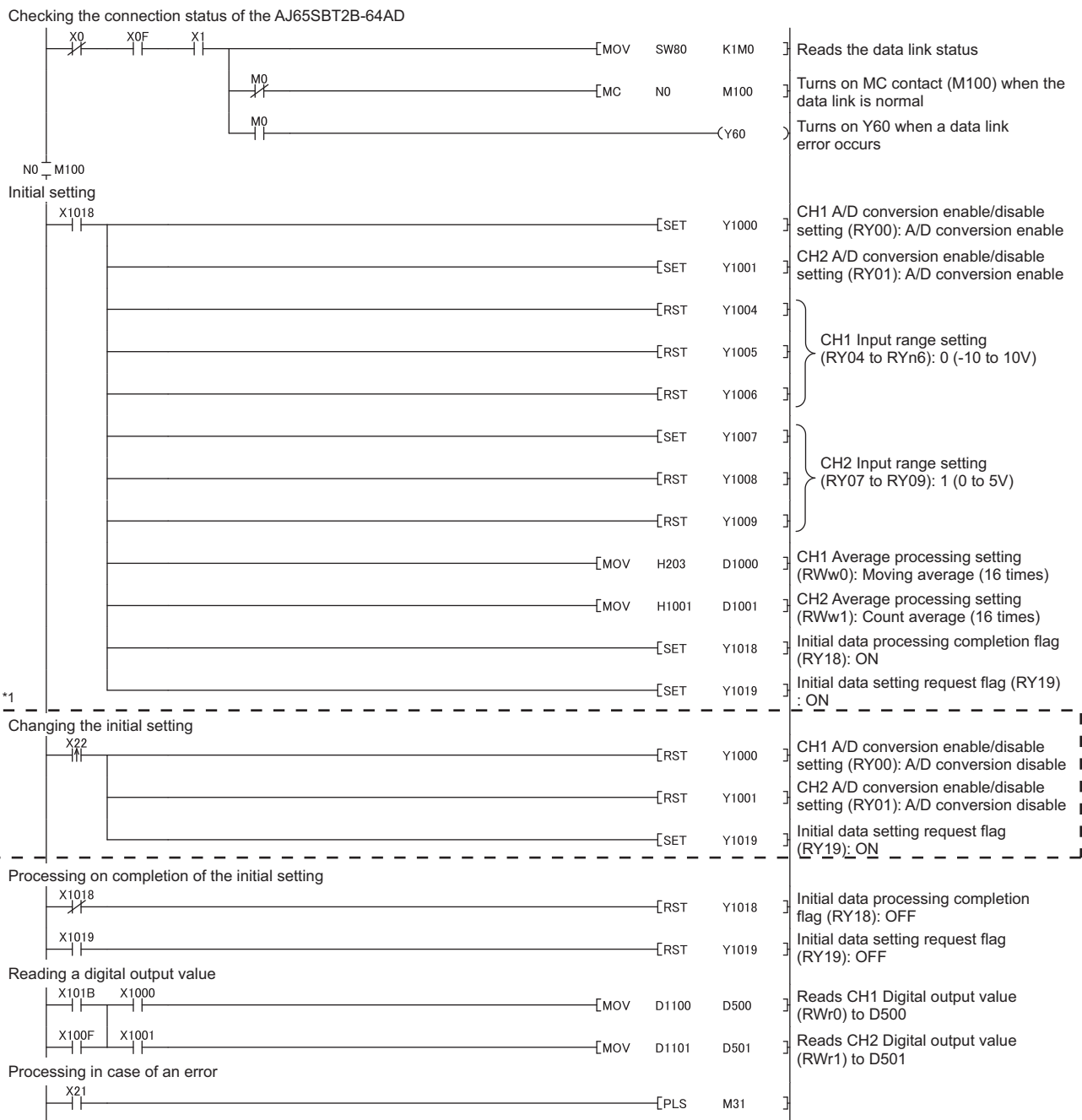**Figure 5.14 Program example (when using the QnACPU) 1/2**

* 1   The program enclosed by the dotted line is required only when changing the initial settings.

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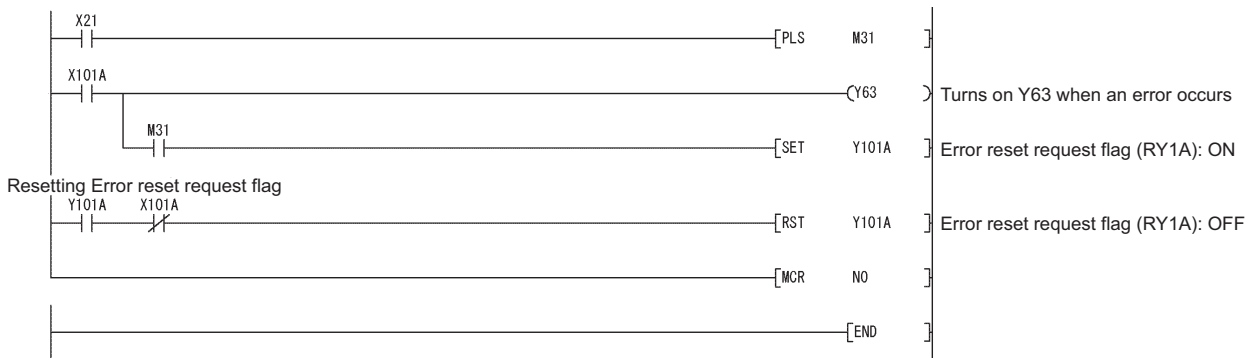
Figure 5.15 Program example (when using the QnACPU) 2/2

5.6 Program Example When Using the ACPU/QCPU (A mode) (Dedicated Instructions)

Set parameters with a sequence program.

For details on the dedicated instruction, refer to the Type AnSHCPU/AnACPU/AnUCPU/ QCPU-A (A Mode) Programming Manual (Dedicated Instructions).

