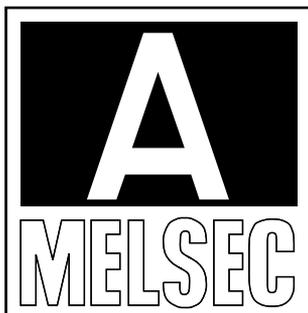
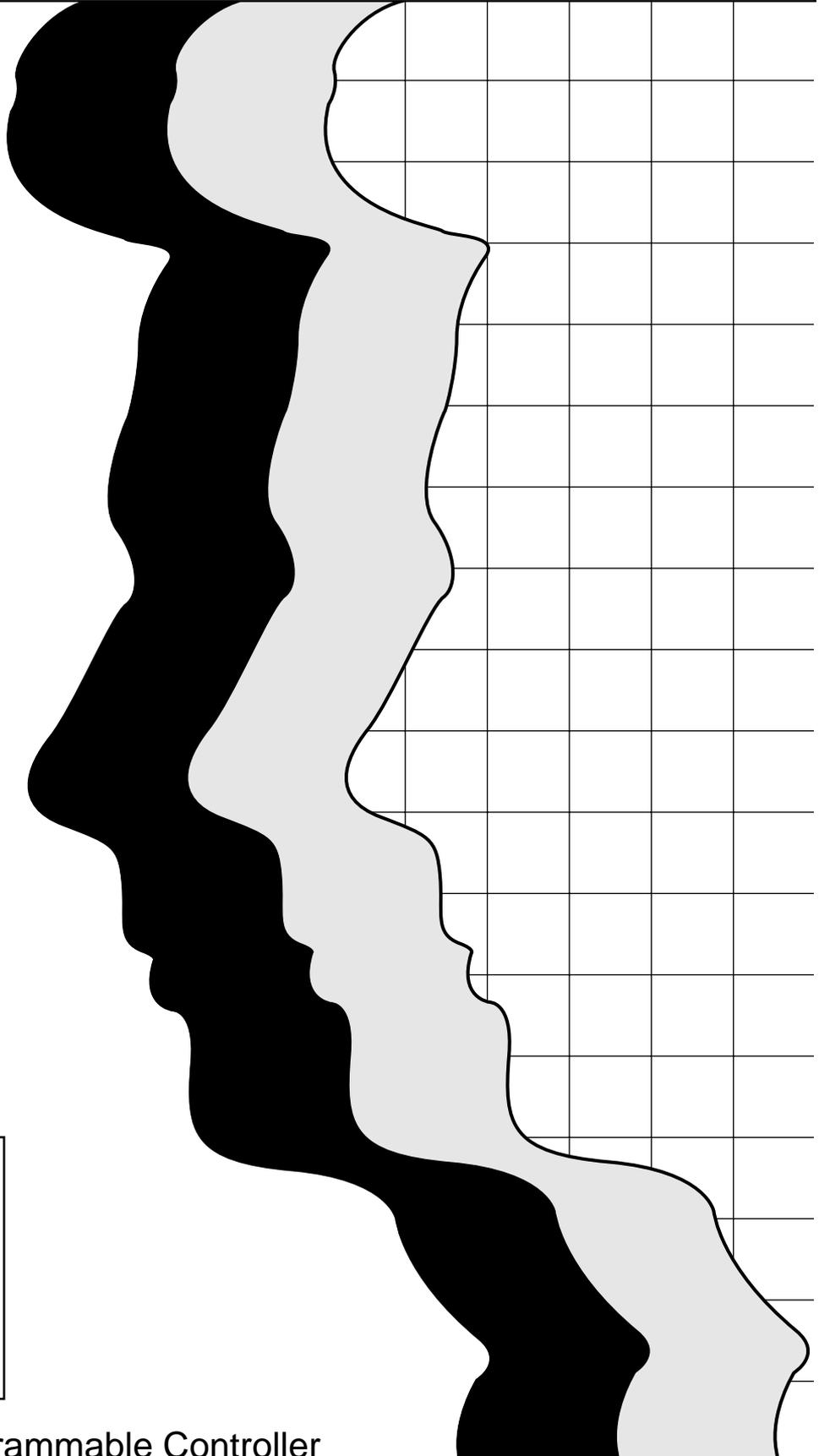


MITSUBISHI

Analog-Digital Converter Module type AJ65VBTCU-68ADV/ADI

User's Manual



Mitsubishi Programmable Controller

• SAFETY PRECAUTIONS •

(Always read these precautions before using this equipment.)

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

The precautions given in this manual are concerned with this product. Refer to the user's manual of the CPU module to use for a description of the PLC system safety precautions.

In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".



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



Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Note that the  CAUTION level may lead to a serious consequence according to the circumstances. Always follow the precautions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[Design Precautions]

DANGER

- When there are communication problems with the data link, the data for the master module will be held.
Configure an interlocking circuit in a sequence program so that the safety of the overall system is always maintained.

CAUTION

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

[Installation Precautions]

CAUTION

- Use the PLC in the environment that meets the general specifications contained in this Manual. Using the PLC outside the range of the general specifications may result in electric shock, fire or malfunction, or may damage or degrade the module.
- Securely fix the module to a DIN rail or securely fix it with the CC-Link connector type metal installation fitting.
Not doing so can cause a drop or malfunction.
- Do not touch the conducted area or electric parts of the module.
Doing so may cause module malfunctioning or breakdowns.

[Wiring Precautions]

CAUTION

- Always switch power off externally in all phases before starting installation, wiring and other works.
Not doing so can cause the product to be damaged or malfunction.
- Always ground the FG pin and FG1 pin to the protective ground conductor.
Not doing so can cause a malfunction.
- Wire the module correctly after confirming the rated voltage and pin layout of the product.
Not doing so can cause a fire or failure.
- Ensure that no foreign matter such as chips and wire-offcuts enter the module.
Foreign matter can cause a fire, failure or malfunction.
- Do not insert the one-touch connector plug for I/O of the one-touch connector type/connector type compact remote I/O unit into the one-touch connector for analog I/O accidentally.
Doing so can cause the module to be damaged.
- Always fit a non-wired, one-touch connector plug to the open one-touch connector for power supply/FG.
Not doing so can cause a failure or malfunction.
- When connecting the communication and power supply cables to the module, always run them in conduits or clamp them.
Not doing so can damage the module and cables due to loose, moved or accidentally pulled cables or can cause a malfunction due to a cable connection fault.
- When disconnecting the communication and power supply cables from the module, do not hold and pull the cable part.
Disconnect the cables after loosening the screws in the portions connected to the module.
Pulling the cables connected to the module can damage the module and cables or can cause a malfunction due to a cable connection fault.

[Starting and Maintenance Precautions]

CAUTION

- Do not touch the pin while the power is on. Doing so may cause malfunction.
- Always start cleaning after switching power off externally in all phases.
Not doing so can cause the module to fail or malfunction.
- Never disassemble or modify the module.
This may cause breakdowns, malfunctioning, injury and/or fire.
- Do not drop the module or give it hard impact since its case is made of resin. Doing so can damage the module.
- Mount or dismount the module to or from an enclosure after switching power off externally in all phases.
Not doing so can cause the module to fail or malfunction.

[Disposal Precautions]

CAUTION

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

INTRODUCTION

Thank you for choosing a Mitsubishi MELSEC-A Series General Purpose Programmable Controller. Before using your new PLC, please read this manual thoroughly to gain an understanding of its functions so you can use it properly.

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About Manuals

The following manuals are also related to this product.

In necessary, order them by quoting the details in the tables below.

Related Manuals

Manual Name	Manual Number (Model Code)
Control & Communication System Master/Local Module User's Manual type AJ61BT11/A1SJ61BT11 Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the AJ61BT11 and A1SJ61BT11. (Optionally available)	IB-66721 (13J872)
Control & Communication System Master/Local Module User's Manual type AJ61QBT11/A1SJ61QBT11 Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the AJ61QBT11 and A1SJ61QBT11. (Optionally available)	IB-66722 (13J873)
Control & Communication System Master/Local Module User's Manual type QJ61BT11 Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the QJ61BT11. (Optionally available)	SH-080016 (13JL91)
Programming Manual type AnSHCPU/AnACPU/AnUCPU/QCPU-A (A Mode) (Dedicated Instructions) Explains the instructions extended for the AnSHCPU/AnACPU/AnUCPU/QCPU-A (A Mode). (Optionally available)	IB-66251 (13J742)

Conformation to the EMC Directive and Low Voltage Instruction

When complying with EMC Directives and Low-Voltage Directives by assembling a Mitsubishi PLC compatible with EMC Directive and Low-Voltage Directives into the user product, refer to Chapter 3 "EMC Directives and Low-Voltage Directives" in the User's Manual (Hardware) for the CPU module being used.

The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction.

To conform this product to the EMC Directive and Low Voltage Directive, refer to the Section of "CC-Link Modules" in Chapter 3 "EMC Directive and Low Voltage Directive" of the User's Manual (Hardware) of the CPU module used.

About the Generic Terms and Abbreviations

Unless otherwise specified, the following generic terms and abbreviations are used in this manual to describe Type AJ65VBTCU-68ADV/ADI analog-digital converter module.

Generic Term/Abbreviation	Description
GX Developer	Generic product name of the product types SWnD5C-GPPW-E, SWnD5C-GPPW-EA, SWnD5C-GPPW-EV and SWnD5C-GPPW-EVA (n in the type indicates 4 or more.)
ACPU	Generic term for A0J2CPU, A0J2HCPU, A2CPU, A2CPU-S1, A3CPU, A1SCPU, A1SCPU-S1, A1SCPUC-24-R2, A1SHCPU, A1SJCPU, A1SJCPU-S3, A1SJHCPU, A1NCPUC, A2NCPUC, A2NCPUC-S1, A3NCPUC, A3MCPUC, A3HCPUC, A2SCPU, A2SCPU-S1, A2SHCPU, A2SHCPU-S1, A2ACPU, A2ACPU-S1, A3ACPU, A2UCPU, A2UCPU-S1, A2ASCPU, A2ASCPU-S1, A2ASCPU-S30, A2USHCPU-S1, A3UCPU, A4UCPU
QnACPU	Generic term for Q2ACPU, Q2ACPU-S1, Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASHCPU-S1, Q3ACPU, Q4ACPU, Q4ARCPU
QCPU (A mode)	Generic term for Q02CPU-A, Q02HCPU-A, Q06HCPU-A
QCPU (Q mode)	Generic term for Q00CPU, Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU
Master station	Station that controls the data link system. One master station is required for each system.
Local station	Station having a PLC CPU and the ability to communicate with the master and other local stations.
Remote I/O station	Remote station that handles bit unit data only. (Performs input and output with external devices.) (AJ65BTB1-16D, AJ65SBTB1-16D)
Remote device station	Remote station that handles bit unit and word unit data only. (Performs input and output with external devices, and analog data exchange.)
Remote station	Generic term for remote I/O station and remote device station. (Controlled by the master station)
Intelligent device station	Station that can perform transient transmission, such as the AJ65BT-R2 (including local stations).
Master module	Generic term for QJ61BT11, AJ61BT11, A1SJ61BT11, AJ61QBT11, and A1SJ61QBT11 when they are used as master stations.
SB	Link special relay (for CC-Link) Bit unit information that indicates the module operating status and data link status of the master station/local station. (Expressed as SB for convenience)
SW	Link special register (for CC-Link) 16 bit unit information that indicates the module operating status and data link status of the master station/local station. (Expressed as SW for convenience)
RX	Remote input (for CC-Link) Information entered in bit units from the remote station to the master station. (Expressed as RX for convenience)
RY	Remote output (for CC-Link) Information output in bit units from the master station to the remote station. (Expressed as RY for convenience)
RWw	Remote register (Write area for CC-Link) Information output in 16-bit units from the master station to the remote device station. (Expressed as RWw for convenience)
RWr	Remote register (Read area for CC-Link) Information entered in 16-bit units from the remote device station to the master station. (Expressed as RWr for convenience)

Product components

This product consists of the following.

Model name	Product Name	Quantity
AJ65VBTCU-68ADV	Type AJ65VBTCU-68ADV analog-digital converter module	1
	Type AJ65VBTCU-68ADV/ADI analog-digital converter module user's manual (hardware)	1
AJ65VBTCU-68ADI	Type AJ65VBTCU-68ADI analog-digital converter module	1
	Type AJ65VBTCU-68ADV/ADI analog-digital converter module user's manual (hardware)	1

1 OVERVIEW

1

This user's manual explains the specifications, handling, programming methods and others of Type AJ65VBTCU-68ADV analog-digital converter module (hereafter abbreviated to the "AJ65VBTCU-68ADV") and Type AJ65VBTCU-68ADI analog-digital converter module (hereafter abbreviated to the "AJ65VBTCU-68ADI") which is used as a remote device station of a Control & Communication Link (hereafter abbreviated to "CC-Link") system.

In this manual, the AJ65VBTCU-68ADV and AJ65VBTCU-68ADI are generically referred to as the AJ65VBTCU-68ADV/ADI.

The AJ65VBTCU-68ADV/ADI converts the analog signals (voltage or current input) from the PLC's external source to a 16-bit encoded binary data digital value.

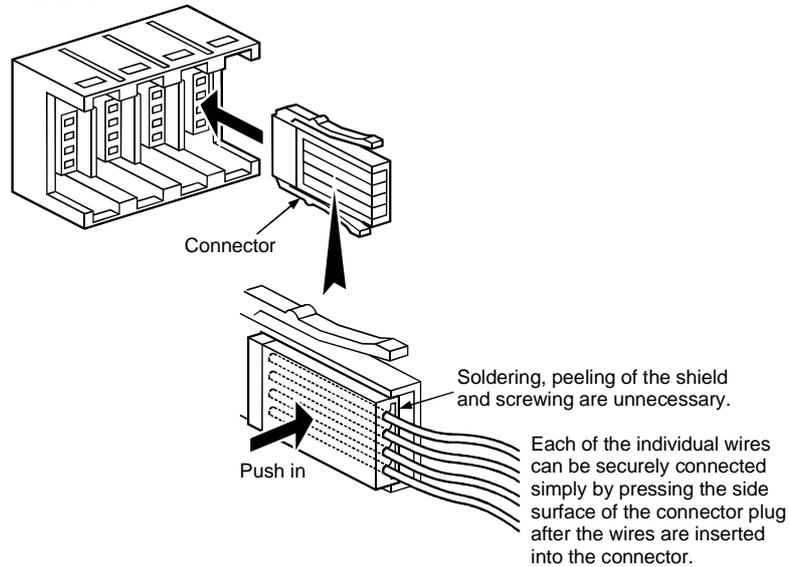
1.1 Features

This section gives the features of the AJ65VBTCU-68ADV/ADI.

- (1) **Selection of model according to application**
AJ65VBTCU-68ADV.....Voltage input on all eight channels.
AJ65VBTCU-68ADI.....Current input on all eight channels.
- (2) **High accuracy**
This module performs A/D conversion at the accuracy of $\pm 0.3\%$ relative to the maximum value of the digital output value at the operating ambient temperature of 0 to 55°C, or at $\pm 0.2\%$ relative to the maximum value of the digital output value at the operating ambient temperature of 25 \pm 5°C.
- (3) **Input range selectable per channel**
You can choose the analog input range per channel to change the I/O conversion characteristics.
- (4) **High resolution of 1/ \pm 4000**
By changing the input range, you can choose and set the digital value resolution to either 1/4000 or 1/ \pm 4000 (Only AJ65VBTCU-68ADV) to provide high-resolution digital values.
- (5) **Designation of sampling processing or average processing**
As a conversion method, you can specify sampling processing or average processing per channel.
- (6) **More channels than those of the conventional A/D converter modules**
The number of channels is twice greater than that of the conventional CC-Link A/D converter module (AJ65SBT-64AD).

(7) Sharply reducible wiring man-hours

Wiring man-hours can be reduced sharply by adopting individual wire insulation displacement termination type one-touch connectors (no need for soldering, shield peeling and screwing) to connect the communication and power supply cables.

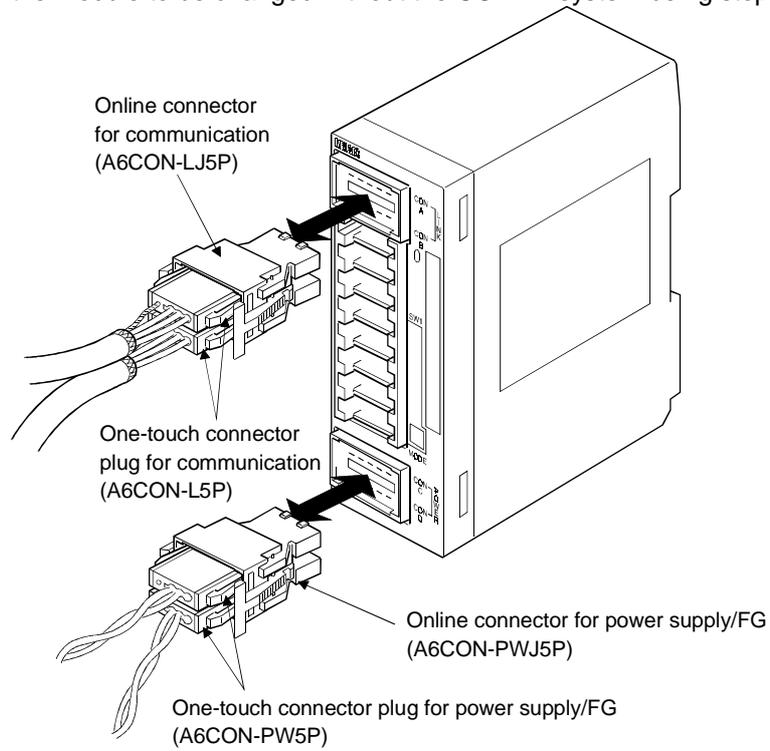


(8) Significant improvement of wiring performance

The above one-touch connectors for IN and OUT sides are plugged individually, greatly improving the performance of jumper wiring especially in an enclosure. (Mixed jumper wiring of the power supply cables with the I/O modules is not allowed.)

(9) Replacement of module without stopping CC-Link system

The use of the online connectors (for communication, for power supply) allows the module to be changed without the CC-Link system being stopped.

**(10) Improved wiring workability**

The connectors and setting switches are all front-mounted.

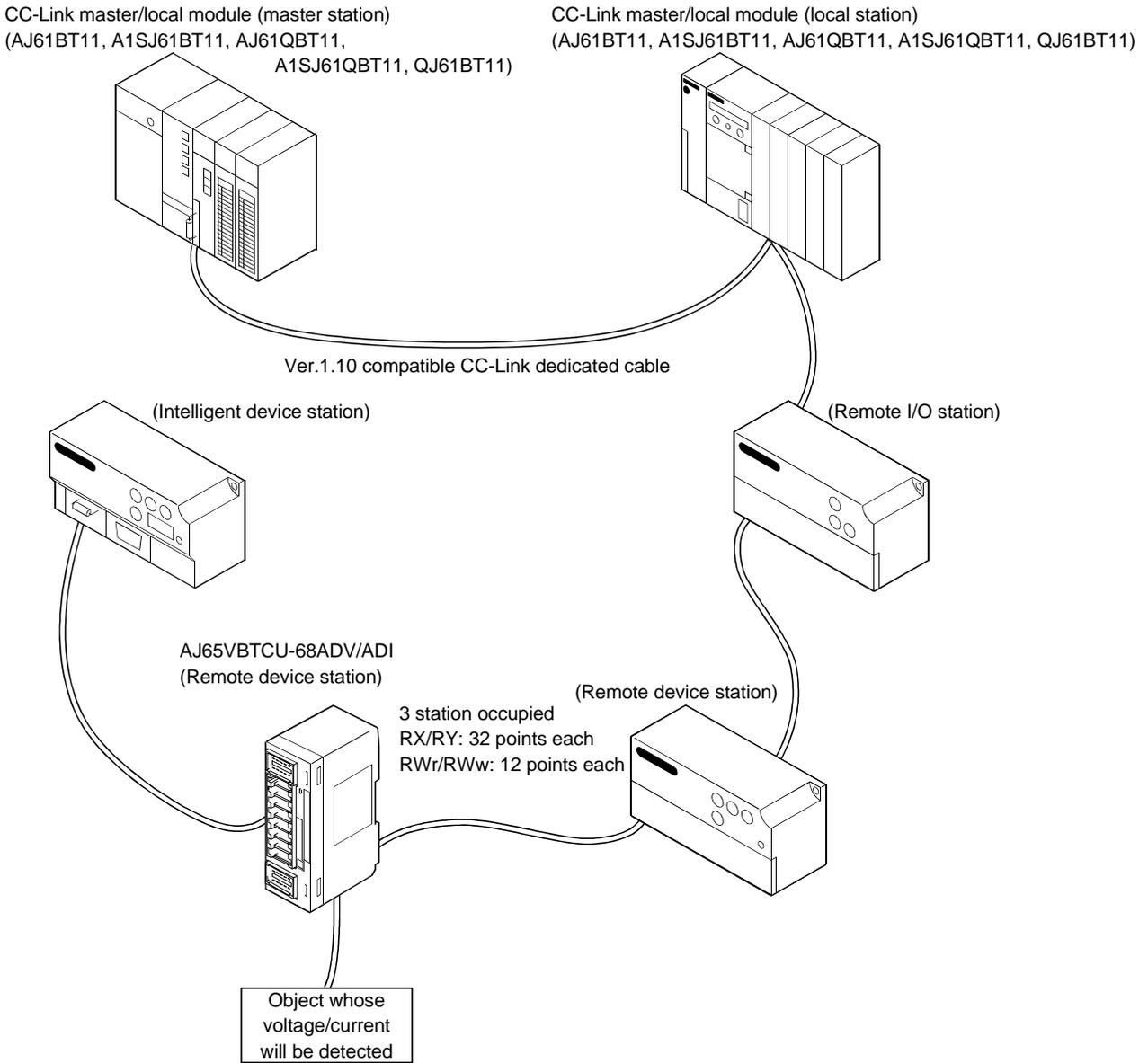
This enables connections to be made only by front wiring, improving wiring workability. It also allows setting to be made after installation to an enclosure.

