Digital-Analog Converter Module

User's Manual

MITSUBISHI

CC-Link/LT

CL2DA2-B

• 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 precautions are ranked as "DANGER" and "CAUTION".

⚠ DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in 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.
  Otherwise, erroneous output and malfunction may result in accidents.

⚠ CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, and do not install them close to each other.
  Keep a distance of 100mm (3.9inch) or more from each other.
  Not doing so could result in noise that would cause erroneous operation.
- At power ON/OFF, voltage or current may instantaneously be output from the output terminal of this module.
  In such case, wait until the analog output becomes stable to start controlling the external device.

A - 1

[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.
- Do not directly touch the module's conductive parts or electronic components. Doing so may cause malfunctions or failure of the module.
- Securely fix the module to a DIN rail or with mounting screws, and securely tighten the mounting screws within the specified torque range.
  Undertightening can cause a drop or malfunction.
  Overtightening can cause a drop or malfunction due to damage of the screws or module.

[Wiring Precautions]

⚠ DANGER

- Be sure to shut off all phases of the external power supply used by the system before installation or wiring. Not completely turning off all power could result in electric shock or damage to the product.

⚠ CAUTION

- Terminal screws which are not to be used must be tightened always.
  Otherwise there will be a danger of short circuit against the bare solderless terminals.
- Wire the module correctly after confirming the rated voltage and terminal layout of the product.
  Not doing so can cause a fire or failure.
- Tighten the terminal screws within the specified torque range.
  Undertightening can cause a short circuit or malfunction.
  Overtightening can cause a short circuit or malfunction due to damage of the screws or module.
- Ensure that no foreign matter such as chips and wire-offcuts enter the module.
  Foreign matter can cause a fire, failure or malfunction.

A - 2

[Starting and Maintenance Precautions]

⚠ DANGER

- Do not touch the terminals while power is on.
  Doing so could cause shock or erroneous operation.
- Be sure to shut off all phases of the external power supply used by the system before cleaning or retightening the terminal screws.
  Not doing so can cause the module to fail or malfunction.

⚠ CAUTION

- 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.
- Be sure to shut off all phases of the external power supply used by the system before mounting or dismounting the module to or from the panel.
  Not doing so can cause the module to fail or malfunction.
- Before handling the module, always touch grounded metal, etc. to discharge static electricity from the human body.
  Failure to do so can cause the module to fail or malfunction.

[Disposal Precautions]

⚠ CAUTION

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

A - 3

REVISIONS

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

Print Date	* Manual Number	Revision
Jan., 2005	SH(NA)-080418E-A	First edition

Japanese Manual Version SH-080416-A

INTRODUCTION

Thank you for purchasing the CC-Link/LT system remote module.
Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the CC-Link/LT system remote module you have purchased, so as to ensure correct use.

CONTENTS

About Manuals

The following manuals are related to this product.
Referring to this list, please request the necessary manuals.

Relevant Manuals

Manual Name	Manual Number (Model Code)
CC-Link/LT Master Module User's Manual QJ61CL12 Explains the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the QJ61CL12. (Sold separately)	SH-080351E (13JR62)
CC-Link - CC-Link/LT Bridge Module Type AJ65SBT-CLB User's Manual Explains the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the AJ65SBT-CLB. (Sold separately)	SH-080362E (13JR63)

Compliance with the EMC Directive and the Low Voltage Directive

For details on making Mitsubishi PLC conform to the EMC directive and low voltage instruction when installing it in your product, please see Chapter 3, "EMC Directive and Low Voltage Instruction" of the User's Manual (Hardware) of the CPU module to use.
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.
By making this product conform to the EMC directive and low voltage instruction, it is not necessary to make those steps individually.

About the Generic Terms and Abbreviations

Unless otherwise specified, the following generic terms and abbreviations are used in this manual to describe Type CL2DA2-B digital-analog converter module.

Generic Term/Abbreviation	Description
CL2DA2-B	Abbreviation for type CL2DA2-B digital-analog converter module.
QJ61CL12	Abbreviation for type QJ61CL12 CC-Link/LT master module.
AJ65SBT-CLB	Abbreviation for type AJ65SBT-CLB CC-Link - CC-Link/LT bridge module.
CC-Link/LT master module	Generic term for QJ61CL12 when they are used as master stations.
CC-Link master module	Generic term for QJ61BT11N, QJ61BT11, AJ61BT11, A1SJ61BT11, AJ61QBT11, A1SJ61QBT11 and A80BDE-J61BT11 when they are used as master stations.
Remote I/O station	Remote station that handles bit information only. (inputs/outputs data to/from external devices.)
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.
Remote I/O module	Remote module that handles bit unit data only. (Performs input and output with external devices.)
Remote device module	Remote module that handles bit unit and word unit data only. (Performs input and output with external devices, and analog data exchange.)
Remote module	Generic term for remote I/O module and remote device module.
QCPU (Q mode)	Generic term for Q00JCPU, Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU, Q12PHCPU, Q25PHCPU, Q12PRHCPU and Q25PRHCPU
QCPU (A mode)	Generic term for Q02CPU-A, Q02HCPU-A, Q06HCPU-A
GX Developer	Generic product name of the product types SWnD5C-GPPW, SWnD5C-GPPW-A, SWnD5C-GPPW-V and SWnD5C-GPPW-VA. (n in the type indicates 4 or more.)
Dedicated power supply	Module connected for power supply to CC-Link/LT system.
Power supply adapter	At least one power supply adapter is required for a system.

Packing List

The following gives the packing list of the CL2DA2-B.

Product name	Quantity
CL2DA2-B	1

A - 8

1 OVERVIEW

This user's manual explains the specifications, handling, programming methods and others of Type CL2DA2-B digital-analog converter module (hereafter abbreviated to the "CL2DA2-B") which is used as a remote device station of a CC-Link/LT system. The CL2DA2-B is a module designed to convert digital values (15-bit signed BIN data) into analog values (voltages or currents).

1.1 Features

This section gives the features of the CL2DA2-B.

(1) Smaller than CC-Link D/A converter module

Being the same size as the terminal block type CC-Link/LT remote I/O module (CL2X8-D1B2, CL2Y8-TP1B2), the CL2DA2-B is 55.7% less in volume than the CC-Link D/A converter module (AJ65SBT-62DA).

(2) Output range selectable per channel

You can choose the analog output range per channel to change the I/O conversion characteristics.

(3) Analog output hold/clear setting for communication cutoff

It can be specified whether the analog value output from each channel immediately before D/A conversion stops due to the cutoff of communication with the CC-Link/LT master module or AJ65SBT-CLB will be held or cleared.

(4) Number of occupied I/O points (number of occupied stations) changeable

The number of occupied I/O points (number of occupied stations) can be saved since it changes depending on the last conversion-enabled channel.
When only Channel 1 is enabled for conversion, the number of occupied I/O points is 16 points (one station occupied).

(5) Improved operability and maintainability

The station number setting switches, HOLD/CLEAR setting switch and analog output setting switches are placed on the module front to improve operability and maintainability.

(6) Simple dustproof shape for improved reliability

Without radiating fins, etc., the casing has a simple dustproof shape to prevent the ingress of wire cuttings, dust and others into the module, improving reliability.

(7) Six facing directions available for module installation

The CL2DA2-B can be installed in any of six different orientations using a DIN rail or module installation screws.
(There are no restrictions on the facing directions. see section 4.5.)

MEMO

1 - 2

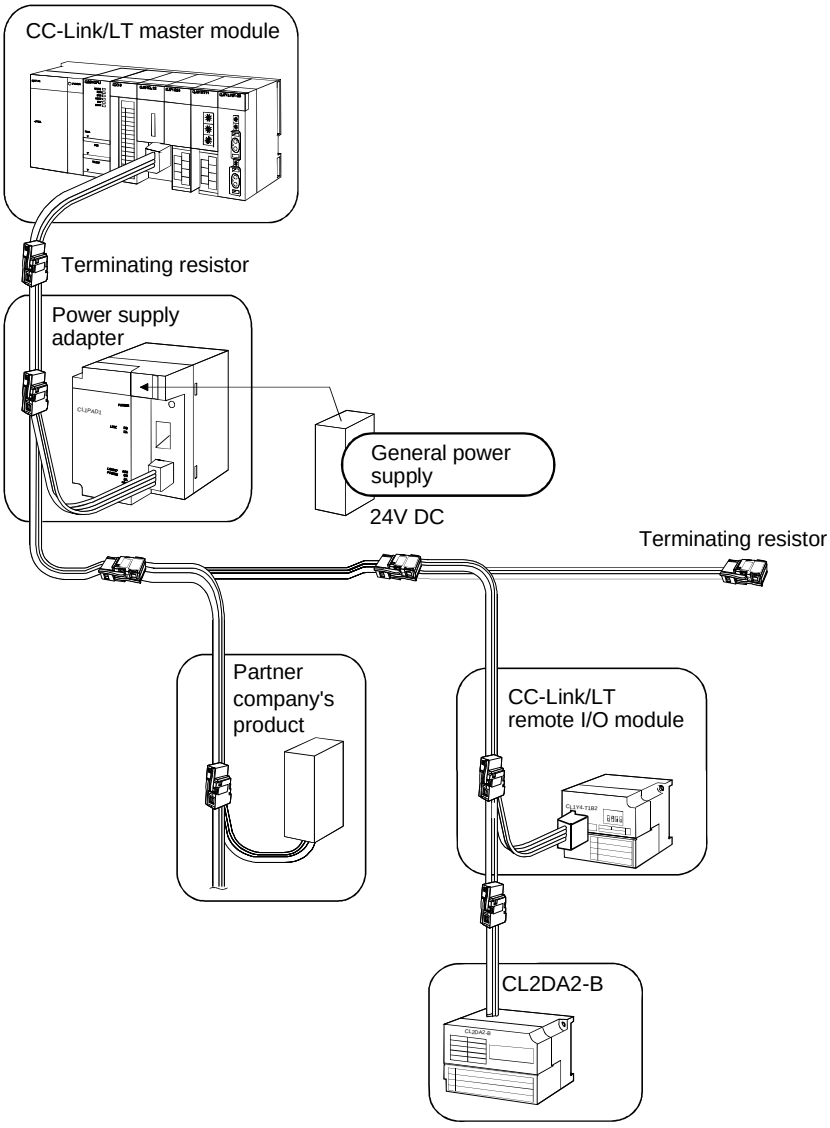
2 SYSTEM CONFIGURATION

This chapter describes the system configuration for use of the CL2DA2-B.

2.1 Overall Configuration

The overall configuration for use of the CL2DA2-B is shown below.

(1) When connected to the CC-Link/LT master module



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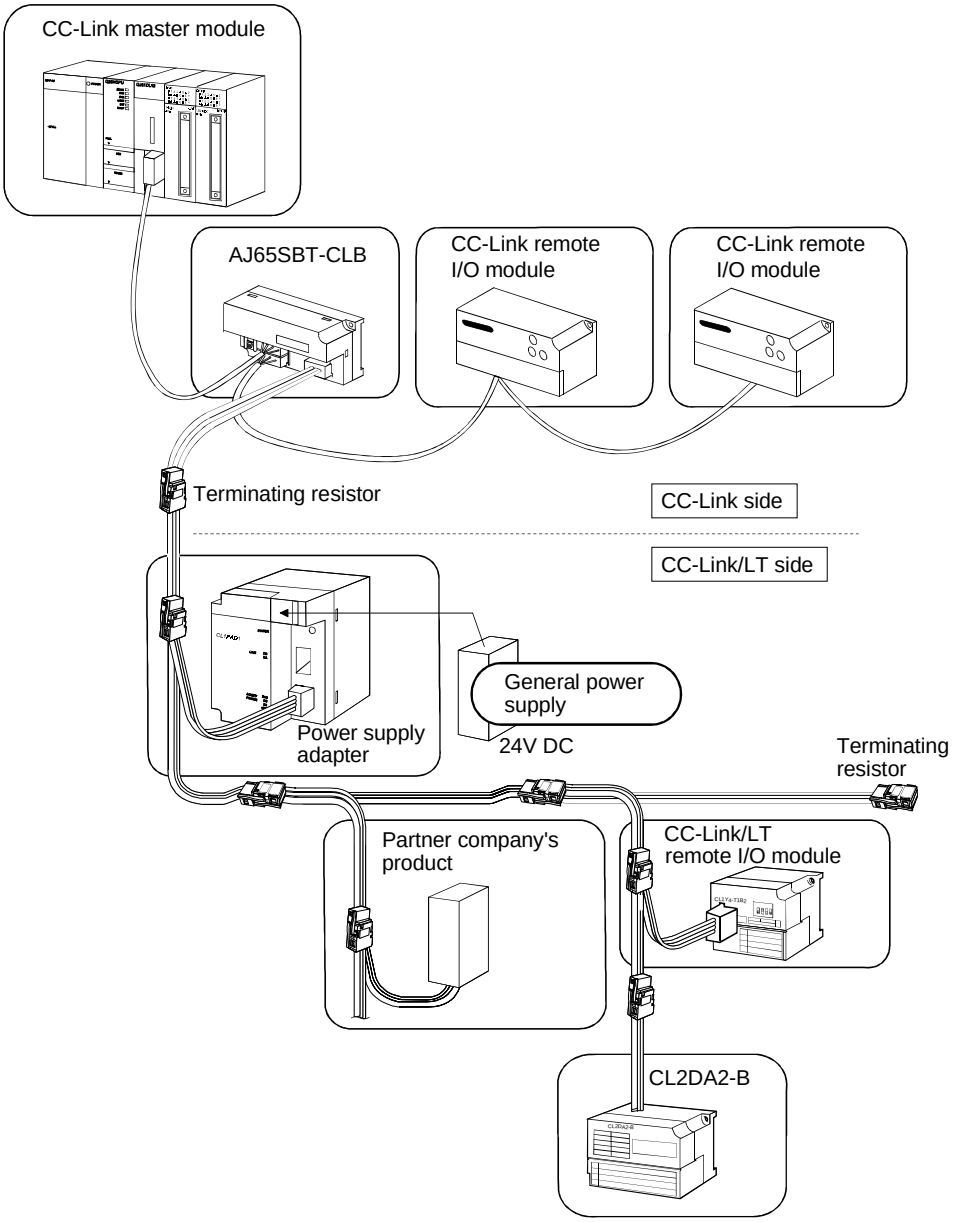
(2) When connected to the AJ65SBT-CLB



2 - 2

2.2 Applicable Module

The following modules can be used with the CL2DA2-B.

- QJ61CL12
- AJ65SBT-CLB

2.3 Notes on the System Configuration

This section explains the notes on the system configuration for use of the CL2DA2-B.

(1) Point mode setting

Set the point mode of the CC-Link/LT master module or AJ65SBT-CLB to the 16-point mode.
Any other mode setting will result in an error, causing the CC-Link/LT master module or AJ65SBT-CLB to turn on (flash if all stations are faulty) the "L ERR." LED, and the CL2DA2-B to turn off the "L RUN" LED and turn on the "L ERR." LED.

Using a remote module of less than 16 occupied I/O points in the 16-point mode will produce unassigned points.
For the concept of the point mode setting and occupied I/O point setting, refer to the user's manual of the used CC-Link/LT master module or AJ65SBT-CLB.

(2) Maximum number of connected stations

The CL2DA2-B can be connected within the occupied I/O point range of the CC-Link/LT master module or AJ65SBT-CLB.
The maximum number of connected modules varies depending on the number of occupied I/O points (number of occupied stations) of the CL2DA2-B.
Refer to Section 3.4 for the number of occupied I/O points (number of occupied stations).

