MITSUBISHI

Mitsubishi Industrial Robot

Crn-500 series INSTRUCTION MANUAL

Cc-Link Interface

MELFA

⚠ Safety Precautions

Always read the following precautions and the separate "Safety Manual" before starting use of the robot to learn the required measures to be taken.

⚠**CAUTION**

All teaching work must be carried out by an operator who has received special training. (This also applies to maintenance work with the power source turned ON.)
→Enforcement of safety training

⚠**CAUTION**

For teaching work, prepare a work plan related to the methods and procedures of operating the robot, and to the measures to be taken when an error occurs or when restarting. Carry out work following this plan. (This also applies to maintenance work with the power source turned ON.)
→Preparation of work plan

⚠**WARNING**

Prepare a device that allows operation to be stopped immediately during teaching work. (This also applies to maintenance work with the power source turned ON.)
→Setting of emergency stop switch

⚠**CAUTION**

During teaching work, place a sign indicating that teaching work is in progress on the start switch, etc. (This also applies to maintenance work with the power source turned ON.)
→Indication of teaching work in progress

⚠**CAUTION**

Provide a fence or enclosure during operation to prevent contact of the operator and robot.
→Installation of safety fence

⚠**CAUTION**

Establish a set signaling method to the related operators for starting work, and follow this method.
→Signaling of operation start

⚠**CAUTION**

As a principle turn the power OFF during maintenance work. Place a sign indicating that maintenance work is in progress on the start switch, etc.
→Indication of maintenance work in progress

⚠**CAUTION**

Before starting work, inspect the robot, emergency stop switch and other related devices, etc., and confirm that there are no errors.
→Inspection before starting work

The points of the precautions given in the separate "Safety Manual" are given below.
Refer to the actual "Safety Manual" for details.

⚠ **CAUTION** Use the robot within the environment given in the specifications. Failure to do so could lead to a drop or reliability or faults. (Temperature, humidity, atmosphere, noise environment, etc.)

⚠ **CAUTION** Transport the robot with the designated transportation posture. Transporting the robot in a non-designated posture could lead to personal injuries or faults from dropping.

⚠ **CAUTION** Always use the robot installed on a secure table. Use in an instable posture could lead to positional deviation and vibration.

⚠ **CAUTION** Wire the cable as far away from noise sources as possible. If placed near a noise source, positional deviation or malfunction could occur.

⚠ **CAUTION** Do not apply excessive force on the connector or excessively bend the cable. Failure to observe this could lead to contact defects or wire breakage.

⚠ **CAUTION** Make sure that the workpiece weight, including the hand, does not exceed the rated load or tolerable torque. Exceeding these values could lead to alarms or faults.

⚠ **WARNING** Securely install the hand and tool, and securely grasp the workpiece. Failure to observe this could lead to personal injuries or damage if the object comes off or flies off during operation.

⚠ **WARNING** Securely ground the robot and controller. Failure to observe this could lead to malfunctioning by noise or to electric shock accidents.

⚠ **CAUTION** Indicate the operation state during robot operation. Failure to indicate the state could lead to operators approaching the robot or to incorrect operation.

⚠ **WARNING** When carrying out teaching work in the robot's movement range, always secure the priority right for the robot control. Failure to observe this could lead to personal injuries or damage if the robot is started with external commands.

⚠ **CAUTION** Keep the jog speed as low as possible, and always watch the robot. Failure to do so could lead to interference with the workpiece or peripheral devices.

⚠ **CAUTION** After editing the program, always confirm the operation with step operation before starting automatic operation. Failure to do so could lead to interference with peripheral devices because of programming mistakes, etc.

⚠ **CAUTION** Make sure that if the safety fence entrance door is opened during automatic operation, the door is locked or that the robot will automatically stop. Failure to do so could lead to personal injuries.

⚠ **CAUTION** Never carry out modifications based on personal judgments, or use non-designated maintenance parts.
Failure to observe this could lead to faults or failures.

⚠ **WARNING** When the robot arm has to be moved by hand from an external area, do not place hands or fingers in the openings. Failure to observe this could lead to hands or fingers catching depending on the posture.

⚠ **CAUTION** Do not stop the robot or apply emergency stop by turning the robot controller's main power OFF.
If the robot controller main power is turned OFF during automatic operation, the robot accuracy could be adversely affected.

■Revision History

Print date	Instruction manual No.	Revision content
2000-04-19	BFP-A8105Z	First print
2000-05-19	BFP-A8105	Formal style
2000-05-26	BFP-A8105-A	Remote register assignment was changed.
2004-02-06	BFP-A8105-B	Revision B, the organization of this manual was changed.
2009-09-30	BFP-A8105-C	The EC Declaration of Conformity was changed. (Correspond to the EMC directive; 2006/42/EC)

■Introduction

Thank you very much for purchasing this product for Mitsubishi Electric Corporation's CR-500 series industrial robots. CC-Link (Control & Communication Link) interface is an add-on option that is used in combination with CR-500 series controllers to add CC-Link field network functionality to robot controllers. Please make sure to read this document thoroughly and understand its information before start using the CC-Link interface.

・ No part of this manual may be reproduced by any means or in any form, without prior consent from Mitsubishi.
・ The details of this manual are subject to change without notice
・ An effort has been made to make full descriptions in this manual. However, if any discrepancies or unclear points are found, please contact your dealer.
・ The information contained in this document has been written to be accurate as much as possible.
  Please interpret that items not described in this document "cannot be performed." or "alarm may occur".
・ This Instruction Manual is original.

Table of Contents

1. Before Using the CC-Link Interface

This chapter describes items to be checked and precautions to be taken before start using the CC-Link interface.

1.1 How to Use the Instruction Manual

This manual is organized as follows and describes functions that have been added to or changed in the CC-Link interface. For information about the functions provided for standard robot controllers and how to operate them, refer to the instruction manual that comes with the robot controller you purchased.

Table 1.1   Contents of the Instruction Manual

Chapter	Title	Description
1	Before Using the CC-Link Interface	Chapter 1 describes how to use this manual (CC-Link Interface Instruction Manual). Please read this manual thoroughly before actually starting to use the CC-Link interface.
2	Flow of Operations	Chapter 2 describes the operations required to configure a CC-Link system. Make sure to perform all of the required operations.
3	Functions and Specification of the CC-Link Interface	Chapter 3 describes the functions and specification of the robot CC-Link interface.
4	Items to Be Checked Before Using This Product	Chapter 4 provides a list of items that come with the CC-Link interface and the devices that need to be furnished by the customer. Please verify that the CC-Link interface package you purchased comes with the standard accessories and is compatible with your system's robot controller version.
5	Hardware Settings	Chapter 5 describes how to perform hardware settings for communication between the CC-Link interface and the master station.
6	Connections and Wiring	Chapter 6 describes how to connect the CC-Link interface and the master station using cables.
7	Basic Communication Procedure	Chapter 7 describes a series of operations using the newly installed CC-Link interface, configured and connected as described in Chapters 4 to 6, from creating a master station's CC-Link program to starting robot program No. 1. Learn how to perform the basic operations following the instructions given for each step as reference.
8	Troubleshooting	Chapter 8 describes how to resolve problems that may occur when using the CC-Link interface, such as malfunctions and errors. Please refer to this chapter as needed.
9	Appendix	Chapter 9 describes a sample ladder program that can be entered when using the CC-Link interface as well as how to monitor data with the personal computer support software. Please refer to this chapter as needed.

2. Flow of Operations

The flowchart below shows the flow of operations necessary for configuring a CC-Link interface system. Use it as a reference to perform the required operations in the correct order.

2.1 Flowchart

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1. Determining Specification for CC-Link Control .... See Chapter 3 of this manual.

Once you understand the CC-Link specification, specify the interfaces required for signals to be communicated within your system via CC-Link communication (e.g., assignment of dedicated I/O signals, specification of general-purpose I/O signals).

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2. Checking Products .... See Chapter 4 of this manual.

Check the product you have purchased and prepare other products as needed.

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3. Hardware Settings and Wiring .... See Chapters 5 and 6 of this manual.

Set up the CC-Link interface card as well as the master station. After you have made the settings, install the CC-Link interface card in the robot controller, and then wire the installed CC-Link interface card and the master station.

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4. Creating a Ladder Program for the Master Station .... See Section 7.1 of this manual.

Create a ladder program for the master station so that it can be linked to the robot controller.

* If the robot controller is started without running a ladder program stored in the master station, an E7730 error (CC-Link local station link error) occurs.

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5. Setting Robot Controller Parameters .... See Section 7.2 of this manual.

Set dedicated I/O signals for communication between the master station and the robot controller. With this setting, it becomes possible to control the robot controller from the master station.

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6. Creating Robot Programs .... See Section 7.3 of this manual.

Create robot programs according to the specification determined in Operation 1 above.

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7. Performing CC-Link Control .... See Section 7.4 of this manual.

Run the ladder program stored in the master station and perform control via the CC-Link communication.