2 SYSTEM CONFIGURATION

This chapter describes the system configuration for use of the AJ65VBTCU-68ADV/ADI.

2.1 Overall Configuration

The overall configuration for use of the AJ65VBTCU-68ADV/ADI is shown below.



2.2 Applicable System

This section explains the applicable system.

(1) Applicable master modules

The following master modules can be used with the AJ65VBTCU-68ADV/ADI.

- AJ61BT11
- A1SJ61BT11
- AJ61QBT11
- A1SJ61QBT11
- QJ61BT11

(2) Restrictions on use of CC-Link dedicated instructions (RLPA, RRPA)

The CC-Link dedicated instructions may not be used depending on the PLC CPU and master module used.

For details of the restrictions, refer to the A series master module user's manual, and the Programming Manual type AnSHCPU/AnACPU/AnUCPU/QCPU (A mode) (Dedicated Instructions).

This module does not allow the use of the dedicated instructions other than RLPA and RRPA.

Refer to Section 5.5 for a program example using the dedicated instructions (RLPA, RRPA).

2.3 Parts Sold Separately

The plugs for AJ65VBTCU-68ADV/ADI are sold separately.
Please purchase them as necessary.

	Mitsubishi model name	Part model name (manufacturer)	Specifications			Color of the cover
			Applicable cable core size (mm ²)	Applicable cable outer diameter (mm)	Maximum rated current (A)	
Plug for one-touch connector * 1, * 4	A6CON-P214	33104-6000FL (3M)	0.14 to 0.2 (AWG#26 to 24)	φ 1.0 to 1.4	2	Transparent
	A6CON-P220	33104-6100FL (3M)		φ 1.4 to 2.0		Yellow
	A6CON-P514	33104-6200FL (3M)	0.3 to 0.5 (AWG#22 to 20)	φ 1.0 to 1.4	3	Red
	A6CON-P520	33104-6300FL (3M)		φ 1.4 to 2.0		Blue
	One-touch connector plug for communication * 2, * 4	A6CON-L5P	35505-6000-BOM GF (3M)	communication line 0.5 (AWG#20)	φ 2.2 to 3.0	
shielded cable (drain wire) 0.5 (AWG#20)						
One-touch connector for power supply/FG * 2, * 4	A6CON-PW5P	35505-6080-A00 GF (3M)	0.75 (0.66 to 0.98) (AWG#18) wire diameter 0.16 mm or more	φ 2.2 to 3.0	7	Gray
Online connector for communication * 3	A6CON-LJ5P	35720-L200-B00 AK (3M)	—	—	—	—
Online connector for power supply/FG * 3	A6CON-PWJ5P	35720-L200-A00 AK (3M)	—	—	—	—
One-touch connector plug with terminating resistor (including 1)	A6CON-TR11	—	One-touch connector plug with terminating resistor attached for communication (110Ω)	—	—	—

*1 Mitsubishi's A6CON-P□□□ includes 20 plugs.

*2 Mitsubishi's A6CON-□5P includes 10 plugs.

*3 Mitsubishi's A6CON-□J5P includes 5 plugs.

*4 Once insulation-displaced, the one-touch connector plugs cannot be reused.

REMARK

The following table indicates the connectors of this module with which the above plugs/connectors are compatible.

Connector of This Module	Compatible Optional Parts
One-touch connector for communication	<ul style="list-style-type: none">• One-touch connector plug for communication• Online connector for communication• One-touch connector plug with terminating resistor
One-touch connector for power supply/FG	<ul style="list-style-type: none">• One-touch connector plug for power supply/FG• Online connector for power supply/FG
One-touch connector for analog I/O	<ul style="list-style-type: none">• Plug for one-touch connector

3 SPECIFICATION

This chapter provides the specifications of the AJ65VBTCU-68ADV/ADI.

3.1 General Specification

Table 3.1 indicates the general specifications of the AJ65VBTCU-68ADV/ADI.

Table 3.1 General specification

Item	Specification					
Usage ambient temperature	0 to 55°C					
Storage ambient temperature	-20 to 75°C					
Usage ambient humidity	10 to 90%RH, no condensation					
Storage ambient humidity	10 to 90%RH, no condensation					
Vibration durability	Conforming to JIS B 3501, IEC 61131-2	When there is intermittent vibration				
		Frequency	Acceleration	Amplitude	Sweep count	
		10 to 57Hz	—	0.075mm (0.0030inch)	10 times in each direction X, Y, Z (80 minutes)	
		57 to 150Hz	9.8m/s ²	—		
		When there is continuous vibration				
		Frequency	Acceleration	Amplitude		
		10 to 57Hz	—	0.035mm (0.0013inch)		
57 to 150Hz	4.9m/s ²	—				
Shock durability	Conforming to JIS B 3501, IEC61131-2 (147m/s ² , 3 times each in 3 directions)					
Usage environment	No corrosive gas					
Usage height	Less than 2000 m (less than 6562 ft.)					
Installation area	Within the control board					
Over-voltage category *1	Less than II					
Pollution level *2	Less than 2					

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

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

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

A temporary conductivity caused by condensation must be expected occasionally.

3.2 Performance Specification

Table 3.2 indicates the performance specifications of the AJ65VBTCU-68ADV/ADI.

Table 3.2 Performance specification

Item		AJ65VBTCU-68ADV	AJ65VBTCU-68ADI				
Protection class		IP1XB					
Analog input	Voltage	DC -10 to 0 to +10V (input resistance 1MΩ)	—				
	Current	—	DC 0 to 20mA (input resistance 250Ω)				
Digital output		16-bit signed binary (-4096 to +4095)	16-bit signed binary (-96 to +4095)				
I/O characteristics, maximum resolution, accuracy (accuracy relative to maximum value of digital output value)		Accuracy					
			Analog input range	Digital output	Ambient temperature 0 to 55°C	Ambient temperature 25±5°C	Max. Resolution
		AJ65VBTCU-68ADV (Voltage)	-10 to +10V	-4000 to +4000	±0.3% (±12 digit *)	±0.2% (±8 digit *)	2.5mV
			User range setting 1 (-10 to +10V)				
			0 to 5V	0 to 4000			
		1 to 5V	1.0mV				
		AJ65VBTCU-68ADI (Current)	User range setting 2 (0 to 5V)	0 to 4000			±0.3% (±12 digit *)
0 to 20mA							
4 to 20mA	4μA						
		*: digit indicates digital value.					
Maximum conversion speed		1ms/1 channel					
Absolute maximum input		Voltage ±15 V	current ±30mA				
Analog input points		8 channels/1 module					
CC-Link station type		Remote device station					
Number of occupied stations		3 station (RX/Ry: each 32 points, RWr/RWw: each 12 points)					
Communication cable		Ver. 1.10 compatible CC-Link dedicated cable: FANC-110SBH, FA-CBL200PSBH, CS-110					
Dielectric withstand voltage		Between power supply/communication system batch and analog input batch: 500VAC, 1 minute					
Insulation method		Across communication system terminals and all analog input terminals: Photocoupler isolated Across power supply system terminals and all analog input terminals: Photocoupler isolated Across channels: Non-isolated					
Noise durability		By noise simulator of 500Vp-p noise voltage, 1μs noise width and 25 to 60Hz noise frequency					
External wiring system		One-touch connector for communication [Transmission circuit] (5 pins pressure welding type, the plug for the connector is sold separately) One-touch connector for power supply and FG [Unit power supply and FG] (5 pins pressure welding type, the plug for the connector is sold separately) One-touch connector for analog I/O (4 pins pressure welding type, the plug for the connector is sold separately) <Sold separately> Online connector for communication : A6CON-LJ5P Online connector for power supply : A6CON-PWJ5P					
Applicable wire size	One-touch connector for communication	Communication line : Ver. 1.10 compatible CC-Link dedicated cable 0.5mm ² (AWG#20) [φ2.2 to 3.0], shielded wire 0.5mm ² (AWG#20)					
	One-touch connector for power supply/FG	0.66 to 0.98 mm ² (AWG#18) [φ2.2 to 3.0] Wire diameter 0.08 mm ² or more					
	One-touch connector for analog I/O	φ1.0 to 1.4 (A6CON-P214), φ1.4 to 2.0 (A6CON-P220) [Applicable cable size : 0.14 to 0.2 mm ²] φ1.0 to 1.4 (A6CON-P514), φ1.4 to 2.0 (A6CON-P520) [Applicable cable size: 0.3 to 0.5 mm ²]					
Applicable DIN rail		TH35-7.5Fe, TH35-7.5Al (conforming to JIS C 2812)					
		CC-Link connector type metal installation fitting: A6PLT-J65V1					
External power supply		DC24V (DC20.4V to DC26.4V, ripple factor within 5%) Inrush current : 4.2A, within 1.2ms Current consumption 0.10A					
Weight		0.17kg					

3

3.3 I/O Conversion Characteristics

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

The offset value is an analog input value (voltage or current) at which the digital output value is 0.

The gain value is an analog input value (voltage or current) at which the digital output value is 4000.

3.3.1 Voltage input characteristics of the AJ68VBTCU-68ADV

The voltage input characteristic graph of the AJ65VBTCU-68ADV is shown below.

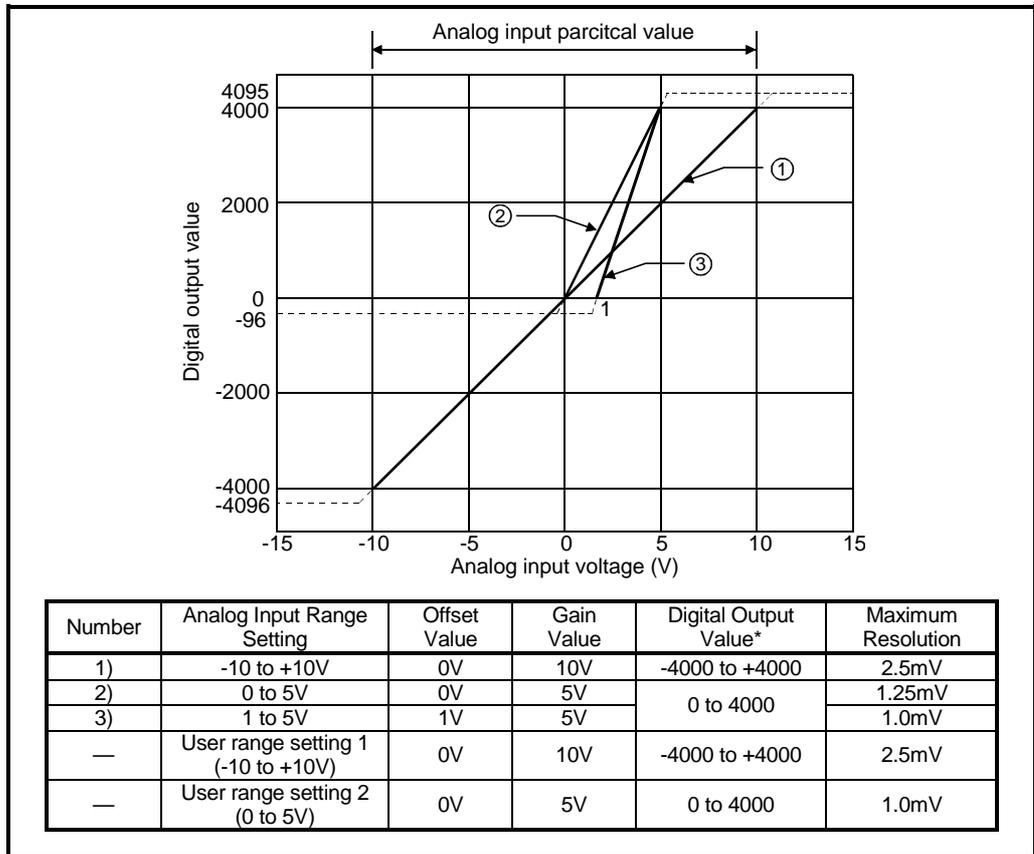


Fig. 3.1 Voltage Input Characteristic of the AJ65VBTCU-68ADV

POINT
(1) Do not input more than ±15V. The element may be damaged.
(2) If the analog input provided corresponds to the digital output value* beyond its range, the digital output value is fixed to the maximum or minimum. <ul style="list-style-type: none"> • For 0 to 4000, the digital output value is within the range -96 to 4095. • For -4000 to +4000, the digital output value is within the range -4096 to +4095.
(3) Within the analog input and digital output scopes of each input range, the maximum resolution and accuracy are within the performance specification range. Outside those scopes, however, they may not fall within the performance specification range. (Avoid using the dotted line part in Fig. 3.1.)
(4) Set the offset and gain values of the user range setting within the range satisfying the following conditions. <ul style="list-style-type: none"> (a) Setting range when user range setting 1 is selected: -10 to +10V (b) Setting range when user range setting 2 is selected: 0 to 5V (c) (Gain value) > (Offset value) <p>If you attempt to make setting outside the setting range of (a) or (b), the "RUN" LED flickers at 0.5s intervals. Set the values within the setting range.</p> <p>If you attempt to make setting outside the setting range of (c), the "RUN" LED flickers at 0.5s intervals. Make setting again.</p>

3.3.2 Current input characteristics of the AJ65VBTCU-68ADI

The current input characteristic graph of the AJ65VBTCU-68ADI is shown below.

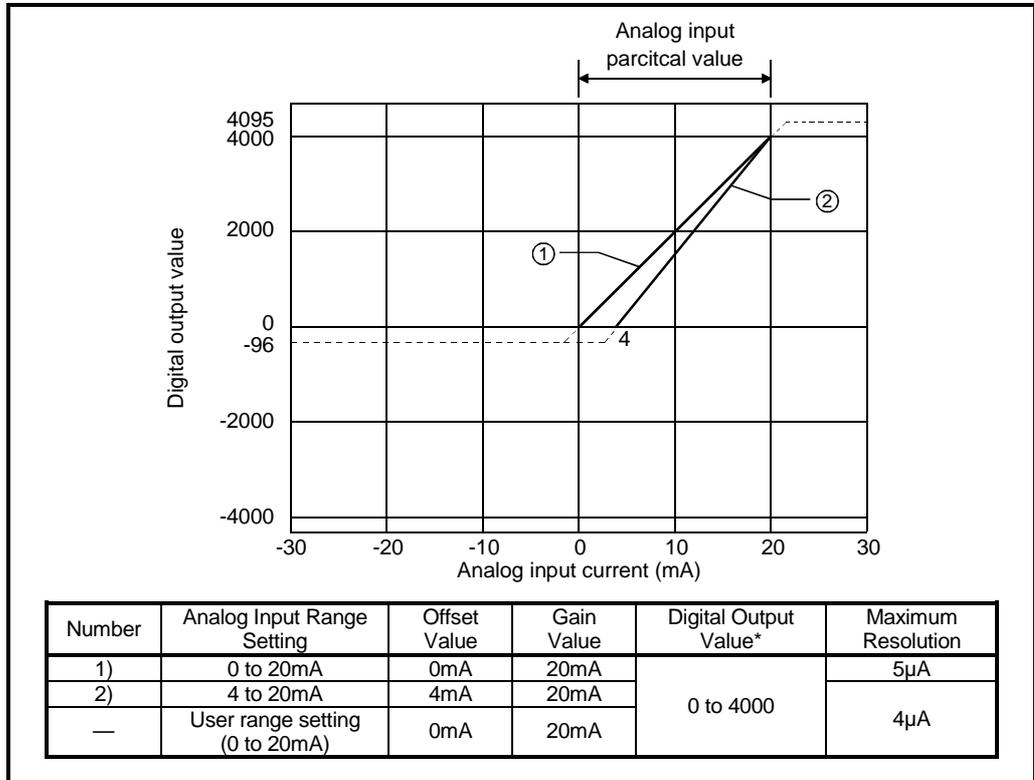


Fig. 3.2 Current Input Characteristic of the AJ65VBTCU-68ADI

POINT
<p>(1) Do not input more than ±30mA. A breakdown may result due to heat increase.</p> <p>(2) If the analog input provided corresponds to the digital output value* beyond its range, the digital output value is fixed to the maximum or minimum. • For 0 to 4000, the digital output value is within the range -96 to 4095.</p> <p>(3) Within the analog input and digital output scopes of each input range, the maximum resolution and accuracy are within the performance specification range. Outside those scopes, however, they may not fall within the performance specification range. (Avoid using the dotted line part in Fig. 3.2.)</p> <p>(4) Set the offset and gain values of the user range setting within the range satisfying the following conditions. (a) Setting range when user range setting is selected: 0 to 20mA (b) (Gain value) > (Offset value)</p> <p>If you attempt to make setting outside the setting range of (a), the "RUN" LED flickers at 0.5s intervals. Set the values within the setting range.</p> <p>If you attempt to make setting outside the setting range of (b), the "RUN" LED flickers at 0.5s intervals. Make setting again.</p>

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

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

(1) Resolution

The resolution is obtained by the following formula:

(a) For the AJ65VBTCU-68ADV:

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

(b) For the AJ65VBTCU-68ADI:

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

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

The maximum resolution of the AJ65VBTCU-68ADV/ADI is as indicated in the performance specification.

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

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

3.3.4 Accuracy

Accuracy is relative to the maximum value of the digital output value.

If you change the offset/gain setting or input range to change the input characteristic, accuracy does not change and is held within the range indicated in the performance specifications.

Accuracy is within ±0.2% (±8 digit) at the operating ambient temperature of 25±5°C or within ±0.3% (±12 digit) at the operating ambient temperature of 0 to 55°C.

