

MELFA Robots

Industrial Robot

Instruction Manual
(CC-Link Interface)

Crn-500 Series



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.

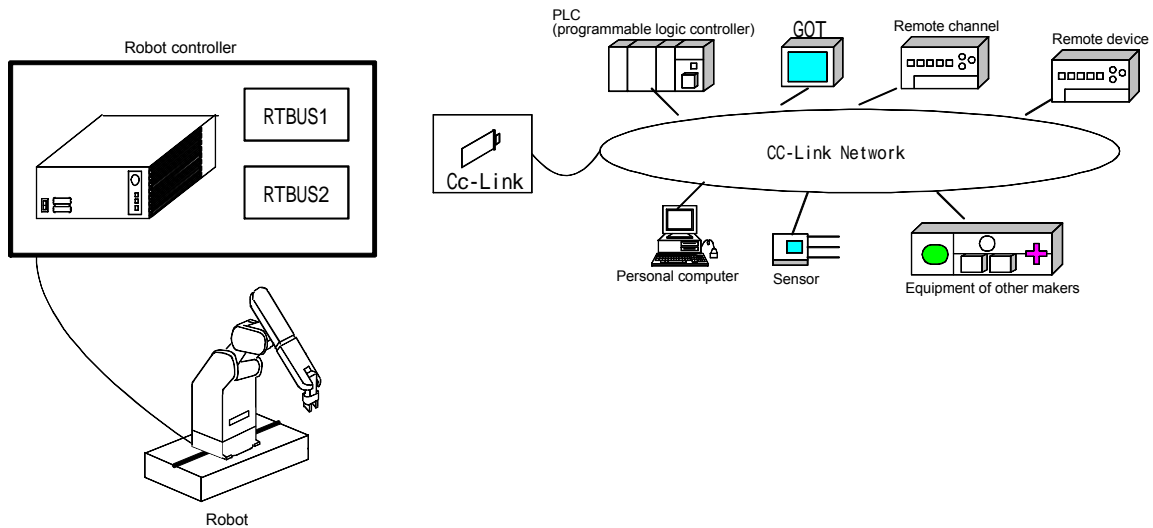
History

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.

Preface

Thank you very much for employing Mitsubishi Electric Industrial Robot CRn-500 series.

Cc-Link interface is an option to add the Cc-Link function as the field network to the robot controller in combination with CRn-500 series controller. Before use, be sure to read through this document for sufficient understanding. Then make the most use of Cc-Link interface.



Whole configuration of system

As the functions of various control device have been enhanced, Cc-Link has been developed as a next generation field network which provides not only the bit control but also the functions of the data control and message transmission/reception.

As it enables cyclic transmission of not only the bit data but also the word data, it becomes possible to easily communicate with the intelligent device such as the inverter and display, etc. in addition to I/O.

The master channel and local channel are connected for the cyclic transmission of n:n, thus this can easily achieve the distributed system.

The optimal distance and speed can be flexibly selected depending on the system. The optimal system can be configured by selecting the optimal device equipment among a variety of the products of the partner makers.

The Cc-Link interface card operates as the intelligent remote channel.

- . It is inhibited to duplicate a partial or whole part of the document without permission.
- . Keep in mind that the document may be subject to change without notice.
- . Though the document is produced with sufficient care, contact our company if any error or obscure point is found.
- . The product names used herein are the trade marks or registered trade marks of the respective companies.