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8. Completion of Operations

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3. Functions and Specification of the CC-Link Interface

3-1

3.1 What Is CC-Link?

Partner manufacturers' devices

CC-Link interface card
(this product)

Figure 3.1   CC-Link Network Configuration Diagram

CC-Link is a field network (*1) that provides not only simple bit control but also additional functions such as data control and message transmission/reception in order to accommodate the continuous advances in the functionality of various control devices.

CC-Link supports cyclic transmission of not only bit data but also word data, facilitating communication with intelligent devices such as inverters, indicators and other I/O devices.

Distributed systems can be built easily by setting up an n:n cyclic transmission network to which a master station and several local stations are connected.

The best communication distance and speed can be selected in a flexible manner according to your system requirements. The optimal system can be built by selecting the most suited devices from the rich product lines of the CC-Link partner manufacturers.

This CC-Link interface card operates as an <u>intelligent device station</u>.

(*1) Please visit the Web site of the CC-Link Partner Association (http://www.cc-link.org/) for more information about CC-Link.

3.2 Specification of the CC-Link Interface Card

Table 3.2-1   General Specification (Specification of HR575 Card)

Item			Specification	Remarks
Communication function			Both bit data and word data can be transmitted.	Word data is used in the registers.
Station type			Intelligent device station	Transient transmission is not supported.
Supported station functionality			Local station	Master station functionality is not available.
Mountable option slot			Slot 2 only	
Number of mountable cards			1 card	It is not allowed to insert multiple cards.
Station number			Can be set between station numbers 1 and 64	Set using the rotary switches on the card.
Baud rate			10 M, 5 M, 2.5 M, 625 k, 156 kbps	
Number of occupied stations			Can be set to occupy 1 or 4 stations.	When occupying 4 stations, contiguous station numbers are used. The setting is performed using the DIP switches on the card.
Number of I/O points	Remote I/O	When occupying 1 station	Input: 30 points, Output: 30 points	The last two points among 32 points cannot be used.
		When occupying 4 stations	Input: 126 points, Output: 126 points	The last two points among 128 points cannot be used.
	Remote register	When occupying 1 station	Input: 4 registers, Output: 4 registers	One register consists of 16 bits.
		When occupying 4 stations	Input: 16 registers, Output: 16 registers	

Table 3.2-2   List of Robot Parameters Used in CC-Link

Item	Function
Dedicated I/O signals	The dedicated I/Os can be set using parameters, in the same way as for standard I/Os.
STOP2 (added)	The robot program can be stopped by setting the dedicated input [STOP2] from CC-Link.
DIODATA (added)	Instructions and outputs of program numbers, error numbers, the number of lines and so forth can be set as data.

Table 3.2-3   List of Robot Program Commands Used in CC-Link

Item	Function
M_IN	Reads 1-bit data of the specified input signal
M_OUT	Writes 1-bit data to the specified output signal
M_INB	Reads 8-bit data from the specified input signal
M_OUTB	Writes 8-bit data to the specified output signal
M_INW	Reads 16-bit data from the specified input signal
M_OUTW	Writes 16-bit data to the specified output
M_DIN	Reads data of the specified input register
M_DOUT	Writes data to the specified output register

Table 3.2-4   Table of CC-Link Signals

(The numbers in the table indicate the numbers of the I/O signals handled by the robot controller.)

Station number	Remote signal		Remote register	
	Input	Output	Input	Output
0 (master)	–	–	–	–
1	6000 to 6031	6000 to 6031	6000 to 6003	6000 to 6003
2	6032 to 6063	6032 to 6063	6004 to 6007	6004 to 6007
3	6064 to 6095	6064 to 6095	6008 to 6011	6008 to 6011
4	6096 to 6127	6096 to 6127	6012 to 6015	6012 to 6015
5	6128 to 6159	6128 to 6159	6016 to 6019	6016 to 6019
6	6160 to 6191	6160 to 6191	6020 to 6023	6020 to 6023
7	6192 to 6223	6192 to 6223	6024 to 6027	6024 to 6027
8	6224 to 6255	6224 to 6255	6028 to 6031	6028 to 6031
9	6256 to 6287	6256 to 6287	6032 to 6035	6032 to 6035
10	6288 to 6319	6288 to 6319	6036 to 6039	6036 to 6039
11	6320 to 6351	6320 to 6351	6040 to 6043	6040 to 6043
12	6352 to 6383	6352 to 6383	6044 to 6047	6044 to 6047
13	6384 to 6415	6384 to 6415	6048 to 6051	6048 to 6051
14	6416 to 6447	6416 to 6447	6052 to 6055	6052 to 6055
15	6448 to 6479	6448 to 6479	6056 to 6059	6056 to 6059
16	6480 to 6511	6480 to 6511	6060 to 6063	6060 to 6063
17	6512 to 6543	6512 to 6543	6064 to 6067	6064 to 6067
18	6544 to 6575	6544 to 6575	6068 to 6071	6068 to 6071
19	6576 to 6607	6576 to 6607	6072 to 6075	6072 to 6075
20	6608 to 6639	6608 to 6639	6076 to 6079	6076 to 6079
∫	∫	∫	∫	∫
63	7984 to 8015	7984 to 8015	6248 to 6251	6248 to 6251
64	8016 to 8047	8016 to 8047	6252 to 6255	6252 to 6255

Example 1: The following is the case where the station number of the robot CC-Link interface is set to station 1 and the number of occupied stations is set to 4 stations.

  I/O: Master station to robot (inputs to robot):

· Signal numbers 6000 to 6125 can be used (remote signal inputs).

           Robot to master station (outputs from robot):

· Signal numbers 6000 to 6125 can be used (remote signal outputs)

* The last two bits cannot be used (i.e., 6126 and 6127 cannot be used).

  Register (word):

           Master station to robot (inputs to robot):

· Signal numbers 6000 to 6015 can be used (register inputs)

           Robot to master station (outputs from robot):

· Signal numbers 6000 to 6015 can be used (register outputs)

Example 2: The following is the case where the station number of the robot CC-Link interface is set to station 5 and the number of occupied stations is set to 1 station.

  I/O: Master station to robot (inputs to robot):

· Signal numbers 6128 to 6157 can be used (remote signal inputs).

           Robot to master station (outputs from robot):

· Signal numbers 6128 to 6157 can be used (remote signal outputs).

* The last two bits cannot be used (i.e., 6158 and 6159 cannot be used).

  Register (word):

           Master station to robot (inputs to robot):

· Signal numbers 6016 to 6019 can be used (register inputs)

           Robot to master station (outputs from robot):

· Signal numbers 6016 to 6019 can be used (register outputs)

3.3 Hardware of the CC-Link Interface Card

This section describes the settings that are performed by using the rotary switches and DIP switches on the CC-Link interface card.

(1) General Layout of the Card
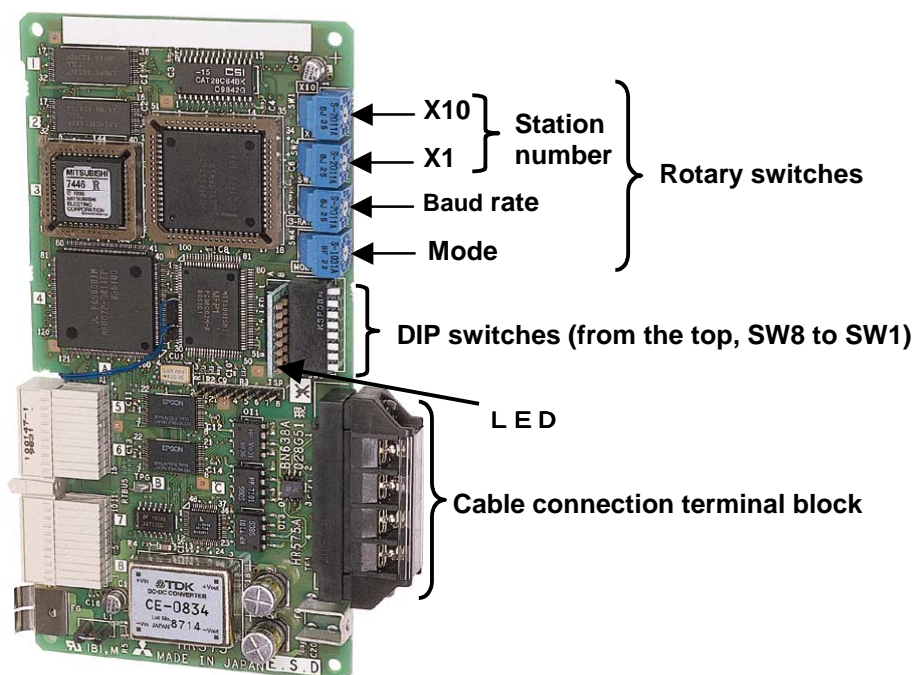
Figure 3.3-1   General Layout of the Card

(2) Description

(2-1) Rotary Switches (See Figure 5.1-1 for a detailed diagram.)

There are four rotary switches, which are used to set the station numbers X10, X1, baud rate and mode, starting from the left.

Table 3.3-2 below shows the details of the setting values.