(a) Maximum number of modules when connected to CC-Link/LT master module

Number of occupied I/O points of CC-Link/LT master module		16 points	32 points	48 points	64 points	128 points	256 points	512 points	1024 points
Number of occupied I/O points of CL2DA2-B (Number of occupied stations)	16 points (Occupies 1 station)	1	2	3	4	8	16	32	64
	32 points (Occupies 2 stations)	—	1	1	2	4	8	16	32

(b) Maximum number of modules when connected to AJ65SBT-CLB

Number of occupied I/O points of AJ65SBT-CLB		48 points	112 points	224 points
Number of occupied I/O points of CL2DA2-B (Number of occupied stations)	16 points (Occupies 1 station)	3	7	14
	32 points (Occupies 2 stations)	1	3	7

POINT

The maximum number of connected modules changes depending on the capacity of the dedicated power supply or power supply adaptor.
For details, refer to the user's manual of the dedicated power supply or power supply adaptor.

2 - 4

3 SPECIFICATIONS

This chapter provides the specifications of the CL2DA2-B.

3.1 General Specifications

Table 3.1 indicates general specifications of the CL2DA2-B.

Table 3.1 General Specifications

Item	Specifications					
Operating ambient temperature	0 to 55°C					
Storage ambient temperature	-25 to 75°C					
Operating ambient humidity	5 to 95%RH, non-condensing					
Storage ambient humidity	5 to 95%RH, non-condensing					
Vibration resistance	Conforming to JIS B 3502, IEC 61131-2		Frequency	Acceleration	Amplitude	Sweep count
		Under intermittent vibration	10 to 57Hz	———	0.075mm (0.003in.)	10 times each in X, Y, Z directions (for 80 min.)
			57 to 150Hz	9.8m/s^2	———	
		Under continuous vibration	10 to 57Hz	———	0.035mm (0.001in.)	
			57 to 150Hz	4.9m/s^2	———	
Shock resistance	Conforming to JIS B 3502, IEC 61131-2 (147 m/s^2, 3 times in each of 3 directions X, Y, Z)					
Operating ambience	No corrosive gases					
Operating altitude	Less than 2000m (6562ft.) ＊1					
Installation location	Inside control panel ＊2					
Overvoltage category ＊3	Less than II					
Pollution level ＊4	Less than 2					

＊1 : The equipment cannot be used under pressure higher than the atmospheric pressure of altitude 0m. Doing so can cause a failure.

＊2 : It can also be used in an environment other than on the control panel if the conditions such as operating ambient temperature and humidity are satisfied.

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

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

3.2 Performance Specifications

Table 3.2 indicates performance specifications of the CL2DA2-B.

Table 3.2 Performance Specifications

<table>
<tr><th colspan="2">Item</th><th>Specification</th></tr>
<tr><td rowspan="2">Digital input</td><td>Voltage</td><td>15-bit signed binary (-4096 to 4095)</td></tr>
<tr><td>Current</td><td>15-bit signed binary (-96 to 4095)</td></tr>
<tr><td rowspan="2">Analog output</td><td>Voltage</td><td>-10 to 10V DC (input resistance: 1kΩ to 1MΩ)</td></tr>
<tr><td>Current</td><td>0 to 20mA DC (external load resistance: 0 to 600Ω)</td></tr>
<tr><td colspan="2">I/O characteristics, maximum resolution, accuracy (accuracy relative to maximum value of analog output value)</td><td>
<table>
<tr><th rowspan="2"></th><th rowspan="2">Analog output range</th><th rowspan="2">Digital input value</th><th colspan="3">Accuracy</th><th rowspan="2">Max. resolution</th></tr>
<tr><th>Ambient temperature 25±5°C ＊1</th><th>Ambient temperature 0 to 55°C</th><th>Temperature coefficient ＊2</th></tr>
<tr><td rowspan="4">Voltage</td><td>-10 to 10V</td><td>-4000 to 4000</td><td rowspan="2">±0.2% (±20mV)</td><td rowspan="2">±0.4% (±40mV)</td><td rowspan="4">±80ppm/°C (±0.0080%/°C)</td><td>2.5mV</td></tr>
<tr><td>0 to 10V</td><td rowspan="3">0 to 4000</td><td>1.25mV</td></tr>
<tr><td>0 to 5V</td><td rowspan="2">±0.2% (±10mV)</td><td rowspan="2">±0.4% (±20mV)</td><td>1.0mV</td></tr>
<tr><td>1 to 5V</td><td>5μA</td></tr>
<tr><td rowspan="2">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td rowspan="2">±0.2% (±40μA)</td><td rowspan="2">±0.4% (±80μA)</td><td>4μA</td></tr>
<tr><td>4 to 20mA</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Conversion speed</td><td>200μs/2 channels</td></tr>
<tr><td colspan="2">Output short-circuit protection</td><td>Yes</td></tr>
<tr><td colspan="2">Absolute maximum output</td><td>Voltage : ±12 V, current : +21mA</td></tr>
<tr><td colspan="2">Number of analog output point</td><td>2 channels/1module</td></tr>
<tr><td colspan="2">CC-Link/LT station type</td><td>Remote device station</td></tr>
<tr><td colspan="2">Number of occupied stations</td><td>2 stations in 16-point mode ＊3</td></tr>
<tr><td colspan="2">Isolation specifications</td><td>
<table>
<tr><th>Specific isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Insulation resistance</th></tr>
<tr><td>Between communication system and analog outputs</td><td rowspan="3">Photocoupler isolation
Transformer isolation</td><td rowspan="3">500V AC for 1 minute</td><td rowspan="3">500V DC 10MΩ or more</td></tr>
<tr><td>Between power supply system and analog outputs</td></tr>
<tr><td>Between communication system and power supply line</td></tr>
<tr><td>Between channels</td><td>No insulation</td><td>—</td><td>—</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Connected terminal block</td><td>Direct type 14-point terminal block (M3 screw)</td></tr>
<tr><td colspan="2">Applicable wire size</td><td>0.3 to 1.25mm^2</td></tr>
<tr><td colspan="2">Applicable crimping terminal</td><td>RAV1.25-3 (in conformance with JIS C 2805), V1.25-3 (Japan Solderless Terminal Mfg. Co., Ltd.), 1.25-3, TG1.25-3(NICHIFU TERMINAL INDUSTRIES Co., Ltd.)</td></tr>
<tr><td colspan="2">Module installation method</td><td>DIN rail installation, mounted by screws of type M4 × 0.7 mm × 16 mm or larger
Can be installed in six directions</td></tr>
<tr><td colspan="2">Applicable DIN rail</td><td>TH35-7.5Fe, TH35-7.5Al, (in conformance with IEC 60715)</td></tr>
<tr><td rowspan="3">Module power supply ＊4</td><td>Voltage</td><td>24V DC (20.4V DC to 28.8V DC, ripple ratio: within 5%)</td></tr>
<tr><td>Current consumption</td><td>170mA</td></tr>
<tr><td>Current on startup</td><td>470mA</td></tr>
<tr><td colspan="2">Protection class</td><td>IP2X</td></tr>
<tr><td colspan="2">Weight</td><td>0.15kg</td></tr>
</table>

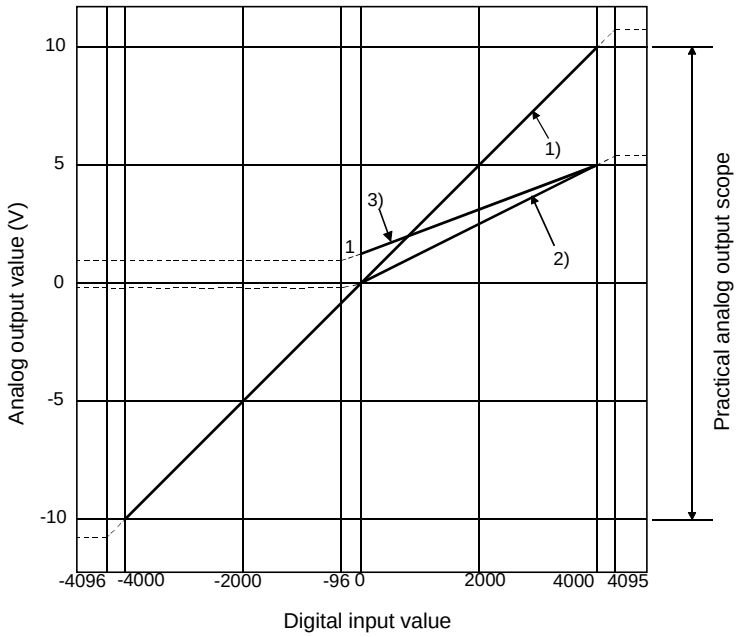
*1: Reference accuracy. (see section 3.3.3)
*2: Accuracy per temperature change of 1°C. (see section 3.3.3)
*3: The number of occupied I/O points (number of occupied stations) changes depending on the last channel enabled for conversion. (see section 3.4)
*4: Supplied by the dedicated power supply or power supply adaptor.

3.3 I/O Conversion Characteristics

An I/O conversion characteristic indicates an inclination of a straight line which connects an offset value and a gain value at the time when a digital value set from the PLC CPU is converted into an analog value (voltage or current output).
The offset value is an analog value (voltage or current) output when the digital value set from the PLC CPU is 0.
The gain value is an analog value (voltage or current) output when the digital value set from the PLC CPU is 4000.

3.3.1 Voltage output characteristics

The voltage output characteristic graph is shown below.



Number	Analog Output Range Setting	Offset Value	Gain Value	Digital Input Value	Maximum Resolution
1)	-10 to 10V	0V	10V	-4000 to 4000	2.5mV
	0 to 10V			0 to 4000	
2)	0 to 5V	0V	5V		1.25mV
3)	1 to 5V	1V	5V		1.0mV

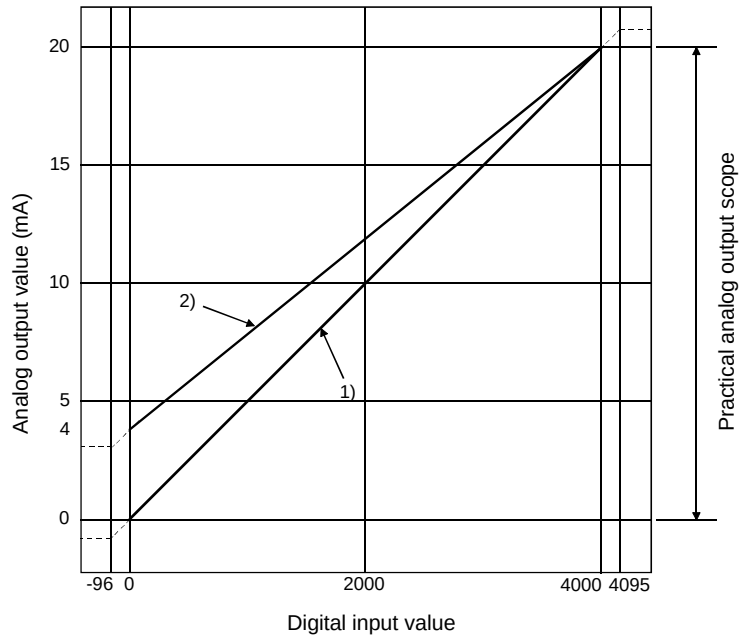
Fig. 3.1 Voltage Output Characteristic

POINT

Within the digital input and analog output scopes of each output 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.)

3.3.2 Current output characteristics

The current output characteristic graph is shown below.



Number	Analog Output Range Setting	Offset Value	Gain Value	Digital Input Value	Maximum Resolution
1)	0 to 20mA	0mA	20mA	0 to 4000	5μA
2)	4 to 20mA	4mA	20mA		4μA

Fig. 3.2 Current Output Characteristic

POINT
Within the digital input and analog output scopes of each output 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.)

3.3.3 Accuracy

Accuracy is relative to the maximum value of the analog output value.
If you change the output range to change the output characteristic, accuracy does not change and is held within the range indicated in the performance specifications.

Calculate the accuracy in the following method.
(Accuracy) = (Reference accuracy) + (Temperature coefficient)
× (Operating ambient temperature change)
Reference accuracy:
Accuracy when the operating ambient temperature is 25±5°C(±0.2%)
Temperature coefficient:
Accuracy for every 1°C change in temperature (±80ppm/°C (±0.0080%/°C))
Operating ambient temperature change:
Difference between the operating ambient temperature outside the range 25±5°C and the minimum/maximum range value

Example) Accuracy when the operating ambient temperature is 35°C
(±0.2%) + (±0.0080%/°C) × (35°C-30°C) = ±0.24%

(1) Accuracy of voltage output

For voltage output, the maximum value of the analog output value changes with the range.
For example, accuracy is relative to 5V when the 0 to 5V range is selected.
Analog output is provided at the accuracy of within ±0.2% (±10mV) when the operating ambient temperature is 25±5°C, or within ±0.4% (±20mA) when the operating ambient temperature is 0 to 55°C.

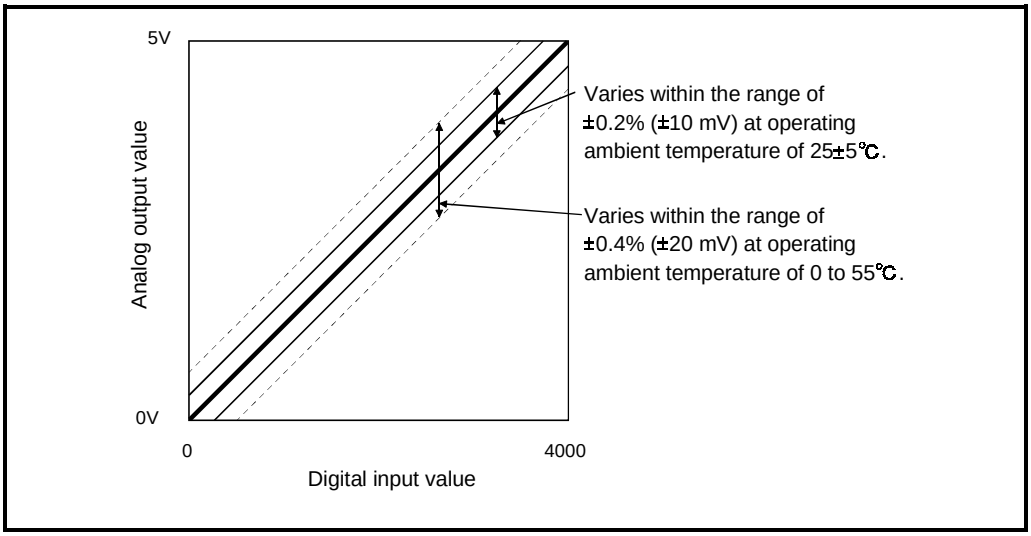


Fig. 3.3 Voltage Output Accuracy (When 0 to 5V Range Is Selected)

(2) Accuracy of current output

For current output, accuracy is relative to 20mA.
Analog output is provided at the accuracy of within ±0.2% (±40μA) when the operating ambient temperature is 25±5°C, or within ±0.4% (±80μA) when the operating ambient temperature is 0 to 55°C.