(1) List of devices used in the program example

Table 5.10 List of devices used in the program example (when using the ACPU/QCPU (A mode) (dedicated instructions))

Device	Description
X0	Module error
X1	Data link status at host station
XF	Module ready
X21	Signal which is turned on to reset Error flag
X22	Signal which is turned on to change the initial settings
X100	CH1 A/D conversion completion flag
X101	CH2 A/D conversion completion flag
X10F	Test mode flag
X118	Initial data processing request flag
X119	Initial data setting completion flag
X11A	Error flag
X11B	Remote ready
Y60	Signal which is output when a data link error occurs
Y63	Signal which is output when an error occurs
Y100 to Y11A	Signal for various settings of the AJ65SBT2B-64AD
M0	Signal where the data link status of the AJ65SBT2B-64AD is stored 0 (OFF): Data link is normal 1 (ON): Data link is error
M10	Network parameter setting start pulse signal
M11	Signal which is turned on when the parameter setting is completed normally
M12	Signal which is turned on when the parameter setting is completed in error
M13	Auto refresh parameter setting start pulse signal
M20	Initial setting change command pulse signal
M31	Reset command pulse signal for Error flag
M100	Master control (MC) contact
D0 to D2	Device for network parameter settings
D3	Device where the own station parameter status is stored when the instruction is completed in error
D10 to D29	Device which configures auto refresh parameter settings
D200	CH1 Average processing setting
D201	CH2 Average processing setting
D456	CH1 Digital output value
D457	CH2 Digital output value
D500	Device which reads CH1 Digital output value (starts to read the value after CH1 A/D conversion completion flag turns on)
D501	Device which reads CH2 Digital output value (starts to read the value after CH2 A/D conversion completion flag turns on)
W80	Other station data link status

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(2) Program example

Setting the network parameter using the RLPA instruction

```
      X0    X0F
   ──┤/├──┤ ├─────────────────────────────────[PLS    M10    ]

      M10
   ──┤ ├──┬──────────────────────────────────[MOV    K1     D0     ]    Synchronous mode: Disable

          ├──────────────────────────────────[MOV    K1     D1     ]    Number of connected modules: 1

          ├──────────────────────────────────[MOV    H1101  D2     ]    Station information of the
                                                                        AJ65SBT2B-64AD (remote device
                                                                        station, occupying 1 station, station
                                                                        No.1)
          ├──────────────────────────────────[LEDA   RLPA   ]          Dedicated instruction (RLPA)

          ├──────────────────────────────────[SUB    H0     ]          Start I/O number of the master
                                                                        module
          ├──────────────────────────────────[LEDC   D0     ]          Start device for storing parameter

          ├──────────────────────────────────[LEDC   M11    ]          Device that is turned on for one
                                                                        scan when the instruction is
                                                                        completed normally
          └──────────────────────────────────[LEDR   ]

      M12
   ──┤ ├────────────────────────[FROM   H0    H668   D3     K1    ]     Reads the host station parameter
                                                                        status when the instruction is
                                                                        completed in error
```

Setting the auto refresh parameter using the RLPA instruction

```
      X0    X0F   M12
   ──┤/├──┤ ├──┤/├───────────────────────────[PLS    M13    ]

      M13
   ──┤ ├──┬──────────────────────────────────[MOV    H0     D10    ]    Sets the start number of RX00

          ├──────────────────────────────────[MOV    H1     D11    ]    Sets "X"

          ├──────────────────────────────────[MOV    H100   D12    ]    Sets X100

          ├──────────────────────────────────[MOV    K32    D13    ]    Sets 32 points

          ├──────────────────────────────────[MOV    H0     D14    ]    Sets the start number of RY00

          ├──────────────────────────────────[MOV    H2     D15    ]    Sets "Y"

          ├──────────────────────────────────[MOV    H100   D16    ]    Sets Y100

          ├──────────────────────────────────[MOV    K32    D17    ]    Sets 32 points

          ├──────────────────────────────────[MOV    H0     D18    ]    Sets the start number of RW

          ├──────────────────────────────────[MOV    H7     D19    ]    Sets "D"

          ├──────────────────────────────────[MOV    K200   D20    ]    Sets D100

          ├──────────────────────────────────[MOV    K260   D21    ]    Sets 260 points

          └──────────────────────────────────[MOV    H0     D22    ]    Sets the start number of SB
```

Figure 5.16 Program example (when using the ACPU/QCPU (A mode) (dedicated instructions)) 1/3

```
                                            ─[MOV   H4      D23  ]   Sets "B"

                                            ─[MOV   K0      D24  ]   Sets B0

                                            ─[MOV   K512    D25  ]   Sets 512 points

                                            ─[MOV   H0      D26  ]   Sets the start number of SW

                                            ─[MOV   H8      D27  ]   Sets "W"

                                            ─[MOV   H0      D28  ]   Sets W0

                                            ─[MOV   K256    D29  ]   Sets 256 points

                                            ─[LEDB   RRPA       ]   Dedicated instruction (RRPA)

                                            ─[SUB    H0         ]   Start I/O number of the master module

                                            ─[LEDC   D10        ]   Start device for storing parameter

                                            ─[LEDR              ]
```

Checking the connection status of the AJ65SBT2B-64AD
```
   X0    X0F    X1
   ╫─────┤├─────┤├──────────────────────────[MOV   W80     K1M0 ]   Reads the data link status

                M0
               ─╫─────────────────────────────[MC    N0      M100 ]   Turns on MC contact (M100) when
                                                                      the data link is normal
                M0
               ─┤├─────────────────────────────(Y60              )   Turns on Y60 when a data link error occurs
```

```
 N0─ M100
   ─┤├
```
Initial setting
```
   X118
   ─┤├──────────────────────────────────────[SET    Y100        ]   CH1 A/D conversion enable/disable
                                                                     setting (RY00): A/D conversion enable

                                            ─[SET    Y101        ]   CH2 A/D conversion enable/disable
                                                                     setting (RY01): A/D conversion enable

                                            ─[RST    Y104        ]  ⎫
                                                                    ⎬ CH1 Input range setting (RY04 to
                                            ─[RST    Y105        ]  ⎬ RYn6): 0 (-10 to 10V)
                                                                    ⎭
                                            ─[RST    Y106        ]

                                            ─[SET    Y107        ]  ⎫
                                                                    ⎬ CH2 Input range setting (RY07 to
                                            ─[RST    Y108        ]  ⎬ RY09): 1 (0 to 5V)
                                                                    ⎭
                                            ─[RST    Y109        ]

                                            ─[MOVP   H203    D200]   CH1 Average processing setting (RWw0)
                                                                     : Moving average (16 times)
```