Table 3.3-2   Description and Setting Value of Each Rotary Switch

Item	Description		Setting at shipment	Remarks
Station number	X10: Set the tens digit of a station number.		0	Station 1 * Station number 0, or 65 or higher cannot be set.
	X1: Set the units digit of a station number.		1	
Baud rate	B_RATE	0: 156 kbps 1: 625 kbps 2: 2.5 Mbps 3: 5 Mbps 4: 10 Mbps	4	10 Mbps * A value of 5 or higher cannot be set.
Mode	MODE	0: Online 1 to 6: Offline, line test	0	Generally, **use the setting of Mode 0 (Online) only.** * A value of 7 or higher cannot be set.

(2-2) DIP Switches (See Figure 5.1-2 for a detailed diagram.)

As shown in Figure 3.3-1, "General Layout of the Card," the DIP switches are arranged in order from SW8 at the top to SW1 at the bottom. The table below provides a detailed description of each switch.

Under normal circumstances, only "SW5" should be set to ON; the other switches need not to be set.

Table 3.3-3   Detailed Descriptions of the DIP Switches

No.	Item set	Description	Setting at shipment
SW1	Station type	Select whether the CC-Link interface card is used as the standby master station or master station/local station. ON: Standby master station OFF: Master station/local station	OFF
SW2	–	Cannot be used	OFF
SW3	–	Cannot be used	OFF
SW4	Specification of whether or not to clear input data at error	Select whether input data should be cleared or kept when a link error occurs. ON: Keep OFF: Clear	OFF
SW5	Specification of the number of occupied stations	Select the number of signal points used in CC-Link, for either 1 station or 4 stations. ON: Occupy 4 stations (I/O: 126 points, Register: 16 points) OFF: Occupy 1 station (I/O: 30 point, Register: 4 points)	ON
SW6	–	Cannot be used	OFF
SW7	–	Cannot be used	OFF
SW8	–	Cannot be used	OFF

(2-3) LEDs

There are 16 LEDs behind the DIP switches. It is possible to keep track of the operation status by checking whether each LED is turned on/off.

Table 3.3-4 as well as Figures 3.3-5 and 3.3-6 below provide detailed descriptions of each LED.

Table 3.3-4   Names of LEDs

LED name		Conditions for turning on
RUN		When the module is operating normally
ERR		At communication status error
MST		When the CC-Link interface card is designated as the master station
S MST		When the CC-Link interface card is designated as the standby master station
LOCAL		When the CC-Link interface card is designated as a local station
CPU R/W		When communicating with the CPU module
ERROR	SW	When a switch setting is prohibited
	M/S	When the same station number exists on the same line
	PPM	When a parameter error occurs
	TIME	When the data link monitoring timer is activated
	LINE	When a cable is disconnected
L RUN		At normal communication
L ERR		At communication data error

Figure 3.3-5   Layout of LEDs

Card
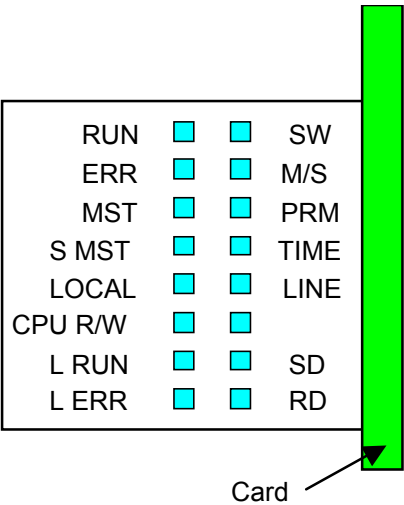
Figure 3.3-6   Example of LED Display by Status Change

At normal
operation
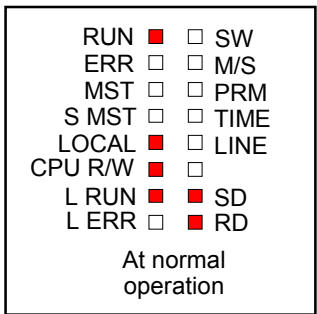
4. Items to Be Checked Before Using This Product

4.1 Checking the Product

The product you purchased consists of the following items as standard. Please verify that the package contains all the items.

Table 4.1-1   List of the Standard Items in the Package

No.	Description	Type	Quantity
[1]	Instruction Manual (this manual)	BFP-A8079	1
[2]	CC-Link interface card	HR575	1
[3]	Ferrite core	Equivalent to ZCAT3035	1

Note: Numbers in the above table correspond to those in Figure 4.1-2 below.
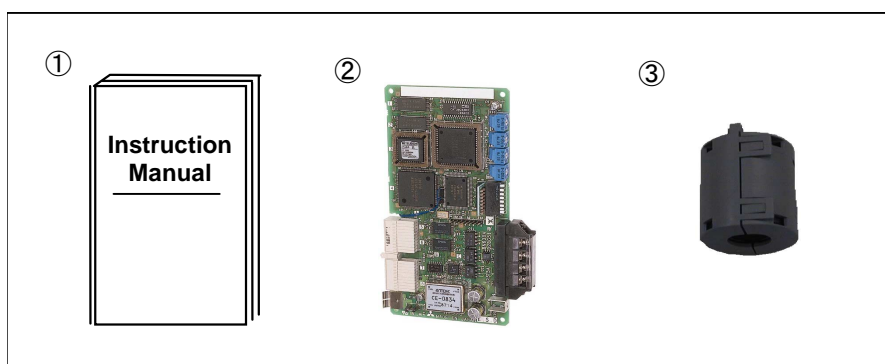
Figure 4.1-2   Items Contained in the Package

4.2 Devices to Be Furnished by the Customer

When using Mitsubishi Electric CC-Link interface card, the devices listed in Table 4.2 below must be furnished by the customer.

Table 4.2   Connection Specification

Device to be furnished	Condition
Master station	The following master stations can be connected to the CC-Link interface card (<u>master stations supporting intelligent device stations</u>). • QJ61BT11 (Q series) • AJ61QBT11 (QnA series) • A1SJ61QBT11 (QnAS series) • AJ61BT11 (A series) • A1SJ61BT11 (AnS series) • A80BD-J61BT11 (personal computer board) * The FX series are not supported (as of April, 2002).
Communication cable	Triple-core twisted shielded cable * These cables may be purchased from Mitsubishi Electric or prepared by the customer. (Note 1)
Terminal resistor	110Ω or 130Ω resistors are recommended. (Note 1)
Robot controller made by Mitsubishi Electric	Software version "C1" or later is supported.

Note 1: For more information, refer to the instruction manual of the MELSEC PLC master station.

5. Hardware Settings

5.1 Settings of the CC-Link Interface Card

OFF
↓
ON

Card
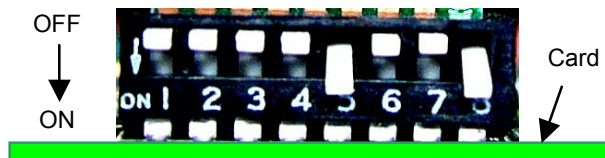
Figure 5.1-1   Photo of Rotary Switch Settings   **Figure 5.1-2   Photo of DIP Switch Settings**

(1) When the Station Number is 1 and the Number of Occupied Stations is 4: Setting [1]

The following points can be used:

Remote I/O: 126 points for both inputs and outputs (The last two points among 128 points cannot be used.)

Remote register: 16 points for both inputs and outputs.

Table 5.1-3   Settings of the CC-Link Interface Card on the Robot Side

Item		Robot controller (local station)		Setting [1]	Setting [2]
Rotary switch	Station number	X10: Set tens digit of a station number (0 to 6)		0	0
		X1: Set units digit of a station number (0 to 9)		1	1

	Baud rate	B_RATE 0: 156 kbps
		            1: 625 kbps
		            2: 2.5 Mbps
		            3: 5 Mbps
		            4: 10 Mbps
				4	4

	Mode	MODE 0: Online 1 to 6: Offline, line test		0	0
DIP switch	Station type	SW1	ON: Standby master station, OFF: Master station/local station	OFF	OFF
	Cannot be used	SW2	Cannot be used	OFF	OFF
	Cannot be used	SW3	Cannot be used	OFF	OFF
	Clearing data at error	SW4	ON: Keep, OFF: Clear	OFF	OFF
	Number of occupied stations	SW5	ON: Occupy 4 stations, OFF: Occupy 1 station	ON	OFF
	Cannot be used	SW6	Cannot be used	OFF	OFF
	Cannot be used	SW7	Cannot be used	OFF	OFF
	Cannot be used	SW8	Cannot be used	OFF	OFF

(2) When the Station Number is 1 and the Number of Occupied Stations is 1: Setting [2]

If the DIP switch 5 is set to OFF, the number of occupied stations is set to 1 and the following points can be used:

Remote I/O: 30 points for both inputs and outputs (the last two points among 32 points cannot be used.)

Remote register: 4 points for both inputs and outputs.

5.2 Settings of the CC-Link Master Station Module

This section describes the settings of the CC-Link master station module.

5.2.1 When Using the CC-Link Master Station Module

(1) Settings of the CC-Link Master Station Module

Figure 5.2.1-1   Rotary Switches of the Master Station

Figure 5.2.1-2   DIP Switches of the Master Station

Set the above rotary switches and DIP switches as indicated in Table 5.2.1-3 below.