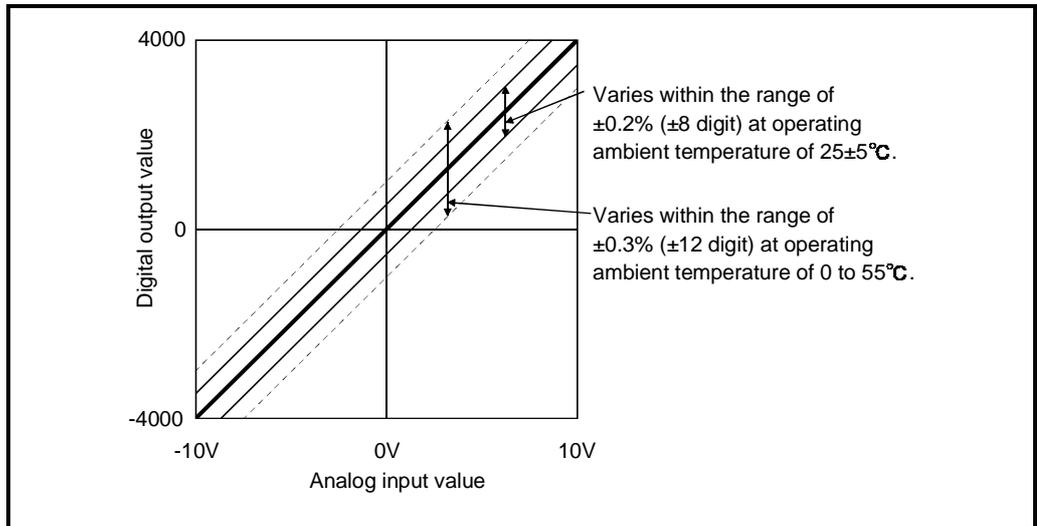


Fig. 3.3 Accuracy of AJ65VBTCU-68DAV

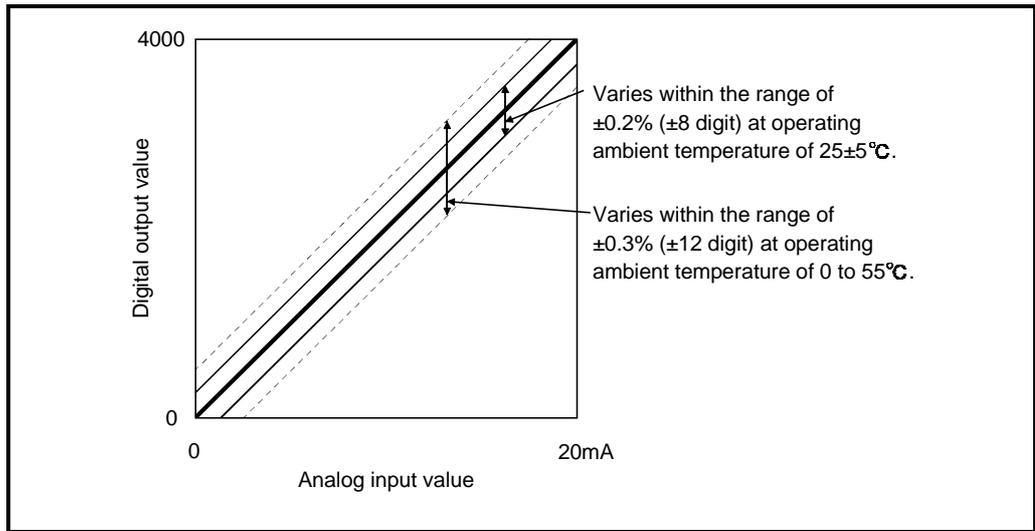


Fig. 3.4 Accuracy of AJ65VBTCU-68DAI

3.3.5 Conversion speed

Conversion speed indicates time from channel changing to A/D conversion completion. Conversion speed per channel of the AJ65VBTCU-68ADV/ADI is 1ms. Due to the data link processing time of the CC-Link system, there is a transmission delay until the A/D conversion value is read actually. For the data link processing time, refer to the user's manual of the master module used.

Example) Data link processing time taken in the asynchronous mode when the master module is the QJ61BT11 (normal value)

[Calculation expression]

$SM + LS \times 1 + \text{remote device station processing time}$

SM : Scan time of master station sequence program

LS : Link scan time

Remote device station processing time: $(\text{Number of channels used} + 1 \times *)$

$\times 1\text{ms}$

*: Internal processing time of AJ65VBTCU-68ADV/ADI

3.4 Function List

The AJ65VBTCU-68ADV/ADI function list is shown in table 3.3.

Table 3.3 AJ65VBTCU-68ADV/ADI function list

Item	Description	Refer to																					
Sampling processing	Perform A/D conversion of an analog input value one by one and store the result into the remote register each time.	Section 3.4.1 Section 3.6.4																					
Average processing	Perform A/D conversion by the preset number of times or for a preset time on the channel specified for average processing, and store the result into the remote register.	Section 3.4.2 Section 3.6.4																					
A/D conversion enable/prohibit specification	Specify whether A/D conversion is enabled or disabled per channel. By prohibiting the conversion for the channels which are not used, the sampling time can be shortened.	Section 3.6.2																					
Input range changing function	<p>Can set the analog input range per channel to change the I/O conversion characteristics.</p> <p>Select the input range setting from among the following 8 types.</p> <table border="1" data-bbox="454 855 1198 1263"> <thead> <tr> <th data-bbox="454 855 683 887"></th> <th data-bbox="683 855 1043 887">Input Range</th> <th data-bbox="1043 855 1198 887">Set Value</th> </tr> </thead> <tbody> <tr> <td data-bbox="454 887 683 918" rowspan="5">AJ65VBTCU-68ADV</td> <td data-bbox="683 887 1043 918">-10 to +10V</td> <td data-bbox="1043 887 1198 918">0H</td> </tr> <tr> <td data-bbox="683 918 1043 949">0 to 5V</td> <td data-bbox="1043 918 1198 949">1H</td> </tr> <tr> <td data-bbox="683 949 1043 981">1 to 5V</td> <td data-bbox="1043 949 1198 981">2H</td> </tr> <tr> <td data-bbox="683 981 1043 1055">User range setting 1 (-10 to +10V)</td> <td data-bbox="1043 981 1198 1055">3H</td> </tr> <tr> <td data-bbox="683 1055 1043 1128">User range setting 2 (0 to 5V)</td> <td data-bbox="1043 1055 1198 1128">4H</td> </tr> <tr> <td data-bbox="454 1128 683 1160" rowspan="3">AJ65VBTCU-68ADI</td> <td data-bbox="683 1128 1043 1160">4 to 20mA</td> <td data-bbox="1043 1128 1198 1160">0H</td> </tr> <tr> <td data-bbox="683 1160 1043 1191">0 to 20mA</td> <td data-bbox="1043 1160 1198 1191">1H</td> </tr> <tr> <td data-bbox="683 1191 1043 1263">User range setting (0 to 20mA)</td> <td data-bbox="1043 1191 1198 1263">2H</td> </tr> </tbody> </table>		Input Range	Set Value	AJ65VBTCU-68ADV	-10 to +10V	0H	0 to 5V	1H	1 to 5V	2H	User range setting 1 (-10 to +10V)	3H	User range setting 2 (0 to 5V)	4H	AJ65VBTCU-68ADI	4 to 20mA	0H	0 to 20mA	1H	User range setting (0 to 20mA)	2H	Section 3.6.3
	Input Range	Set Value																					
AJ65VBTCU-68ADV	-10 to +10V	0H																					
	0 to 5V	1H																					
	1 to 5V	2H																					
	User range setting 1 (-10 to +10V)	3H																					
	User range setting 2 (0 to 5V)	4H																					
AJ65VBTCU-68ADI	4 to 20mA	0H																					
	0 to 20mA	1H																					
	User range setting (0 to 20mA)	2H																					
Offset/gain setting	The offset/gain setting can be performed volumeless for each channel, and the I/O conversion characteristics can be changed.	Section 4.4																					

3.4.1 Sampling processing

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

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

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

[Example] When three channels, channels 1, 2, and 3 are enabled for conversion:
 $3 \times 1 = 3 \text{ (ms)}$

3.4.2 Average processing

The AJ65VBTCU-68ADV/ADI performs A/D conversion to the channel(s) for the average processing specified by the PC CPU for the set number of times or for the set time. The average is then obtained from the total value excluding the maximum and minimum values, and stored in the remote register. When the number of processing is two times or less, the sampling processing is performed.

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

(1) When the average processing specification is made for time

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

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

[Example] When the number of A/D conversion enabled channels is two, and the set time is 1000 ms:
 $1000 / (2 \times 1) = 500 \text{ times}$

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

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

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

[Example] When two channels, channels 1 and 3 are A/D conversion enabled, and the set number of times is 500:
 $500 \times 2 \times 1 = 1000 \text{ (ms)}$

3.5 Remote I/O Signals

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

3.5.1 Remote I/O signal list

Remote inputs (RX) mean the input signals from the AJ65VBTCU-68ADV/ADI to the master module, and remote outputs (RY) mean the output signals from the master module to the AJ65VBTCU-68ADV/ADI.

In communications with the master station, the AJ65VBTCU-68ADV/ADI uses 32 points of the remote inputs (RX) and 32 points of the remote outputs (RY).

This module occupies three stations but do not use the latter 64 points.

Table 3.4 indicates the assignment and names of the remote I/O signals.

Table 3.4 Remote I/O Signals List

Signal direction: AJ65VBTCU-68ADV/ADI → Master Module		Signal direction: Master Module → AJ65VBTCU-68ADV/ADI			
Remote input (RX)	Signal name	Remote output (RY)	Signal name		
RXn0	CH.1 A/D conversion completion flag	RYn0 to RY(n+1)7	Reserved		
RXn1	CH.2 A/D conversion completion flag				
RXn2	CH.3 A/D conversion completion flag				
RXn3	CH.4 A/D conversion completion flag				
RXn4	CH.5 A/D conversion completion flag				
RXn5	CH.6 A/D conversion completion flag				
RXn6	CH.7 A/D conversion completion flag				
RXn7	CH.8 A/D conversion completion flag				
RXn8 to RXnB	Reserved				
RXnC	E ² PROM write error flag				
RXnD to RX(n+1)7	Reserved				
RX(n+1)8	Initial data processing request flag			RY(n+1)8	Initial data processing completion flag
RX(n+1)9	Initial data setting completion flag			RY(n+1)9	Initial data setting request flag
RX(n+1)A	Error status flag	RY(n+1)A	Error reset request flag		
RX(n+1)B	Remote READY	RY(n+1)8 to RY(n+1)F	Reserved		
RX(n+1)C to RX(n+1)F	Reserved				

POINT

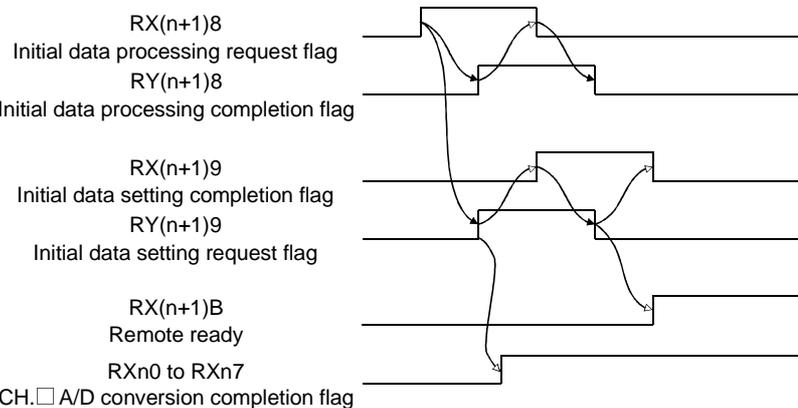
The reserved devices given in Table 3.4 are used by the system and cannot be used by the user.

If the user has used (turned on/off) any of them, we cannot guarantee the functions of the AJ65VBTCU-68ADV/ADI.

3.5.2 Functions of the remote I/O signals

Table 3.5 explains the functions of the remote I/O signals of the AJ65VBTCU-68ADV/ADI.

Table 3.5 Remote I/O Signal Details (1/2)

Device No.	Signal Name	Description
RXn0 to RXn7	CH.□ A/D Conversion completion flag	<p>The A/D conversion completion flag turns on at completion of the A/D conversion of the corresponding channel when the initial data setting request flag (RY(n+1)9) turns from off to on after power-on.</p> <p>The A/D conversion completion flag processing is processed only once when the A/D conversion enable/prohibit specification is changed.</p> <ul style="list-style-type: none"> When changing the A/D conversion from prohibit to enable: <ul style="list-style-type: none"> When the average processing is specified, the flag turns on after completing the average processing of the number of times or time, and storing the A/D conversion digital value in the remote register. When changing the A/D conversion from enable to prohibit: <ul style="list-style-type: none"> The corresponding channel's A/D conversion completion flag turns off.
RXnC	E ² PROM write error flag	<p>Turns on if the number of E²PROM write times exceeds its limit (100,000 times per channel). If this flag has turned on, this module itself has failed (hardware fault) and therefore this flag cannot be reset (turned off) by the error reset request flag.</p> <p>At occurrence of this error, power on the AJ65VBTCU-68ADV/ADI again. If this flag turns on after the power is switched on again, it is a hardware fault. Contact your nearest Mitsubishi representative.</p>
RX(n+1)8	Initial data processing request flag	<p>After power-on, the initial data processing request flag is turned on by the AJ65VBTCU-68ADV/ADI to request the initial data to be set.</p> <p>Also, after the initial data processing is complete (initial data processing completion flag RY(n+1)8 ON), the flag is turned off.</p>  <p> 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)B Remote ready RXn0 to RXn7 CH.□ A/D conversion completion flag </p> <p> ← : Performed by sequence ladder ◀ : Performed by AJ65VBTCU-68ADV/ADI </p>
RX(n+1)9	Initial data setting completion flag	<p>When the initial data setting request (RY(n+1)9 ON) is made, the flag turns on after the initial data setting completion is done.</p> <p>Also, after the initial data setting is complete, the initial data setting completion flag turns off when the initial data setting request flag turns off.</p>

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

Table 3.5 Remote I/O Signal Details (2/2)

Device No.	Signal Name	Description
RX(n+1)A	Error status flag	<p>Turns on at occurrence of an input range setting error, average time/number of times setting error or E²PROM write error (RXnC). Does not turn on at occurrence of the watchdog timer error. ("RUN" LED goes off.)</p> <p> RX(n+1)A Error status flag RY(n+1)A Error reset request flag RWrn+8 Error code </p> <p> ← : Performed by sequence ladder - - - : Performed by AJ65VBTCU-68ADV/ADI </p>
RX(n+1)B	Remote READY	<p>Turns on when initial data setting is completed after power-on or at termination of the test mode. (Used for interlocking read/write from/to the master module.)</p>
RY(n+1)8	Initial data processing completion flag	Turns on after initial data processing completion when initial data processing is requested after power-on or test mode operation.
RY(n+1)9	Initial data setting request flag	Turns on at the time of initial data setting or changing.
RY(n+1)A	Error reset request flag	When this flag turns on, the error status flag (RX(n+1)A) is reset, but the E ² PROM write error flag (RXnC) cannot be reset and therefore the error status flag remains on.

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

3.6 Remote Register

The AJ65VBTCU-68ADV/ADI has a remote register for data communication with the master module. The remote register allocation and data structures are described.

3.6.1 Remote register allocation

The remote register allocation is shown in Table 3.6.

Table 3.6 Remote register allocation

Communication direction	Address	Description	Default value	Reference section
Master → Remote	RWwm	A/D conversion enable/prohibit specification	0	Section 3.6.2
	RWwm+1	CH.1 to 4 input range setting	0	Section 3.6.3
	RWwm+2	CH.5 to 8 input range setting	0	
	RWwm+3	Average processing specification	0	Section 3.6.4
	RWwm+4	CH.1 average time, number of times setting	0	Section 3.6.5
	RWwm+5	CH.2 average time, number of times setting	0	
	RWwm+6	CH.3 average time, number of times setting	0	
	RWwm+7	CH.4 average time, number of times setting	0	
	RWwm+8	CH.5 average time, number of times setting	0	
	RWwm+9	CH.6 average time, number of times setting	0	
	RWwm+A	CH.7 average time, number of times setting	0	
	RWwm+B	CH.8 average time, number of times setting	0	
Remote → Master	RWrn	CH.1 digital output value	0	Section 3.6.6
	RWrn+1	CH.2 digital output value	0	
	RWrn+2	CH.3 digital output value	0	
	RWrn+3	CH.4 digital output value	0	
	RWrn+4	CH.5 digital output value	0	
	RWrn+5	CH.6 digital output value	0	
	RWrn+6	CH.7 digital output value	0	
	RWrn+7	CH.8 digital output value	0	
	RWrn+8	Error code	0	Section 3.6.7
RWrn+9 to RWrn+B	Reserved	0	—	

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

POINT

Do not read or write data from or to the reserved area of the remote register. If data is read or written, we cannot guarantee the functions of the AJ65VBTCU-68ADV/ADI.

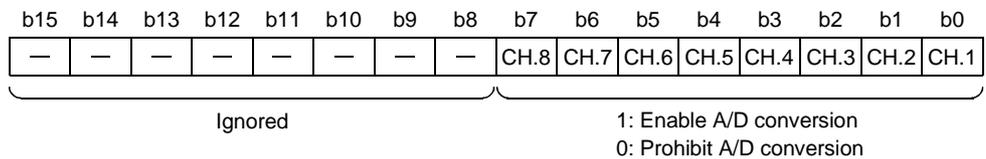
3.6.2 A/D conversion enable/prohibit specification (Address RWwm)

- (1) Set whether A/D conversion is enabled or disabled per channel.
- (2) By setting the unused channels to conversion prohibit, the sampling cycle can be shortened.

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

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

- (3) Operation is performed according to the setting made for the leading edges of initial data setting request flag (RY(n+1)9).
- (4) The default setting is A/D conversion disable for all channels.



- (5) AJ65VBTCU-68ADV//ADI processing when conversion is enabled/prohibited
 - (a) Average processing initialization

The data in the work area stored by the AJ65VBTCU-68ADV//ADI system to perform the average processing is initialized.

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

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

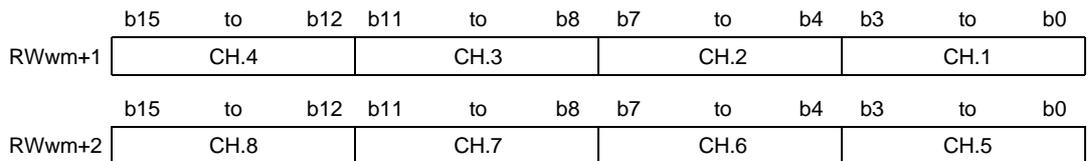
 - When changed the A/D conversion from prohibit to enabled:

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

The A/D conversion completion flag for the corresponding channel is turned off.

3.6.3 CH. \square input range setting (Address RWwm+1, RWwm+2)

- (1) Set the analog input range per channel.
- (2) Operation is performed according to the setting made for the leading edges of the initial data setting request flag (RY(n+1)9).
- (3) The default is as follows.
 AJ65VBTCU-68ADV : -10 to +10V
 AJ65VBTCU-68ADI : 4 to 20mA



	Input Range	Set Value
AJ65VBTCU-68ADV	-10 to +10V	0H
	0 to 5V	1H
	1 to 5V	2H
	User range setting 1 (-10 to +10V)	3H
	User range setting 2 (0 to 5V)	4H
AJ65VBTCU-68ADI	4to 20mA	0H
	0 to 20mA	1H
	User range setting (0 to 20mA)	2H

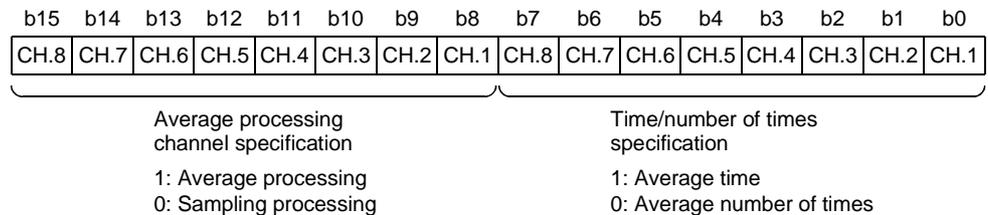
POINT

If the set value is outside the setting range, error "20 \square *" occurs, the "RUN" LED flickers at intervals of 0.1s, and all channels do not make A/D conversion.

* \square indicates the channel No. where the error occurred.

3.6.4 Average processing specification (Address RWwm+3)

- (1) Selects between sampling processing and average processing selection and when average processing is selected, the processing method is specified.
- (2) The default is sampling processing on all channels.



- (3) Operation of average processing specification is performed according to the setting made for the leading edges of the initial data setting request flag (RY(n+1)9).

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

3.6.5 CH. Average time/number of times setting (Address RWwm+4 to RWwm+B)

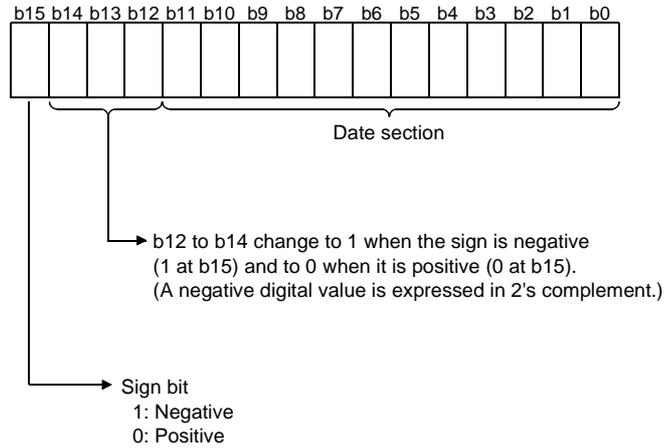
- (1) On each channel specified for average processing, the average time or average number of times is written to the address corresponding to the channel at the remote register address RWwm+4 to RWwm+B.
At power-on, the average time and average number of times are 0.
- (2) The setting ranges are as follows.
Number of times-based average processing: 1 to 10000 times
Time-based average processing: 4 to 10000ms
- (3) Operation is performed according to the setting made for the leading edges of the initial data setting request flag (RY(n+1)9).