Contents

1.BEFORE USE	1-1
1.1.HOW TO USE THE INSTRUCTION MANUAL	1-1
1.1.1.CONTENT OF INSTRUCTION MANUAL	1-1
1.2.CONFIRMATION OF PRODUCT	1-2
1.3.CC-LINK.....	1-3
1.3.1.SPECIFICATIONS OF CC-LINK INTERFACE	1-3
1.3.2.SIGNAL ASSIGNMENT (BETWEEN CC-LINK AND ROBOT CONTROLLER).....	1-4
1.3.3.SIGNAL FLOW IN THE MIXED SYSTEM.....	1-5
2.PREPARATION BEFORE USE	2-1
2.1.INSTALLING OF CC-LINK INTERFACE	2-2
2.2.PARAMETER SETTING OF CC-LINK INTERFACE	2-3
2.3.CONNECTION CONFIRMATION	2-4
2.4.ASSIGNMENT OF DEDICATED INPUT/OUTPUT SIGNALS AND DEDICATED REGISTER FOR ROBOT.....	2-5
3.OPERATION	3-1
3.1.SET THE PARAMETERS OF CC-LINK INTERFACE	3-2
3.2.SET THE PARAMETER OF DEDICATED INPUT/OUTPUT FOR THE ROBOT CONTROLLER	3-3
3.3.START-UP THE SAMPLE PROGRAM.....	3-3
3.4.COMMUNICATE.....	3-3
3.5.END	3-3
3.6.OTHER APPLICATION EXAMPLES	3-4
3.6.1.SIGNAL ASSIGNMENT	3-4
3.6.2.OPERATE THE ROBOT	3-4
3.7.TROUBLE SHOOTING	3-5
3.7.1.E7730 ERROR OCCURS AND CC-LINK CAN NOT BE LINKED.	3-5
3.7.2.IT IS LINKED BUT IT DOES NOT COMMUNICATE.	3-5
4.APPENDIX	4-1
4.1.ERROR LIST	4-1
4.2.MONITOR OF REGISTER DATA	4-2
4.2.1.T/B REGISTER MONITOR SCREEN	4-2
4.2.2PERSONAL COMPUTER SUPPORT SOFTWARE MONITOR SCREEN.....	4-2
4.3.SAMPLE PROGRAM.....	4-3

1. Before use

This chapter describes the confirmation items and cautionary items which must be read before practical use of Cc-Link interface.

1.1. How to use the instruction manual

1.1.1. Content of instruction manual

Through the following configuration, this document introduces the functions which are added or changed in Cc-Link interface. For the functions and their operating methods provided in the standard robot controller, refer to "instruction manual" appended to the robot controller.

Table: Content of instruction manual

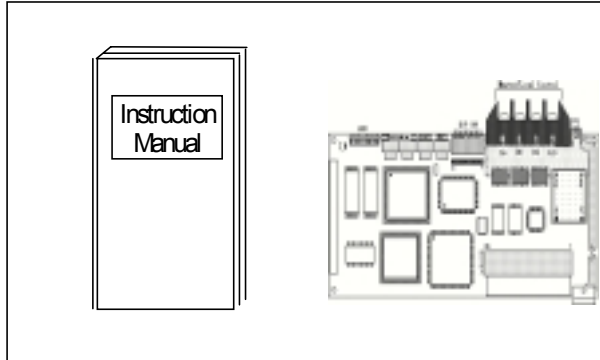
Chapter	Title	Description
1	Before use	Together with the using method of the instruction manual, the confirmation items and cautionary items are introduced to use Cc-Link interface. Read through the chapter before practical use of the Cc-Link interface.
2	PREPARATION BEFORE USE	The preparatory work is introduced to use Cc-Link interface. Referring to this chapter, install the interface card, apply the cabling and wiring and confirm the other setting items.
3	OPERATION	Using the system configured in "This document/Chapter 2 Preparation before use", it introduces a series of the operating methods from the start-up to the stop. Referring to each introduction, understand the basic operating methods.
4	Appendix	Since the added errors when indexing the terms or using Cc-Link interface are herein described, refer to them as necessary.