Table 5.2.1-3   Settings of the CC-Link Master Station Module

Item		Setting		Setting value
Rotary switch	Station number	X10: Set tens digit of a station number		0
		X1: Set units digit of a station number		0
	Baud rate	B_RATE: Set the baud rate (0 to 4) Specify the same setting value as for the CC-Link interface card of the robot.		4 (Note)
	Mode	MODE: Set the mode		0
DIP switch	Station type	SW1	ON: Standby master station, OFF: Master station/local station	OFF
	Clearing data at error	SW4	ON: Keep data, OFF: Clear data	OFF
	Number of occupied stations	SW5	ON: Occupy 4 stations, OFF: Occupy 1 station	OFF

Note: Specify the same setting as for the CC-Link interface card of the robot. If you need to change the baud rate of the master station, be sure to also change the setting of the CC-Link interface card of the robot.

5.2.2 When Using the CC-Link Master Station Personal Computer Board (A80BD-J61BT11)

[1] Install the A80BD-J61BT11 board in the PCI bus of your personal computer.

[2] When you start your personal computer, the Install Hardware Device Drivers wizard starts.

[3] Insert the supplied floppy disk (4/4) in the floppy disk drive, and install the driver.

[4] After restarting Windows, install the CC-Link Utility software from the floppy disk provided. (For more information, refer to the attached instruction manual.)

[5] From the **Start** menu, click **Programs**, **Melsec** and then **Melsec CC-Link Utility** to start the utility software.

[6] Click the **Board Information** tab, and set the card information.
   Set "81: CC-Link (1st card)" in the **Channel** box.
   Set "0" in the **Board Setting** box.
   Select either "Catch" or "Clear" in the **Link Err X Data**.
   Set a baud rate in the **Baud Rate** box.
   Set "Online" in the **Mode Setting** box.
   Click the **Apply** button.

[7] Click the **Parameter Setting** button. The Set Parameters window appears.
   Set the **Number of Connected modules**.
   Set the robot to be linked to.
   Select "Intelligent Station" for **Type**.
   Select "1" or "4" for the **Occupy Station**. (* Specify the same setting as on the robot side.)
   If there are other devices to be linked to, perform settings for them as well.
   Click the **OK** button.

[8] Click the **Parameter Write** button.

[9] Click the **Apply** button.

Table 5.2.2   Settings of the CC-Link Utility

Window name	Setting item	Setting	Setting value
Card Information	Channel	Specify how many CC-Link interface cards are connected.	81: CC-Link (1st card)
	Local Station Setting	Specify the station number of the local station.	0
	Input Data at Error	Specify how input data should be handled in case a data link error occurs.	Clear
	Baud Rate	Set the baud rate (transmission speed). * Specify the same setting value as for the CC-Link interface card of the robot.	10 M
	Mode	Set the mode.	Online
Set Parameters	Total Number of Connected Cards	Specify the number of CC-Link interface cards that are connected.	1
	Station Type	The station type of the CC-Link interface card of the robot is fixed as "Intelligent device station."	Intelligent device station
	Number of Occupied Stations	Specify to occupy 1 station or 4 stations.	4

6. Connections and Wiring

6.1 Mounting the CC-Link Interface Card in the Controller

For more information about how to mount the CC-Link interface card, refer to the "Installing Optional Devices" in "Controller Setup and Basic Operations to Maintenance" in the instruction manual of the corresponding controller.

The CC-Link interface card is mounted in option slot 2 of the CPU module in the controller or the extension option box. For more information about the CPU module, refer to "Controller Setup and Basic Operations to Maintenance" of the instruction manual of the corresponding controller.

* **Make sure to mount the CC-Link interface card in slot 2.**

(1) Option Slot of the CPU Module **(Front Views of the CR4 with its Cover Opened)**

Figure 6.1-1　Card not Installed

Figure 6.1-2　Card Installed

(2) Option Slot of the Extension Option Box (When Using the CR1 Controller)
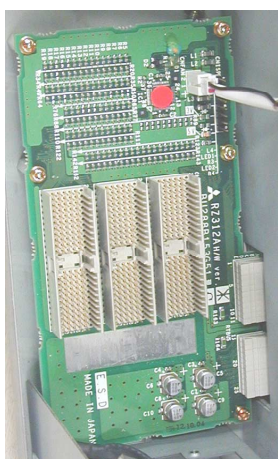
Figure 6.1-3　Card not Installed

Figure 6.1-4　Card Installed

6.2 Connection Between Robot and Master Station CC-Link Interfaces

(1) One-to-One Cable Connection

As shown in Figures 6.2-1 and 6.2-2 below, the cable connection terminal blocks of the robot and master station CC-Link interfaces have the "DA," "DB," "DG" and "SLD" terminals, from the top. Connect the appropriate cable to these terminals.

* Connect the shielded wire of the cable to SLD.
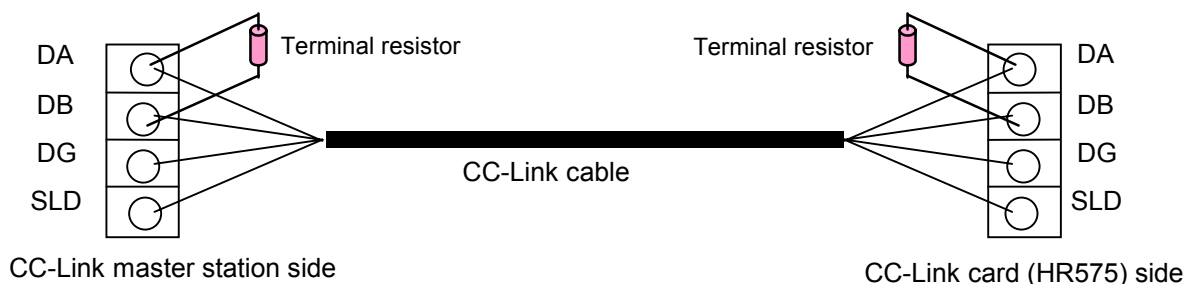
Figure 6.2-1   One-to-One Cable Connection
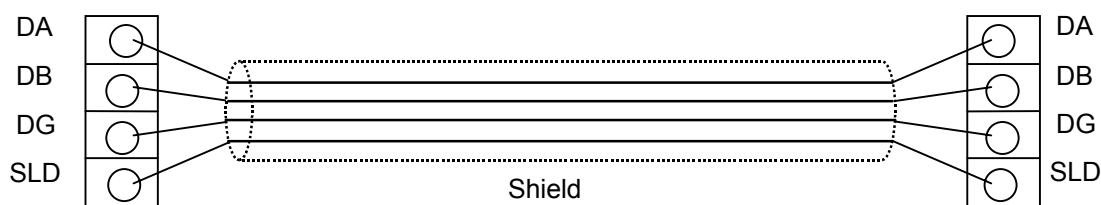
Figure 6.2-2   Wiring Diagram (One-to-One)

(2) Cable Connection of Multiple Modules

To connect multiple modules, connect cables as shown in Figures 6.2-3 and 6.2-4 below.
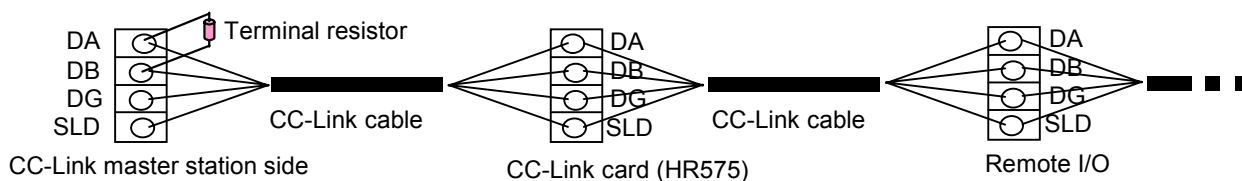
Figure 6.2-3   Cable Connection of Multiple Modules
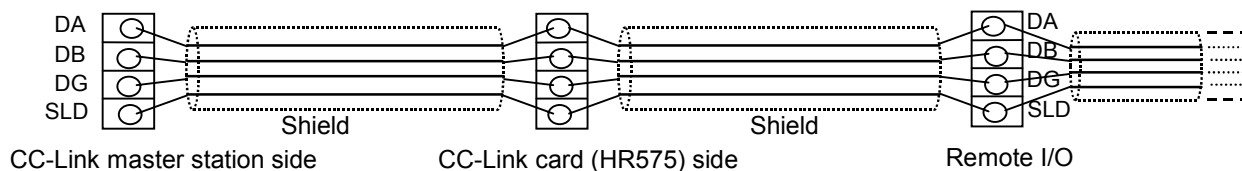
Figure 6.2-4   Wiring Diagram (Multiple Modules)

(3) Connection of a Terminal Resistor

Connect a terminal resistor to the terminals of the CC-Link module at the end of the network, in such a way that a terminal resistor is laid across terminals "DA" and "DB."
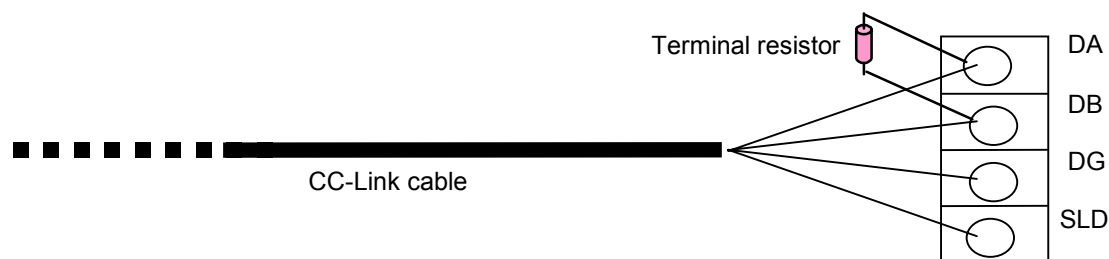
Figure 6.2-5   Connection of a Terminal Resistor

(4) How to Connect the Ferrite Core

Attach the ferrite core included in the package to the cable in order to prevent noise. The installation method is explained below.