POINT	
	If the set value written is outside the above range, the corresponding channel results in error "10 <input type="checkbox"/> *", "11 <input type="checkbox"/> *" and performs A/D conversion processing using the average time/number of times used prior to error occurrence.

* indicates the channel No. where the error occurred.

3.6.6 CH. □ Digital output value (Address RWrn to RWrn+7)

- (1) The digital value after the A/D conversion is stored in the remote register address from RWrn to RWrn+7 for each channel.
- (2) The digital output value is expressed in a 16-bit encoded binary.



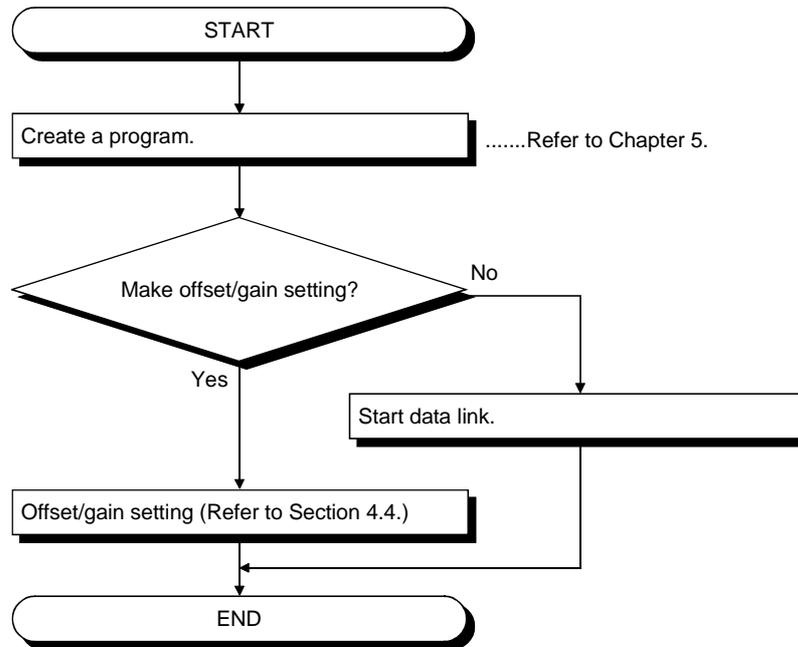
3.6.7 Error code (Address RWrn+8)

If an error occurs (the RUN LED flickers) when data is written to the AJ65VBTCU-68ADV/ADI, the corresponding error code is stored into the remote register (address RWrn+8) of the AJ65VBTCU-68ADV/ADI.
Refer to Section 6.1 for details of the error codes.

4 SETUP AND PREPARATION BEFORE OPERATION

4.1 Pre-Operation Procedure

This section explains the preparatory procedure for operating the AJ65VBTCU-68ADV/ADI.



4.2 Precautions When Handling

The precautions when handling the AJ65VBTCU-68ADV/ADI are described below:

**CAUTION**

- Do not touch the pins while power is on. Doing so can cause a malfunction.
- Ensure that no foreign matter such as chips and wire-offcuts enter the module. Foreign matter can cause a fire, failure or malfunction.
- Do not disassemble or modify the module. Doing so can cause a failure, malfunction, injury or fire.
- Do not touch the conductive and electronic parts of the module directly. Doing so can cause the module to malfunction or fail.
- Do not drop the module or give it hard impact since its case is made of resin. Doing so can damage the module.
- Do not touch the conductive parts of the module directly. Doing so can cause the module to malfunction or fail.

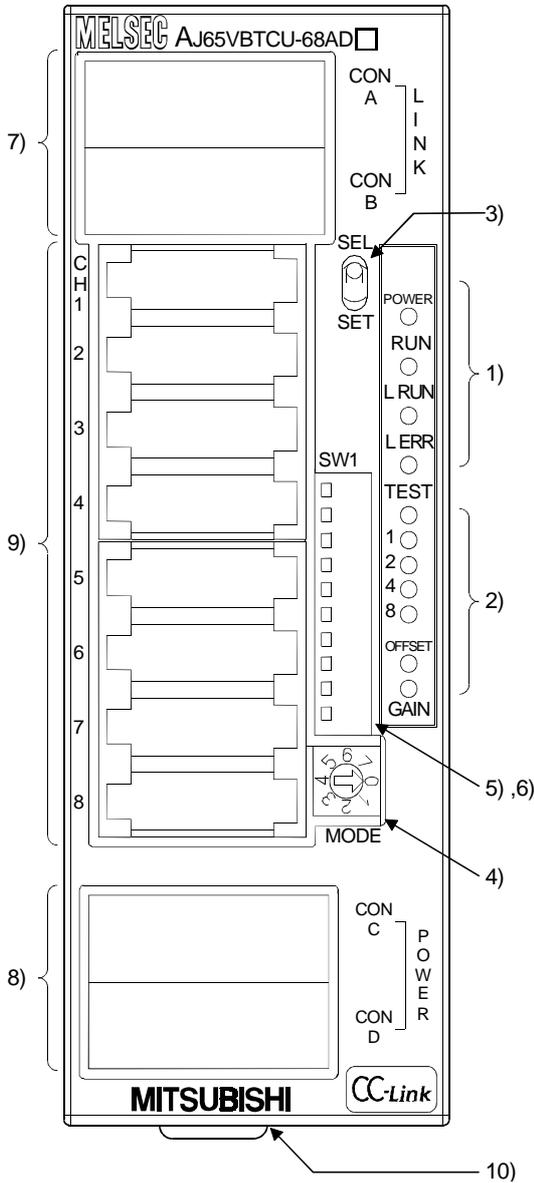
**CAUTION**

- Dispose of the product as industrial waste.
- Use the module in the environment indicated in the general specifications given in this manual.
Not doing so can cause an electric shock, fire, malfunction, product damage or deterioration.
- Securely fix the module to a DIN rail or securely fix it with the CC-Link connector type fitting.
Not doing so can cause a drop or malfunction.
- Mount or dismount the module to or from an enclosure after switching power off externally in all phases. Not doing so can cause the module to fail or malfunction.

- (1) When using the DIN rail adapter, install the DIN rail by making sure of the following:
 - (a) Applicable DIN rail models (conforming to the JIS C 2812)
TH35-7.5Fe
TH35-7.5Al
 - (b) DIN rail installation screw interval
When installing the DIN rail, tighten the screws with less than 200mm (7.87 inch) pitches.
- (2) As the CC-Link connector type metal installation fitting, use the narrow-width type (width 41)-dedicated fitting.
 - (a) CC-Link connector type metal installation fitting model
A6PLT-J65V1
- (3) Refer to the Master Module user's manual for specification, and manufacturers of supported cables for the use with AJ65VBTCU-68ADV/ADI.

4.3 Name of Each Part

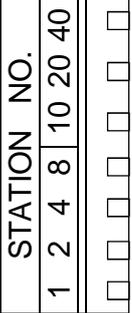
The name of each part in the AJ65VBTCU-68ADV/ADI is shown.



[Pin layout and signals name]

Pin arrangement	Pin No.	Signal name
<p>A module view from the top</p>	CONA, B	1 DA
		2 DB
		3 DG
		4 NC
		5 SLD
	CON1	1 CH1 V+/I+
		2 CH1 V-/I-
		3 NC
		4 SLD
	CON2	1 CH2 V+/I+
		2 CH2 V-/I-
		3 NC
		4 SLD
	CON3	1 CH3 V+/I+
		2 CH3 V-/I-
		3 NC
		4 SLD
	CON4	1 CH4 V+/I+
		2 CH4 V-/I-
		3 NC
4 SLD		
CON5	1 CH5 V+/I+	
	2 CH5 V-/I-	
	3 NC	
	4 SLD	
CON6	1 CH6 V+/I+	
	2 CH6 V-/I-	
	3 NC	
	4 SLD	
CON7	1 CH7 V+/I+	
	2 CH7 V-/I-	
	3 NC	
	4 SLD	
CON8	1 CH8 V+/I+	
	2 CH8 V-/I-	
	3 NC	
	4 SLD	
CONC, D	1 FG	
	2 +24V(UNIT)	
	3 24G (UNIT)	
	4 AG	
	5 FG1	

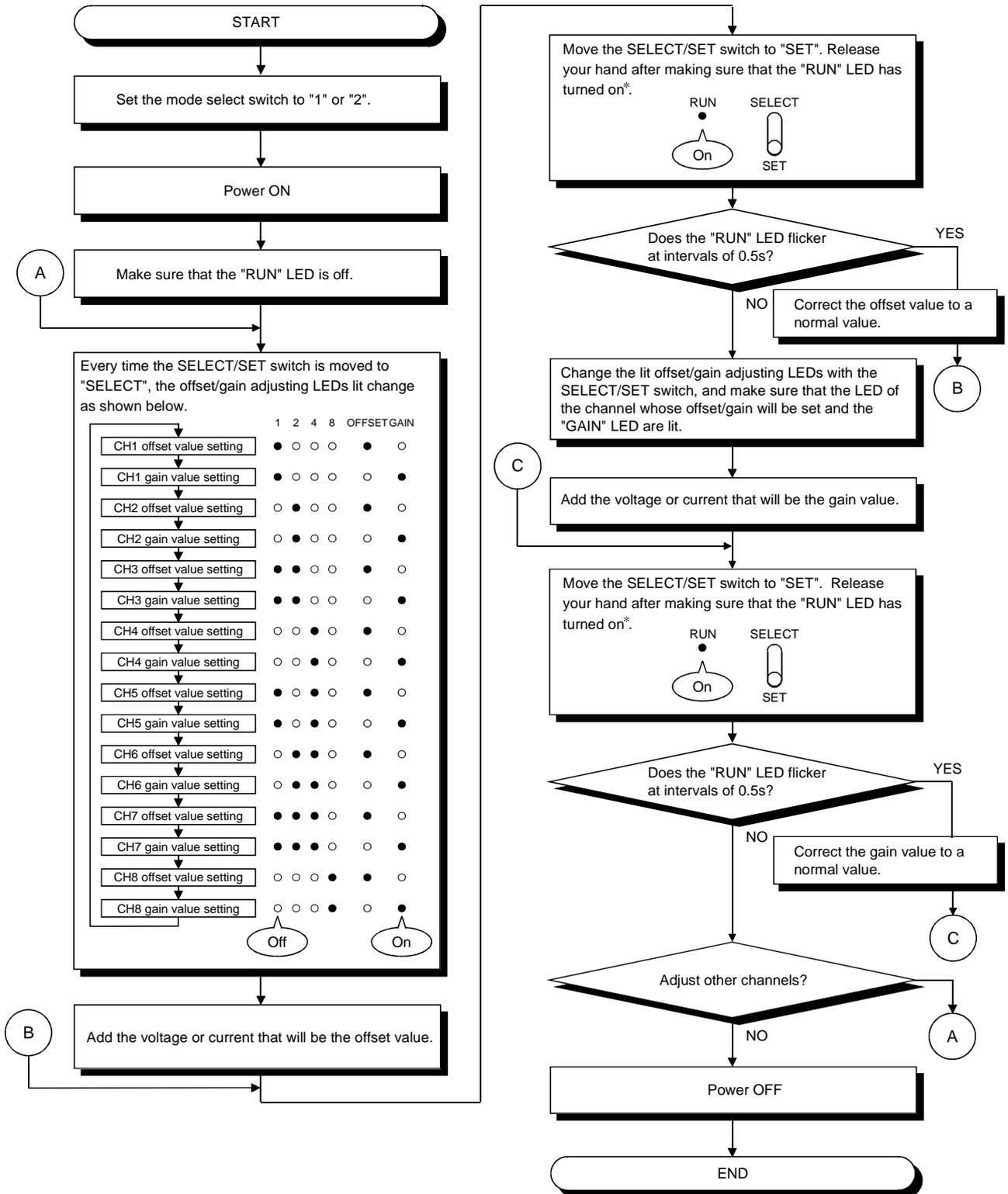
Number	Name and appearance	Description																																		
1)	Operation status display LED	POWER LED	ON : Power supply on OFF : Power supply off																																	
		RUN LED	Normal mode On : Normal operation Flashing : 0.1s intervals: Input range setting error, mode select switch setting error 0.5s intervals: Average value setting (count) time error Off : 24VDC power supply shutoff or watchdog timer error occurred																																	
		Test mode	On : Indicates that the SELECT/SET switch is in the SET position. Flashing : 0.5s intervals: An attempt was made to make setting outside the setting range at the time of offset/gain setting. Off : Indicates that the SELECT/SET switch is in the SELECT or center position.																																	
		L RUN LED	On : Normal communication Off : Communication cutoff (time expiration error)																																	
		L ERR. LED	On : Indicates that transmission speed setting or station number setting is outside the range. Flicker at fixed intervals : Indicates that transmission speed setting or station number setting was changed from that at power-on. Flicker at unfixed intervals: Indicates that you forgot fitting the terminating resistor or the module or CC-Link dedicated cable is affected by noise. Off : Indicates normal communications.																																	
2)	Offset/gain adjusting LEDs	TEST CH <input type="checkbox"/>	Normal mode Normally OFF																																	
		OFFSET GAIN	Test mode TEST:ON The OFFSET/GAIN/ CH <input type="checkbox"/> LEDs lit change every time the SELECT/SET switch is moved to SELECT. (Refer to section 4.4)																																	
3)	SELECT/SET switch	Used to make offset/gain setting in the test mode.																																		
4)	Mode select switch	Normal mode/ Test mode select switch																																		
		AJ65VBTCU-68ADV	AJ65VBTCU-68ADI																																	
		0: Normal mode 1: Test mode (user range setting 1) 2: Test mode (user range setting 2) 3 to 7: Must not be used	0: Normal mode 1: Test mode (user range setting) 2 to 7: Must not be used																																	
5)	Transmission speed setting switches 	<table border="1" data-bbox="437 1375 1422 1630"> <thead> <tr> <th rowspan="2">Set Value</th> <th colspan="3">Setting Switches</th> <th rowspan="2">Transmission Speed</th> </tr> <tr> <th>4</th> <th>2</th> <th>1</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>156kbps</td> </tr> <tr> <td>1</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>625kbps</td> </tr> <tr> <td>2</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>2.5Mbps</td> </tr> <tr> <td>3</td> <td>OFF</td> <td>ON</td> <td>ON</td> <td>5.0Mbps</td> </tr> <tr> <td>4</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>10Mbps</td> </tr> </tbody> </table> <p data-bbox="427 1639 1431 1787"> Always set the transmission speed within the above range. The switches are all factory-set to OFF. Making any other setting than the above will result in an error flickering the "L ERR." LED. Confirm the transmission speed setting switch numbers on the seal located on the side face of the connector for analog I/O. </p>		Set Value	Setting Switches			Transmission Speed	4	2	1	0	OFF	OFF	OFF	156kbps	1	OFF	OFF	ON	625kbps	2	OFF	ON	OFF	2.5Mbps	3	OFF	ON	ON	5.0Mbps	4	ON	OFF	OFF	10Mbps
Set Value	Setting Switches				Transmission Speed																															
	4	2	1																																	
0	OFF	OFF	OFF	156kbps																																
1	OFF	OFF	ON	625kbps																																
2	OFF	ON	OFF	2.5Mbps																																
3	OFF	ON	ON	5.0Mbps																																
4	ON	OFF	OFF	10Mbps																																

Number	Name and appearance	Description																																																																																																														
6)	Station number setting switches 	<p>Use the switches in STATION NO. "10", "20" and "40" to set the tens of the station number. Use the switches in STATION NO. "1", "2", "4" and "8" to set the units of the station number. The switches are all factory-set to OFF. Always set the station number within the range 1 to 64. Setting any other number than 1 to 64 will result in an error, flickering the "L ERR." LED. You cannot set the same station number to two or more stations.</p> <table border="1" data-bbox="437 533 1426 927"> <thead> <tr> <th rowspan="2">Station Number</th> <th colspan="3">Tens</th> <th colspan="4">Units</th> </tr> <tr> <th>40</th> <th>20</th> <th>10</th> <th>8</th> <th>4</th> <th>2</th> <th>1</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>2</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>3</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>ON</td> </tr> <tr> <td>4</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>⋮</td> <td>⋮</td> <td>⋮</td> <td>⋮</td> <td>⋮</td> <td>⋮</td> <td>⋮</td> <td>⋮</td> </tr> <tr> <td>10</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>11</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>⋮</td> <td>⋮</td> <td>⋮</td> <td>⋮</td> <td>⋮</td> <td>⋮</td> <td>⋮</td> <td>⋮</td> </tr> <tr> <td>64</td> <td>ON</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>OFF</td> </tr> </tbody> </table> <p>(Example) To set the station number to "32", set the switches as indicated below.</p> <table border="1" data-bbox="437 994 1426 1106"> <thead> <tr> <th rowspan="2">Station Number</th> <th colspan="3">Tens</th> <th colspan="4">Units</th> </tr> <tr> <th>40</th> <th>20</th> <th>10</th> <th>8</th> <th>4</th> <th>2</th> <th>1</th> </tr> </thead> <tbody> <tr> <td>32</td> <td>OFF</td> <td>ON</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>OFF</td> </tr> </tbody> </table> <p>Confirm the station number setting switch numbers on the seal located on the side face of the connector for analog I/O.</p>	Station Number	Tens			Units				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	Station Number	Tens			Units				40	20	10	8	4	2	1	32	OFF	ON	ON	OFF	OFF	ON	OFF
Station Number	Tens			Units																																																																																																												
	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																																																																																																									
Station Number	Tens			Units																																																																																																												
	40	20	10	8	4	2	1																																																																																																									
32	OFF	ON	ON	OFF	OFF	ON	OFF																																																																																																									
7)	One-touch connector for communication	A one-touch connector for connection of the communication line When carrying out wiring, connect two optional one-touch connector plugs for communication at top and bottom.																																																																																																														
8)	One-touch connector for power supply and FG	A one-touch connector for connection of the module power supply line and FG. When carrying out jumper wiring, connect two optional one-touch connector plugs for power supply/FG at top and bottom.																																																																																																														
9)	One-touch connector for analog I/O	One-touch connector for analog I/O Connect a one-touch connector plug when wiring.																																																																																																														
10)	DIN rail hook	Used to mount the module to the DIN rail.																																																																																																														

POINT
After power-on, do not change the mode select switch setting. If you change it midway during operation, the setting at power-on is valid.

4.4 Offset/Gain Setting

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



* If the "RUN" LED is not lit, E²PROM may have failed. For details, refer to Section 3.5.2.