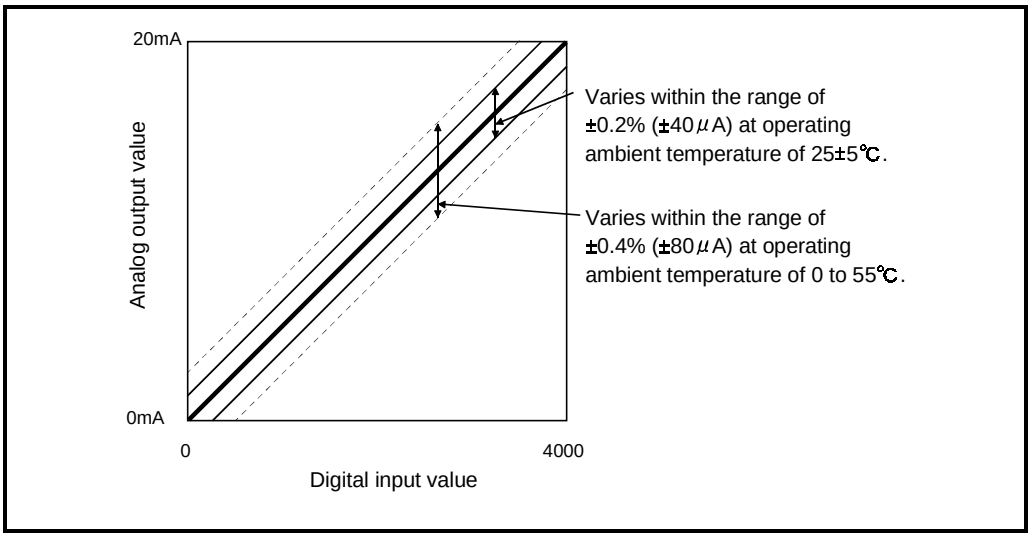


Fig. 3.4 Current Output Accuracy

3.3.4 Conversion speed

The conversion speed of the CL2DA2-B is fixed to 200μs independently of the number of conversion-enabled channels.

3.3.5 Output response time of remote station

This section explains the remote station output response time of the CL2DA2-B.
The remote station output response time is used in the calculation of the transmission delay time.
The remote station output response time of the CL2DA2-B is 0.4ms including the internal processing time.

0.2ms (conversion speed) × 2 = 0.4ms

[Transmission delay time]
The transmission delay time is the time from when the set digital value written to the device (Y) of the PLC CPU is read until an analog value is output after digital-to-analog conversion.
For how to calculate the link scan time, refer to the user's manual of the CC-Link/LT master module or AJ65SBT-CLB.

SM +LS × 2 + Output response time of remote station [ms]
SM : Sequence program scan time of master station
LS : Link scan time

Example) When the module is connected to the QJ61CL12, the transmission speed is 625kbps, the last station No. is 10, the sequence scan time of the master station is 5ms, the link scan time is 1.2ms, and the output response time of the remote station is 0.4ms

=5 + 1.2 × 2 + 0.4
=7.8ms

3.4 Function

The CL2DA2-B function list is shown in table 3.3.

Table 3.3 CL2DA2-B Function List

Item	Description	Reference Section
D/A conversion enable/disable function	(1) Specifies whether to enable or disable the D/A conversion for each channel. (2) The number of occupied I/O points (number of occupied stations) changes depending on the last channel enabled for conversion. For example, when only Channel 2 is enabled for conversion, the number of occupied I/O points is 32 points (occupies 2 stations). (3) Set this function using the analog output setting switches. (see section 4.3)	—
D/A output enable/disable function	(1) Whether the output of the D/A conversion value is enabled or disabled can be specified for each channel. (2) Set this function using the CH□ output enable/disable flag (YnF). (see section 3.5.2)	—
Output range changing function	(1) Can set the analog output range per channel to change the I/O conversion characteristics. (2) Set this function using the analog output setting switches. (see section 4.3)	—
Communication cutoff-time analog output hold/clear function (HOLD/CLEAR setting)	(1) It can be specified whether the analog value output from each channel immediately before D/A conversion stops due to the cutoff of communication with the CC-Link/LT master module or AJ65SBT-CLB will be held or cleared. (2) Set this function for all channels at once using the HOLD/CLEAR setting switch. (see section 4.3)	Section 3.4.1

3.4.1 Combinations of various functions

The analog output can be set as indicated in Table 3.4 and Table 3.5 by the combination of the D/A conversion enable/disable setting (analog output setting switches), CH□ output enable/disable flag (YnF) and HOLD/CLEAR setting (HOLD/CLEAR setting switch).
Make setting according to your application.

Table 3.4 List of Analog Output Status by Combinations in Case of CC-Link/LT Master Module Connection

Setting combination / Execution status	D/A conversion enable/disable setting	Enable			Disable
	CH□ output enable/disable flag	Enable (ON)		Disable (OFF)	Enable or disable
	HOLD/CLEAR setting	HOLD	CLEAR	HOLD or CLEAR	HOLD or CLEAR
Analog output status when the PLC CPU is in the RUN status		Output of the analog value after D/A conversion from the digital value specified by the PLC CPU		Offset value	0V/0mA
Analog output status when the PLC CPU is in the STOP status		Offset value (Not held)		Offset value	0V/0mA
Analog output status at PLC CPU stop error		The analog value before the "L RUN" LED turns OFF is held.	Offset value	Offset value	0V/0mA
Analog output status when a digital value setting error occurred		Output of the maximum or minimum analog value		Offset value	0V/0mA
Analog output status when a timeout error occurred		The analog value before the "L RUN" LED turns OFF is held.	Offset value	Offset value	0V/0mA
Analog output status when a communication data error occurred		The analog value converted from the digital value set from the PLC CPU during normal communication is output.		Offset value	0V/0mA
Analog output status when a setting switch error (station number setting, analog output setting switches) or point mode setting error occurred		0V/0mA	0V/0mA	0V/0mA	0V/0mA
Analog output status when "L ERR." LED flickers at fixed intervals (0.4s intervals)		Output of the analog value after D/A conversion from the digital value specified by the PLC CPU		Offset value	0V/0mA
Analog output status when a watchdog timer error occurred		0V/0mA	0V/0mA	0V/0mA	0V/0mA

Table 3.5 List of Analog Output Status by Combinations in Case of AJ65SBT-CLB Connection

Setting combination / Execution status	D/A conversion enable/disable setting	Enable			Disable
	CH□ output enable/disable flag	Enable (ON)		Disable (OFF)	Enable or disable
	HOLD/CLEAR setting	HOLD	CLEAR	HOLD or CLEAR	HOLD or CLEAR
When a communication error occurs between the CC-Link master station and AJ65SBT-CLB		The analog value before the "L RUN" LED turns OFF is held.	Offset value	Offset value	0V/0mA
When a communication error occurs between the AJ65SBT-CLB and CL2DA2-B		The analog value before the "L RUN" LED turns OFF is held.	Offset value	Offset value	0V/0mA

3.5 Remote I/O Signal

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

3.5.1 Remote I/O signal list

The remote input (X) means the input signal from the CL2DA2-B to the CC-link/LT master module or AJ65SBT-CLB, and the remote output (Y) means the output signal from the CC-link/LT master module or AJ65SBT-CLB to the CL2DA2-B.

The numbers of remote input (X) and remote output (Y) points change depending on the number of occupied CL2DA2-B stations.

When occupies 1 station : X00 to X0F, Y00 to Y0F
When occupies 2 stations : X00 to X1F, Y00 to Y1F

The remote I/O numbers (X/Y) change depending on the following conditions.

When connected to CC-Link/LT master module
- Start I/O numbers of CC-Link/LT master module
- Station number of CL2DA2-B

When connected to AJ65SBT-CLB
- Station number of AJ65SBT-CLB
- Station number of CL2DA2-B

The remote I/O numbers (X/Y) in this chapter and later are indicated under the following conditions.

- Start I/O number of CC-Link/LT master module: 0
- Station number of CL2DA2-B: 1

Table 3.6 indicates the assignment and names of the remote I/O signals.

Table 3.6 Remote I/O Signals List

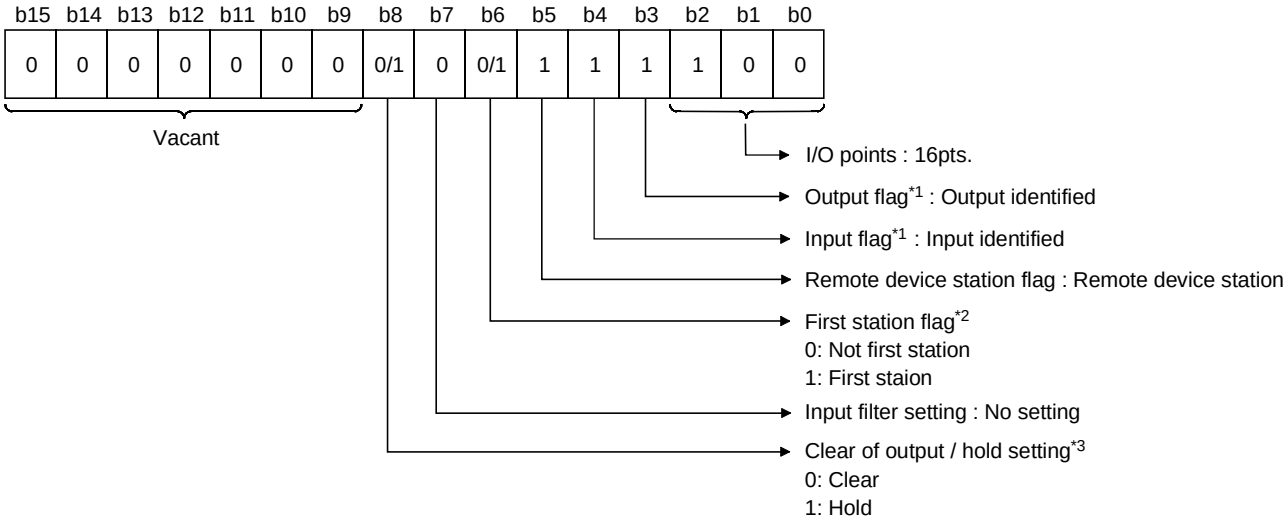
Signal direction: CL2DA2-B → CC-Link/LT master module/AJ65SBT-CLB		Signal direction: CC-Link/LT master module/ AJ65SBT-CLB → CL2DA2-B		Remote I/O point
Remote input(X)	Signal name	Remote output(Y)	Signal name	
X00 to X1F	Use prohibited	Y00 to Y0E	CH1 digital value setting	16 points (Occupies 1 station)
		Y0F	CH1 output enable/disable flag	
		Y10 to Y1E	CH2 digital value setting	32 points (Occupies 2 stations)
		Y1F	CH2 output enable/disable flag	

POINT

The reserved devices given in Table 3.6 are used by the system and cannot be used by the user.

REMARK

When the CL2DA2-B is connected to the QJ61CL12, the following information is stored in the detailed remote station information area (buffer memory address 32 to 95: Un\G32 to Un\G95).

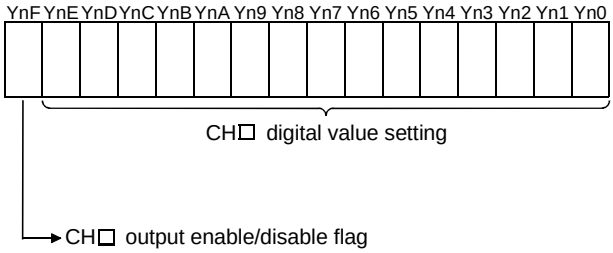


*1 In the case of the CL2DA2-B, 11 are stored to be, b4.
*2 For a module that has 2 occupied stations, only the bit of the first station will turn on.
*3 This depends on the setting of the HOLD/CLEAR setting switch on the CL2DA2-B.

3.5.2 Functions of the remote I/O signals

Table 3.7 explains the functions of the remote I/O signals of the CL2DA2-B.
"n" in the table is determined by the channel, starting I/O number and station number.

Table 3.7 Remote I/O Signal Details

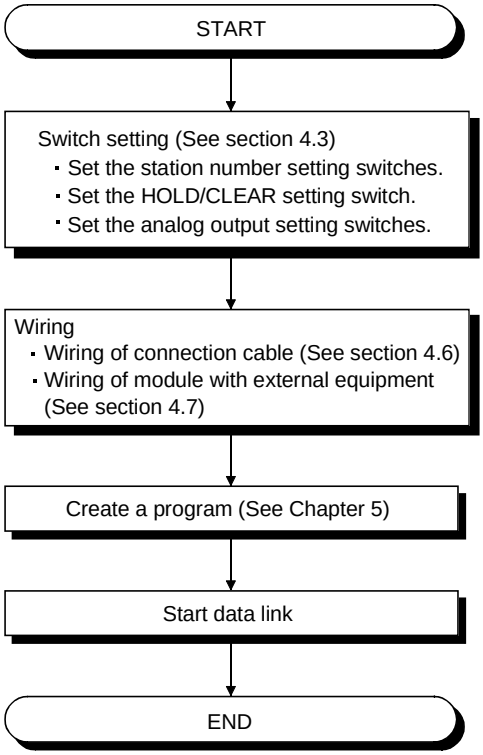
<table>
<tr><th>Device No.</th><th>Signal Name</th><th>Description</th></tr>
<tr><td>Yn0
to
YnE</td><td>CH□ digital value setting</td><td>(1) This area is used to write digital values for performing D/A conversion from the PLC CPU as 15-bit signed binary code.
 

(2) When the digital value setting is outside the valid range, D/A conversion will be performed as described below.
<table>
<tr><th>Output range setting</th><th>Valid range (practical range)</th><th>Digital value that is set when a value outside the valid range is written</th></tr>
<tr><td>-10 to 10V</td><td>-4096 to 4095
(practical range: -4000 to 4000)</td><td>4096 or larger: 4095
-4097 or smaller: -4096</td></tr>
<tr><td>4 to 20mA</td><td rowspan="5">-96 to 4095
(practical range: 0 to 4000)</td><td rowspan="5">4096 or larger: 4095
-97 or smaller: -96</td></tr>
<tr><td>0 to 20mA</td></tr>
<tr><td>1 to 5V</td></tr>
<tr><td>0 to 5V</td></tr>
<tr><td>0 to 10V</td></tr>
</table>
</td></tr>
<tr><td>XnF</td><td>CH□ output enable/disable flag</td><td>(1) Set whether the output of the D/A conversion value is enabled or disabled for each channel.
ON: output enable OFF: output disable</td></tr>
</table>

4 SETUP AND PROCEDURES BEFORE OPERATION

4.1 Pre-operation Procedure

This section explains the preparatory procedure for operating the CL2DA2-B.



4.2 Precautions when Handling

The precautions when handling the CL2DA2-B are described below:

⚠ DANGER	• Be sure to shut off all phases of the external power supply used by the system before installation or wiring. Not completely turning off all power could result in electric shock or damage to the product. • Do not touch the terminals while power is on. Doing so could cause shock or erroneous operation. • Be sure to shut off all phases of the external power supply used by the system before cleaning or retightening the terminal screws. Not doing so can cause the module to fail or malfunction.

⚠ CAUTION	• Ensure that no foreign matter such as chips and wire-offcuts enter the module. Foreign matter can cause a fire, failure or malfunction. • Never disassemble or modify the module. This may cause breakdowns, malfunctioning, injury and/or fire. • Do not directly touch the module's conductive parts or electronic components. Doing so may cause malfunctions or failure of the module.

⚠ CAUTION

- When disposing of this product, treat it as industrial waste.
- 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 with mounting screws, and securely tighten the mounting screws within the specified torque range. Undertightening can cause a drop or malfunction. Overtightening can cause a drop or malfunction due to damage of the screws or module.
- Be sure to shut off all phases of the external power supply used by the system before mounting or dismounting the module to or from the panel.
  Not doing so can cause the module to fail or malfunction.
- Before handling the module, always touch grounded metal, etc. to discharge static electricity from the human body.
  Failure to do so can cause the module to fail or malfunction.

(1) Tighten the terminal screws for the module to the specified torque shown below.

Screw location	Clamping torque range
Module mounting screw (M4 screw)	78 to 108 N ▪ cm
Terminal block terminal screw (M3 screw)	42 to 58 N ▪ cm

(2) When using a DIN rail, attach the DIN rail after taking the following items into consideration:

(a) Applicable DIN rail types (conform to IEC 60715)
TH35-7.5Fe
TH35-7.5Al

(b) Interval between the DIN rail's installation screws
Tighten the screws using a pitch of 200mm (7.87in.) or less when attaching a DIN rail.