Attach the ferrite core to the CC-Link cable that connects the CC-Link interface card installed in the robot controller and the CC-Link module as shown in the illustration below. Place the ferrite core within 30 cm of the connection terminal area. If the ferrite core is placed outside this range, it may not be effective in reducing noise, causing malfunction.
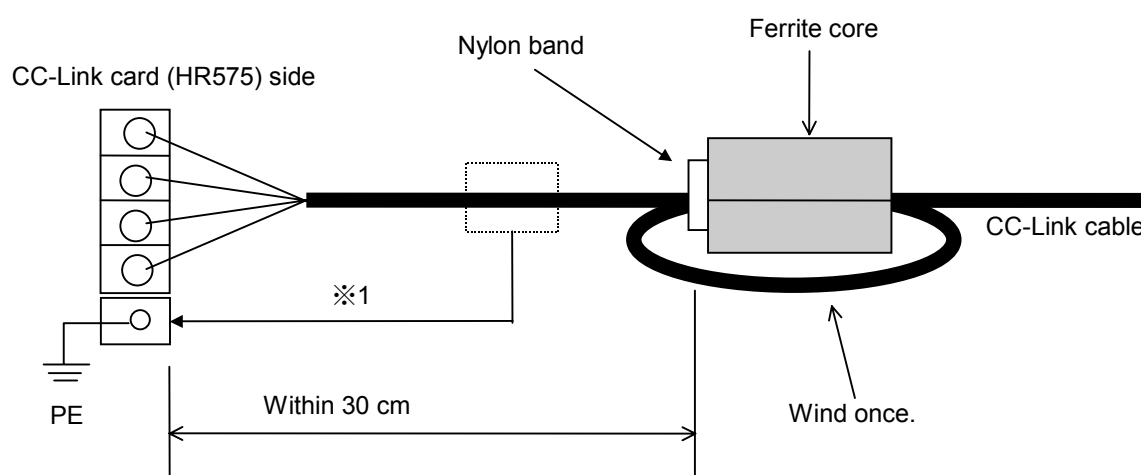
*1 Note

If you are using the equipment in an environment highly likely to be affected by noise, it is recommended to peel off the cable sheath and connect the shield directly to the ground of the chassis by using a ground terminal.

6.3 Checking Connections

Check the following connections again before using the CC-Link interface card.

Table 6.3   Checking Connections

No.	Check item	Check
1	Is the CC-Link interface card securely installed in slot 2 of the controller?	
2	Are the CC-Link cables between the CC-Link interface card and the external devices you provided connected properly?	
3	Are the rotary switches and DIP switches on the card set correctly?	
4	Is a terminal resistor installed?	
5	Is the ferrite core attached?	

7. Basic Communication Procedure

This chapter describes the operations from creating a master station's CC-Link program to establishing a communication by running the sample ladder program provided with this product, using a system configured with one CC-Link interface card connected to one PLC master station module (one-to-one connection).

An example is shown in which the robot is operated from the PLC using the network configuration mentioned above to communicate 126 remote I/O points and 16 remote register points.

The sample ladder program provided starts up robot program No. 1.

* For information about communication via the personal computer CC-Link interface board, refer to the instruction manual of the personal computer CC-Link interface board.

Creating a master station CC-Link program

······See Section 7.1

↓

Setting dedicated I/O parameters

······See Section 7.2

↓

Creating robot program No. 1

······See Section 7.3

↓

Running robot program No. 1

······See Section 7.4
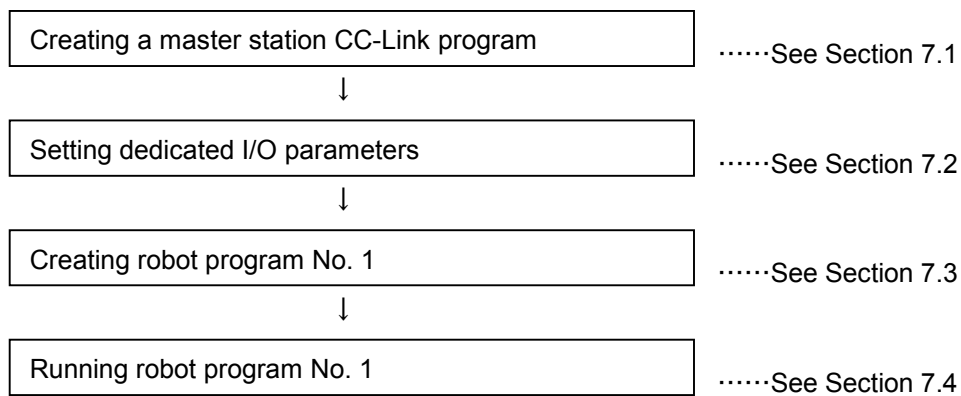
7.1 Creating a Master Station CC-Link Program

This section describes the procedure for creating a program that allows the CC-Link master station module to communicate using a one-to-one connection with the CC-Link interface card of the robot.

7.1.1 Knowledge Required to Create Master Station CC-Link Programs

Tables 7.1.1-1 through 7.1.1-3 show the specifications that must be implemented in creating a CC-Link ladder program to be executed on the master station. Items that are absolutely necessary are marked with underlines.

Table 7.1.1-1   I/O Signals to the PLC CPU   Note: n is the slot number of the PLC.

Input signal	Signal name	Output signal	Signal name
Signal direction: Master station module to PLC CPU		Signal direction: PLC CPU to master station module	
Xn0	**Module error**	**Yn0**	**Refresh instruction**
Xn1	**Local station data link error**	Yn1	(Cannot be used)
Xn2	Parameter setting status	Yn2	(Cannot be used)
Xn3	**Other station data link error**	Yn3	(Cannot be used)
Xn4	Module reset acknowledgement complete	Yn4	Module reset request
Xn5	(Cannot be used)	Yn5	(Cannot be used)
Xn6	Normal completion of data link startup using buffer memory parameters	Yn6	Data link startup request using buffer memory parameters
Xn7	Abnormal completion of data link startup using buffer memory parameters	Yn7	(Cannot be used)
Xn8	Normal completion of data link startup using EEPROM parameters	Yn8	Data link startup request using EEPROM parameters
Xn9	Abnormal completion of data link startup using EEPROM parameters	Yn9	(Cannot be used)
XnA	Normal completion of parameter registration to EEPROM	YnA	Parameter registration request to EEPROM
XnB	Abnormal completion of parameter registration to EEPROM	YnB	(Cannot be used)
XnC	(Cannot be used)	YnC	(Cannot be used)
XnD	(Cannot be used)	YnD	(Cannot be used)
XnE	(Cannot be used)	YnE	(Cannot be used)
XnF	**Module ready**	YnF	(Cannot be used)

* Frequently used signals are indicated in boldface.

Table 7.1.1-2   List of Buffer Memory Addresses

Address (Hex)	Item	Description
0 to 5F	**Parameter information area**	Stores information (parameters) for running the data link.
E0 to 15F	**Remote input**	Stores the input status from a remote/local station.
160 to 1DF	**Remote output**	Store the output status to a remote/local station.
1E0 to 2DF	**Remote register (writing)**	Stores transmission data to a remote/local station.
2E0 to 3DF	**Remote register (reading)**	Stores reception data from a remote/local station
5E0 to 5FF	Remote special relay	Stores the data link status.
600 to 7FF	Remote special register	Stores the data link status.

 * Frequently used buffer memory addresses are indicated in boldface.

Table 7.1.1-3   Detailed Descriptions of Buffer Memory

Address (Hex)	Item	Description	Default value
1	Number of connected modules	Set the number of modules for connected remote/local stations (including reserved stations).	64
2	Number of retries	Set the number of retries at communication error.	3
3	Number of automatic return modules	Set the number of remote/local stations that can return to the network in a single link scan.	1
6	Specification of operation at CPU down	Specify the data link status when an error occurs in the master station's PLC CPU.	0 (stop)
10 to 13	Specification of reserved station	Specify reserved stations.	0 (no reserved stations specified)
14 to 17	Specification of error disabled station	Specify disabled stations.	0 (no disabled stations specified)
20 to 5F	Station information	Set the type of connected remote/local station.	Station type: Remote I/O station Number of occupied stations: 1 station Station number: 1 to 64

7.1.2 Loading the Sample Ladder Program

Load the sample ladder program shown in Appendix to the PLC CPU. This sample ladder program can be used for both A series and Q series CC-Link master station modules.