POINT
<p>(1) Set the offset and gain values in the actual usage state.</p> <p>(2) The offset and gain values are stored on E²PROM in the AJ65VBTCU-68ADV/ADI and are not cleared at power-off.</p> <p>(3) Make offset/gain setting within the range indicated in POINT of Section 3.3.1 and Section 3.3.2. If setting is made outside this range, the maximum resolution/accuracy may not fall within the performance specifications range.</p> <p>(4) When making offset/gain setting (in the test mode), choose the test mode (AJ65VBTCU-68ADV: 1, 2/AD65VBTCU-68ADI: 1) with the mode select switch. If the switch has been set to any unusable number, an error occurs and the "RUN" LED flickers at intervals of 0.1s.</p> <p>(5) When the grounding indicated in Section 4.8.2 *5 is changed (not performed → perform, or performed to removed), repeat the offset/gain setting from the start.</p>

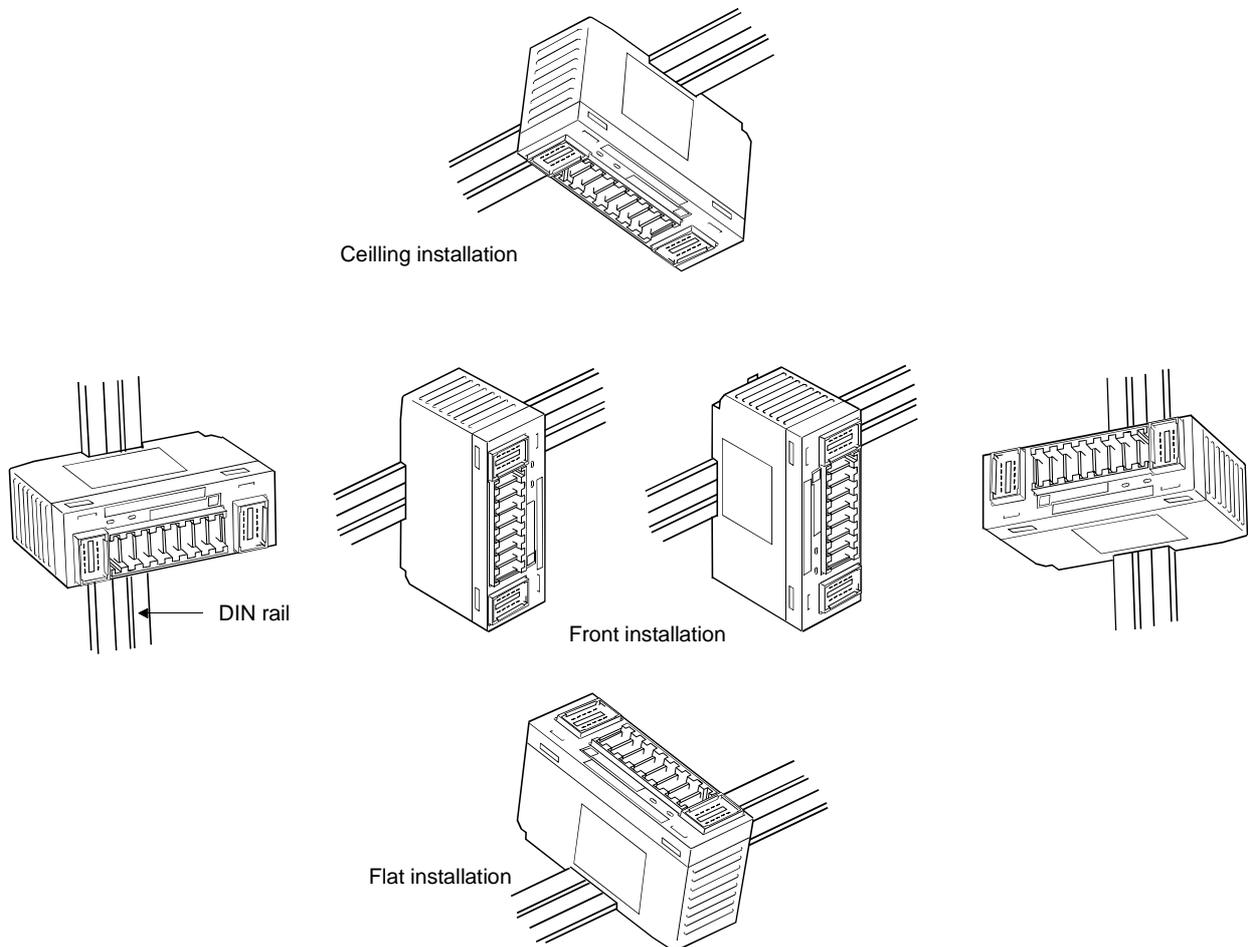
4.5 Station Number Setting

The station number setting of the AJ65VBTCU-68ADV/ADI determines the buffer memory addresses of the master module where the remote I/O signals and read/write data are stored.

For details, refer to the user's manual of the master module used.

4.6 Facing Direction of the Module Installation

The AJ65VBTCU-68ADV/ADI module may be installed in any of six orientations using a DIN rail or CC-Link connector type fitting. (There are no restrictions on the facing directions.)



4.7 Data Link Cable Wiring

This section explains the wiring of the CC-Link dedicated cable used for connection of the AJ65VBTCU-68ADV/ADI and master module.

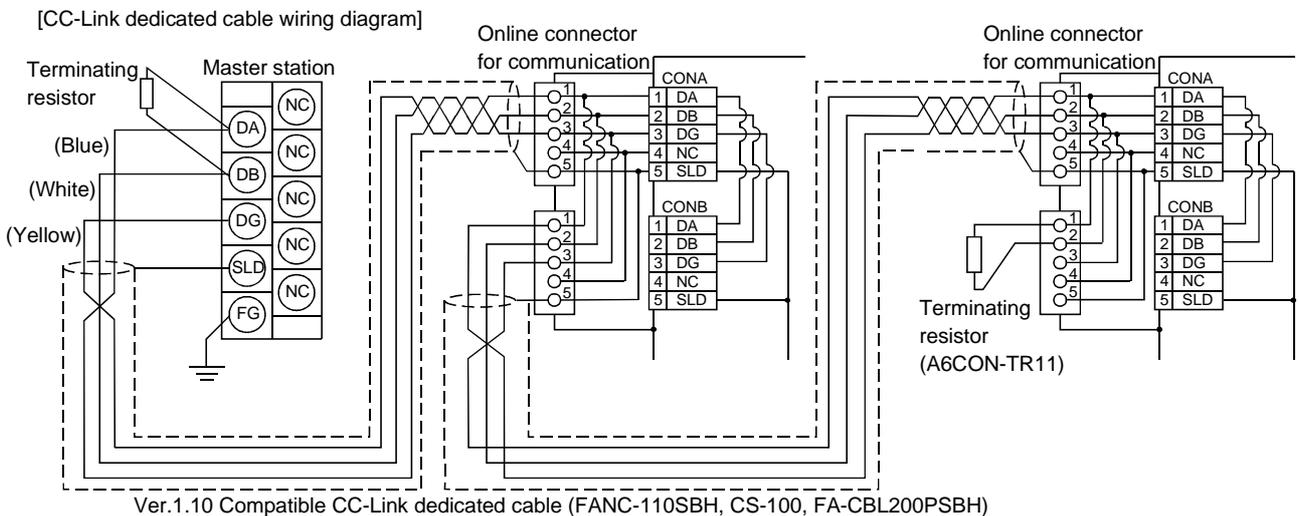
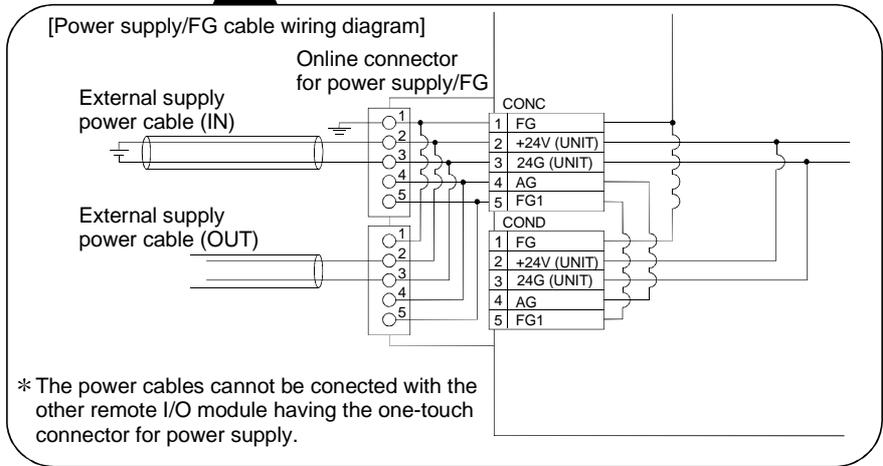
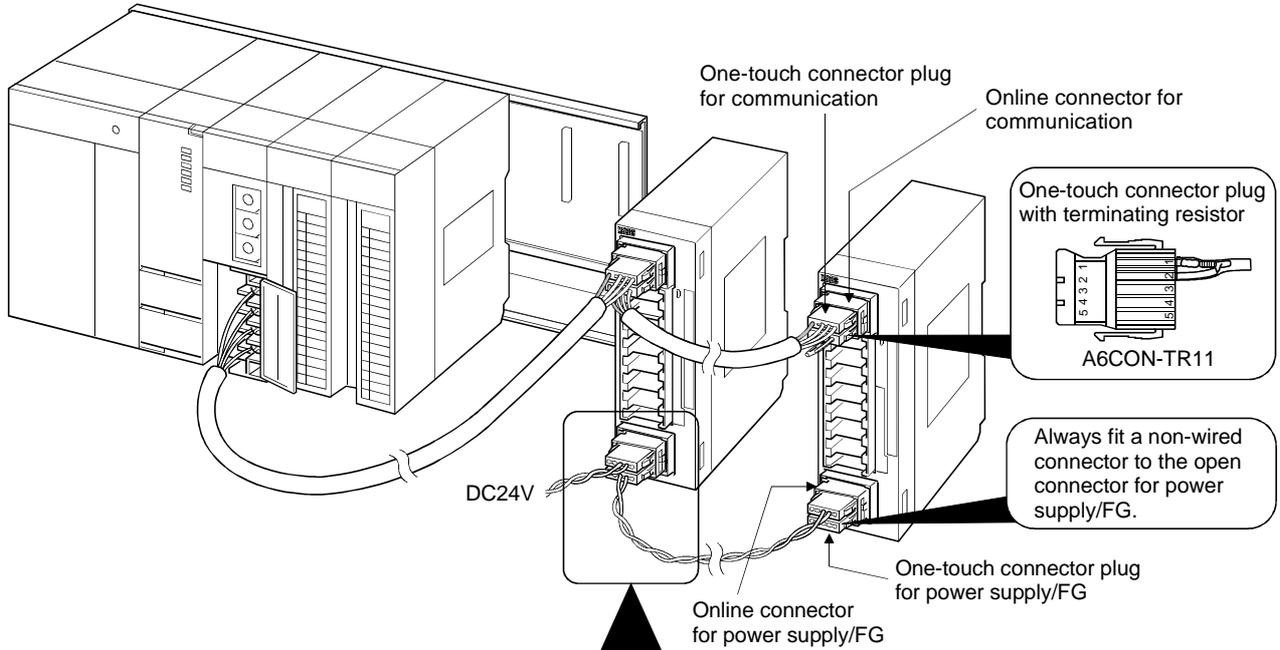
4.7.1 Instructions for handling the CC-Link dedicated cables

Do not handle the CC-Link dedicated cables roughly as described below. Doing so can damage the cables.

- Compact with a sharp object.
- Twist the cable excessively.
- Pull the cable hard. (more than the permitted elasticity.)
- Step on the cable.
- Place an object on the top.
- Scratch the cable's protective layer.

4.7.2 Connection of the CC-Link dedicated cables

Connect the CC-Link dedicated cable between the AJ65VBTCU-68ADV/ADI and master module as shown below.



POINT
<ul style="list-style-type: none">• On this unit, use the Ver. 1.10-compatible CC-Link dedicated cable (FANC-110SBH, CS-110, FA-CBL200PSBH). You cannot use the Ver. 1.10-compatible CC-Link dedicated cables of other than the above types, CC-Link dedicated cables and CC-Link dedicated, high-performance cables.• The shield cable of the CC-Link dedicated cable should be connected to "SLD" in each module, and both ends should be grounded through "FG". SLD and FG are connected inside the module.

4.8 Wiring

This section provides the instructions for wiring the AJ65VBTCU-68ADV/ADI and its wiring with external equipment.

4.8.1 Wiring precautions

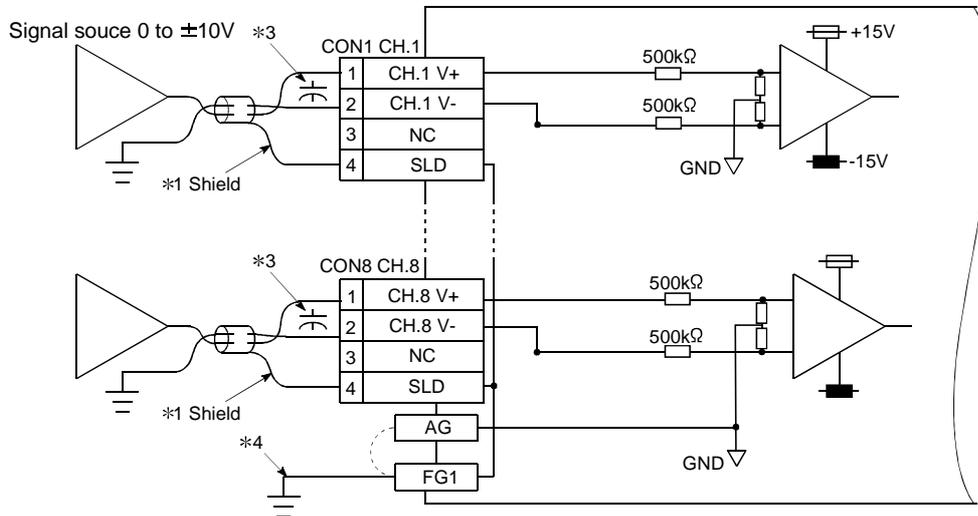
To obtain maximum performance from the functions of AJ65VBTCU-68ADV/ADI and improve the system reliability, an external wiring with high durability against noise is required.

The precautions when performing external wiring are as follows:

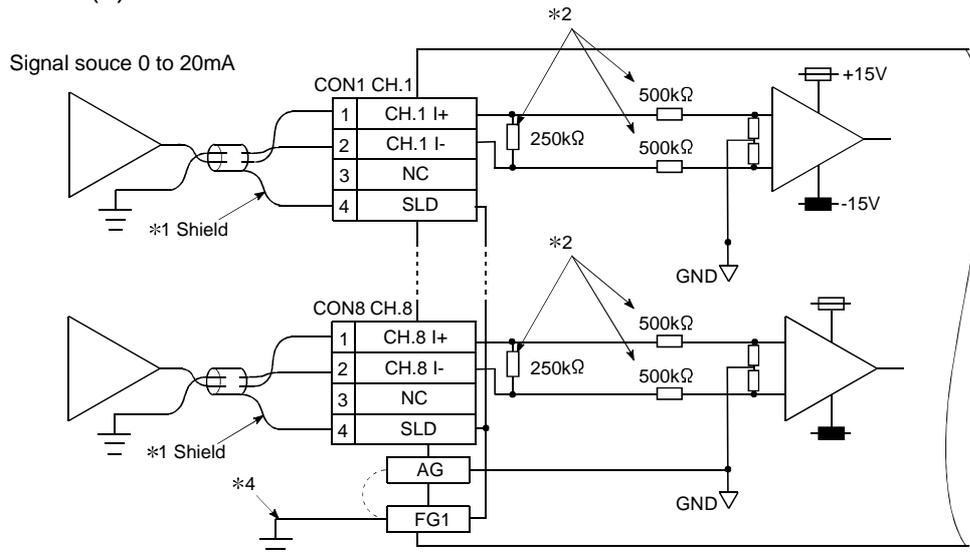
- (1) Use separate cables for the AC and AJ65VBTCU-68ADV/ADI external input signals, in order not to be affected by the AC side surge or conductivity.
- (2) Do not bundle or place with load carrying wires other than the main circuit line, high voltage line or PLC. Noises, surges, or conductivity may affect the system.
- (3) Place a one-point grounding on the PLC side for the shielded line or shielded cable. However, depending on the external noise conditions, it may be better have a grounding externally.

4.8.2 Wiring of module with external equipment

(1) AJ65VBTCU-68ADV



(2) AJ65VBTCU-68ADI



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

*2 Indicates the AJ65VBTCU-68ADI input resistor.

*3 When noise or ripple occurs with the external cable, connect a condenser with about 0.1 to 0.47μF (25V or higher voltage-resistant product) between the terminal V+ and V-.

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

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

POINT

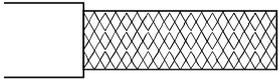
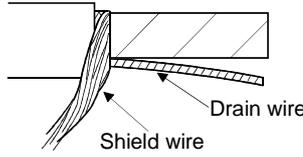
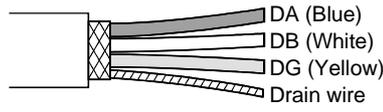
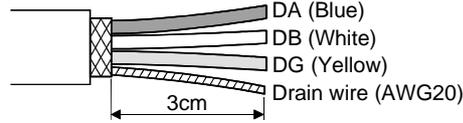
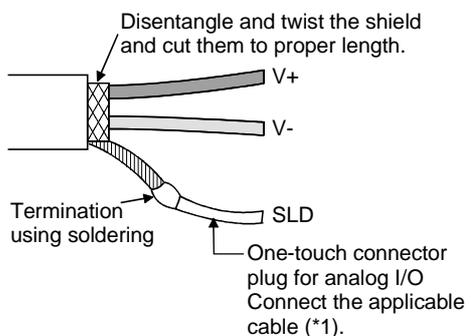
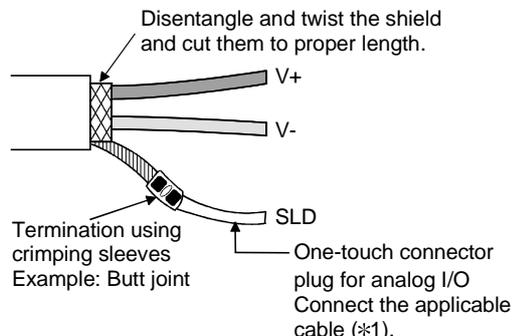
- A/D conversion values are fluctuated by self-heating within approx. 30 minutes after power is turned ON.
- Do not insert the one-touch connector plug for I/O of the one-touch connector type/connector type compact remote I/O unit into the one-touch connector for analog I/O accidentally. Doing so can cause the module to be damaged.

4.9 How to Wire the One-Touch Connector Plug

This section describes the way to wire the one-touch connector plug.
 Refer to section 2.3 for more information on the types and specifications of the one-touch connector plugs which conform to the AJ65VBTCU-68ADV/ADI.

(1) Cable termination work

Do the following work on the cable terminations of the communication and analog input cables that are inserted into the one-touch connector plugs.

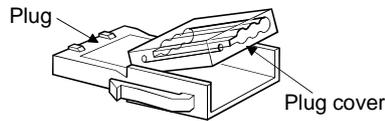
Communication Cable Termination Work	
<p>1. Cut the sheath.</p> 	<p>2. Separate the shield and drain wire and cut the shield.</p> 
<p>3. Cut the aluminum tape and intervening cord.</p> 	<p>4. Straighten out the drain wire and twist it from the root. (3cm seven or more times)</p> 
Analog Input Cable Termination Work	
Termination using soldering	Termination using crimping sleeves
 <p>Disentangle and twist the shield and cut them to proper length.</p> <p>V+</p> <p>V-</p> <p>SLD</p> <p>Termination using soldering</p> <p>One-touch connector plug for analog I/O Connect the applicable cable (*1).</p>	 <p>Disentangle and twist the shield and cut them to proper length.</p> <p>V+</p> <p>V-</p> <p>SLD</p> <p>Termination using crimping sleeves Example: Butt joint</p> <p>One-touch connector plug for analog I/O Connect the applicable cable (*1).</p>

*1 For the applicable cable size, refer to section 3.2.

POINT
<ul style="list-style-type: none"> • Where possible, round the tip that was cut with nippers or like. If the section of the cable to be inserted is not round, the cable may be caught at any point and not go far enough. • Do insulation work as necessary on the area of the shield that will not be inserted into the one-touch connector plug.

(2) Checking the plug cover

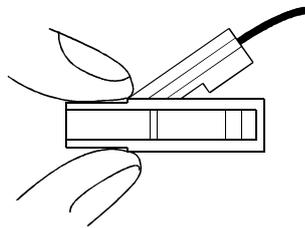
Check whether the plug cover is installed in the plug.



Caution: Before inserting the cable, do not push the plug cover into the plug. Once insulation-displaced, the plug cannot be reused.

(3) Inserting the cable

Lift the back of the plug cover and insert the cable until it makes contact with the plug.

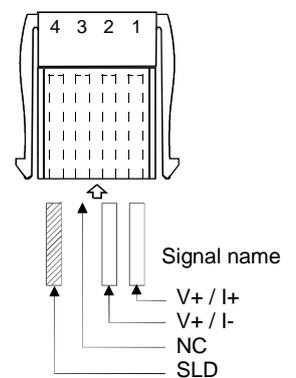
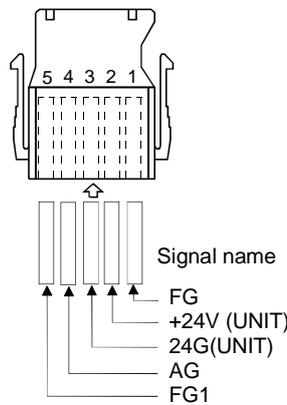
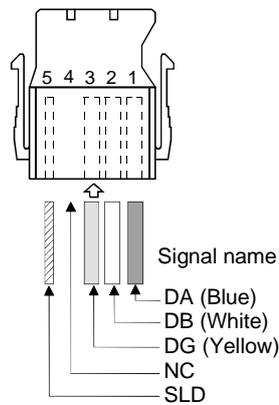


Insert the signal cables into the one-touch connector plug as shown below.