1.2. Confirmation of product

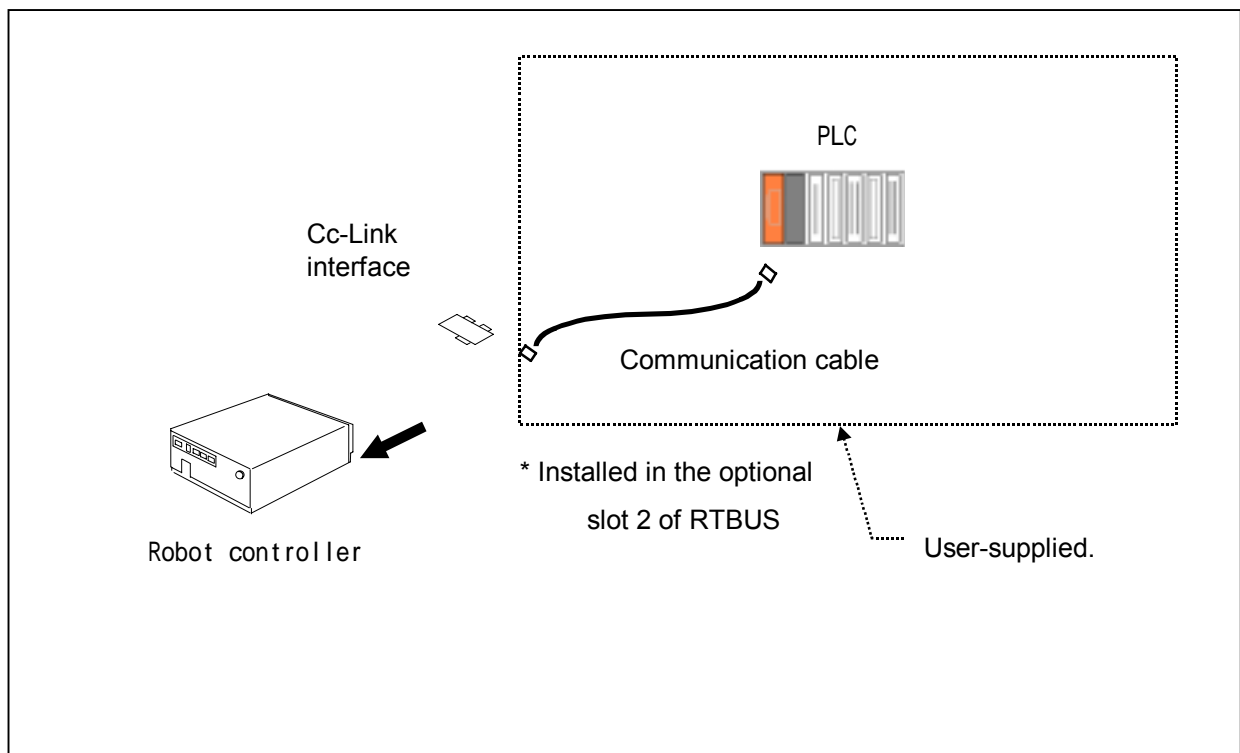
The standard configuration of the product is as follows. Confirm the configuration.

No.	Part name	Type	Qty.
①	Instruction manual (this document)	BFP-A8105	1
②	Cc-Link interface card	HR575	1

In addition to the standard robot system configuration, the following are necessary. These devices are separately procured by the customer.



No.	Part name	Type	Qty.
③	Cc-Link connection devices (Including the PLC)		1~
④	Communication cable	Cable for Cc-Link (3-core twist cable with shield)	1~



1.3. Cc-Link

1.3.1. Specifications of Cc-Link interface

Item		Description	
Communication function		The word data is transmitted by the bit data and register.	
Channel type		Intelligent device channel	
Support channel		The local channel alone is supported.	
Mount possible optional slot		Cc-Link card can be mounted in the optional slot 2 alone.	
Number of mount possible cards		One card alone can be mounted, Two cards can not be mounted.	
Number of channels		Applicable for 1 to 64 channels. The signal No. specified for the robot is different at each channel. For details, refer to 1.3.2.	
Number of occupied channels		1 channel/4 channels can be occupied. (Set with the dip switch of Cc-Link interface card.)	
Remote I/O	Maximum number of link points	Input: 2048 points Output: 2048 points	For the allocation of numbers of the robot program, refer to 1.3.2.
	1 channel occupied	Input/output	Usable every 30 points. (Though 32 points are present, the last 2 points can not be used.)
	4 channel occupied	Input/output	Usable every 126 points. (Though 128 points are present, the last 2 points can not be used.)
Remote register	Maximum number of link points	Input: 256 points Output: 256 points	For the allocation of numbers of the robot program, refer to 1.3.2.
	1 channel occupied	Input/output	Usable every 4 points.
	4 channel occupied	Input/output	Usable every 16 points.
Exclusive input/output setting which uses Cc-Link		Like standard IO, the dedicated input/output are set with the parameters.	
Applicable robot program commands	M_IN	The data of specified input signal 1 bit is read.	IF M_IN(6000) = 1 THEN GOTO 100
	M_OUT	The data of the specified output signal 1 bit is written.	M_OUT(6005) = 1
	M_INB	The data of 8 bits is read from the specified input signal.	IF M_INB(6010) = 100 THEN GOTO 100
	M_OUTB	The data of 8 bits is written from the specified output signal.	M_OUTB(6015) = 255
	M_INW	The data of 16 bits is read from the specified input signal.	IF M_INW(6020) = 500 THEN GOTO 200
	M_OUTW	The data of 16 bits is written from the specified output signal.	M_OUTW(6025) = 1000
	M_DIN	The data of the specified register input is read.	IF M_DIN(6000) = -10 THEN GOTO 10
	M_DOUT	The data is written to the specified register output.	M_DOUT(6003) = 111
Exclusive input/output parameter for Cc-Link	STOP2	Since the dedicated input 【STOP】 is fixed at the input signal "0" (fixed for safety), use the dedicated input 【STOP2】 to command the stop from Cc-Link.	
	DIODATA	Like the dedicated input/output 【IODATA】, it instructs and outputs the program No., error No. and line number, etc..	