[Point] In the case of Q series modules, it is possible to make the same settings using the utility software of the personal computer support software for PLC (GPPW) without using the sample ladder program.

The basic program structure of the ladder program is shown below:
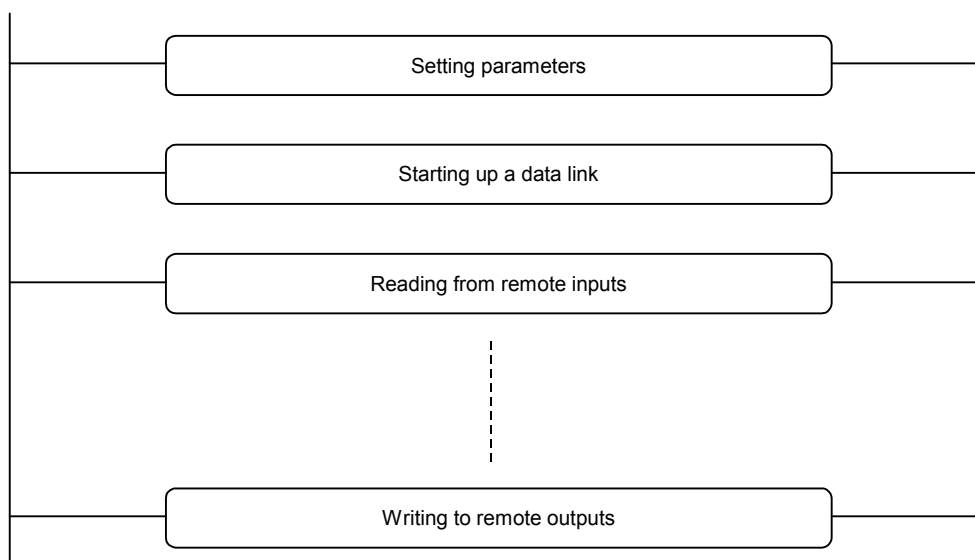
Figure 7.1.2   Ladder Program Structure

* **For more information, refer to the instruction manual that comes with the PLC master station module you purchased.**

7.1.3 Assignment of Signals for the Master Station and the Robot

The signal numbers used in robot programs and the buffer addresses used on the master station side vary depending on the station number settings. Table 7.1.3-1 below lists the signal numbers corresponding to the station numbers.

Table 7.1.3-1   Remote I/O Signal Assignment Table

Station number	Master station Output address	→	Robot Input	Robot Output	→	Master station Input address
0(Master)	—		—	—		—
1	160 h		6000 to 6031	6000 to 6031		E0 h
2	162 h		6032 to 6063	6032 to 6063		E2 h
3	164 h		6064 to 6095	6064 to 6095		E4 h
4	166 h		6096 to 6127	6096 to 6127		E6 h
5	168 h		6128 to 6159	6128 to 6159		E8 h
6	16A h	→	6160 to 6191	6160 to 6191	→	EA h
7	16C h		6192 to 6223	6192 to 6223		EC h
8	16E h		6224 to 6255	6224 to 6255		EE h
9	170 h		6256 to 6287	6256 to 6287		F0 h
⟨	⟨		⟨	⟨		⟨
63	1DC h		7984 ～ 8015	7984 ～ 8015		15C h
64	1DE h		8016 ～ 8047	8016 ～ 8047		15E h

This CC-Link interface card can be set to occupy either 1 station or 4 stations (this is selected using the DIP switches on the card).
- When it is set to occupy 1 station, the number of remote I/O points that can be used is 30 **(even though there are a total of 32 points, the last two points, 31 and 32, are reserved and cannot be used by the user)**.
- When it is set to occupy 4 stations, the number of remote I/O points that can be used is 126 **(even though there are a total of 128 points, the last two points, 127 and 128, are reserved and cannot be used by the user)**.

Table 7.1.3-2   Remote Register Data Assignment Table

Station number	Master station Output address	→	Robot Input	Robot Output	→	Master station Input address
0(Master)	—		—	—		—
1	1E0 h		6000 to 6003	6000 to 6003		2E0 h
2	1E4 h		6004 to 6007	6004 to 6007		2E4 h
3	1E8 h		6008 to 6011	6008 to 6011		2E8 h
4	1EC h		6012 to 6015	6012 to 6015		2EC h
5	1F0 h		6016 to 6019	6016 to 6019		2F0 h
6	1F4 h	→	6020 to 6023	6020 to 6023	→	2F4 h
7	1F8 h		6024 to 6027	6024 to 6027		2F8 h
8	1FC h		6028 to 6031	6028 to 6031		2FC h
9	200 h		6032 to 6035	6032 to 6035		300 h
⟨	⟨		⟨	⟨		⟨
63	2D8 h		6248 to 6251	6248 to 6251		3D8 h
64	2DC h		6252 to 6255	6252 to 6255		3DC h

This CC-Link interface card can be set to occupy either 1 station or 4 stations (this is selected using the DIP switches on the card).
- When it is set to occupy 1 station, the number of remote register points that can be used is 4.
  When it is set to occupy 4 stations, the number of remote register points that can be used is 16.

7.1.4 Specification of the Sample Ladder Program

Table 7.1.4 below shows the specification of the sample ladder program shown in Appendix 9.2.

Table 7.1.4   Sample Ladder Program Specification List

Item	Specification
Connection configuration	The communication takes place between the CC-Link master station module and the robot CC-Link card (one to one).
Position of CC-Link module connection	The CC-Link module is connected to slot 0 of the PLC CPU module.
Number of connected modules	1 module
Number of retries	3 times
Station information setting	The robot is an intelligent device station that occupies 4 stations, starting from the 1st station.
Remote input	Signals from the robot are input from device B100.
Remote output	Signals are output to the robot by writing to device B200.
Register input	Data from the robot is input from device D1000.
Register output	Data is output to the robot by writing to device D1200.
Error handling	Errors are monitored using D90 and D91.
Operation	Start up robot program No. 1 by turning on device X30.

* **The settings on the robot side are stored as the settings with four occupied stations, as explained in Chapter 5.**

7.1.5 How to Change Settings

Example 1: Changing the station number of the robot CC-Link interface

Table 7.1.5-1 below shows how to change the settings when it is desired to change the station number of the robot from station 1 to station 5.

[1] Check that the power supply to the robot controller is turned off, and then change the rotary switch (X1) on the robot CC-Link interface card from 1 to 5.

Table 7.1.5-1   Items that Need to Be Changed in the Sample Ladder Program (Example 1)

Step	Setting name	Before change		After change
[2]	Slave station setting information	[MOV <u>H2401</u> D51]		[MOV <u>H2405</u> D51]
[3]	Remote I/O input	[FROM H0 <u>H0E0</u> K4B100 K8]	→	[FROM H0 <u>H0E8</u> K4B100 K8]
	Remote register input	[FROM H0 <u>H2E0</u> D1000 K16]		[FROM H0 <u>H2F0</u> D1000 K16]
	Remote I/O output	[TO H0 <u>H160</u> K4B200 K8]		[TO H0 <u>H168</u> K4B200 K8]
	Remote register output	[TO H0 <u>H1E0</u> D1200 K16]		[TO H0 <u>H1F0</u> D1200 K16]

Example 2: Adding a remote I/O station as the fifth station

Table 7.1.5-2 below shows how to add a remote I/O station to the next station number of the robot.

[1] Set the station number of the remote I/O module to "5" using the rotary switch.

Table 7.1.5-2   Items that Need to Be Changed in the Sample Ladder Program (Example 2)

Step	Setting name	Before change		After change
[2]	Number of connected modules	[MOV K1 D41]	→	[MOV K2 D41]
[3]	Slave station information	[MOV H2401 D51]		[MOV H1105 D51]
		[TO H0 H20 D51 K1]		[TO H0 H20 D51 K2]
[4]	Remote input	–		[FROM H0 H0E8 K4B300 K2]・・・Added
	Remote output	–		[TO H0 H168 K4B350 K2]・・・・・Added

Example 3: Connecting two robots

Table 7.1.5-3 below shows how to add another robot, for instance, assuming that it occupies 4 stations starting from the fifth station.

[1] Set the station number of the CC-Link interface card of the second robot to "5" using the rotary switch (X1).

[2] Set the same baud rate as for the first robot.

[3] Set the DIP switches in the same way as for the first robot

Table 7.1.5-3   Items that Need to Be Changed in the Sample Ladder Program (Example 3)

Step	Setting name	Before change		After change
[4]	Number of connected modules	[MOV K1 D41]	→	[MOV K2 D41]
[5]	Slave station information	[MOV H2401 D51]		[MOV H2401 D51] [MOV H2405 D52]・・・Added
		[TO H0 H20 D51 K1]		[TO H0 H20 D51 K2]
[6]	Remote I/O	[TO H0 H1E0 D1200 K16]		Assume that remote inputs start at B300, remote outputs start at B400, remote register inputs start at D1300, and remote register outputs start at D1400. [TO H0 H1E0 D1200 K16] [FROM H0 H0E8 K4B300 K8]・・・Added [FROM H0 H2F0 D1300 K16]・・・Added [TO H0 H168 K4B400 K8]・・・Added [TO H0 H1F0 D1400 K16]・・・Added

7.1.6 Executing the Master Station Program

When the creation of a ladder program is complete, set the key switch to "RUN" and execute the program.
* At this point, verify that X30 is not turned on and that no CC-Link link error has occurred.