<For communication>

<For power supply/FG>

<For analog input>

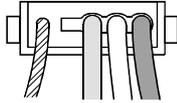


POINT

- Insert the cables far enough.
Not doing so can cause an insulation displacement fault.
- The cable inserted may come out of the cover front.
At this time, pull it back until the cable tip goes back into the plug cover.

(4) Insulation displacement of plug cover

Using pliers or like, push the plug cover into the plug to insulation-displace it. After insulation displacement, make sure that the plug cover is securely installed in the plug as shown below.

**POINT**

- The plug cover and plug latches may not engage at the time of insulation displacement, raising the cover. Since the plug cover has not been insulation-displaced sufficiently in this state, push the cover into the plug until it is installed securely.

4.10 Maintenance and Inspection

There are no special inspection items for the AJ65VBTCU-68ADV/ADI module, but follow the inspections items describes in the PLC CPU User's Manual so that the system can always be used in the best condition.

5 PROGRAMMING

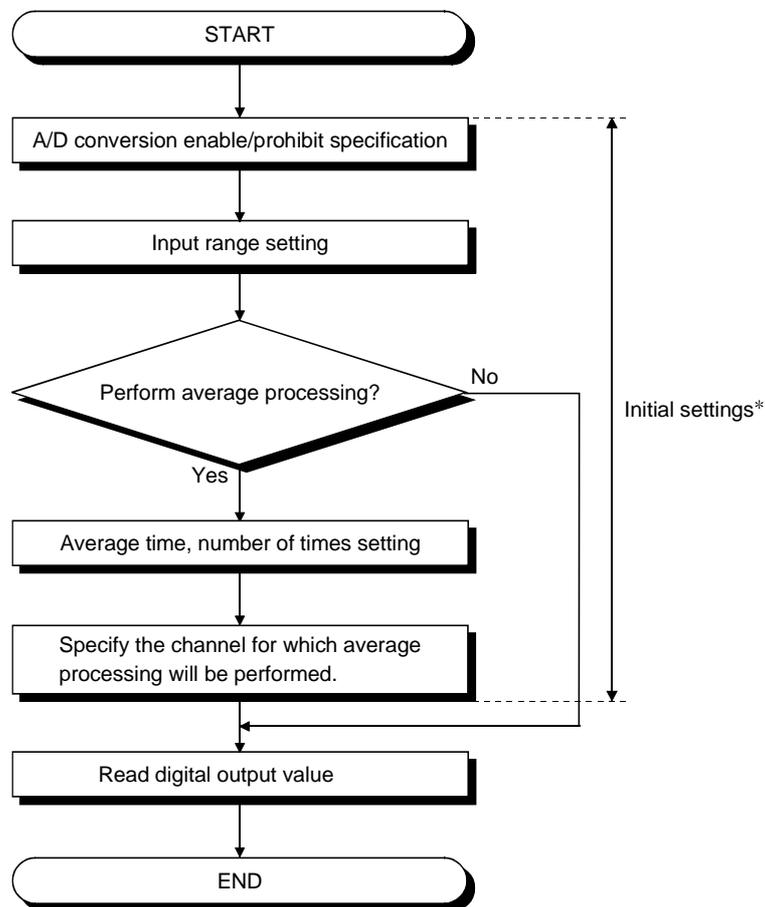
The programming procedure, basic read/write programs, and program examples for the AJ765VBTCU-68ADV/ADI are described.

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

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

5.1 Programming Procedure

Create a program which executes the AJ765VBTCU-68ADV/ADI analog/digital conversion by following the procedure below:

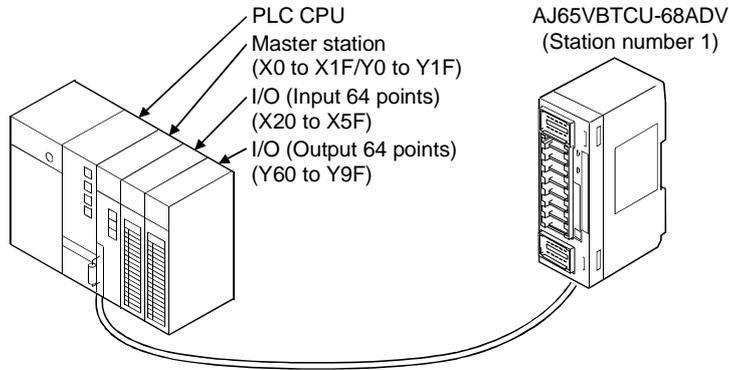


* When using the QCPU (Q mode), you can use the remote device station initialization procedure registration function to make settings. When using the ACPU, QCPU (A mode) or QnACPU, use the sequence program to make settings.

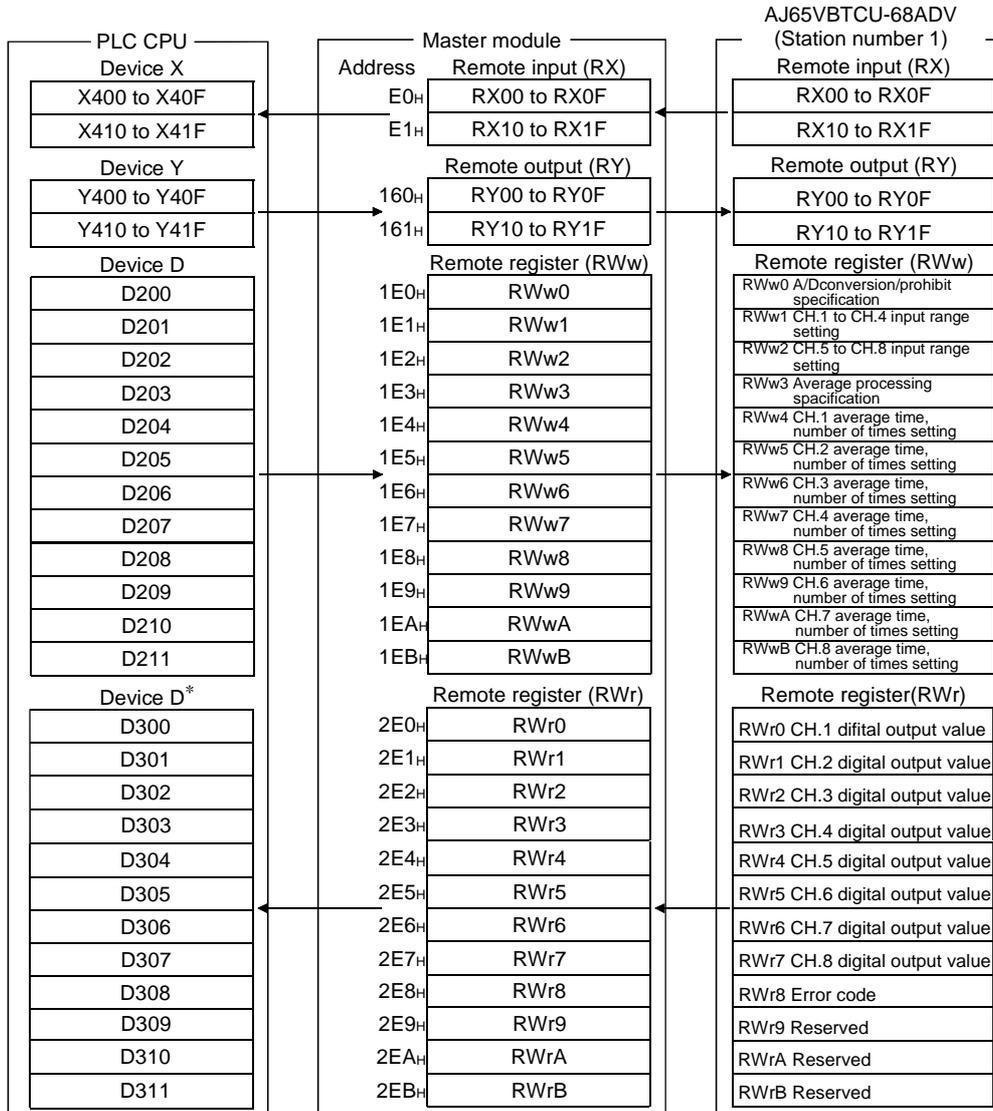
5.2 Conditions of Program Example

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

(1) System configuration



(2) Relationships between PLC CPU, master module and AJ65VBTCU-68ADV



* In the program example (refer to Section 5.5) that uses the RRP instruction (automatic refresh parameter setting) with the ACPU/QCPU (A mode), RWr0 to RWr8 are assigned to D456 to D464.

POINT

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

For the A1SCPU, for example, devices X100, Y100 and later are unusable. Use such devices as B and M.

(3) Initial settings

Setting Item	Settings
A/D conversion enable/prohibit specification (RWw0)	A/D conversion enabled channel: Channel 1, 2
CH. 1 to CH. 4 input range setting (RWw1)	Channel 1: 0 to 5V Channel 2: User range setting 1
Average processing specification (RWw3)	Channel 1: Sampling processing Channel 2: Average processing, number of times average
CH. 2 average time, number of times setting (RWw5)	Number of average processing times of channel 2: 16 times

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

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

- (1) Parameter setting
 - (a) Network parameter setting

	1
Start I/O No	0000
Operational setting	Operational settings
Type	Master station
Master station data link type	PLC parameter auto start
Mode	Online (Remote net mode)
All connect count	1
Remote input(RX)	
Remote output(RY)	
Remote register(RW)	
Remote register(RWw)	
Special relay(SB)	
Special register(SW)	
Retry count	3
Automatic reconnection station count	1
Stand by master station No.	
PLC down select	Stop
Scan mode setting	Asynchronous
Delay information setting	0
Station information setting	Station information
Remote device station initial setting	Initial settings
Interrupt setting	Interrupt settings

Station No	Station type	Exclusive station count	Reserve/invalid station select	Intelligent buffer select(word)		
				Send	Receive	Automatic
1/1	Remote device station	Exclusive station 3	No setting			

- (b) Automatic refresh parameter setting

	1
Start I/O No	0000
Operational setting	Operational settings
Type	Master station
Master station data link type	PLC parameter auto start
Mode	Online (Remote net mode)
All connect count	1
Remote input(RX)	X400
Remote output(RY)	Y400
Remote register(RW)	D300
Remote register(RWw)	D200
Special relay(SB)	S80
Special register(SW)	Sw0
Retry count	3
Automatic reconnection station count	1
Stand by master station No.	
PLC down select	Stop
Scan mode setting	Asynchronous
Delay information setting	0
Station information setting	Station information
Remote device station initial setting	Initial settings
Interrupt setting	Interrupt settings

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

(a) Setting the target station number

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

Set the target station number to "1".

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

(b) Setting the procedure registration

When the initial data processing request flag (RX18) turns on and the remote device station initialization procedure registration (SB0D) is set, the following data are registered to the AJ65VBTCU-68ADV/ADI.

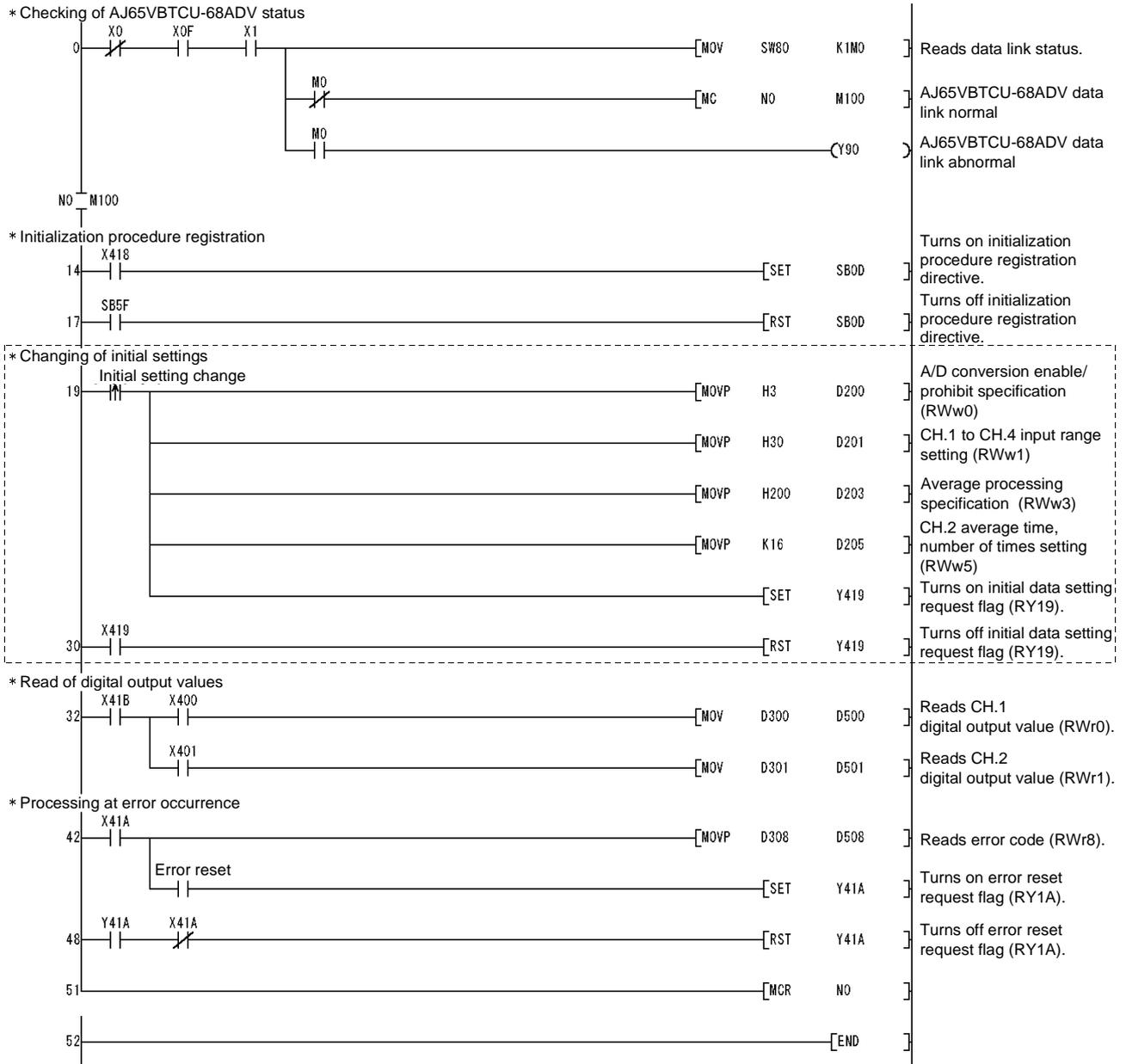
Procedure Execution Condition	Execution
Initial data processing request flag (RX18) turns on	A/D conversion enable/prohibit specification: channels 1, 2: enable (RWw0 :0003H)
	CH.1 to CH.4 input range setting : channel 1: 0 to 5V : channel 2: user range setting 1 (RWw1: 31H)
	Average processing setting : channel 1: sampling processing : channel 2: average processing, average number of times (RWw3: 200H)
	CH.2 average time, number of times setting: channel 2: 16 times (RWw5: 10H)
	Initial data processing completion flag (RY18) is turned on.
	Initial data setting request flag (RY19) is turned on.
Initial data processing request flag (RX18) turns off	Initial data processing completion flag (RY18) is turned off.
Initial data setting completion flag (RX19) turns on	Initial data setting request flag (RY19) is turned off.

(c) Setting results

The setting results are shown below.

Remote device station initial setting: Procedure registration module 1: Target station 1							
Input format <input type="text" value="HEX."/>							
Execute Flag	Operational condition	Executorial condition			Details of execution		
		Condition Device	Device Number	Execute Condition	Write Device	Device Number	Write Data
Execute	Set new	RX	18	ON	RWw	00	0003
Execute	Same as prev.set	RX	18	ON	RWw	01	0031
Execute	Same as prev.set	RX	18	ON	RWw	03	0200
Execute	Same as prev.set	RX	18	ON	RWw	05	0010
Execute	Same as prev.set	RX	18	ON	RY	18	ON
Execute	Same as prev.set	RX	18	ON	RY	19	ON
Execute	Set new	RX	18	OFF	RY	18	OFF
Execute	Set new	RX	19	ON	RY	19	OFF

(3) Program example



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

5.4 Program Example for Use of the QnACPU

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

(1) Parameter setting

(a) Network parameter setting

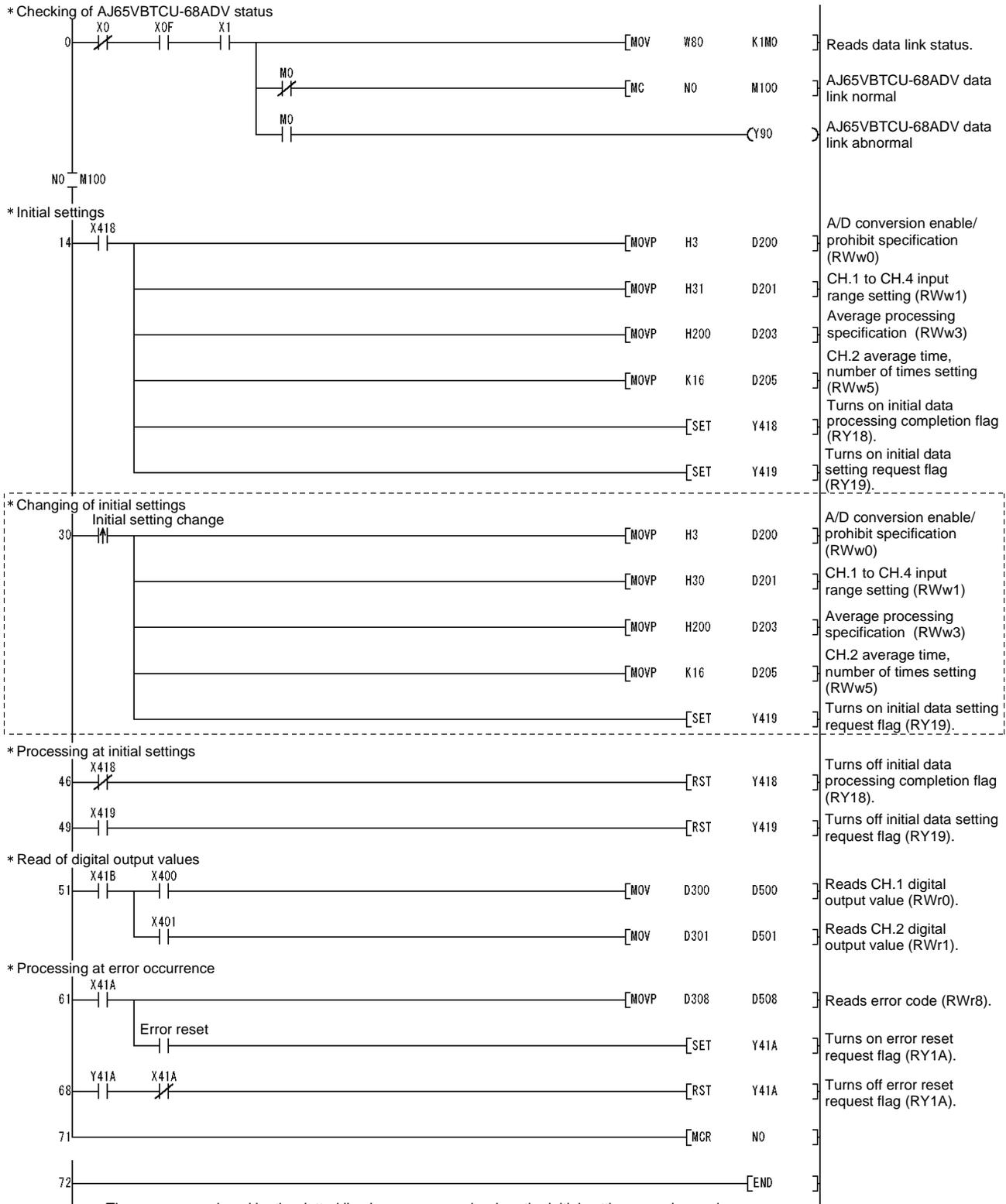
	1
Start I/O No.	0000
Type	Master station ▼
All connect count	1
Remote input(RX)	
Remote output(RY)	
Remote register(RW/r)	
Remote register(RW/w)	
Special relay(SB)	
Special register(SW)	
Retry count	3
Automatic reconnection station count	1
Wait master station No.	0
PLC down select	Stop ▼
Scan mode setting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