Figure 5.17 Program example (when using the ACPU/QCPU (A mode) (dedicated instructions)) 2/3

```
                                                    ─[MOVP    H1001    D201  ]   CH2 Average processing setting
                                                                                 (RWw1): Count average (16 times)

                                                             ─[SET     Y118  ]   Initial data processing completion flag
                                                                                 (RY18): ON

                                                             ─[SET     Y119  ]   Initial data setting request flag (RY19)
                                                                                 : ON
  *1
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─┐
│ Changing the initial setting                                                    │
│       X22                                                                        │
│      ─┤ ├─                                          ─[PLS     M20   ]            │
│                                                                                  │
│       M20                                                                        │
│      ─┤ ├─                                          ─[RST     Y100  ]   CH1 A/D conversion enable/disable
│                                                                         setting (RY00): A/D conversion disable
│                                                                                  │
│                                                     ─[RST     Y101  ]   CH2 A/D conversion enable/disable
│                                                                         setting (RY01): A/D conversion disable
│                                                                                  │
│                                                     ─[SET     Y119  ]   Initial data setting request flag (RY19)
│                                                                         : ON
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─┘
  Processing on completion of the initial setting
       X118
      ─┤╱├─                                           ─[RST     Y118  ]   Initial data processing completion flag
                                                                          (RY18): OFF
       X119
      ─┤ ├─                                           ─[RST     Y119  ]   Initial data setting request flag (RY19)
                                                                          : OFF
  Reading a digital output value
       X11B     X100
      ─┤ ├──────┤ ├─                                  ─[MOV     D456    D500 ]  Reads CH1 Digital output value (RWr0)
                                                                                to D500
       X10F     X101
      ─┤ ├──────┤ ├─                                  ─[MOV     D457    D501 ]  Reads CH2 Digital output value (RWr1)
                                                                                to D501
  Processing in case of an error
       X21
      ─┤ ├─                                            ─[PLS     M31   ]
       X11A
      ─┤ ├─                                                   ─(Y63   )  Turns on Y63 when an error occurs
            M31
           ─┤ ├─                                       ─[SET     Y11A  ]  Error reset request flag (RY1A): ON
  Resetting Error reset request flag
       Y11A    X11A
      ─┤ ├─────┤╱├─                                    ─[RST     Y11A  ]  Error reset request flag (RY1A): OFF

                                                       ─[MCR     N0    ]

                                                       ─[END           ]
```
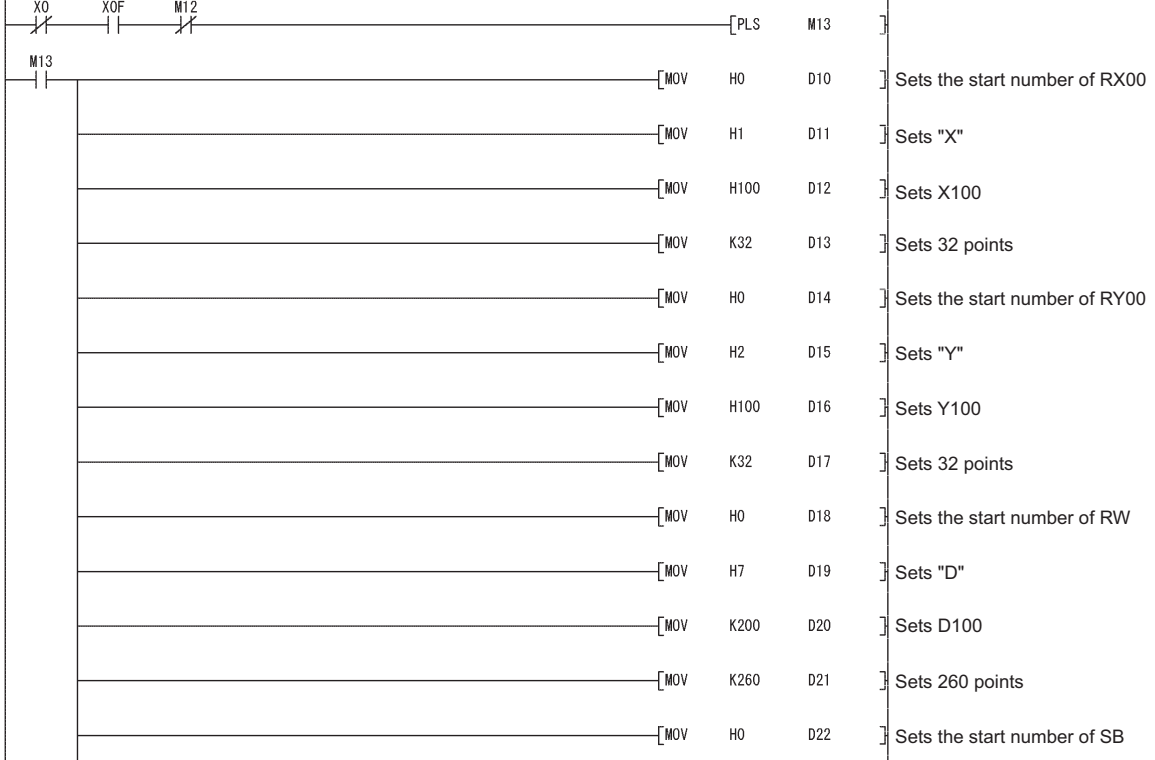
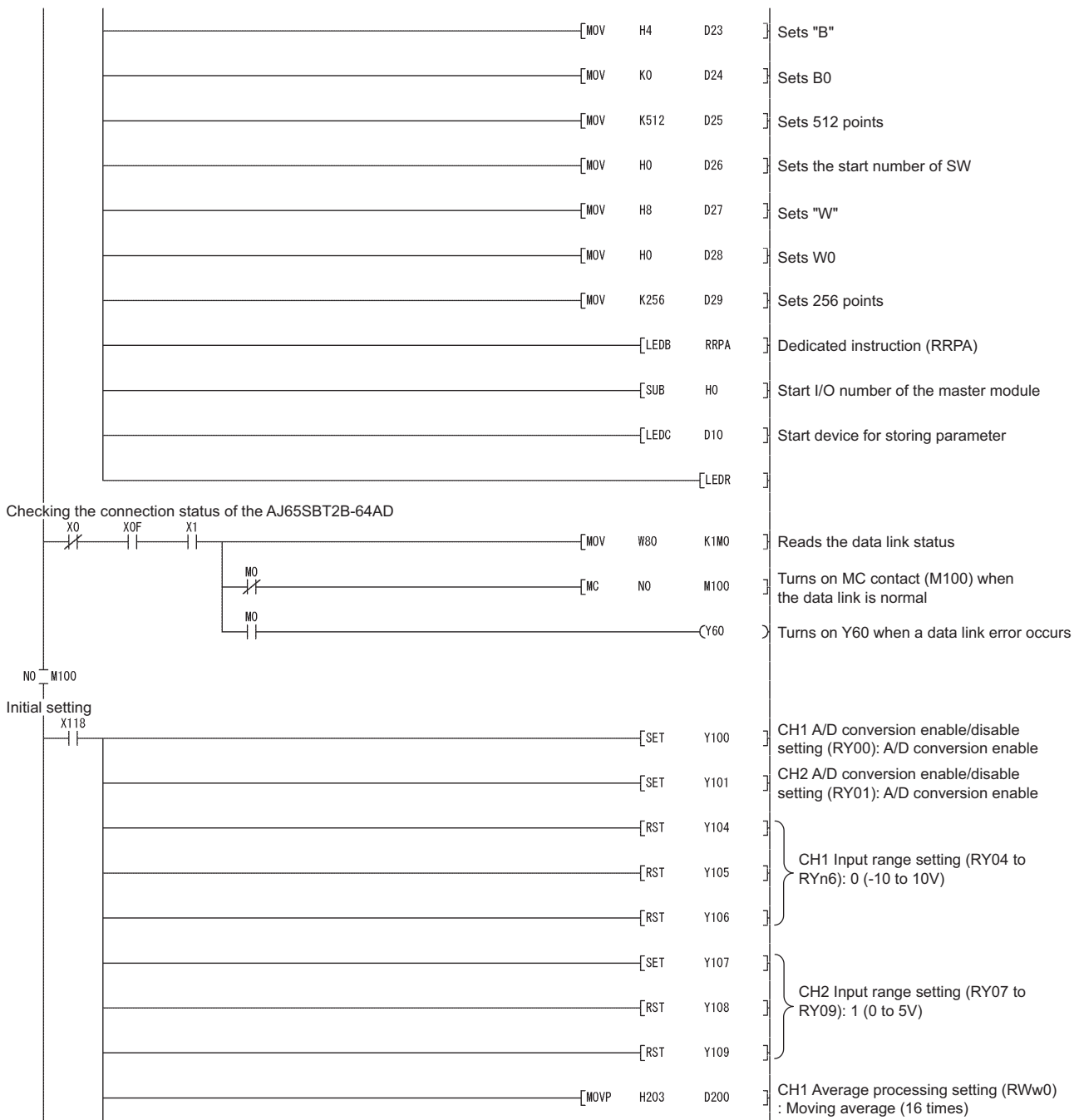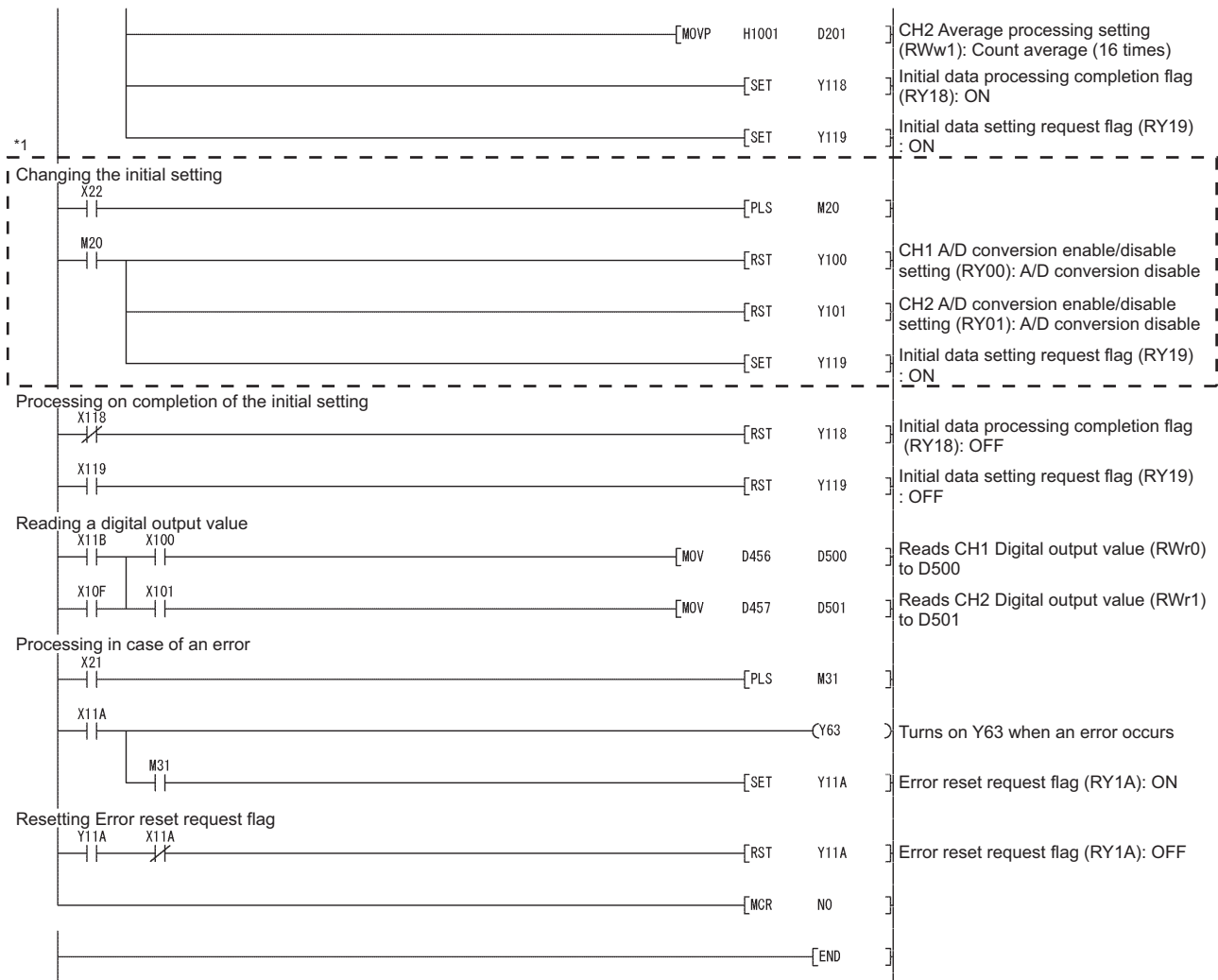**Figure 5.18 Program example (when using the ACPU/QCPU (A mode) (dedicated instructions)) 3/3**