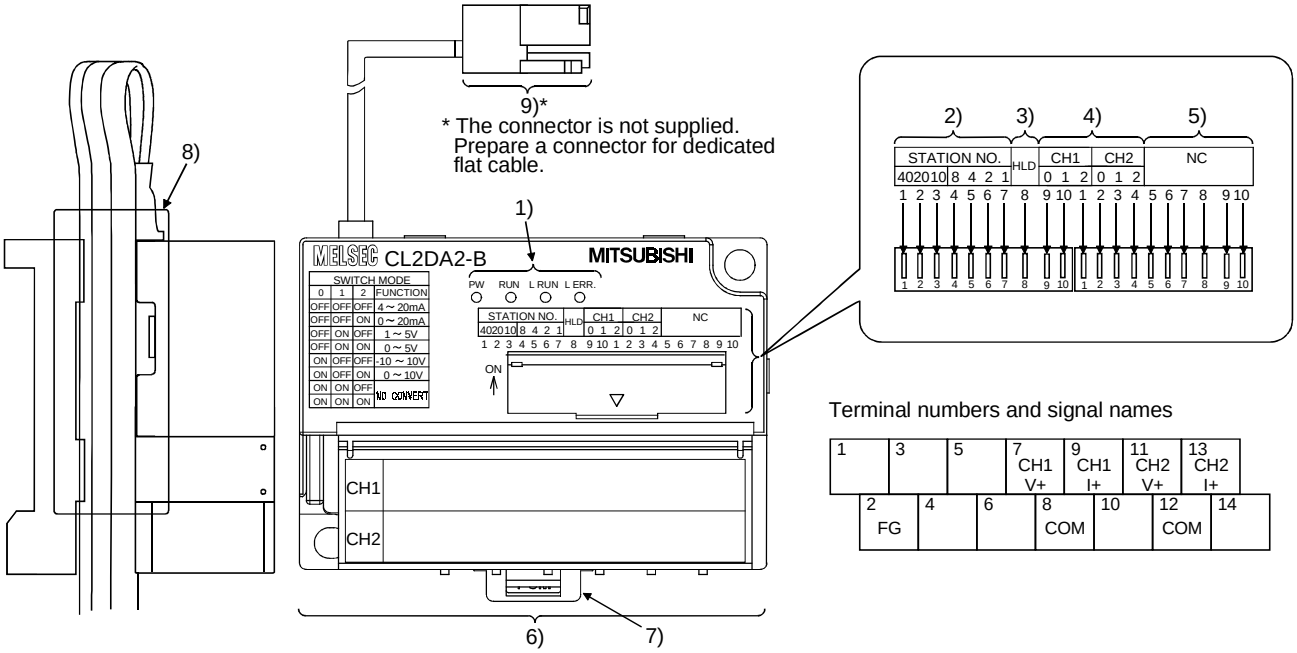
(3) To attach the CL2DA2-B to the DIN rail, press the centerline area of the DIN rail hook beneath the module until a click is heard.

(4) Maintain some distance between the module and other components and parts, 10 mm (0.39in.) from the top and 60 mm (2.36in.) from the bottom of the module, in order to improve ventilation and to make replacement of the module easy if a CL2DA2-B is installed on a board.

(5) Install the CL2DA2-B on a level surface.
If the surface is uneven, unnecessary force is applied to the printed circuit board, causing malfunctions.

4.3 Part Identification Nomenclature

The name of each part in the CL2DA2-B is listed below.



Number	Name	Description	
1)	Operation status display LED	PW LED	ON : Power supply on OFF : The power supply is turned off The voltage drop is too large
		RUN LED	ON : Normal operation Flickering : When the set digital value is outside the valid range When the analog output setting switches are set to disable the conversion of all channels When the analog output setting switch or HOLD/CLEAR setting switch setting was changed during operation When the NC switch is ON OFF : Watchdog timer error Fault in hardware
		L RUN LED	ON : Normal communication OFF : Communication cut off (timeout error)
		L ERR. LED	ON : When a communication data error occurred When the station number setting switch setting is outside the valid range When other than the 16-point mode is set Communication cut off (timeout error) When the analog output setting switches are set to disable the conversion of all channels Flickering at fixed intervals (0.4s intervals): When the station number setting switch setting was changed from the power-on setting. Flickering at unfixed intervals: When the terminating resistor was not installed When the module or connection cable is affected by noise OFF : Indicates normal communications

<table>
<tr><th>Number</th><th>Name</th><th>Description</th></tr>
<tr><td>2)</td><td>Station number setting switch</td><td>
Select "10", "20" or "40" to set the ten's place of the station number.
Select "1", "2", "4" or "8" to set the one's place of the station number.
Always set the station number within the range of 1 to 64.
Setting of other than 1 to 64 will result in an error, turning ON the "L ERR." LED.
The same station number cannot be used more than once.
(Factory default: All OFF)
<table>
<tr><th rowspan="2">Station number</th><th colspan="3">Ten's place</th><th colspan="4">One's place</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>
<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>
</table>
(Example) Set the switches as below when setting the station number to 32:
<table>
<tr><th rowspan="2">Station number</th><th colspan="3">Ten's place</th><th colspan="4">One's place</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>
<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>
</table>
</td></tr>
<tr><td>3)</td><td>HOLD/CLEAR setting switch</td><td>
Set whether the analog value is to be held or cleared in the event of communication cutoff (one setting for all channels).
OFF: Clear
ON: Hold
(Factory default: OFF(Clear))
</td></tr>
<tr><td>4)</td><td>Analog output setting switch</td><td>
Set the D/A conversion enable/disable and output range to each channel.
Set the unused channel to conversion disable.
<table>
<tr><th colspan="2" rowspan="2">Output range</th><th colspan="3">Setting switches</th></tr>
<tr><th>0</th><th>1</th><th>2</th></tr>
<tr><td rowspan="6">Conversion enable</td><td>4 to 20mA</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>0 to 20mA</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>1 to 5V</td><td>OFF</td><td>ON</td><td>OFF</td></tr>
<tr><td>0 to 5V</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>-10 to 10V</td><td>ON</td><td>OFF</td><td>OFF</td></tr>
<tr><td>0 to 10V</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td colspan="2" rowspan="2">Conversion disable</td><td>ON</td><td>ON</td><td>OFF</td></tr>
<tr><td>ON</td><td>ON</td><td>ON</td></tr>
</table>
(Factory default: All OFF (4 to 20mA))
</td></tr>
<tr><td>5)</td><td>NC</td><td>Must not be used. (Used by the system and unavailable for the user. Keep this switch OFF. If it is turned ON, the RUN LED flickers.)</td></tr>
<tr><td>6)</td><td>Terminal block</td><td>Terminal block for connection of the I/O signals.</td></tr>
</table>

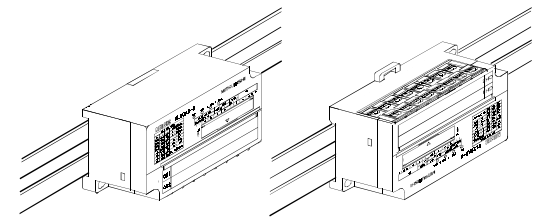
Number	Name	Description
7)	DIN rail hook	Used to mount the module to the DIN rail.
8)	Cable guide	Guide used when wiring the CC-Link/LT dedicated flat cable of the CL2DA2-B downward. (See section 4.6)
9)	CC-Link/LT interface connector	Connector for connection of the CC-Link/LT communication line or module power supply (Sold separately).

4.4 Station Number Setting

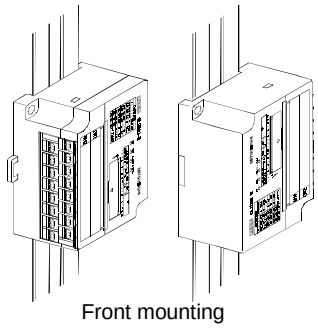
The remote I/O signals (X/Y) are determined by the station number setting of the CL2DA2-B.
For details, refer to the user's manual of the used CC-Link/LT master module or AJ65SBT-CLB.

4.5 Facing Direction of the Module Installation

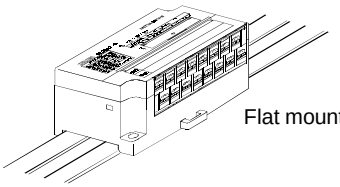
The CL2DA2-B may be installed in any of six directions.
(There are no restrictions on the facing directions.)



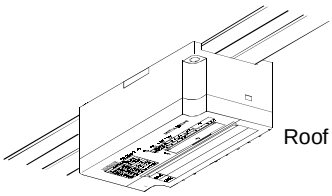
Front mounting



Front mounting



Flat mounting



Roof mounting

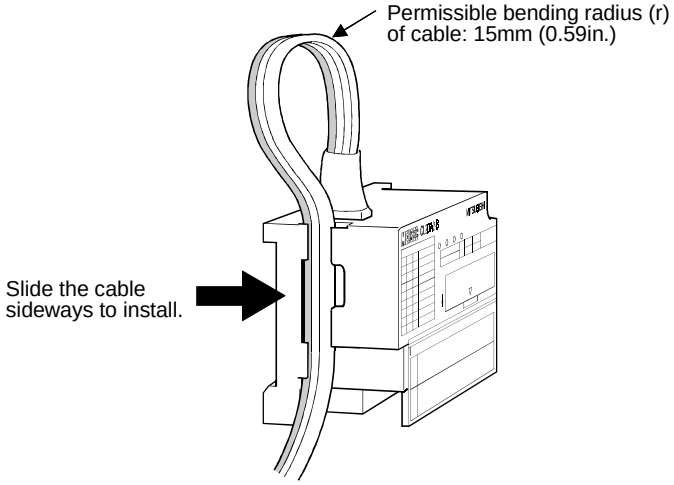
4 - 5

4.6 Wiring of Connection Cable

For the wiring of the connection cable for connection of the CL2DA2-B and CC-Link/LT master module/AJ65SBT-CLB, refer to the user's manual of the used CC-Link/LT master module or AJ65SBT-CLB.

(1) When the CL2DA2-B is connected to the drop line of the VCTF or high flexible cable, the CC-Link/LT dedicated flat cable of the CL2DA2-B must be fabricated to 20cm (7.87in.) or less.

(2) The CC-Link/LT dedicated flat cable of the CL2DA2-B can be wired downward by use of the cable guide.
The permissible bending radius (r) of the CC-Link/LT dedicated flat cable of the CL2DA2-B is 15mm (0.59in.).



4.7 Wiring

This section provides the precautions for wiring the CL2DA2-B and its wiring with external equipment.

4.7.1 Wiring precautions

To obtain maximum performance from the functions of CL2DA2-B and improve the system reliability, an external wiring with high durability against noise is required.
The precautions when performing external wiring are as follows:

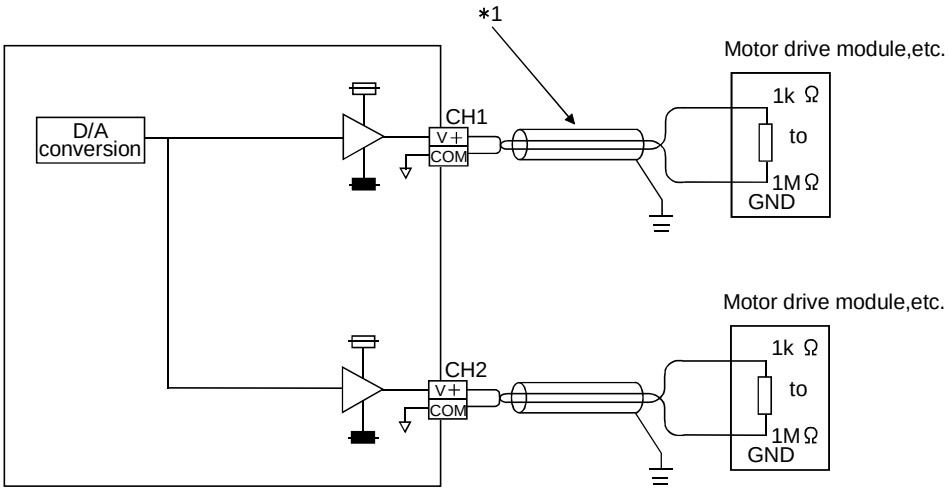
(1) Use separate cables for the AC and CL2DA2-B external output signals, in order not to be affected by the AC side surge or conductivity.

(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) Ground the shield wires or shield cables at one end on the external device side.

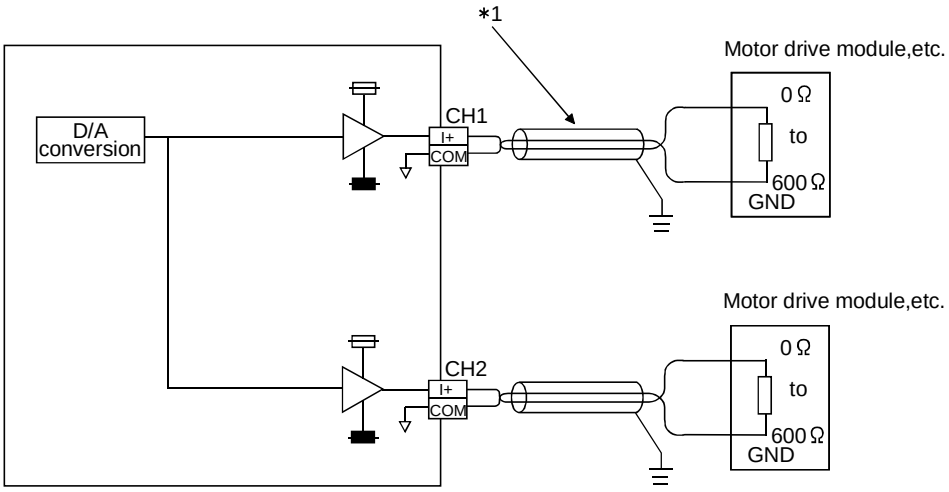
4.7.2 Wiring of module with external equipment

(1) For voltage output



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

(2) For current output



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

4.8 Check of Wiring

Using the program in Chapter 5, check the wiring.

4.9 Maintenance and Inspection

There are no special inspection items for the CL2DA2-B 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

This chapter describes the programming of the CL2DA2-B.
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 used CC-Link/LT master module or AJ65SBT-CLB for the CC-Link/LT master module/AJ65SBT-CLB, and refer to the AnSHCPU/AnACPU/AnUCPU/QCPU-A (A Mode) Programming Manual (Dedicated Instructions) for details of the dedicated instructions.

5.1 Precautions on Programming

The following explains precautions on the creation of a program:

(1) CH□ digital value setting and CH□ output enable/disable flag setting

For the CH□ digital value setting (Yn0 to YnE) and CH□ output enable/disable flag (YnF), create a sequence program so that the setting is stored into the word devices once and then finally written to the Y signal areas.
If a program in which these data are directly written to the Y signal areas (sequence program as shown in Fig. 5.1), the Y signal (YnF) may turn OFF instantaneously.

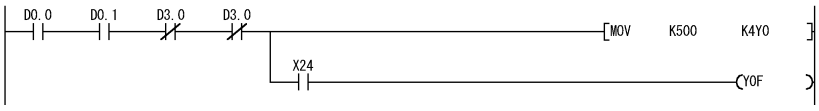


Fig. 5.1

In the following program example, the CH□ digital value setting (Yn0 to YnE) and CH□ output enable/disable flag (YnF) setting are stored into the "digital value setting, output enable/disable flag storing data registers (D11, D12)" and then are written to the Y signal areas.