Power on the robot controller, and verify that an "E7730" error does not occur by checking the "ERR" LED as well as the robot. If any error occurs when starting up, resolve the error by referring to Chapter 8, "Troubleshooting."

7.2 Setting Dedicated I/O Parameters

Set the parameters listed in Table 7.2 below. After the power to the controller is switched from OFF to ON, the new parameter settings will take effect.

Table 7.2   List of Parameters Used in the Sample Ladder Program

Parameter name	Classification	Setting value	Name	Description
ATEXTMD	Input	-	-	Outputs that the key switch on the operation panel is in the automatic mode (Ext).
	Output	-	Remote mode output	
IOENA	Input	6001	Operation right input	Enables/disables the operation right of external signal control.
	Output	6001	Operation right output	Outputs that the operation right of external signal control is enabled.
START	Input	6013	Start input	Starts the program.
	Output	6013	Running state output	Outputs that the program is running.
STOP	Input	0 (fixed)	Stop input	Stops the execution of the program currently running.
	Output	-	Standby state output	Outputs that the program is currently stopped.
STOP2	Input	6021	Stop input	The program is stopped via CC-Link using the signal set by STOP2.
	Output	6021	Standby state output	Outputs that the program is currently stopped.
SLOTINIT	Input	6002	Program reset	Cancels the stop state of the program and returns the execution line to the top. It becomes possible to select the program to be executed.
	Output	6002	Program selection enabled	Outputs that a program can be selected.
ERRRESET	Input	-	Error reset	Cancels the error state.
	Output	-	Error occurring	Outputs that an error has occurred.
SRVON	Input	6003	Servo ON enabled	Turns on the servo power supply of the robot.
	Output	6003	In servo ON	Turns on when the servo power supply of the robot is on.
SRVOFF	Input	6004	Servo OFF	Turns off the servo power supply of the robot.
	Output	6004	Servo ON disabled	Turns on when the servo power supply of the robot is off.
CYCLE	Input	-	Cycle stop	Stops a cycle.
	Output	-	In cycle stop operation	Outputs that a cycle is in the process of being stopped. Turns off when the cycle is stopped.
OUTRESET	Input	-	General-purpose output signal reset	Resets the general-purpose output signal. The parameters ORST6000 to ORST8016 must be set.
PRGSEL	Input	6015	Program selection input signal	The setting value of the numeric value input signal is used as the program number.
IODATA	Input	6005, 6012	Numerical value input	Read as a binary value.
	Output	6005, 6012	Numerical value output	Output as a binary value.
DIODATA	Input	-	Register numerical value input	Reads a binary value from the designated register.
	Output	-	Register numerical value output	Outputs a binary value to the designated register.
PRGOUT	Input	6014	Program No. output request	Outputs the currently selected program number to the numerical value output.
	Output	6014	Program No. output	Outputs that the currently selected program number is being output to the numerical value output.

*1 For more information about the various dedicated I/O signals, refer to the Instruction Manual (BFP-A5945).
*2 With CC-Link, additional DIODATA parameters (register input and register output) can be used. The register input is selected when the numerical value of the input register is read at the rising edge of the signal assigned to the "PRGSEL" or "OVRDSEL" parameter. Note that if both IODATA and DIODATA are set, IODATA is given higher referencing priority.
　The register output outputs the corresponding data to the output register at the rising edge of the signal assigned to a parameter such as "PRGOUT" or "ERROUT." If both IODATA and DIODATA are set, the data is output to IODATA as well.
*3 Regarding the CC-Link stop input signal, please use the "STOP2" parameter as the stop input of CC-Link because No. 0 of the standard parallel input signal is fixed (No. 0 is assigned to a fixed stop input for safety reasons).

7.3 Creating Robot Program No. 1

Create robot program No. 1 using the personal computer support software or teaching pendant (T/B). For information about how to create programs, refer to the CR1/CR2/CR4/CR7/CR8 Controller Instruction Manual (BFP-A5945).

An example of a simple program is shown below:

```
10 MOV PHOME          'Move to the origin
20 MOV P1             'Move to P1
30 M_OUT(6032)=1      'Turn on the signal for confirming movement to P1
40 MOV P2
50 M_OUT(6033)=1      'Turn on the signal for confirming movement to P2
60 MOV PHOME          'Move to the origin
70 M_DOUT(6000)=123   'Output to the register
80 END                'End
```

7.4 Running Robot Program No. 1

This section describes how to start robot program No. 1
[1] Set the key switch of the robot controller to "AUTO (ext)."
[2] Turn on X30 in the sample ladder program.
　　* The servo is turned on and program No. 1 is automatically started by turning on X30.

Note: **When X30 of this sample ladder program is turned on, robot program No. 1 is started and the robot is then activated. Therefore, check safety by making sure that the areas surrounding the robot is clear before turning on X30.**

8. Troubleshooting

Please read this chapter first if you suspect that some failure has occurred.

8.1 List of Errors

Table 8.1   List of Errors

Error No.	Error message	Cause	Action
7700	Cannot mount a CC-Link card in slot 1.	Another CC-Link card is already mounted in slot 1.	Mount the new CC-Link card in slot 2.
7710	Cannot set a CC-Link master station.	A master station is already set by the rotary switch.	Set the rotary switch to other than 0.
7720	Two CC-Link interface cards are mounted.	Mount one card in slot 2.	It is not allowed to install two cards. Install only one card.
7730	CC-Link data link error (local station connection error)	There is a line error or the master station's parameter settings are invalid.	Review the line and parameters (see Section 8.2).
7731	CC-Link data link error (other station connection error)	There is a line error or the master station's parameter settings are invalid.	Contact the system service.
7750	A (CC-Link) cable is not connected or parameters do not match.	A cable is not connected or parameters do not match.	Reset the power and start again.
7760	CC-Link initialization error	The master station's parameters do not match.	Correct the parameters, and then start again.
7780	A CC-Link register number is outside the range.	A register number entered is outside the allowable range.	Enter the correct value.
7781	A signal number for CC-Link was specified.	A signal number for CC-Link was specified.	Install a CC-Link interface card.
7799	CC-Link system error	CC-Link system error	Contact the system service.

* **If an E7730 error occurs, see Section 8.2, "An E7730 Error Has Occurred and CC-Link does not Establish a Link."**

8.2 An E7730 Error Has Occurred and CC-Link does not Establish a Link

[1] Check the settings of the master station module.

1) Is the power to the master station module turned on?

2) Is the key switch of the master station module set to "RUN"?

3) If you are using the sample ladder program, be aware that it has been created assuming that a CC-Link master station is installed next to the CPU module (slot 0). Is the CC-Link master station module installed in slot 0?
If it is installed in another slot, change the value of "H0" in FROM and TO instructions and so forth so that it matches the slot number in which the module is installed.
   * **An E7730 error occurs if the master station module is not running before turning on the power to the robot controller.**

[2] Do the parameter settings of the master station match those of the CC-Link interface card installed in the robot?

1) Is the same number of connected modules (value of PLC buffer address "1h") set ?

2) Is the same station information (values starting from PLC buffer address "20h") set?
   * The CC-Link card connected to the robot controller must be set as an "**intelligent device station.**"

3) Are the settings made as many as the number of connected modules (values from PLC buffer address "20h")?

4) Do the station information and the corresponding parameters of the CC-Link interface match?
   * For more information, see Chapter 3, "Functions and Specification of the CC-Link Interface."

Table 8.2   Settings in Sequence Programs

Setting item	Description	Buffer address
Number of connected modules	This item specifies the number of connected remote/local station modules (including reserved stations). Check 1: If, for example, two robots are connected and both are set to occupy 4 stations, the total number of occupied stations is 8 stations. Since this item specifies the number of connected modules, "2" must be set. In other words, the correct setting is [MOV <u>K2</u> D41] if there are two modules. Is "K2" specified? Check 2: If there are reserved stations, they are also included in the number of connected modules. Is the right setting made?	1H
Station information	This item specifies the type of connected remote stations and intelligent device stations. B15 to B12 B11 to B8 B7 to B0 | Station type	Occupied stations	Station number | └─ 1 to 64 └─1:1 Occupied stations 4:4 Occupied stations └── 2: **Intelligent device station** (CC-Link interface): **Fixed** Check 1: The station type of the robot should be fixed to "2" (intelligent device station). Is the setting correct? Check 2: Does the station number match the setting of the rotary switch of the robot CC-Link interface card?	20H to 5FH

[3] Is the cable between the CC-Link interface and PLC CC-Link connected properly?
- Are terminals DA, DB, DG and SLD on both sides connected to their counterparts?
- Is a terminal resistor connected to terminals DA and DB of the cable connection terminal block of the station connected at the end of the network?
- Is a ferrite core installed in the environment affected by a significant amount of noise?