StationNo.	Station type	Exclusive station count	Reserve/invalid station select	Intelligent buffer select(word) ▲		
				Send	Receive	Automatic
1/1	Remote device station ▼	Exclusive station 3 ▼	No setting ▼			

(b) Automatic refresh parameter setting

	1
Start I/O No.	0000
Type	Master station ▼
All connect count	1
Remote input(RX)	X400
Remote output(RY)	Y400
Remote register(RW/r)	D300
Remote register(RW/w)	D200
Special relay(SB)	B0
Special register(SW)	w0
Retry count	3
Automatic reconnection station count	1
Wait master station No.	0
PLC down select	Stop ▼
Scan mode setting	Asynchronously ▼
Delay information setting	0
Station information setting	Station information

(2) Program example

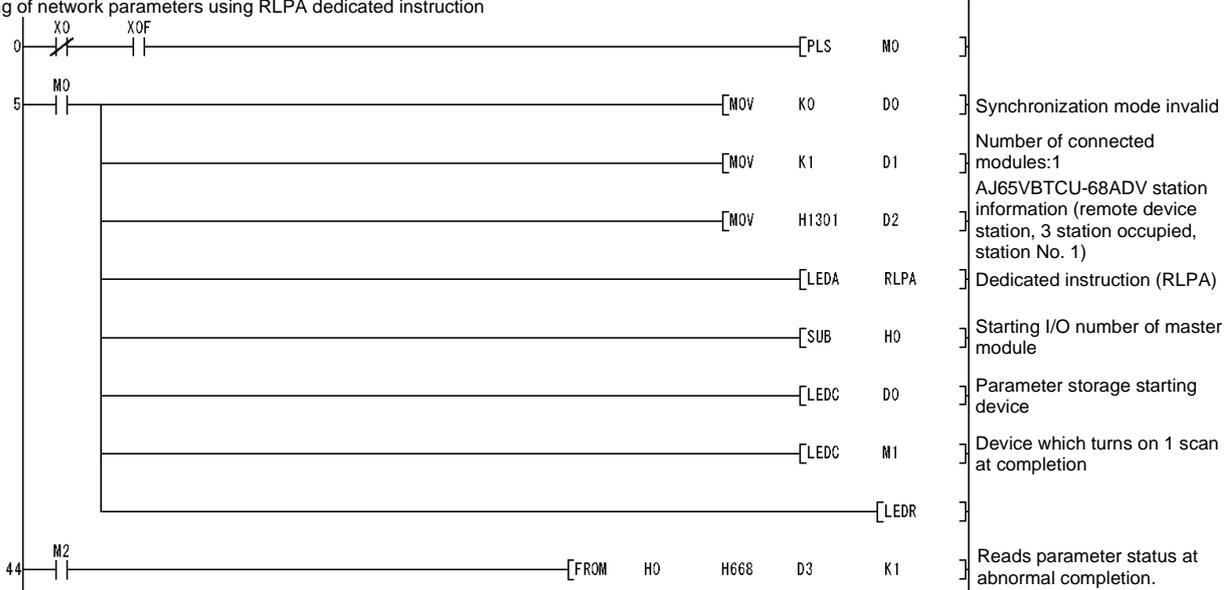


5.5 Program Example for Use of the ACPU/QCPU (A mode) (dedicated instructions)

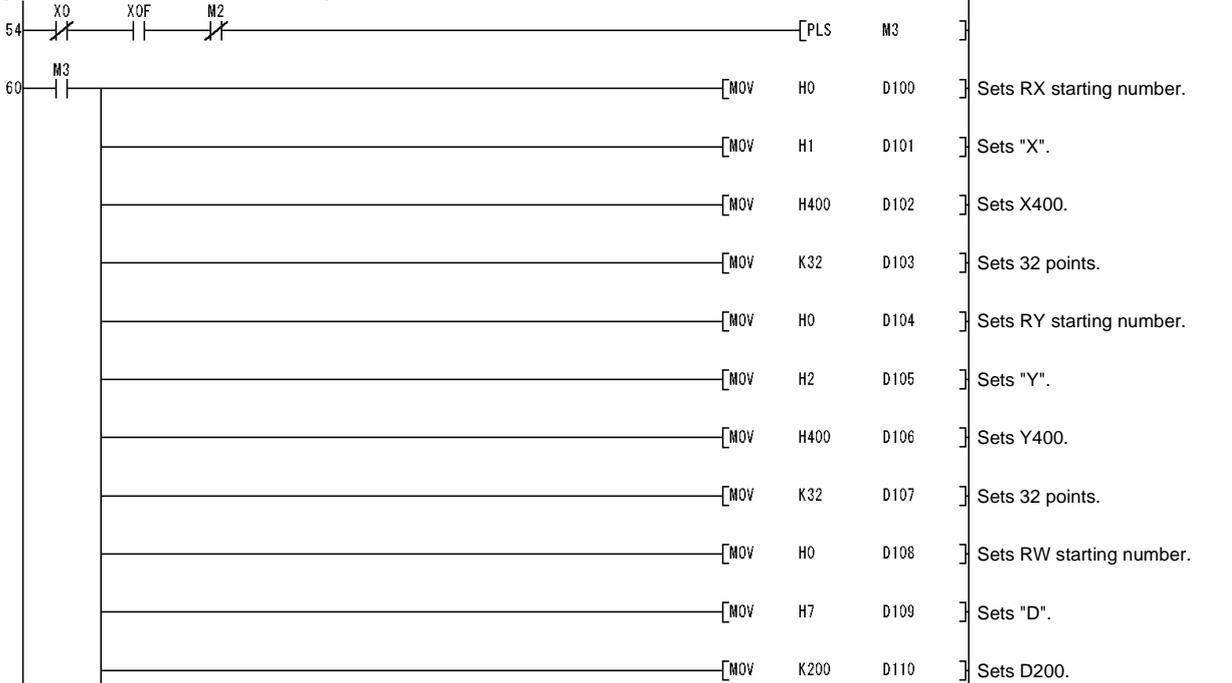
A sequence program is used to set the network and automatic refresh parameters.

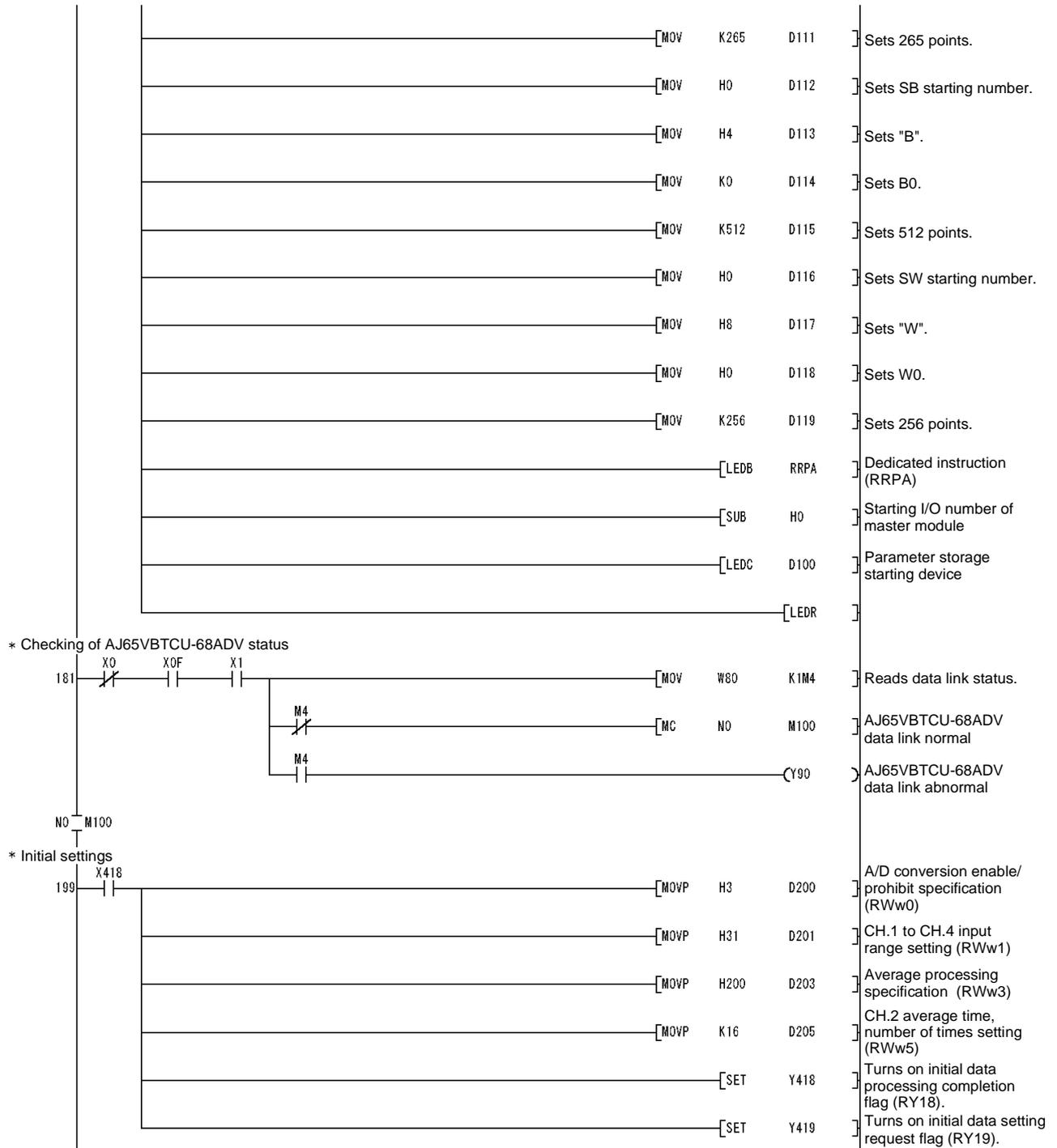
(1) Program example

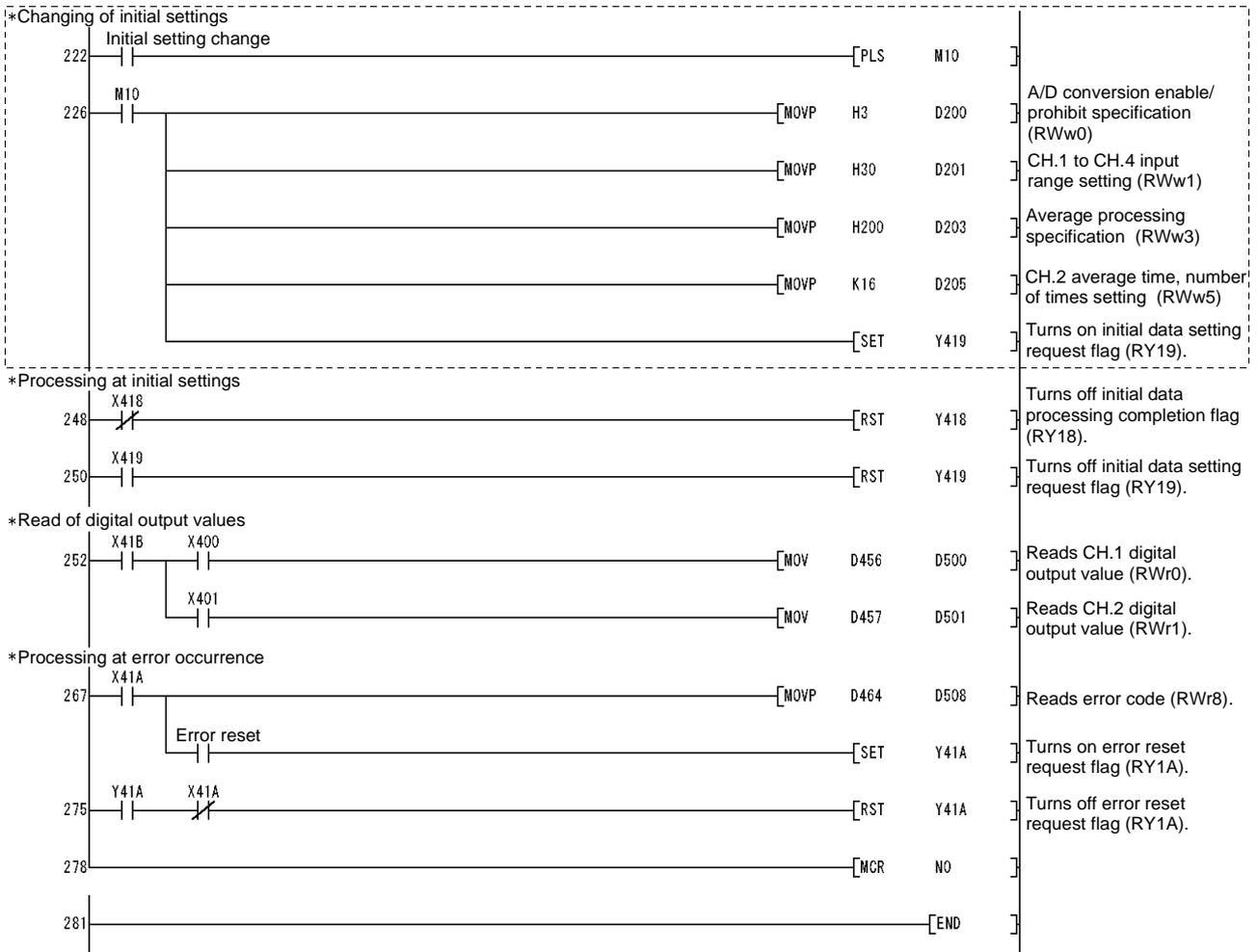
* Setting of network parameters using RLPA dedicated instruction



* Setting of automatic refresh parameters using RRPA dedicated instruction





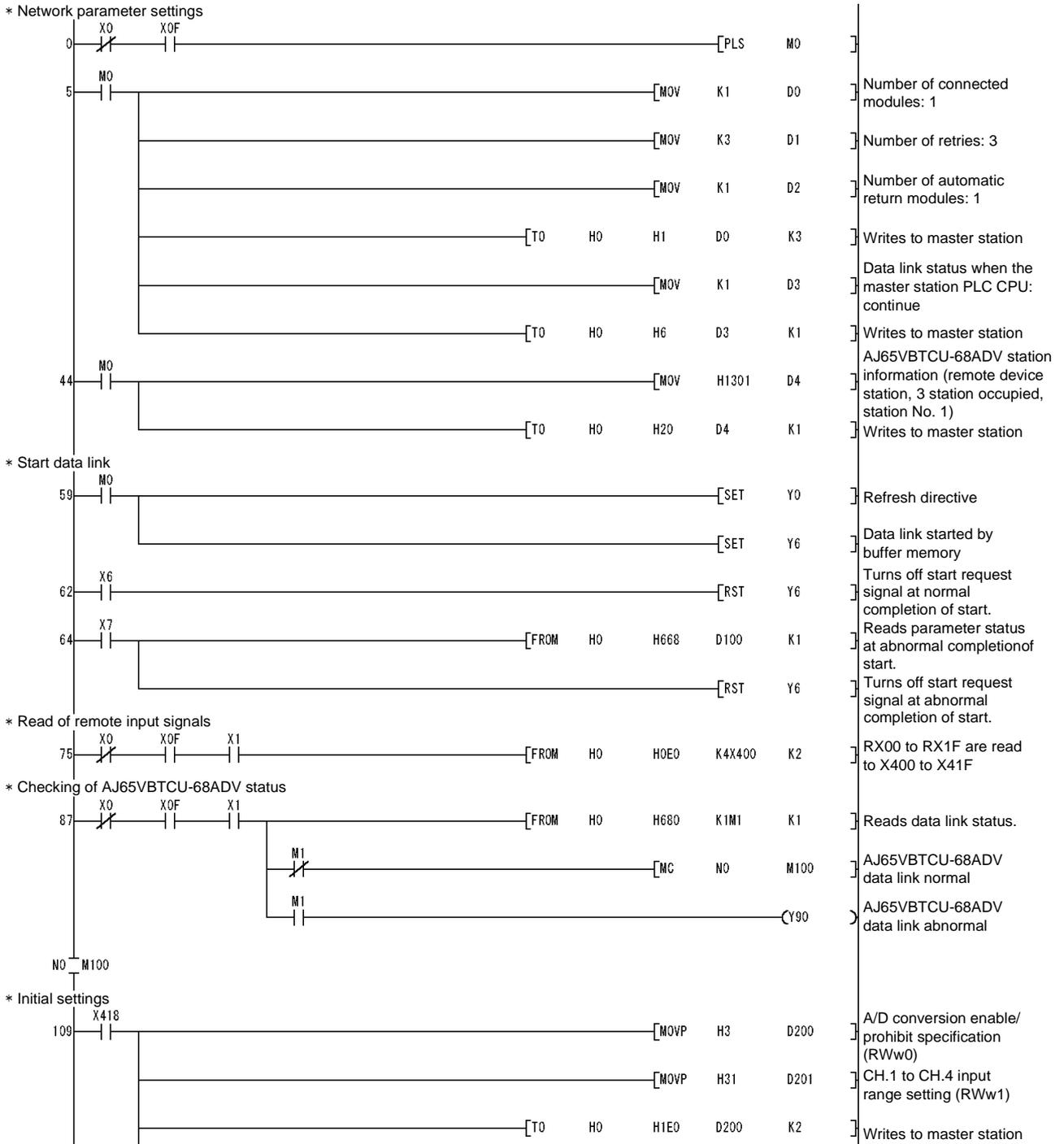


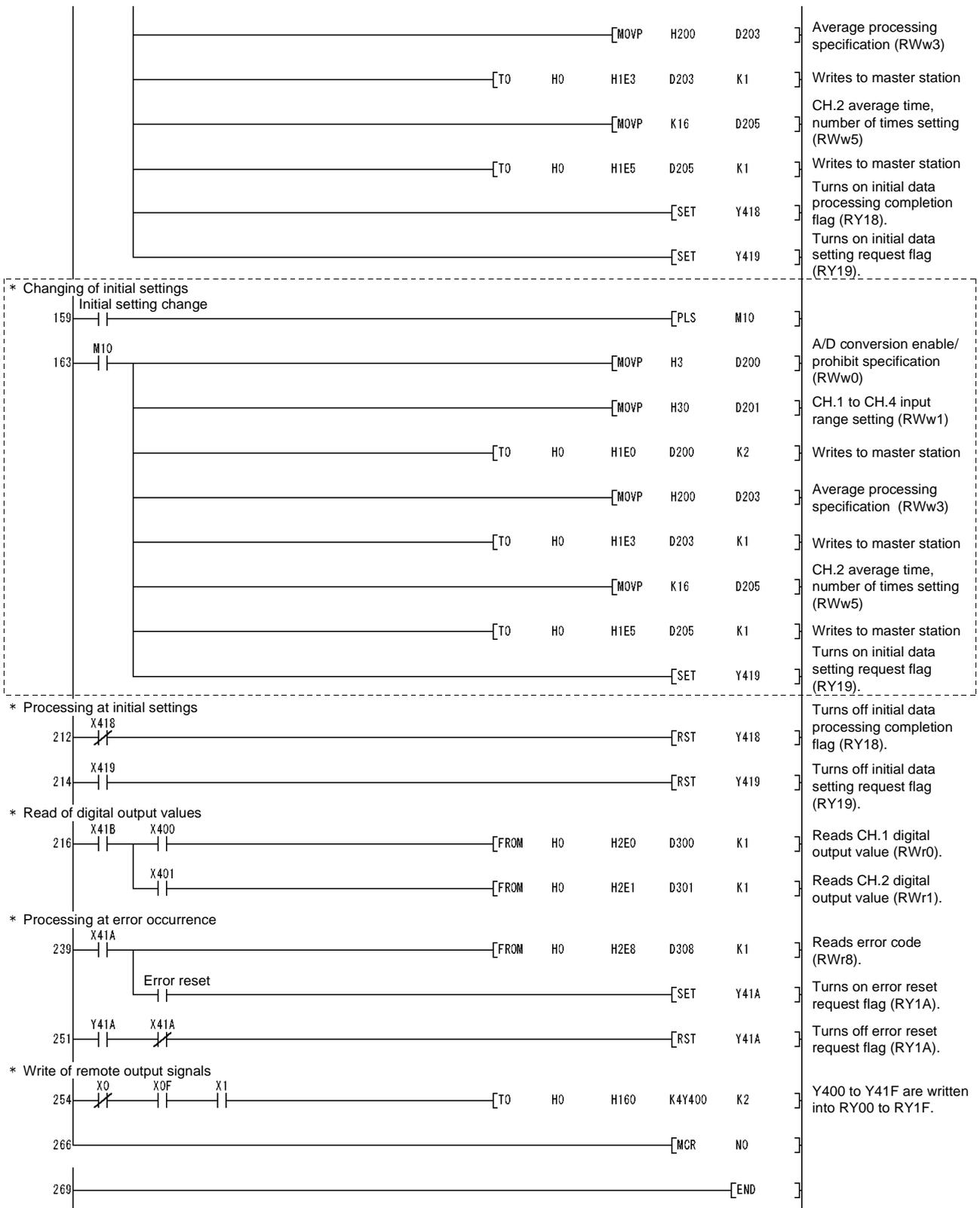
*The program enclosed by the dotted line is necessary only when the initial settings are changed.