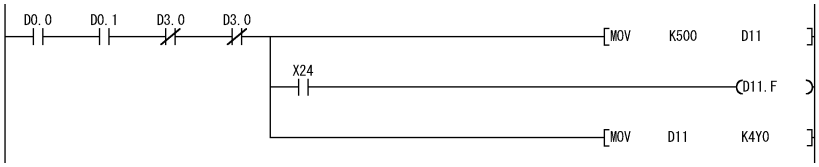
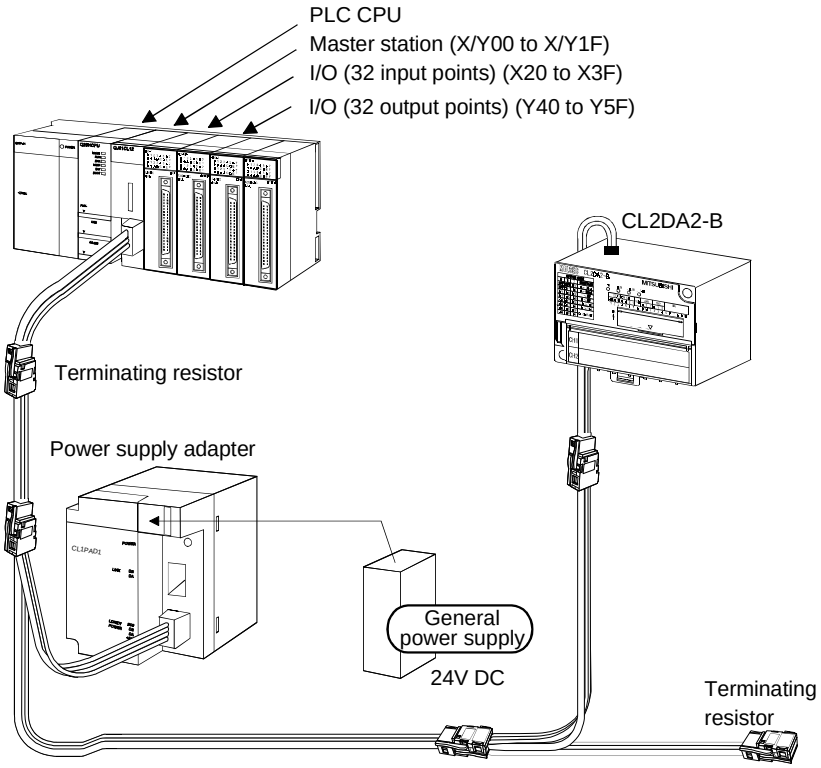


Fig. 5.2

5.2 Conditions of Program Examples (when connected to QJ61CL12)

The program example of Section 5.2.1 is created under the following conditions.

(1) System configuration



(a) Master station settings

Item	Settings
Number of occupied I/O points setting	32 points (X/Y00 to X/Y1F)
Transmission rate setting	2.5Mbps
Point mode setting	16-point mode
Last station number setting	2

(b) CL2DA2-B settings

Item	Settings
Station number setting	Station number 1
Number of occupied stations setting	Occupies 2 stations
CH1 output range setting	0 to 5V
CH2 output range setting	4 to 20mA
HOLD/CLEAR setting	HOLD

(2) Device assignment to program examples

The devices used in the program example of Section 5.2.1 are shown below.

(a) Remote I/O (X/Y)

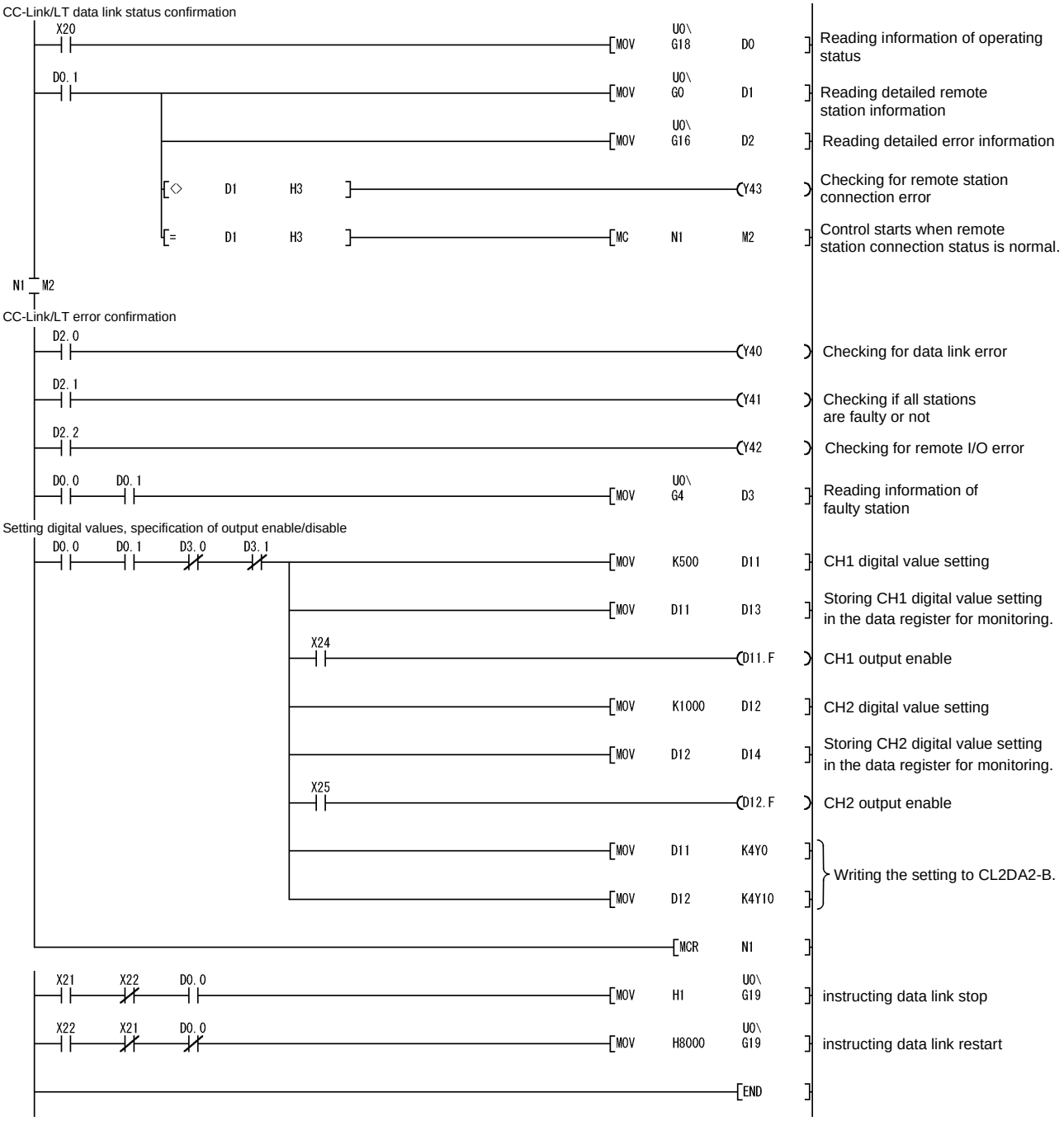
Station No.	Model Name	Input		Output		Station No.	Model Name	Input		Output	
1	CL2DA2-B (Occupies 2 stations)	X 00	Use prohibited	Y 00	CH1 digital value setting	3		X 20		Y 20	
		X 01		Y 01				X 21		Y 21	
		X 02		Y 02				X 22		Y 22	
		X 03		Y 03				X 23		Y 23	
		X 04		Y 04				X 24		Y 24	
		X 05		Y 05				X 25		Y 25	
		X 06		Y 06				X 26		Y 26	
		X 07		Y 07				X 27		Y 27	
		X 08		Y 08				X 28		Y 28	
		X 09		Y 09				X 29		Y 29	
		X 0A		Y 0A				X 2A		Y 2A	
		X 0B		Y 0B				X 2B		Y 2B	
		X 0C		Y 0C				X 2C		Y 2C	
		X 0D		Y 0D				X 2D		Y 2D	
		X 0E		Y 0E				X 2E		Y 2E	
		X 0F		Y 0F	CH1 output enable/ disable flag			X 2F		Y 2F	
2	CL2DA2-B (Occupies 2 stations)	X 10	Use prohibited	Y 10	CH2 digital value setting	4		X 30		Y 30	
		X 11		Y 11				X 31		Y 31	
		X 12		Y 12				X 32		Y 32	
		X 13		Y 13				X 33		Y 33	
		X 14		Y 14				X 34		Y 34	
		X 15		Y 15				X 35		Y 35	
		X 16		Y 16				X 36		Y 36	
		X 17		Y 17				X 37		Y 37	
		X 18		Y 18				X 38		Y 38	
		X 19		Y 19				X 39		Y 39	
		X 1A		Y 1A				X 3A		Y 3A	
		X 1B		Y 1B				X 3B		Y 3B	
		X 1C		Y 1C				X 3C		Y 3C	
		X 1D		Y 1D				X 3D		Y 3D	
		X 1E		Y 1E				X 3E		Y 3E	
		X 1F		Y 1F	CH2 output enable/ disable flag			X 3F		Y 3F	

5 - 3

(b) Device used by user

Device	Application	Device	Application
X20	CC-Link/LT control start signal	X24	CH1 output enable signal
X21	Data link stop instruction signal	X25	CH2 output enable signal
X22	Data link restart instruction signal	—	
Y40	Data link error confirmation signal	Y42	Remote I/O error confirmation signal
Y41	All station fault confirmation signal	Y43	Remote station error confirmation signal
M2	Control start flag	—	
D0	Data register for reading information of operating status	D11	CH1 digital value setting, output enable/disable flag storing data register
D1	Data register for reading information of remote station connection	D12	CH2 digital value setting, output enable/disable flag storing data register
D2	Data register for reading detailed error information	D13	CH1 digital value setting monitoring data register
D3	Data register for reading information of faulty station	D14	CH2 digital value setting monitoring data register

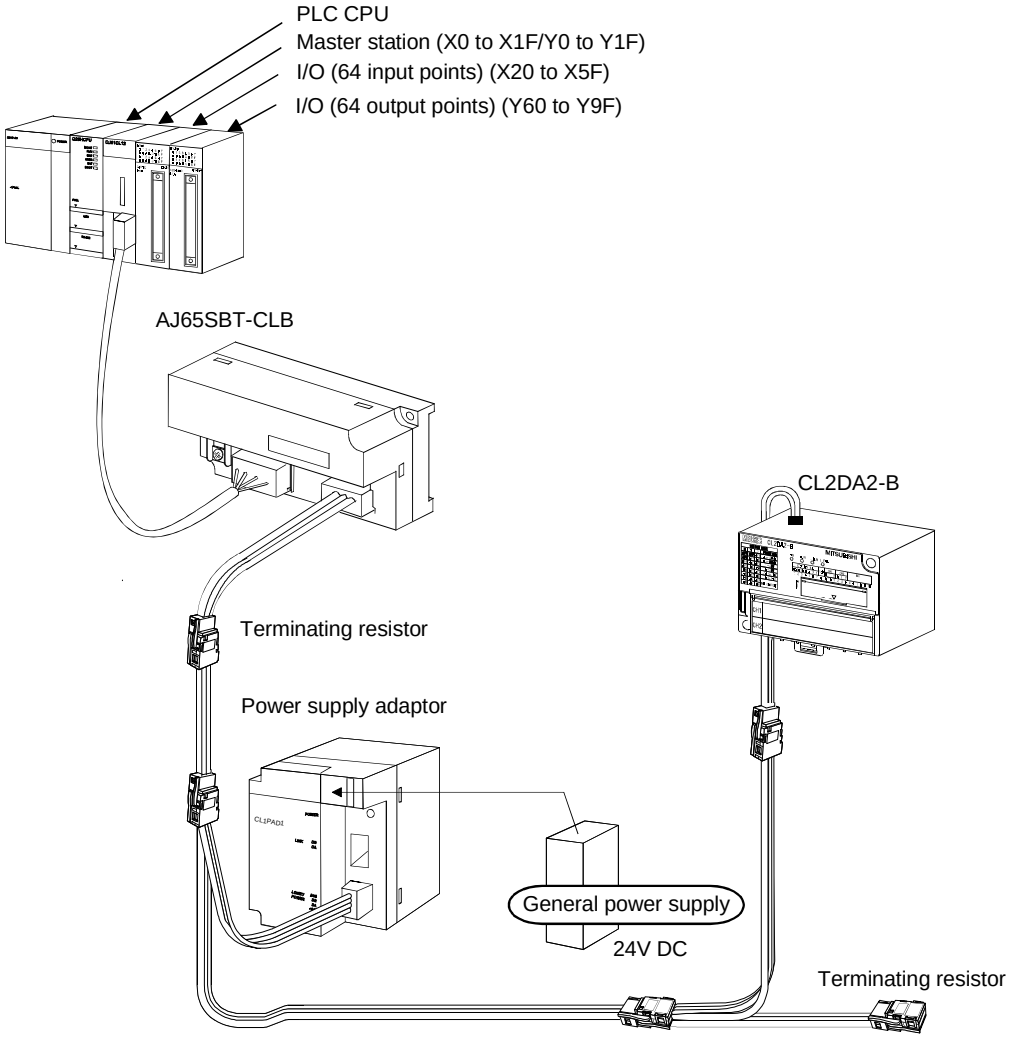
(3) Program example



5.3 Conditions of Program Examples (when connected to AJ65SBT-CLB)

The program examples of Sections 5.3.1 to 5.3.4 are created under the following conditions.

(1) System configuration



(a) Master station settings

Item	Settings
Number of occupied I/O points setting	32 points (X/Y00 to X/Y1F)
Transmission rate setting	156 kbps

5 - 6

(b) AJ65SBT-CLB settings

Item	Settings
Station number setting (CC-Link side)	Station number 1
Number of occupied stations setting (CC-Link side)	Occupies 4 stations
Transmission rate setting (CC-Link side)	156 kbps
Point mode setting (CC-Link/LT side)	16-point mode
Transmission rate setting (CC-Link/LT side)	156 kbps
Last station number setting (CC-Link/LT side)	2

(c) CL2DA2-B settings

Item	Settings
Station number setting	Station number 1
Number of occupied stations setting	Occupies 2 stations
CH1 output range setting	0 to 5V
CH2 output range setting	4 to 20mA
HOLD/CLEAR setting	HOLD

5 - 7

(2) Device assignment to program examples

The devices used in the program example of Section 5.3.1 to 5.3.4 are shown below.