* 1 The program enclosed by the dotted line is required only when changing the initial settings.

5.7 Program Example When Using the ACPU/QCPU (A mode) (FROM/TO Instructions)

Set parameters with a sequence program.

(1) List of devices used in the program example

Table 5.11 List of devices used in the program example (when using the ACPU/QCPU (A mode) (FROM/TO instructions))

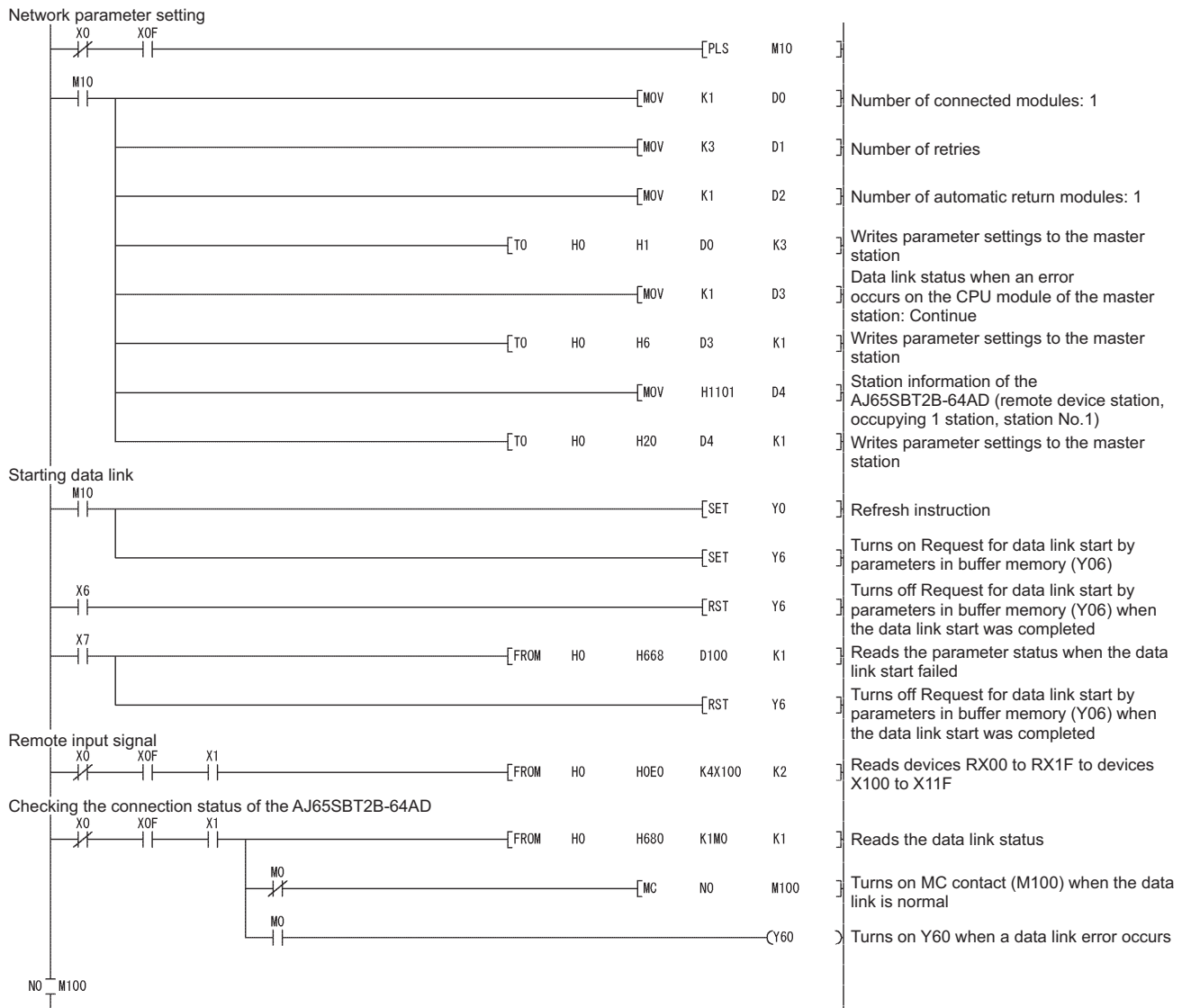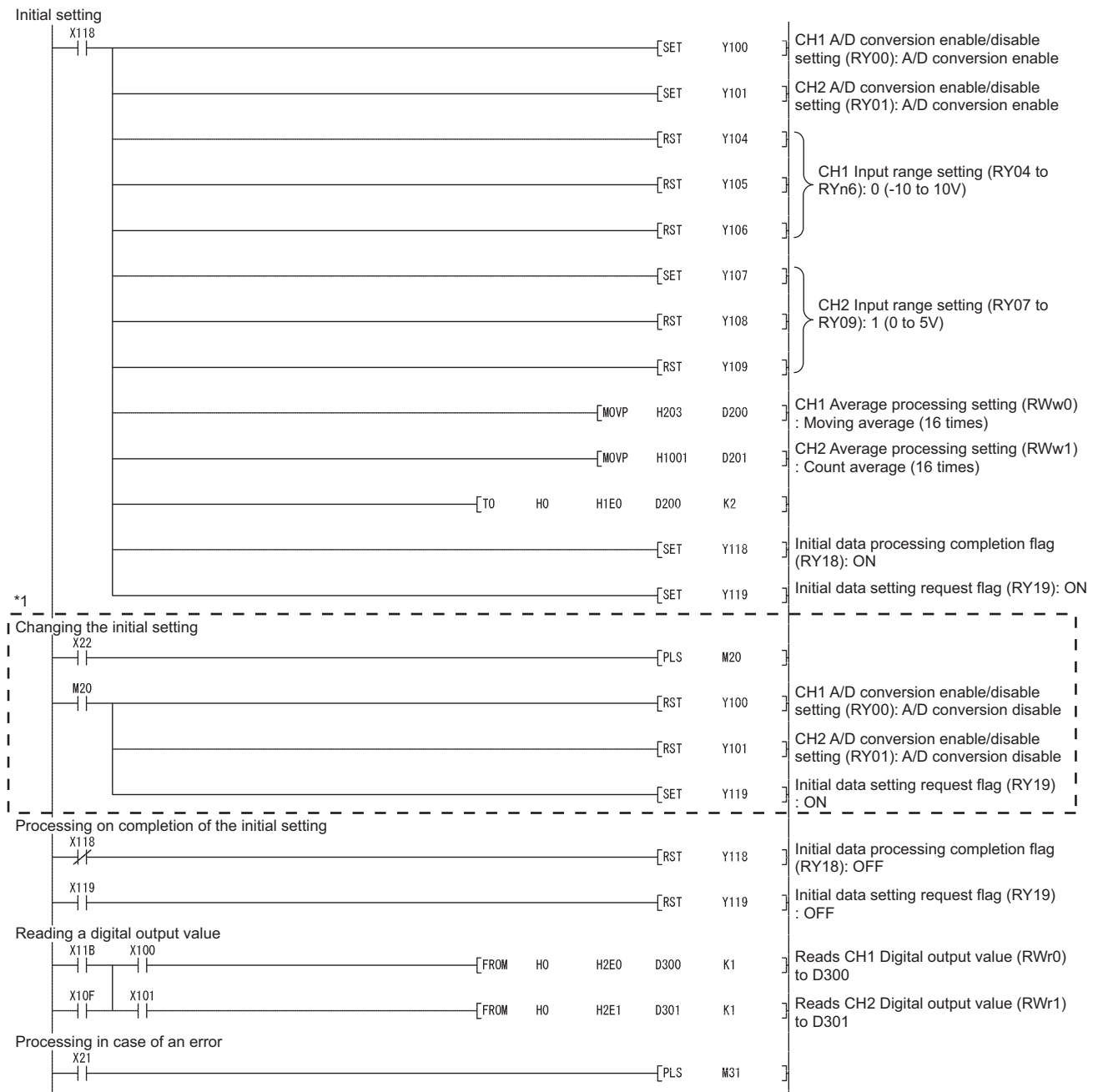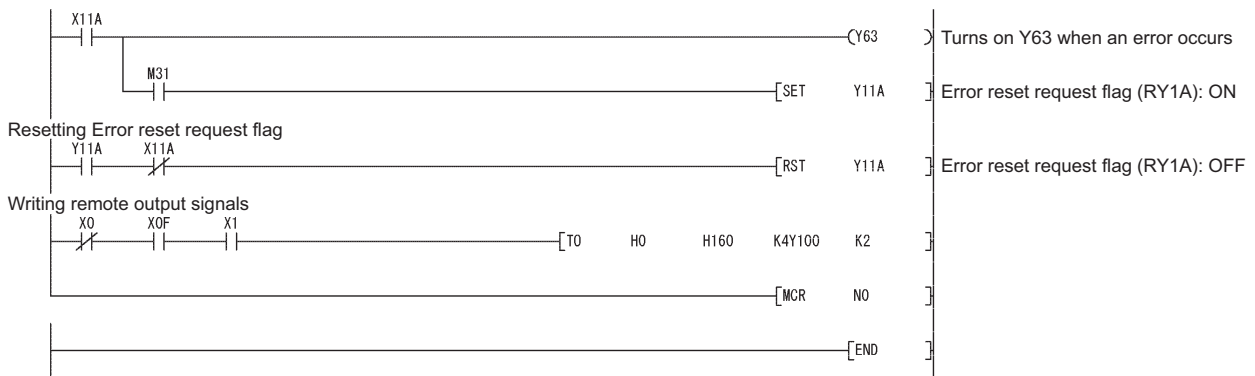| Device	Description
X0	Module error
X1	Data link status at host station
X6	Data link startup by buffer memory parameter normal completion
X7	Data link startup by buffer memory parameter error completion
XF	Module ready
X21	Signal which is turned on to reset Error flag
X22	Signal which is turned on to change the initial settings
X100	CH1 A/D conversion completion flag
X101	CH2 A/D conversion completion flag
X10F	Test mode flag
X118	Initial data processing request flag
X119	Initial data setting completion flag
X11A	Error flag
X11B	Remote ready
Y0	Refresh instruction
Y6	Data link startup request from buffer memory parameters
Y60	Signal which is output when a data link error occurs
Y63	Signal which is output when an error occurs
Y100 to Y11A	Signal for various settings of the AJ65SBT2B-64AD