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

A sequence program is used to set the network parameters.

(1) Program example





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

6 TROUBLESHOOTING

The details of the errors which may occur when using the AJ65VBTCU-68ADV/ADI and troubleshooting are described.

6.1 Error Code List

If an error occurs (the "RUN" LED of the AJ65VBTCU-68ADV/ADI flickers) during write of data from the PLC CPU to the master module, the corresponding error code is stored into the remote register RWrn+8 of the AJ65VBTCU-68ADV/ADI.

Table 6.1 Error Code List (Errors detected by AJ65VBTCU-68ADV/ADI)

Error Code (Decimal)	Cause	Action
10□	The average number of times setting is outside the range.	Correct the average number of times setting to within 1 to 10000.
11□	The average time setting is outside the range.	Correct the average time setting to within 4 to 10000.
20□	The input range setting is outside the setting range.	Correct the input range setting to within the setting range.

□ indicates the channel No. where the error occurred.

- (1) If the average time/number of times setting error occurs, the "RUN" LED flickers at intervals of 0.5s and A/D conversion processing is performed with the average time or number of times used prior to error occurrence.
If the input range setting error occurs, the "RUN" LED flickers at intervals of 0.1s and A/D conversion processing is not performed on all channels.
- (2) If two or more errors occurred, the error code of the first error is stored and the other errors are not stored.
- (3) To reset the error code, turn on the error reset request flag RY(n+1)A.

6.2 Using the LED Indications to Check Errors

This section explains how to check errors using the LED indications of the AJ65VBTCU-68ADV/ADI.

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

(1) When the AJ65VBTCU-68ADV/ADI "POWER" LED is off

Check item	Corrective action
Is 24VDC power on?	Check the external power supply.
Is the voltage of the 24VDC power supply within the specified value?	Set the voltage value to within the range 20.4 to 26.4V.

(2) When the AJ65VBTCU-68ADV/ADI "RUN" LED is flashing

Check item	Corrective action
Is the LED flickering at 0.1s intervals in the normal mode?	<ol style="list-style-type: none"> 1. Check that the mode select switch is in the position other than 0. 2. Check the error code (RWrn+8) to confirm the channel where the input rang setting error occurred. 3. Make correction to the sequence program or GX Developer setting.
Is the LED flickering at 0.5s intervals in the normal mode?	<ol style="list-style-type: none"> 1. Check the error code (RWrn+8) to confirm the channel where the average number of times setting or average time setting error occurred. 2. Make correction to the sequence program or GX Developer setting.
Is the LED flickering at 0.5s intervals in the test mode?	Change the offset/gain adjustment to within the available setting range.

(3) When the AJ65VBTCU-68ADV/ADI "RUN" LED is off

Check item	Corrective action
Has the watchdog timer error occurred?	<p>Using the link special registers (SW0084 to SW0087) of the master module, check the watchdog timer error and power on the AJ65VBTCU-68ADV/ADI again.</p> <p>If the "RUN" LED is not lit after power is switched on again, the possible cause is a hardware fault. Contact your nearest Mitsubishi representative.</p>

(4) When the AJ65VBTCU-68ADV/ADI "L RUN" LED is off

Communications are broken.

For details, refer to troubleshooting in the user's manual of the master module used.

(5) When the AJ65VBTCU-68ADV/ADI "L ERR." LED flickers at fixed intervals

Check item	Corrective action
Has the station number or transmission speed setting switch position been changed during normal operation?	After correcting the setting switch setting, switch power on again.
Is the station number or transmission speed setting switch faulty?	If the "L ERR." LED has begun flickering though switch setting change was not made during operation, the possible cause is a hardware fault. Contact your nearest Mitsubishi representative.

(6) When the AJ65VBTCU-68ADV/ADI "L ERR." LED flickers at unfixed intervals

Check item	Corrective action
Have you forgotten fitting the terminating resistor?	Check whether the terminating resistor is fitted. If it is not connected, connect it and switch power on again.
Is the module or CC-Link dedicated cable affected by noise?	Earth both ends of the shield wire of the CC-Link dedicated cable to the protective earth conductor via SLD and FG of the corresponding module. Earth the FG terminal of the module without fail. When carrying out wiring in piping, earth the pipe without fail.

(7) When the AJ65VBTCU-68ADV/ADI "L ERR." LED is on

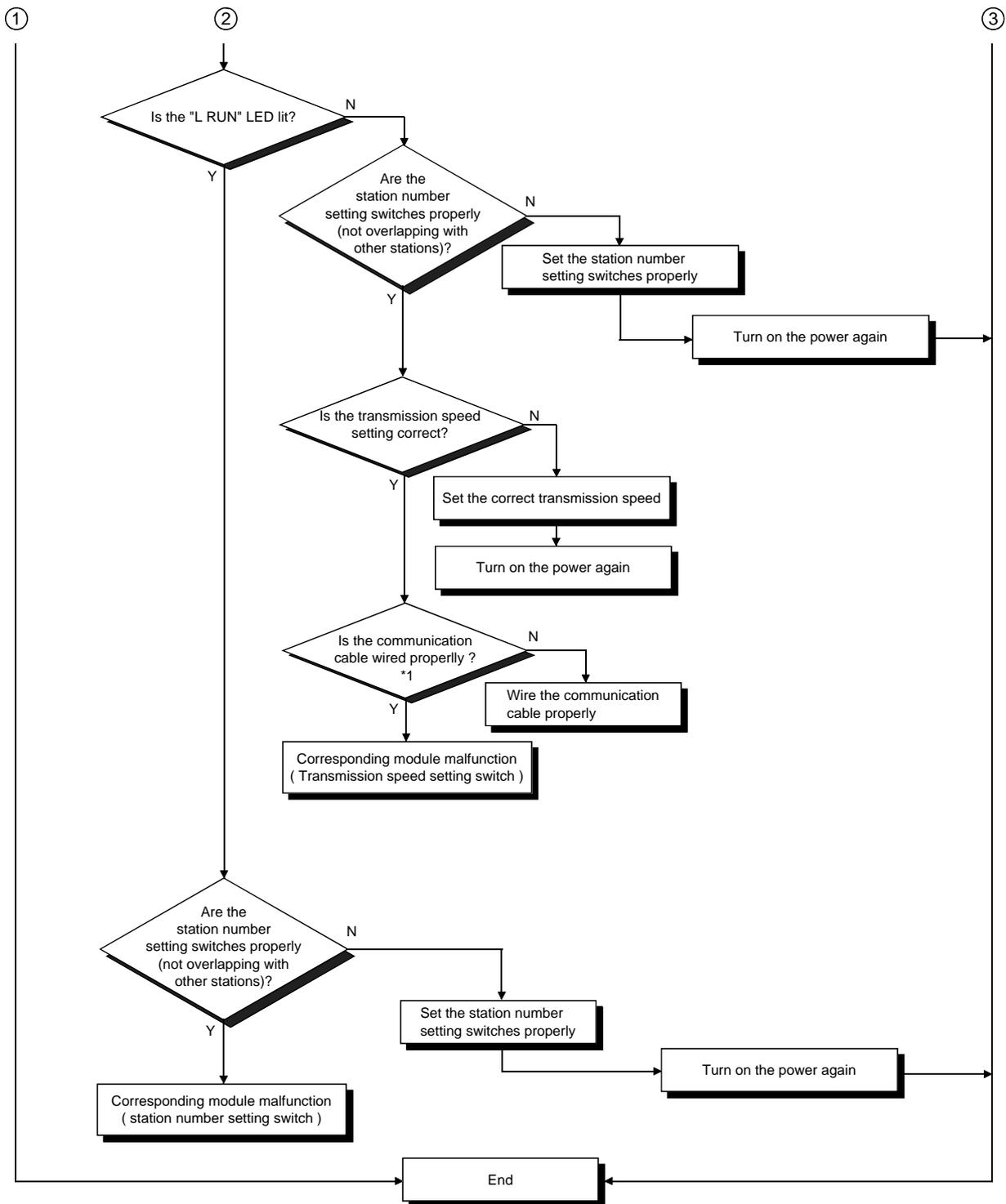
Check item	Corrective action
Are the station number and transmission speed correct?	Set the correct station number and transmission speed.

6.3 When the digital output value cannot be read

Check item	Corrective action
Is the "POWER" LED off?	Take action as described in Section 6.2 (1).
Is the "RUN" LED flashing or off?	Take action as described in Section 6.2 (2), (3).
Is the "L RUN" LED off?	Take action as described in Section 6.2 (4).
Is the "L ERR." LED on?	Take action as described in Section 6.2 (7). Check the error details according to the master module user's manual.
Is the PLC CPU "RUN" LED flashing or off?	Check the error details according to the PLC CPU user's manual.
Is the master module "RUN" LED off?	Check the error details according to the master module user's manual.
Is the master module [RD] [SD] LED on?	Check the error details according to the master module user's manual.
Is the analog input signal line disconnected, cut off, or any errors?	Check the error area by checking the signal line visually or by conductive check.
Remove the AJ65VBTCU-68ADV/ADI analog input cable. Apply the test voltage (stable power supply or battery) to this module's terminal, and measure the digital output value.	If the AJ65VBTCU-68ADV/ADI module digital output value is normal, the effects are being received by noise from an external wiring. So check the wiring and grounding method. Lift the AJ65VBTCU-68ADV/ADI from the system, and remove the grounding circuit. (install to the DIN rail.)

6.4 Troubleshooting for the Case where the "ERR." LED of the Master Station Flickers





*1 Check for a short, reversed connection, wire breakage, terminal resistor, FG connection, overall distance and station-to-station distance.

APPENDIX

Appendix1 Comparison between This Product and AJ65SBT-64AD

- (1) Comparison in performance between this product and AJ65SBT-64AD
The following table gives performance comparison between the AJ65VBTCU-68ADV/ADI and AJ65SBT-64AD.

Performance Comparison between AJ65VBTCU-68ADV/ADI and AJ65SBT-64AD

Item		Specifications																																													
		AJ65VBTCU-68ADV	AJ65VBTCU-68ADI	AJ65SBT-64AD																																											
Analog input	Voltage	-10 to +10VDC (input resistance: 1MΩ)	————	-10 to +10VDC (input resistance: 1MΩ)																																											
	Current	————	0 to 20mADC (input resistance: 250Ω)	0 to 20mADC (input resistance: 250Ω)																																											
Digital output		-4096 to +4095	-96 to +4095	-4096 to +4095																																											
I/O characteristics Maximum resolution		<table border="1"> <thead> <tr> <th></th> <th>Input Range</th> <th>Digital Output</th> <th>Max. Resolution</th> </tr> </thead> <tbody> <tr> <td rowspan="4">AJ65VBTCU-68ADV</td> <td>-10 to +10V</td> <td rowspan="2">-4000 to +4000</td> <td rowspan="2">2.5mV</td> </tr> <tr> <td>User range setting 1 (-10 to +10V)</td> </tr> <tr> <td>0 to 5V</td> <td rowspan="2">0 to 4000</td> <td>1.25mV</td> </tr> <tr> <td>1 to 5V</td> <td>1.0mV</td> </tr> <tr> <td rowspan="3">AJ65VBTCU-68ADI</td> <td>0 to 20mA</td> <td rowspan="3">0 to 4000</td> <td>5μA</td> </tr> <tr> <td>4 to 20mA</td> <td rowspan="2">4μA</td> </tr> <tr> <td>User range setting (0 to 20mA)</td> </tr> </tbody> </table>			Input Range	Digital Output	Max. Resolution	AJ65VBTCU-68ADV	-10 to +10V	-4000 to +4000	2.5mV	User range setting 1 (-10 to +10V)	0 to 5V	0 to 4000	1.25mV	1 to 5V	1.0mV	AJ65VBTCU-68ADI	0 to 20mA	0 to 4000	5μA	4 to 20mA	4μA	User range setting (0 to 20mA)	<table border="1"> <thead> <tr> <th></th> <th>Input Range</th> <th>Digital Output</th> <th>Max. Resolution</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Voltage</td> <td>-10 to +10V</td> <td rowspan="2">-4000 to +4000</td> <td rowspan="2">2.5mV</td> </tr> <tr> <td>User range setting 1 (-10 to +10V)</td> </tr> <tr> <td>0 to 5V</td> <td rowspan="2">0 to 4000</td> <td>1.25mV</td> </tr> <tr> <td>1 to 5V</td> <td>1.0mV</td> </tr> <tr> <td rowspan="3">Current</td> <td>0 to 20mA</td> <td rowspan="3">0 to 4000</td> <td>5μA</td> </tr> <tr> <td>4 to 20mA</td> <td rowspan="2">4μA</td> </tr> <tr> <td>User range setting 3 (0 to 20mA)</td> </tr> </tbody> </table>			Input Range	Digital Output	Max. Resolution	Voltage	-10 to +10V	-4000 to +4000	2.5mV	User range setting 1 (-10 to +10V)	0 to 5V	0 to 4000	1.25mV	1 to 5V	1.0mV	Current	0 to 20mA	0 to 4000	5μA	4 to 20mA	4μA	User range setting 3 (0 to 20mA)
			Input Range	Digital Output	Max. Resolution																																										
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	1 to 5V		1.0mV																																												
Current	0 to 20mA	0 to 4000	5μA																																												
	4 to 20mA		4μA																																												
	User range setting 3 (0 to 20mA)																																														
Input range changing		Per channel																																													
Offset/gain setting		Yes																																													
Accuracy	Ambient temperature 0 to 55°C	±0.3% (accuracy relative to maximum value of digital output value)		±0.4% (accuracy relative to maximum value of digital output value)																																											
	Ambient temperature 25±5°C	±0.2% (accuracy relative to maximum value of digital output value)		±0.2% (accuracy relative to maximum value of digital output value)																																											
Max. conversion speed		1ms/1 channel																																													
Absolute max. input		Voltage ±15V	Current ±30mA	Voltage ±15V, current ±30mA																																											
Number of analog input points		8 channels/1 module		4 channels/1 module																																											
Number of occupied I/O points		3 station occupied (RX/RX: 32 points each, RWr/RWw: 12 points each)		1 station occupied (RX/RX: 32 points each, RWr/RWw: 4 points each)																																											
External wiring system		Dedicated one-touch connector		Terminal block																																											
24VDC internal current consumption (A)		0.010		0.090																																											
Weight (kg)		0.17		0.20																																											
Outline dimensions (mm)		41 (W) × 63 (H) × 115 (D)		118 (W) × 50 (H) × 40 (D)																																											

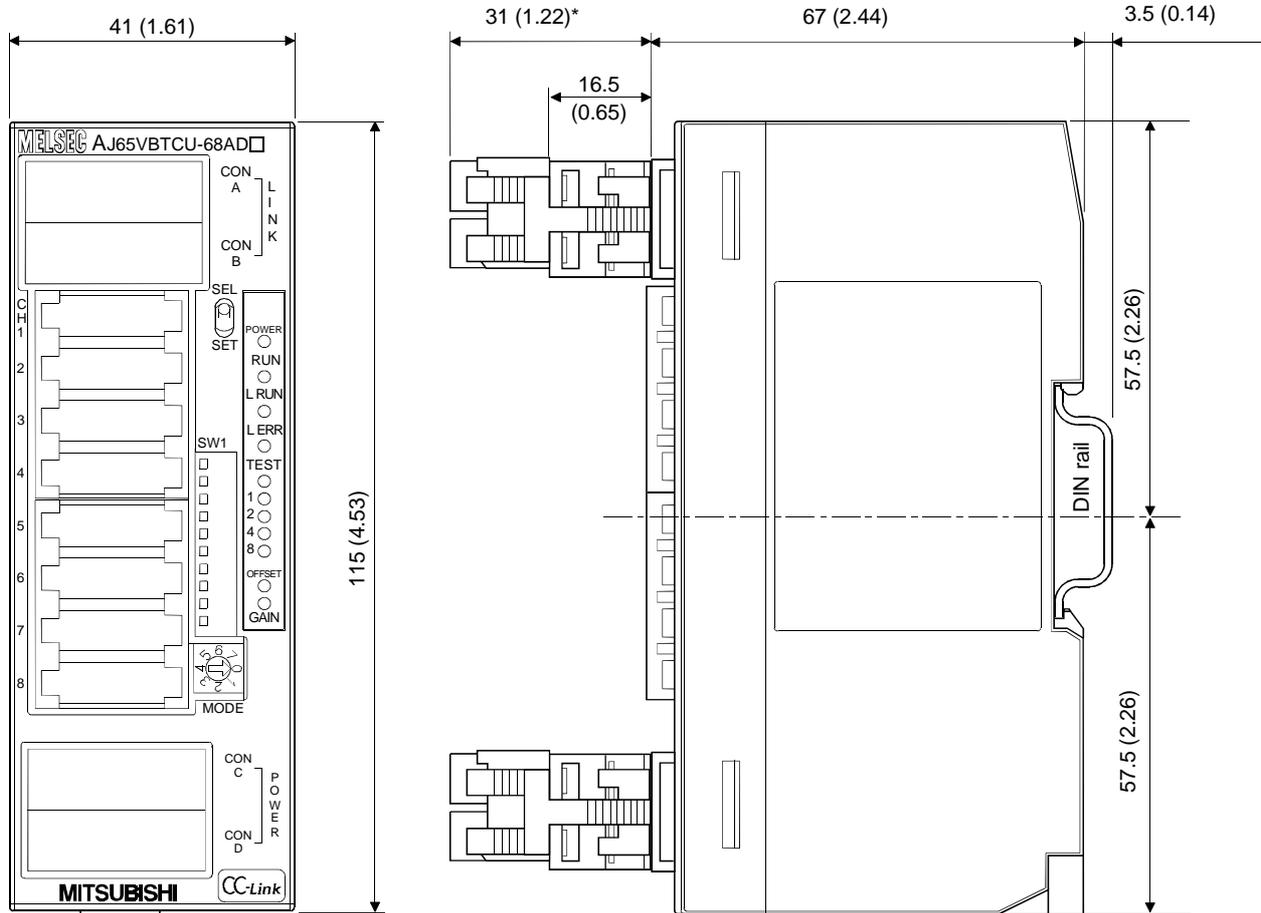
App

- (2) Differences between AJ65VBTCU-68ADV/ADI and AJ65SBT-64AD
Since the remote I/O signals, remote registers and so on differ, replacement cannot be made.
- The AJ65VBTCU-68ADV is a voltage input-dedicated model.
 - The AJ65VBTCU-68ADI is a current input-dedicated model.

Appendix2 External dimension diagram

The outline dimension drawing of the AJ65VBTCU-68ADV/ADI is shown below.

[AJ65VBTCU-68ADV/ADI]



* :This section should be 14.5mm (0.57inch) when an online connector is not installed.

Unit : mm (inch)

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WARRANTY

Please confirm the following product warranty details before starting use.

1. Gratis Warranty Term and Gratis Warranty Range

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

[Gratis Warranty Term]

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

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

[Gratis Warranty Range]

- (1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
- (2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
 1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
 2. Failure caused by unapproved modifications, etc., to the product by the user.
 3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
 4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
 5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
 6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
 7. Any other failure found not to be the responsibility of Mitsubishi or the user.

2. Onerous repair term after discontinuation of production

- (1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
- (2) Product supply (including repair parts) is not possible after production is discontinued.

3. Overseas service

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

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

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

5. Changes in product specifications

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

6. Product application

- (1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.
- (2) The Mitsubishi general-purpose programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or National Defense purposes shall be excluded from the programmable logic controller applications.

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

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

Analog-Digital Converter Module type AJ65VBTCU-68ADV/ADI

User's Manual

MODEL	AJ65V-68AD-U-SY-E
MODEL CODE	13JR41
SH(NA)-080181-B(0110)MEE	

 **MITSUBISHI ELECTRIC CORPORATION**

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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.