(a) Remote I/O (X/Y)

Station No.	Model Name	Input		Output		Station No.	Model Name	Input		Output	
1	CL2DA2-B (Occupies 2 stations)	X 400	Use prohibited	Y 400	CH1 digital value setting	3		X 420		Y 420	
		X 401		Y 401				X 421		Y 421	
		X 402		Y 402				X 422		Y 422	
		X 403		Y 403				X 423		Y 423	
		X 404		Y 404				X 424		Y 424	
		X 405		Y 405				X 425		Y 425	
		X 406		Y 406				X 426		Y 426	
		X 407		Y 407				X 427		Y 427	
		X 408		Y 408				X 428		Y 428	
		X 409		Y 409				X 429		Y 429	
		X 40A		Y 40A				X 42A		Y 42A	
		X 40B		Y 40B				X 42B		Y 42B	
		X 40C		Y 40C				X 42C		Y 42C	
		X 40D		Y 40D				X 42D		Y 42D	
		X 40E		Y 40E				X 42E		Y 42E	
		X 40F		Y 40F	CH1 output enable/ disable flag			X 42F		Y 42F	
2	CL2DA2-B (Occupies 2 stations)	X 410	Use prohibited	Y 410	CH2 digital value setting	4		X 430		Y 430	
		X 411		Y 411				X 431		Y 431	
		X 412		Y 412				X 432		Y 432	
		X 413		Y 413				X 433		Y 433	
		X 414		Y 414				X 434		Y 434	
		X 415		Y 415				X 435		Y 435	
		X 416		Y 416				X 436		Y 436	
		X 417		Y 417				X 437		Y 437	
		X 418		Y 418				X 438		Y 438	
		X 419		Y 419				X 439		Y 439	
		X 41A		Y 41A				X 43A		Y 43A	
		X 41B		Y 41B				X 43B		Y 43B	
		X 41C		Y 41C				X 43C		Y 43C	
		X 41D		Y 41D				X 43D		Y 43D	
		X 41E		Y 41E				X 43E		Y 43E	
		X 41F		Y 41F	CH2 output enable/ disable flag			X 43F		Y 43F	

(b) Remote register (RWw)

Device	Remote register (RWw)		Device	Remote register (RWw)	
D200	RWw0	Last station number setting	D202	RWw2	Error status flag clear
D201	RWw1	Data link stop/restart instructions	—		

(c) Remote register (RWr)

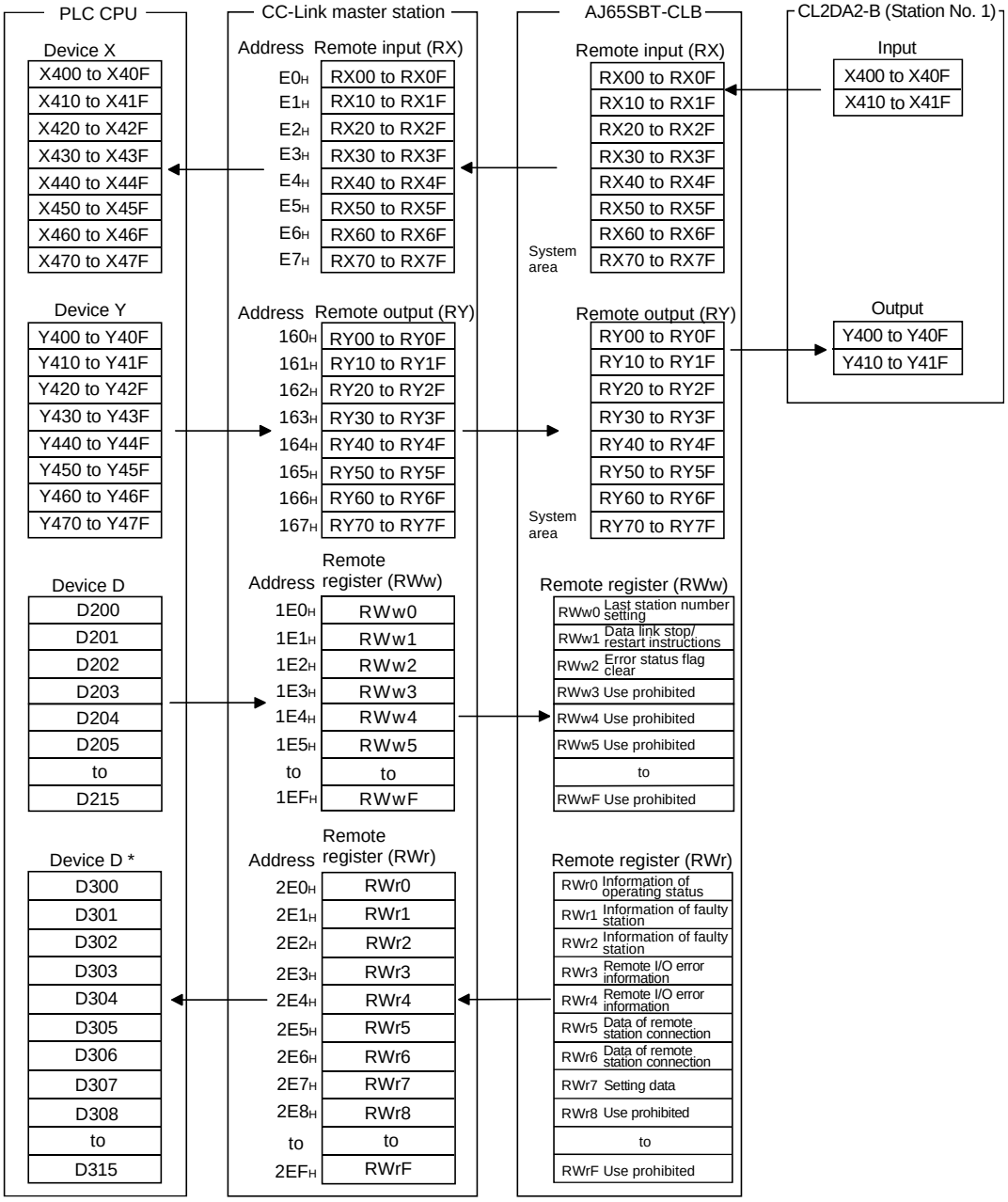
Device*	Remote register (RWr)		Device*	Remote register (RWr)	
D300(D456)	RWr0	Information of operating status	D305(D461)	RWr5	Data of remote station connection
D301(D457)	RWr1	Information of faulty station: station number 1 to 28	D306(D462)	RWr6	
D302(D458)	RWr2		D307(D463)	RWr7	Setting data
D303(D459)	RWr3	Remote input error information: station number 1 to 28	—		
D304(D460)	RWr4				

*In the program example (refer to Section 5.3.3) that uses the RRPA instruction (automatic refresh parameter setting) with the ACPU/QCPU (A mode), RWr0 to RWr7 are assigned to D456 to D463.

(d) Devices used by user

Device	Application	Device	Application
X21	Data link stop instruction signal	X24	CH1 output enable signal
X22	Data link restart instruction signal	X25	CH2 output enable signal
Y90	CC-Link side data link error confirmation signal	Y93	CC-Link/LT side all station fault confirmation signal
Y91	CC-Link/LT side remote station connection error confirmation signal	Y94	CC-Link/LT side remote I/O error confirmation signal
Y92	CC-Link/LT side data link error confirmation signal	—	
M0	CC-Link side data link status read flag	M100	CC-Link side data link normal flag
M10	RLPA instruction execution flag	M101	Control start flag
M11	RLPA instruction normally completed flag	M200 to M215	Reading information of operating status flag
M12	RLPA instruction abnormally completed flag	M250 to M253	Reading information of faulty station flag
M13	RRPA instruction execution flag	M300	Instructing data link stop flag
M20	Network parameter setting flag	M315	Instructing data link restart flag
D11	CH1 digital value setting, output enable/disable flag storing data register	D13	CH1 digital value setting monitoring data register
D12	CH2 digital value setting, output enable/disable flag storing data register	D14	CH2 digital value setting monitoring data register

(3) Relation between PLC CPU, CC-Link master station, AJ65SBT-CLB and CL2DA2-B



∗In the program example (refer to Section 5.3.3) that uses the RRPA instruction (automatic refresh parameter setting) with the ACPU/QCPU (A mode), RWr0 to RWr7 are assigned to D456 to D463.

POINT

Depending on the CPU module, the devices used in the program examples of this chapter may be unusable. For the valid ranges of the devices, refer to the users' manual of the CPU module.
For example, when the A1SCPU is used, devices of X100, Y100 and later cannot be used. Use the devices such as B and M.

5.3.1 Program example for use of QCPU (Q Mode)

The network parameters and automatic refresh parameters are set using GX Developer.

(1) Parameter setting

(a) Network parameter setting

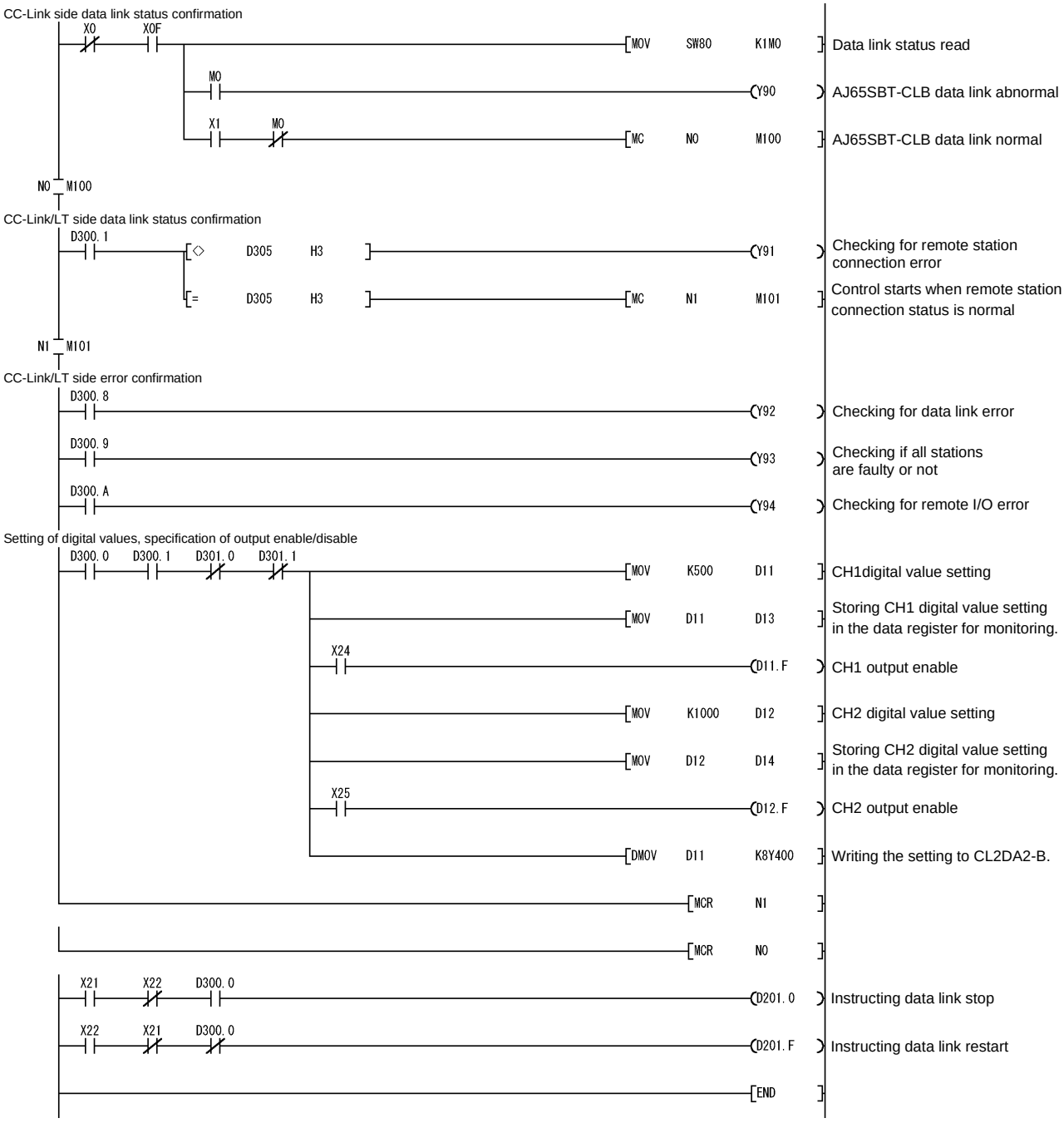
	1
Start I/O No	0000
Operational setting	Operational settings
Type	Master station
Master station data link type	PLC parameter auto start
Mode	Remote net(Ver.1 mode)
All connect count	1
Remote input(RX)	
Remote output(RY)	
Remote register(RWr)	
Remote register(RWw)	
Ver.2 Remote input(RX)	
Ver.2 Remote output(RY)	
Ver.2 Remote register(RWr)	
Ver.2 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 infomation setting	0
Station information setting	Station information
Remote device station initial setting	Initial settings
Interrupt setting	Interrupt settings

Station No.	Station type	Expanded cyclic setting	Exclusive station count	Remote station points	Reserve/invalid station select	Intelligent buffer select(word) Send	Receive	Automatic
1/1	Remote device station	single	Exclusive station 4	128 points	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	Remote net(Ver.1 mode)
All connect count	1
Remote input(RX)	X400
Remote output(RY)	Y400
Remote register(RWr)	D300
Remote register(RWw)	D200
Ver.2 Remote input(RX)	
Ver.2 Remote output(RY)	
Ver.2 Remote register(RWr)	
Ver.2 Remote register(RWw)	
Special relay(SB)	SB0
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 infomation setting	0
Station information setting	Station information
Remote device station initial setting	Initial settings
Interrupt setting	Interrupt settings

(2) Program example



5 - 12

5.3.2 Program example for use of QnACPU

The network parameters and automatic refresh parameters are set using GX Developer.

(1) Parameter setting

(a) Network parameter setting

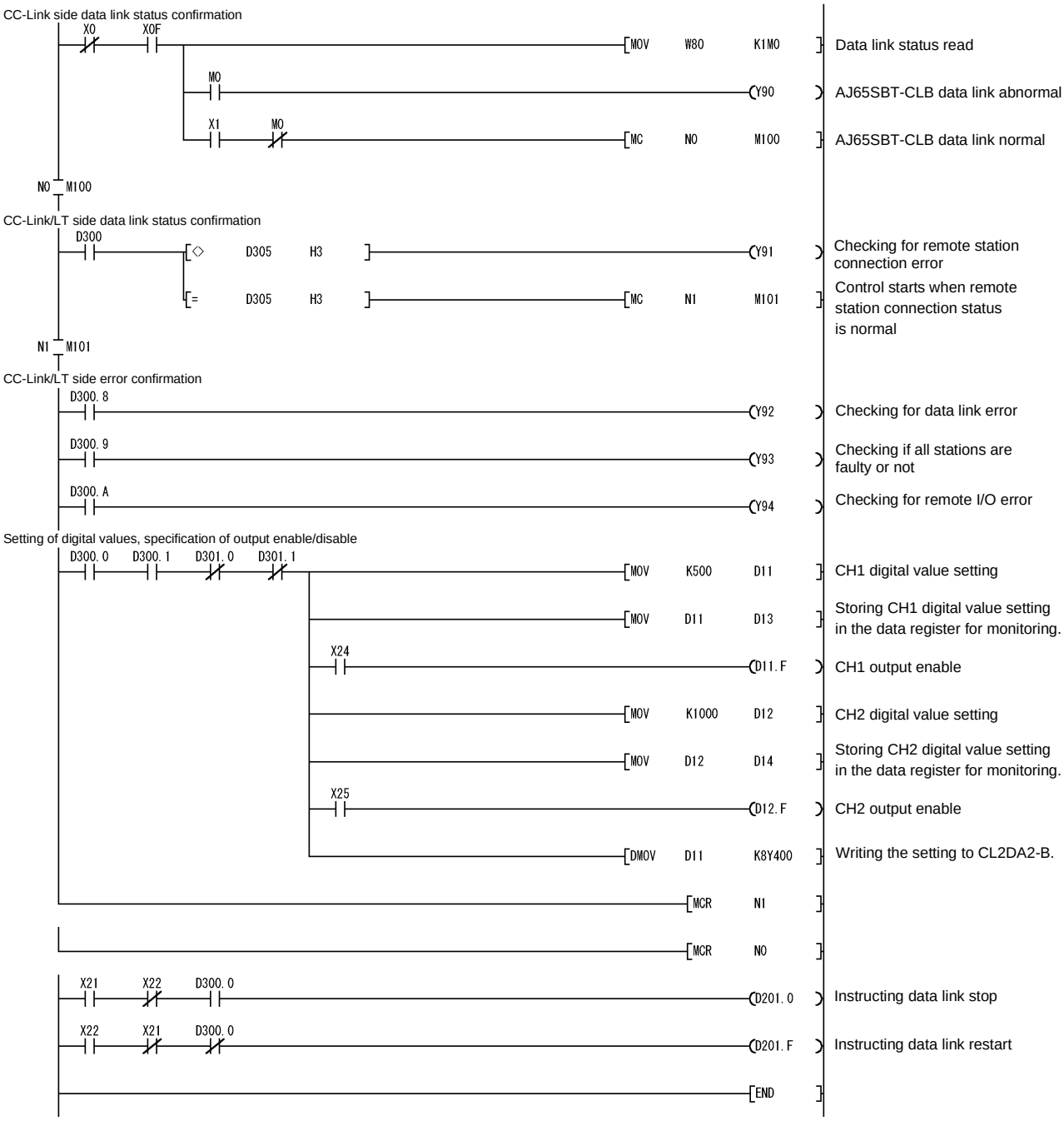
	1
Start I/O No.	0000
Type	Master station
All connect count	1
Remote input(RX)	
Remote output(RY)	
Remote register(RWr)	
Remote register(RWw)	
Special relay(SB)	
Special register(SW)	
Retry count	3
Automatic reconnection station count	1
Wait master station No.	0
PLC down select	Stop
Scan mode setting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