8.3 If an E7750 Error Occurs

[1] Is the CC-Link card securely installed in position?

[2] Are any slot pin on the CPU side bent or broken?

[3] Contact your vendor or CC-Link system service, since it is likely caused by a hardware failure.

8.4 Linked but No Communication

[1] Is a refresh instruction output from the master station side? (Is the Y0 device turned on, in case you are using the sample ladder program?)

[2] Is X30 turned on in the sample ladder program?

[3] The I/O signal numbers of the robot vary depending on the designated station number. Are the numbers correct?
   Example: If the robot is set to occupy 4 stations from the fifth station, the signal numbers that can be used are 6128 to 6255.

9. Appendix

9.1 Monitoring Register Data

The teaching pendant (T/B) and personal computer support software provide the windows for monitoring the registers of the CC-Link interface. This appendix describes each of these register windows.

9.1.1 Teaching Pendant Register Monitor Window

The following shows how to monitor the CC-Link register data in the monitor window of the teaching pendant.

```
<Monitor>
1. INPUT          2. OUTPUT
3. VAR            4. ERROR
5. REGISTER
```

```
<EGISTER>
1. INPUT          2. OUTPUT
```

```
<NPUT>
NUMBER: (                    )
DATA 16: 0 x (               )
DATA 10: (                   )
```

[1] Select "5. REGISTER."

[2] Select either input register or output register.

[3] Specify a number in the NUMBER field, and then click the Execute button to display the contents of the register in the Data fields.
NUMBER: 6000 -
DATA 16: Hexadecimal value of the specified register.
DATA 10: Decimal value of the specified register.

* If you have selected "Output" in the Register window, the Output window similar to the Input window appears.

9.1.2 Personal Computer Support Software Monitor Window

(5) General-purpose input signal

Pseudo-Input
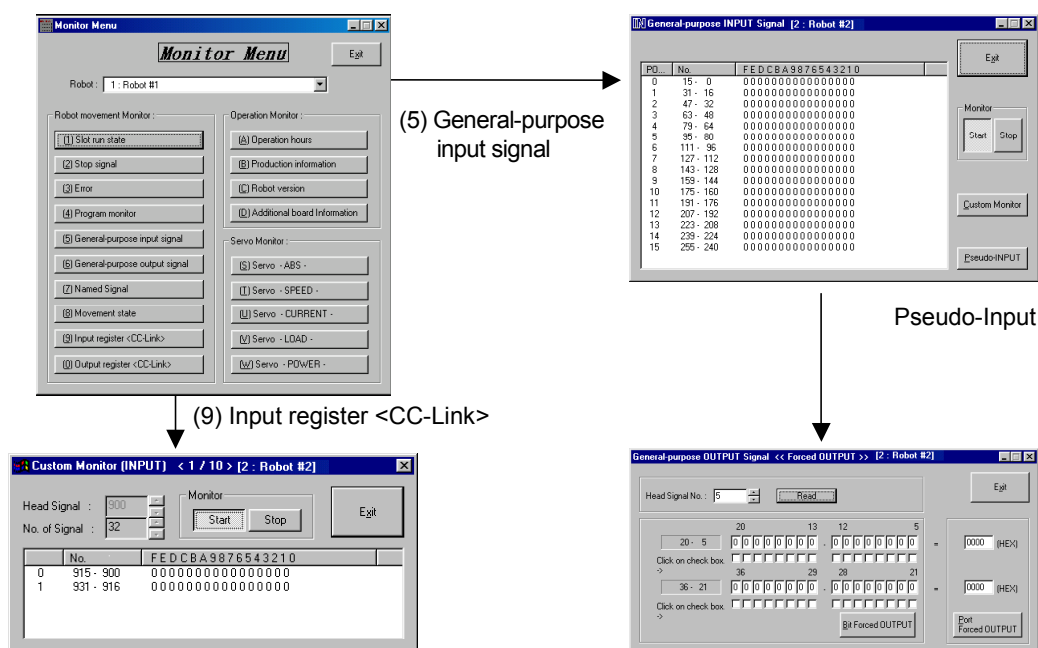
(9) Input register <CC-Link>

General-purpose input/output signal: Select number 6000 or larger in the window shown in the figure at the top right and monitor the signals.

Input/output register: The data and bit data of the registers specified in the window shown in the figure at the top left are displayed.

9.2 Sample Ladder Program (See Section 7.1.4.)

```
         X0        X0F
0      ──┤/├───────┤ ├──────────────────────────────────────────[ PLS    M31    ]
      CC-Link master CC-Link master                                     CC-Link
      module error  module ready                                        parameter
                                                                        setting P

         M31
5      ──┤ ├───────────────────────────────────────────────────[ SET    M32    ]
      CC-Link parameter                                                 CC-Link
      setting P                                                         parameter
                                                                        setting

         M32
7      ──┤ ├─────────────────────────────────────────[ MOV    K1     D40    ]
      CC-Link                                                          Number of
      parameter                                                        connected
      setting                                                          modules

               ─────────────────────────────────────[ MOV    K3     D41    ]
                                                                       Number of
                                                                       retries

               ─────────────────────────────────────[ MO     K1     D42    ]
                                                                       Number of
                                                                       automatic
                                                                       return modules

               ─────────────────────────[ TO     H0     H1     D40     K3    ]
                                                                Number of
                                                                connected
                                                                modules

         M32
32     ──┤ ├───────────────────────────────[ MO     K0     D43    ]
      CC-Link                                               Specification of
      parameter                                             operation at
      setting                                               CPU down

               ─────────────────────[ TO     H0     H6     D43     K1    ]
                                                      Specification of
                                                      operation at
                                                      CPU down

         M32
47     ──┤ ├───────────────────────────────[ MO     H2401  D51    ]
      CC-Link                                               Station
      parameter                                             information
      setting                                               setting

               ─────────────────────[ TO     H0     H20    D51     K1    ]
                                                      Station
                                                      information
                                                      setting

               ─────────────────────────────[ RST    M32    ]
                                                              CC-Link
                                                              parameter
                                                              setting

         M9038
63     ──┤ ├───────────────────────────────────────────────[ SET    Y0     ]
      Single scan on                                                  CC-Link
      after RUN                                                       refresh
                                                                      instruction

         X0        X0F
65     ──┤/├───────┤ ├──────────────────────────────────────[ PLS    M33    ]
      CC-Link master CC-Link master                                   CC-Link
      module error  module ready                                      starting PLS

         M33
70     ──┤ ├───────────────────────────────────────────────[ SET    M34    ]
      CC-Link                                                         CC-Link buffer
      starting PLS                                                    memory start

         M34
72     ──┤ ├───────────────────────────────────────────────[ SET    Y6     ]
      CC-Link buffer                                                  CC-Link buffer
      memory start                                                    memory data
                                                                      link start
```

```
74    X6 ─┤├──────────────────────────────────────────────────[RST  Y6  ]
      CC-Link                                                          CC-Link buffer
      buffer                                                           memory data
      memory start                                                     link start

           ──────────────────────────────────────────────────[RST  M34 ]
                                                                       CC-Link
                                                                       buffer
                                                                       memory start

77    X7 ─┤├────────────────────────────[FRO  H0   H668   D60   K1 ]
      CC-Link                                                   Local station
      buffer                                                    parameter
      memory start                                              status

           ──────────────────────────────────────────────────[RST  Y6  ]
                                                                       CC-Link buffer
                                                                       memory data
                                                                       link start

           ──────────────────────────────────────────────────[RST  M34 ]
                                                                       CC-Link
                                                                       buffer
                                                                       memory start

89    X0    X0F
      ─┤/├──┤├──────────────────────────────────────────────────( M41 )
      CC-Link   CC-Link                                                CC-Link
      master    master                                                normal start
      module    module ready
      error

92    M41 ─┤├──────────────────────[FRO  H0   H0E0   K4B100   K8 ]
      CC-Link                                            RX head
      normal start                                       number

           ─────────────────────────[FRO  H0   H2E0   D1000   K16 ]
                                                         Rr head
                                                         number

111   M41 ─┤├──────────────────────[TO   H0   H160   K4B200   K8 ]
      CC-Link                                            RX head
      normal start                                       number

           ─────────────────────────[TO   H0   H1E0   D1200   K16 ]
                                                         Rw head
                                                         number

131   M41 ─┤├──────────────────────[FRO  H0   H680   D90   K3 ]
      CC-Link                                            Other station
      normal start                                       data link
                                                         status

141  [<>  K0   D90 ]───┤├─────────────────────────────────( M42 )
           Other        M41                                     CC-Link
           station data CC-Link                                 remoter
           link status  normal start                            I/O error

     [<>  K0   D91 ]
           Other
           station data
           link status

     [<>  K0   D92 ]
           Other
           station data
           link status

158   X30 ─┤├──────────────────────────────────────────[MO   K1   D100 ]
      Start flag                                                    Program
                                                                    number

           ──────────────────────────────────────[MO   D100   K2B205 ]
                                                         Program  Numerical
                                                         number   value input 0

           ──────────────────────────────────────────────────[B200 ]
```

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