M0	Signal where the data link status of the AJ65SBT2B-64AD is stored
	  0 (OFF): Data link is normal
	  1 (ON): Data link is error

M10	Network parameter setting start pulse signal
M20	Initial setting change command pulse signal
M31	Reset command pulse signal for Error flag
M100	Master control (MC) contact
D0 to D4	Device for network parameter settings
D100	Device where the own station parameter status is stored when the instruction is completed in error
D200	CH1 Average processing setting
D201	CH2 Average processing setting
D300	CH1 Digital output value
D301	CH2 Digital output value

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(2) Program example

Network parameter setting

X0 X0F				[PLS M10]	

M10	[MOV K1 D0]			Number of connected modules: 1
	[MOV K3 D1]			Number of retries
	[MOV K1 D2]			Number of automatic return modules: 1
	[T0 H0 H1 D0 K3]			Writes parameter settings to the master station
	[MOV K1 D3]			Data link status when an error occurs on the CPU module of the master station: Continue
	[T0 H0 H6 D3 K1]			Writes parameter settings to the master station
	[MOV H1101 D4]			Station information of the AJ65SBT2B-64AD (remote device station, occupying 1 station, station No.1)
	[T0 H0 H20 D4 K1]			Writes parameter settings to the master station

Starting data link

M10	[SET Y0]	Refresh instruction
	[SET Y6]	Turns on Request for data link start by parameters in buffer memory (Y06)
X6	[RST Y6]	Turns off Request for data link start by parameters in buffer memory (Y06) when the data link start was completed
X7	[FROM H0 H668 D100 K1]	Reads the parameter status when the data link start failed
	[RST Y6]	Turns off Request for data link start by parameters in buffer memory (Y06) when the data link start was completed

Remote input signal

X0 X0F X1	[FROM H0 H0E0 K4X100 K2]	Reads devices RX00 to RX1F to devices X100 to X11F

Checking the connection status of the AJ65SBT2B-64AD

X0 X0F X1	[FROM H0 H680 K1M0 K1]	Reads the data link status
M0	[MC N0 M100]	Turns on MC contact (M100) when the data link is normal
M0	(Y60)	Turns on Y60 when a data link error occurs

N0 — M100

Figure 5.19 Program example (when using the ACPU/QCPU (A mode) (FROM/TO instructions)) 1/3

Initial setting

Figure 5.20 Program example (when using the ACPU/QCPU (A mode) (FROM/TO instructions)) 2/3

   * 1 The program enclosed by the dotted line is required only when changing the initial settings.

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Figure 5.21 Program example (when using the ACPU/QCPU (A mode) (FROM/TO instructions)) 3/3

CHAPTER 6   TROUBLESHOOTING

This chapter describes error contents that may occur while using the AJ65SBT2B-64AD and troubleshooting.

6.1   Error Check Method by the LED Display

This section describes how to check errors by the LED display of the AJ65SBT2B-64AD. For errors related to the CPU module and the master module, refer to the user's manual for the modules.

(1) When the PW LED turns off

Table 6.1 When the PW LED of the AJ65SBT2B-64AD turns off

Check item	Action
Is the 24VDC power supply turned on?	Check the external power supply.
Is the voltage of the 24VDC power supply within the specified range?	Set the voltage value within the range of 20.4 to 28.8V.

(2) When the RUN LED flashes

Table 6.2 When the RUN LED of the AJ65SBT2B-64AD flashes

	Flash interval	Check item	Action
Normal mode	0.1s	Are the values of CH1 Input range setting (0th bit) (RYn4) to CH4 Input range setting (2nd bit) (RYnF) correct?	Referring to Section 3.4.4, check CH1 Input range setting (0th bit) (RYn4) to the CH4 Input range setting (2nd bit) (RYnF). If a setting value of a channel is wrong, set it to a correct value.
		Is Hardware error flag (RXnA) ON?	Turn the power supply of the AJ65SBT2B-64AD from off to on. If the same error occurs again, the possible cause is a hardware failure. Please consult your local Mitsubishi representative.
		Is User range read error flag (RXnB) ON?	Configure the offset/gain setting again for all channels where the user range setting is used in test mode. If the same error occurs again even after the offset/gain setting is configured correctly, the possible cause is a hardware failure. Please consult your local Mitsubishi representative.
	0.5s	Are the values of CH1 Average processing setting (RWwm) to CH4 Average processing setting (RWwm+3) correct?	Referring to Section 3.4.3, check CH1 Average processing setting (RWwm) to CH4 Average processing setting (RWwm+3). If a setting value of a channel is wrong, set it to a correct value.