StationNo.	Station type	Exclusive station count	Reserve/invalid station select	Intelligent buffer select(word)		
				Send	Receive	Automatic
1/ 1	Remote device station	Exclusive station 4	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(RWr)	D300
Remote register(RWw)	D200
Special relay(SB)	B0
Special register(SW)	W0
Retry count	3
Automatic reconnection station count	1
Wait master station No.	0
PLC down select	Stop
Scan mode setting	Asynchronously
Delay information setting	0
Station information setting	Station information

(2) Program example

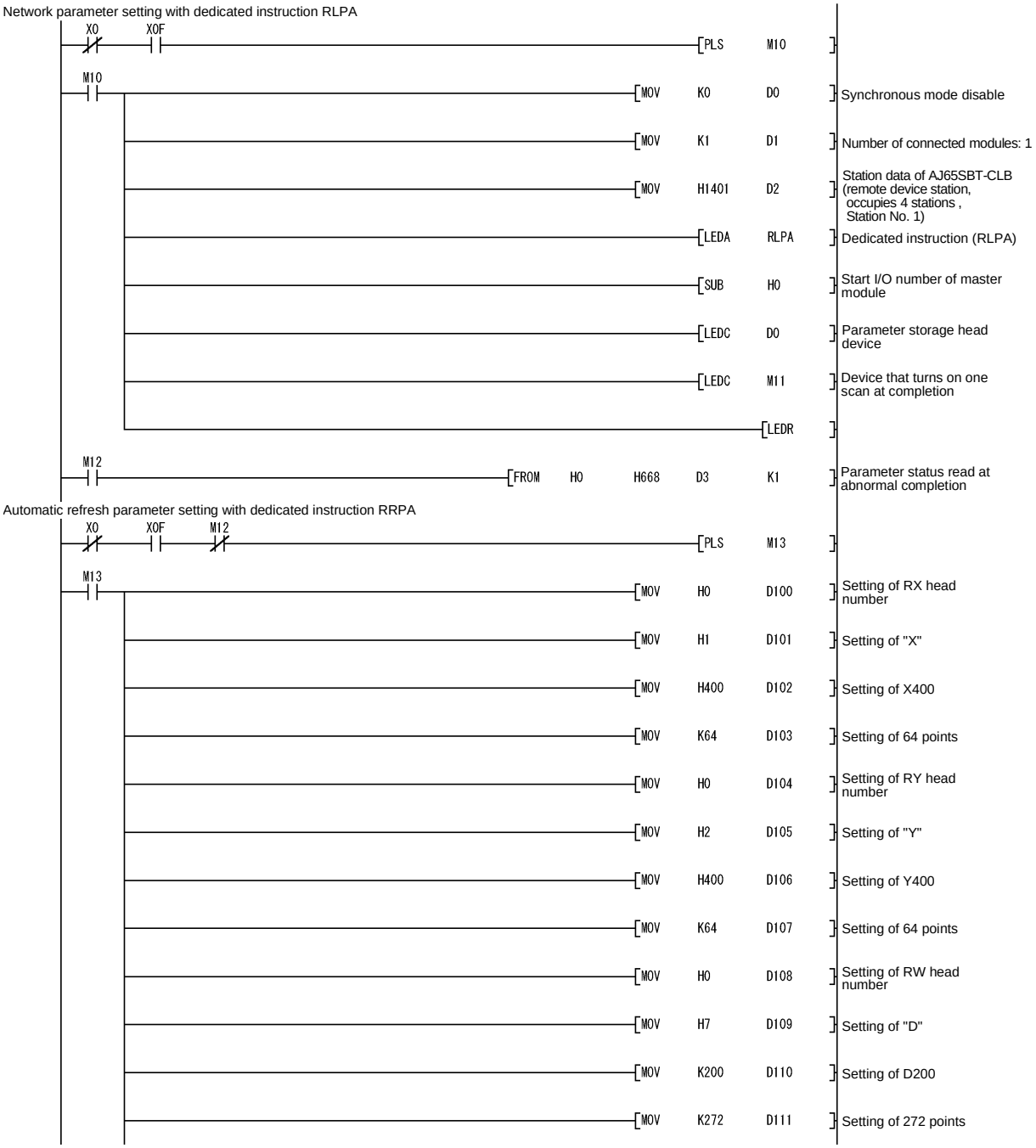


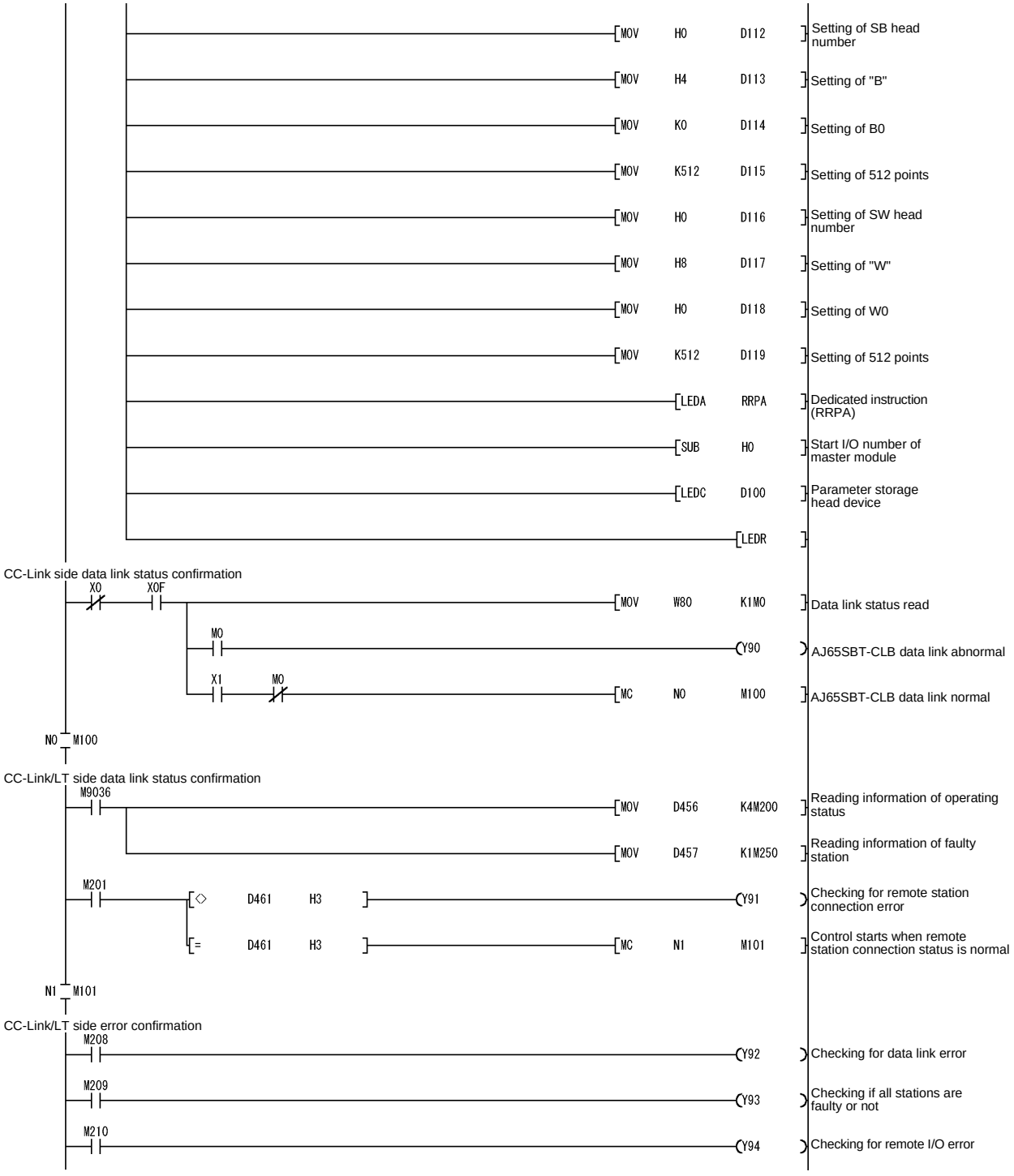
5 - 14

5.3.3 Program example for use of ACPU/QCPU (A Mode) (dedicated instructions)

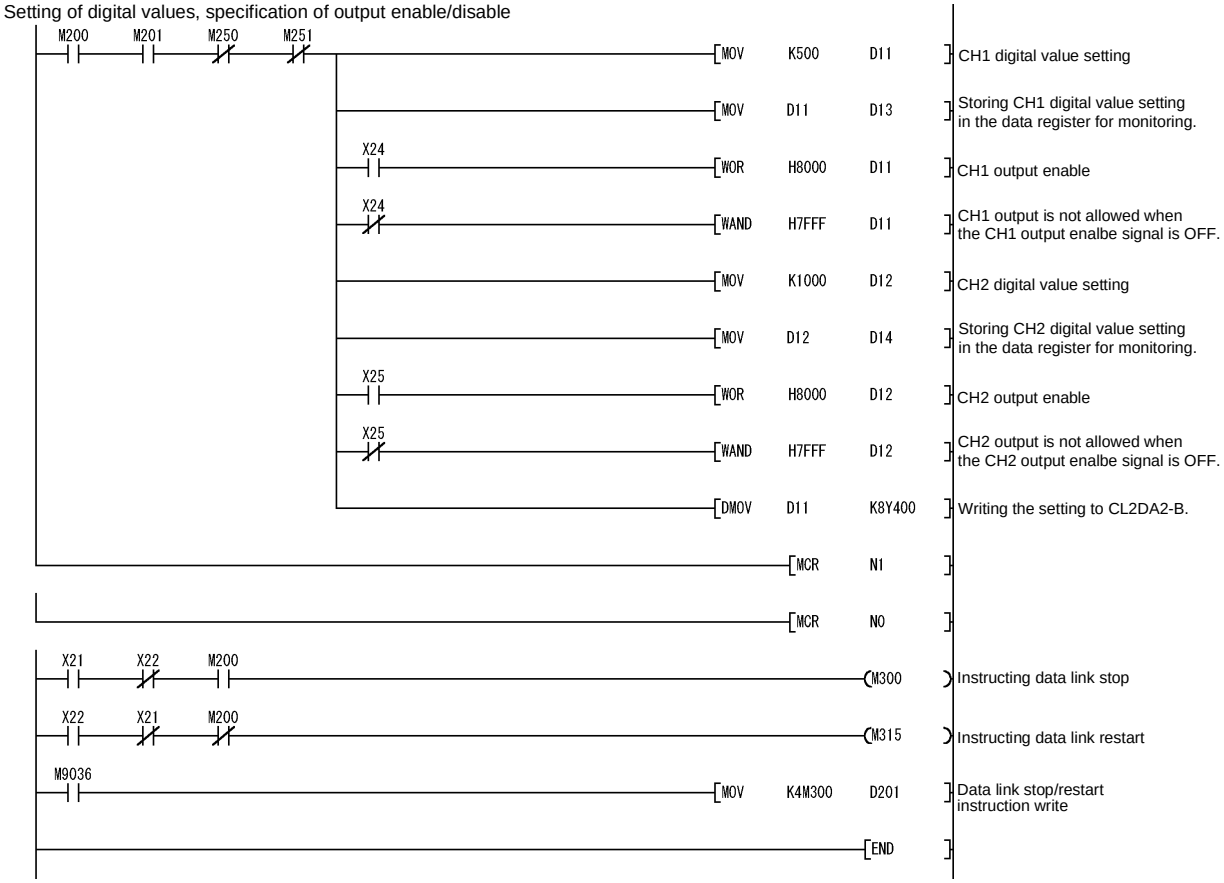
A sequence program is used to set the network and automatic refresh parameters.

(1) Program example




MOV H0 D112
Setting of SB head number
MOV H4 D113
Setting of "B"
MOV K0 D114
Setting of B0
MOV K512 D115
Setting of 512 points
MOV H0 D116
Setting of SW head number
MOV H8 D117
Setting of "W"
MOV H0 D118
Setting of W0
MOV K512 D119
Setting of 512 points
LEDA RRPA
Dedicated instruction (RRPA)
SUB H0
Start I/O number of master module
LEDC D100
Parameter storage head device
LEDR
CC-Link side data link status confirmation
X0 X0F
MOV W80 K1M0
Data link status read
M0
Y90
AJ65SBT-CLB data link abnormal
X1 M0
MC N0 M100
AJ65SBT-CLB data link normal
N0 M100
CC-Link/LT side data link status confirmation
M9036
MOV D456 K4M200
Reading information of operating status
MOV D457 K1M250
Reading information of faulty station
M201
◇ D461 H3
Y91
Checking for remote station connection error
= D461 H3
MC N1 M101
Control starts when remote station connection status is normal
N1 M101
CC-Link/LT side error confirmation
M208
Y92
Checking for data link error
M209
Y93
Checking if all stations are faulty or not
M210
Y94
Checking for remote I/O error