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Table 6.2 When the RUN LED of the AJ65SBT2B-64AD flashes

	Flash interval	Check item	Action
Test mode	0.1s	Is User range read error flag (RXnB) ON?	Configure the offset/gain setting again for all channels where the user range setting is used in test mode. If the same error occurs again even after the offset/gain setting is configured correctly, the possible cause is a hardware failure. Please consult your local Mitsubishi representative.
		Is Flash memory write error flag (RXnC) ON?	This flag turns on if the write to the flash memory is failed when configuring the offset/gain setting. In this case, turn the power supply of the AJ65SBT2B-64AD from off to on. If Flash memory write error flag (RXnC) is still ON even after turning the power supply from off to on and performing the write to the flash memory, the possible cause is a hardware failure. Please consult your local Mitsubishi representative.
		Are User range read error flag (RXnB) and Flash memory write error flag (RXnC) OFF?	Turn the power supply of the AJ65SBT2B-64AD from off to on. If the state remains the same even after turning the power supply from off to on, the possible cause is a hardware failure. Please consult your local Mitsubishi representative.
	0.5s	Are the offset value and gain value set within the available setting range?	Referring to Section 3.3.1 and Section 3.3.2, check the available setting range of the offset value and gain value and reset the error by turning on Error reset request flag (RY(n+1)A). Then, set the offset value and gain value to the correct value.

(3) When the RUN LED turns off

Table 6.3 When the RUN LED of the AJ65SBT2B-64AD turns off

Check item	Action
Does the watchdog timer error occur?	After checking the watchdog timer error with the link special register (SW0084 to SW0087) of the master module, turn the power supply of the AJ65SBT2B-64AD from off to on. If the RUN LED does not turn on even after turning the power supply from off to on, the possible cause is a hardware failure. Please consult your local Mitsubishi representative.
Is the AJ65SBT2B-64AD in test mode by short-circuiting between the TEST terminals?	After configuring the offset/gain setting, release the TEST terminals.

(4) When the L RUN LED turns off
   Communication is disconnected.
   For details, refer to the troubleshooting on the user's manual for the master module used.

(5) When the L ERR. LED flashes regularly

Table 6.4 When the L ERR. LED of the AJ65SBT2B-64AD flashes regularly

Check item	Action
Is the station number setting switch changed during normal operation?	Turn off the power supply of the AJ65SBT2B-64AD, correct the setting of the station number setting switch, and turn the power supply from off to on.
Is the station number setting switch broken?	If the L ERR. LED starts flashing although the station number setting switch is not changed during the operation, the possible cause is a hardware failure. Please consult your local Mitsubishi representative.

(6) When the L ERR. LED flashes irregularly

Table 6.5 When the L ERR. LED flashes irregularly

Check item		Action
Is the module or CC-Link dedicated cable affected by noise?		Ground both ends of the shield part of the CC-Link dedicated cable to the protective ground conductor via the SLD and FG terminals of each module. Ground the FG terminal of the module without fail. When wiring is performed using pipes, ground the pipes without fail.
Is the communication disconnected?		The station number setting switch may be changed while the communication is disconnected. In this case, check all the items described in Section 6.1 (5) and take an appropriate action.
When the AJ65SBT2B-64AD is not connected at the network termination	Is the L TER. switch ON?	Turn off the L TER. switch.
	Is a terminating resistor connected?	Remove the terminating resistor.
When the AJ65SBT2B-64AD is connected at the network termination	Is the L TER. switch ON or a terminating resistor installed?	Remove the terminating resistor. Or, turn off the L TER. switch.
	Is the L TER. switch OFF or a terminating resistor forgotten to be installed?	Turn on the L TER. switch. Or, connect a terminating resistor. After completing either of the above actions, turn the power supply from off to on.

(7) When the L ERR. LED turns on

Table 6.6 When the L ERR. LED of the AJ65SBT2B-64AD turns on

Check item	Action
Is the station number setting correct?	Set the correct station number.

6.2   When the Digital Output Value Cannot Be Read
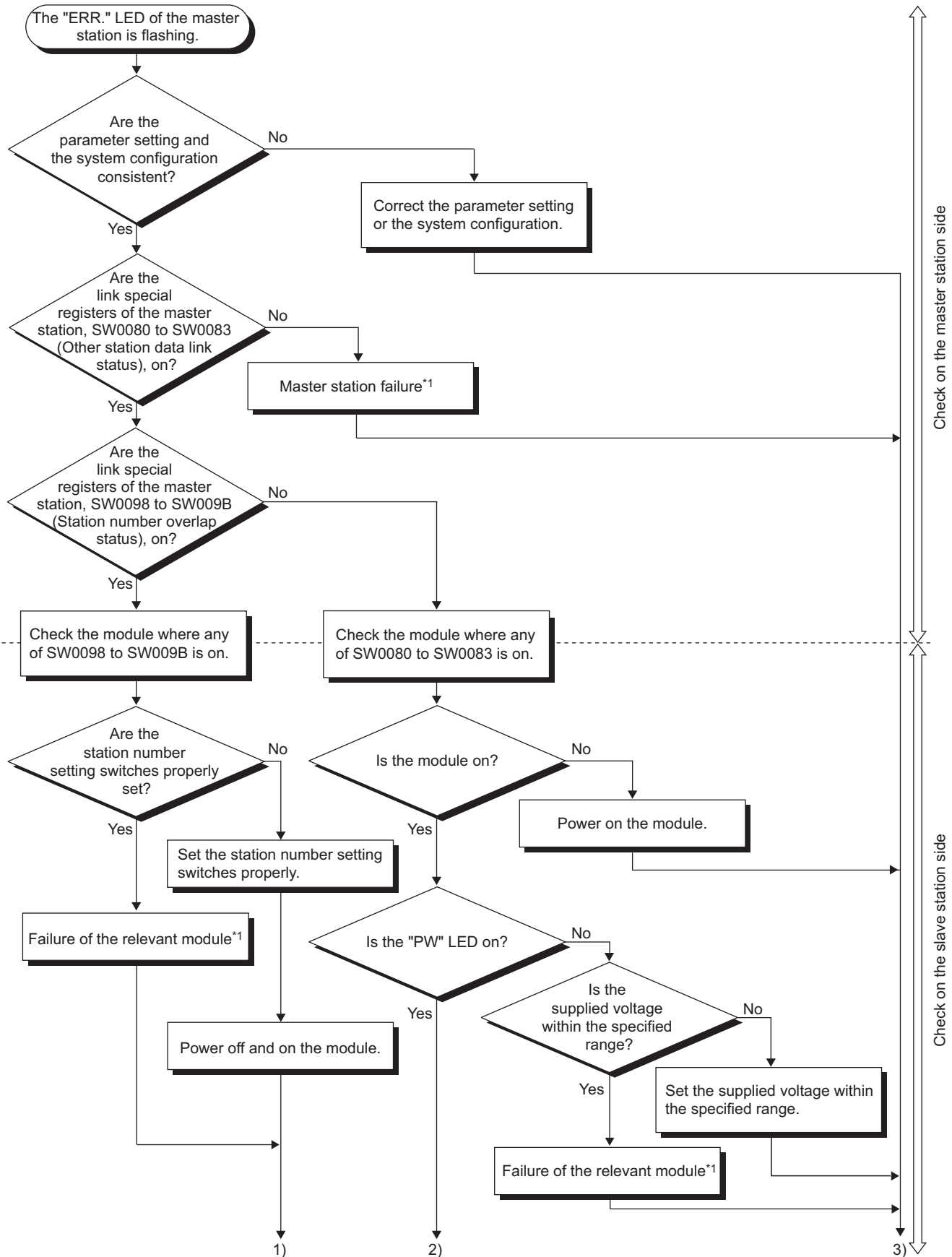
Table 6.7 When the digital output value cannot be read

Check item	Action
Does an error occur in a CPU module or the master module?	Check the CPU module or the master module. When an error occurs, refer to the user's manual of the CPU module or the master module used and resolve the error.
Is the input range setting correct?	Referring to Section 3.4.4, check CH□ Input range setting (RYn4 to RYnF) in the monitor of the programming tool. If the input range setting is wrong, correct the sequence program.
Is the A/D conversion disabled in CH□ A/D conversion enable/disable setting (RYn0 to RYn3) for the channel to be used?	Referring to Section 3.4.2, check CH□ A/D conversion enable/disable setting (RYn0 to RYn3) in the monitor of the programming tool. When the setting is wrong, correct the sequence program.
Are analog signal lines connected properly or unbroken?	Identify the failure location by visual check or cable check, and re-wire the cables.
Are the V+ and I+ terminals connected for the current input?	When executing the current input, wire between the V+ and I+ terminals.
Is the terminal block for analog input signal mounted on the module?	Check the connection of the terminal block for analog input signal. If it is not connected, connect it to the module.
Is the module affected by noise?	Check the influence of the noise from the grounded point or adjacent equipment, and take an action against the noise.

6.3   When the Data Link Needs a Lot of Time

Table 6.8 When the data link needs a lot of time

Check item	Action
Is the setting value of the Automatic Reconnection Station Count of the master module small?	Set the setting value of the "Automatic Reconnection Station Count" in the "Network Parameter" on the programming tool. For details on the setting method, refer to the user's manual for the used master module.

6.4 Troubleshooting When the ERR. LED of the Master Station Flashes

The "ERR." LED of the master station is flashing.

Are the parameter setting and the system configuration consistent?

No → Correct the parameter setting or the system configuration.

Yes ↓

Are the link special registers of the master station, SW0080 to SW0083 (Other station data link status), on?

No → Master station failure[1]

Yes ↓

Are the link special registers of the master station, SW0098 to SW009B (Station number overlap status), on?

No → Check the module where any of SW0080 to SW0083 is on.

Yes ↓

Check the module where any of SW0098 to SW009B is on.

Are the station number setting switches properly set?

No → Set the station number setting switches properly.

Yes ↓

Failure of the relevant module[1]

Power off and on the module.

Is the module on?

No → Power on the module.

Yes ↓

Is the "PW" LED on?

No → Is the supplied voltage within the specified range?

Yes ↓

No → Set the supplied voltage within the specified range.

Yes ↓

Failure of the relevant module[1]

Check on the master station side

Check on the slave station side

1)   2)   3)

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1) 2) 3)

```
                    Is the "L RUN" LED on?  ── No ──┐
                              │                     │
                             Yes                    ▼
                              │        Are the station number
                              │        setting switches properly set  ── No ──┐
                              │        (no overlap with those of              │
                              │        other stations)?                       ▼
                              │              │               Set the station number
                              │             Yes              setting switches properly.
                              │              │                        │
                              │              ▼                        ▼
                              │        Are the             Power off and on the module. ──→
                              │        communication cables ── No ──┐
                              │        properly wired?*2             │
                              │              │                       ▼
                              │             Yes          Wire the communication cables
                              │              │           properly.
                              │              ▼
                              │      Failure of the relevant module*1 ──────────────────→
                              │              │
                              ▼              │
                    Are the station number   │
                    setting switches properly set ── No ──┐
                    (no overlap with those of            │
                    other stations)?                     ▼
                          │              Set the station number
                         Yes             setting switches properly.
                          │                      │
              Failure of the relevant module*1   ▼
                          │           Power off and on
                          │           the module.
                          └────────────────┬──────────────┘
                                           ▼
                                         ( End )
```

Check on the slave station side

* 1 For the failure of the master module or corresponding modules, please consult your local Mitsubishi representative.
* 2 Check for a short circuit, reversed connection, disconnection, terminating resistor, FG connection, overall cable distance, and station-to-station distance.

6 TROUBLESHOOTING

MELSEC-A

6.5 When Hardware Error Flag (RXnA) Turns on

In this case, turn the power supply of the AJ65SBT2B-64AD from off to on.
If Hardware error flag (RXnA) turns on even after turning the power supply from off to on, the possible cause is a failure of the AJ65SBT2B-64AD.
Please consult your local Mitsubishi representative.

6.6 When User Range Read Error Flag (RXnB) Turns on

An error has occurred while reading the user range.

In this case, configure the offset/gain setting again for all channels where the user range setting is used.
If User range read error flag (RXnB) is still ON even after configuring the offset/gain setting again, the possible cause is a failure of the AJ65SBT2B-64AD. Please consult your local Mitsubishi representative.

6.7 When Flash Memory Write Error Flag (RXnC) Turns on

Writing to the flash memory failed when configuring the offset/gain setting.

In this case, turn the power supply of the AJ65SBT2B-64AD from off to on.
If Flash memory write error flag (RXnC) is still ON even after turning the power supply from off to on and performing the write to the flash memory, the possible cause is a failure of the AJ65SBT2B-64AD.
Please consult your local Mitsubishi representative.

6.8 When Number of Offset/Gain Settings Excess Flag (RXnD) Turns on

The number of offset/gain setting times has exceeded the maximum of the guaranteed value (10,000 times).

If the offset/gain setting is configured after this flag turns on, the reflection of offset/gain value cannot be guaranteed. Replacement of the module is recommended.

6.5 When Hardware Error Flag (RXnA) Turns on   **6** **- 7**

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Appendix 1   External Dimensions

The following figures show the external dimensions of the AJ65SBT2B-64AD.

Unit: mm

Memo

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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.

SH(NA)-080979ENG-B(1410)MEE

MODEL: AJ65SBT2B64AD-U-SY-E

MODEL CODE: 13JZ57

MITSUBISHI ELECTRIC CORPORATION

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.