Setting of digital values, specification of output enable/disable

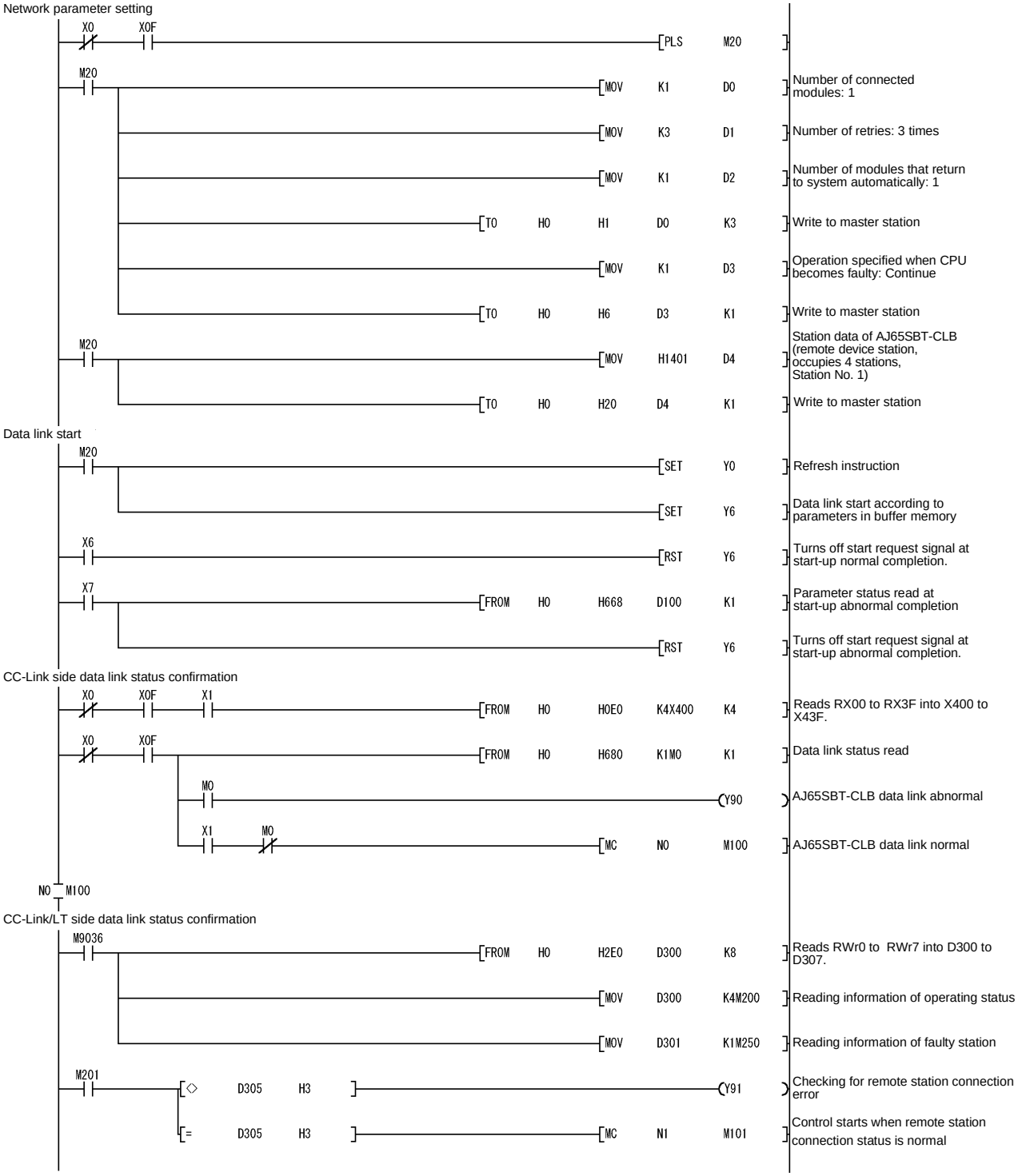


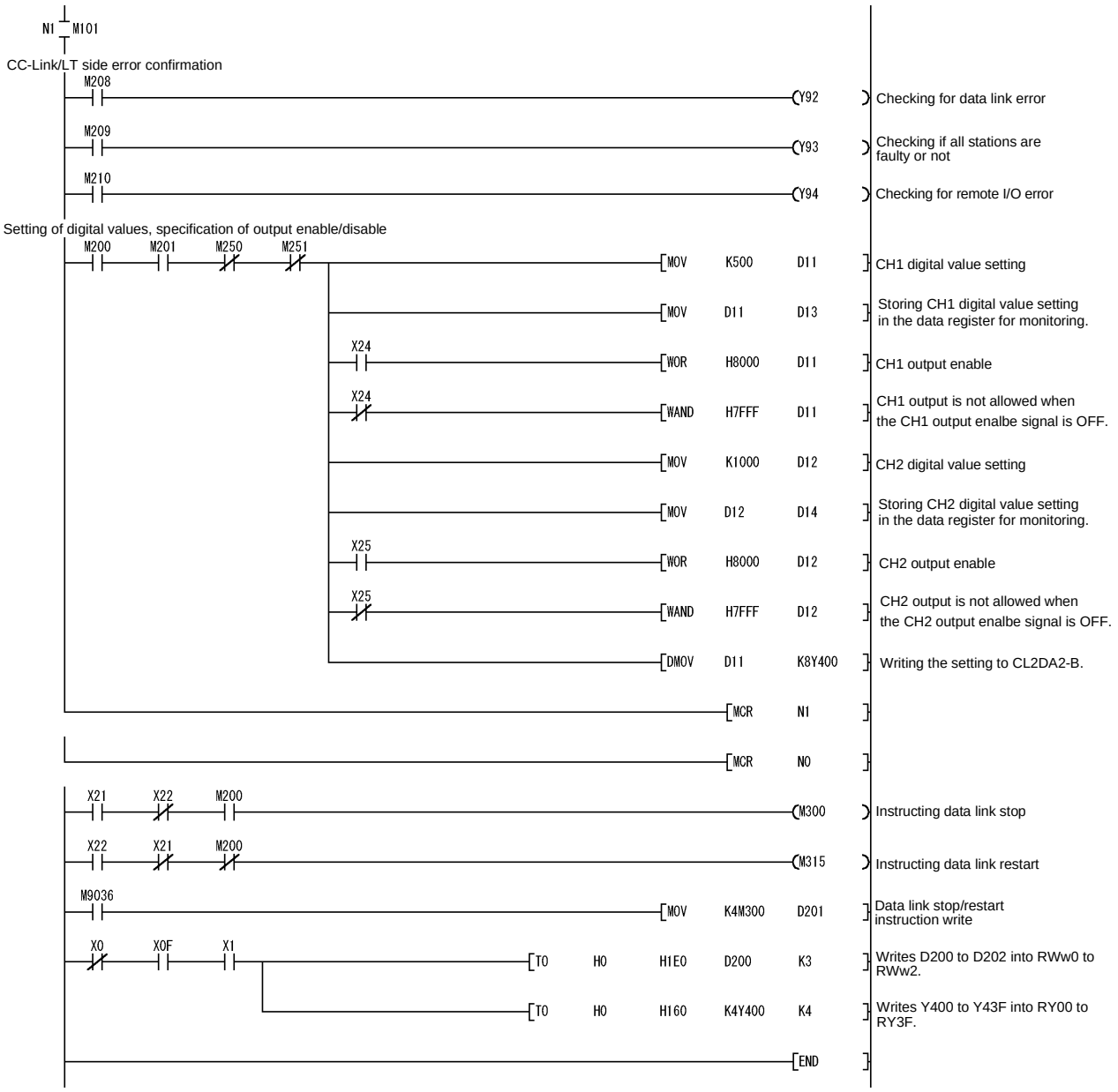
5 - 17

5.3.4 Program example for use of ACPU/QCPU (A Mode) (FROM/TO instructions)

A sequence program is used to set the network parameters.

(1) Program example




N1 M101
CC-Link/LT side error confirmation
M208
Y92
Checking for data link error
M209
Y93
Checking if all stations are faulty or not
M210
Y94
Checking for remote I/O error
Setting of digital values, specification of output enable/disable
M200 M201 M250 M251
MOV K500 D11
CH1 digital value setting
MOV D11 D13
Storing CH1 digital value setting in the data register for monitoring.
X24
WOR H8000 D11
CH1 output enable
X24
WAND H7FFF D11
CH1 output is not allowed when the CH1 output enalbe signal is OFF.
MOV K1000 D12
CH2 digital value setting
MOV D12 D14
Storing CH2 digital value setting in the data register for monitoring.
X25
WOR H8000 D12
CH2 output enable
X25
WAND H7FFF D12
CH2 output is not allowed when the CH2 output enalbe signal is OFF.
DMOV D11 K8Y400
Writing the setting to CL2DA2-B.
MCR N1
MCR N0
X21 X22 M200
M300
Instructing data link stop
X22 X21 M200
M315
Instructing data link restart
M9036
MOV K4M300 D201
Data link stop/restart instruction write
X0 X0F X1
TO H0 H1E0 D200 K3
Writes D200 to D202 into RWw0 to RWw2.
TO H0 H160 K4Y400 K4
Writes Y400 to Y43F into RY00 to RY3F.
END

5 - 19

6 TROUBLESHOOTING

The details of the errors which may occur when using the CL2DA2-B and trouble shooting measures are described in this chapter.
When a problem has occurred, first check the CC-Link/LT master module and AJ65SBT-CLB for any error.
When no error is identified in either of them, refer to Sections 6.1 and 6.2.
The module may be faulty if no analog value is output after corrective actions have been taken according to the check items of this chapter. Please consult your local Mitsubishi representative, explaining a detailed description of the problem.

6.1 Using the LED Indications to Check Errors

This section explains how to check errors using the LED indications of the CL2DA2-B. Check in due order, starting with (1).

(1) When the CL2DA2-B "PW" LED is off

Check item	Corrective action
Is the wiring correct?	Check the wiring.
Is the supply voltage within the specified range?	Make the supply voltage within the specified range.

(2) When the CL2DA2-B "RUN" LED is flickering

Check item	Corrective action
Is the digital value setting outside the setting range?	Correct the sequence program.
Was the analog output setting switch or HOLD/CLEAR setting switch setting changed during operation?	Return the switch setting to the power-on setting.
Are the analog output setting switches set to disable the conversion of all channels?	Check the analog output setting switch setting.
Is the NC switch ON?	After powering OFF the whole system (master and remote stations), turn OFF the NC switch and power ON the whole system again.

(3) When the CL2DA2-B "RUN" LED is off

Check item	Corrective action
Is the bit corresponding to the remote I/O error information of the CC-Link/LT master module or AJ65SBT-CLB ON?	Power ON the CL2DA2-B again. If the "RUN" LED does not turn ON after the CL2AD4-B has been powered ON again, the hardware may be faulty. Please consult your local Mitsubishi representative, explaining a detailed description of the problem.

6 - 1

(4) When the CL2DA2-B "L RUN" LED is off

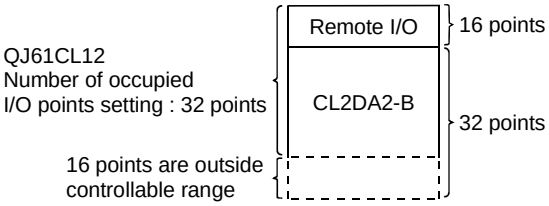
Check item	Corrective action
Was the transmission rate setting of the CC-Link/LT master module or AJ65SBT-CLB changed after data link communication?	Power OFF and then ON the whole system (master and remote stations).
Any line problem? ＊1	Correct communication cable wiring.
Is the station number within the controllable range of the CC-Link/LT master module or AJ65SBT-CLB? ＊2	Set the station number to within the controllable range of the CC-Link/LT master module or AJ65SBT-CLB. ＊3
Is the point mode setting correct?	Check the point mode setting.

＊1: Check for a short, reversed connection, insulation displacement status , mixed cables, terminating resistors, overall distance, drop line distance (overall drop line length, maximum drop line length) and peripheral environment (noise, etc) .

＊2: Note the following points.

- The station number setting switches are not mistaken for analog output setting switches.
- Last station number setting of CC-Link/LT master module/AJ65SBT-CLB
- All station numbers occupied by the local module are within the controllable range of the CC-Link/LT master module or AJ65SBT-CLB.

[Example of station number outside controllable range]
Master module: QJ61CL12
Start I/O number: X/Y00
Number of occupied I/O points setting: 32 points
16-points mode
Station number 1: Remote I/O module
Remote I/O point: 16 points (Occupies 1 station)
Station number 2: CL2DA2-B
Remote I/O point: 32 points (Occupies 2 stations)



＊3: After changing the station number setting, power OFF and then ON the whole system (master and remote stations).

6

(5) When the CL2DA2-B "L ERR." LED flickers at fixed intervals (0.4s intervals)

Check item	Corrective action
Was the station number setting switch setting changed during normal operation?	Correct the switch setting.
Are the station number setting switches faulty?	If the "L ERR." LED starts flickering at fixed intervals (0.4s intervals) although the switch setting has not been changed during operation, the hardware may be faulty. Please consult your local Mitsubishi representative, explaining a detailed description of the problem.

(6) When the CL2DA2-B "L ERR." flickers at unfixed intervals

Check item	Corrective action
Have you forgotten fitting 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 connection cable affected by noise?	Move the connection cable away from the noise source. When carrying out wiring in piping, earth the pipe without fail.

(7) When the CL2DA2-B "L ERR." is on

Check item	Corrective action
Are the station number and point mode set correctly?	Take action as described in (4)
Any line problem?	
Are the analog output setting switches set to disable the conversion of all channels?	Take action as described in (2)

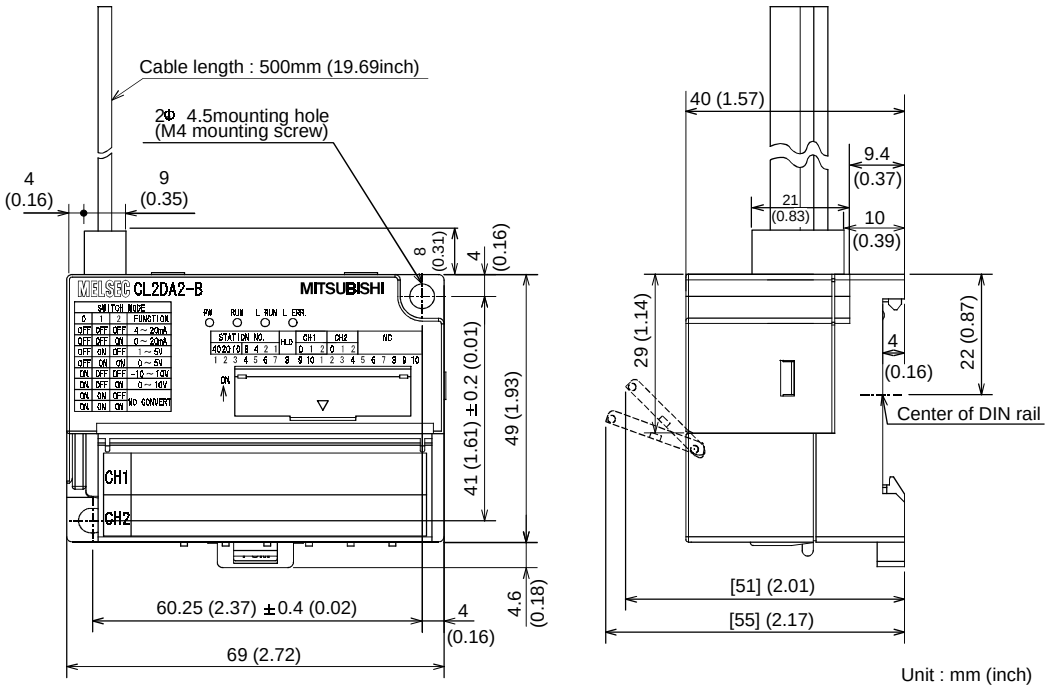
6.2 When an Analog Output Value Is Not Output

Check item	Corrective action
Is the "PW" LED off?	Take action as described in Section 6.1 (1)
Is the "RUN" flickering or off?	Take action as described in Section 6.1 (2),(3)
Is the "L RUN" LED off?	Take action as described in Section 6.1 (4)
Is the "L ERR." LED on?	Take action as described in Section 6.1 (7)
Is the output enable/disable flag for the channel to be output set to disable?	Verify ON/OFF for the output enable/disable flags (YnF) in GX Developer monitor. (see section 3.5.2) Review the sequence program if the output enable/disable flag (YnF) is OFF.
Is there any fault with the analog signal lines such as broken or disconnected line?	Check for any abnormality on the signal lines by doing a visual check and performing a continuity check.
Is the output setting range correct?	Check the analog output setting switches. (see section 4.3) If the output range setting is incorrect, change the analog output setting switch setting and then power OFF and then ON the whole system (master and remote stations).
Are the station numbers overlapping?	Check that the station number is not the same as those of the other remote stations.

APPENDIX

Appendix1 External Dimensions

The external dimension of the CL2DA2-B is shown below.



Unit : mm (inch)

APP

App - 1

MEMO

App - 2

INDEX

Ind

Index - 1

MEMO

Index - 2

WARRANTY

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

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.
However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.
Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

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

2. Onerous repair term after discontinuation of production

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

3. Overseas service

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

4. Exclusion of loss in opportunity and secondary loss from warranty liability

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

5. Changes in product specifications

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

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 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 Public service purposes shall be excluded from the programmable logic controller applications.
In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable logic controller range of applications.
However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.

Digital-Analog Converter Module

User's Manual

MODEL	CL2DA-U-SY-E
MODEL CODE	13JP31
SH(NA)-080418E-A(0501)MEE	

MITSUBISHI ELECTRIC CORPORATION

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