*1 This Cc-Link transient transmission function is not provided.

*2 The basic specifications of Cc-Link are similar to those of the PLC Cc-Link unit. For details of the function, refer to the instruction manual of the PLC Cc-Link unit.

1.3.2. Signal assignment (between Cc-Link and robot controller)

The signal numbers used in the robot program are different depending on the channel No. The signal numbers which correspond to the channel No. are listed below.

Table: Signal assignment list between Cc-Link and robot controller (Remote I/O)

Channel No.	Remote input RX	Remote output RY	Robot input	Robot output
0 (master)	—	—	—	—
1	RX0000~RX001F	RY0000~RY001F	6000 ~ 6031	6000 ~ 6031
2	RX0020~RX003F	RY0020~RY003F	6032 ~ 6063	6032 ~ 6063
3	RX0040~RX005F	RY0040~RY005F	6064 ~ 6095	6064 ~ 6095
⋮	⋮	⋮	⋮	⋮
61	RX0780~RX079F	RY0780~RY079F	7720 ~ 7951	7920 ~ 7951
62	RX07A0~RX07BF	RY07A0~RY07BF	7952 ~ 7983	7952 ~ 7983
63	RX07C0~RX07DF	RY07C0~RY07DF	7984 ~ 8015	7984 ~ 8015
64	RX07E0~RX07FF	RY07E0~RY07FF	8016 ~ 8047	8016 ~ 8047

Either 1 channel or 4 channels can be set on Cc-Link interface board. (Set it with the switch on the card.)

- In the case of the 1-channel occupancy, 30 remote input/output points. (Though 32 points are provided, the last points 31 and 32 are reserved and cannot be used by the user.)
- In the case of the 4-channels occupancy, 126 remote input/output points. (Though 128 points are provided, the last points 127 and 128 are reserved and cannot be used by the user.)

Table: Register assignment list between Cc-Link and robot controller (Remote register)

Channel No.	Remote register RX	Remote register RY	Robot register input	Robot register output
0(master)	—	—	—	—
1	RWw0000~RWw0003	RWr0000~RWr0003	6000 ~ 6003	6000 ~ 6003
2	RWw0004~RWw0007	RWr0004~RWr0007	6004 ~ 6007	6004 ~ 6007
3	RWw0008~RWw000B	RWr0008~RWr000B	6008 ~ 6011	6008 ~ 6011
⋮	⋮	⋮	⋮	⋮
61	RWw00F0~RWw00F3	RWr00F0~RWr00F3	6240 ~ 6243	6240 ~ 6243
62	RWw00F4~RWw00F7	RWr00F4~RWr00F7	6244 ~ 6247	6244 ~ 6247
63	RWw00F8~RWw00FB	RWr00F8~RWr00FB	6248 ~ 6251	6248 ~ 6251
64	RWw00FC~RWw00FF	RWr00FC~RWr00FF	6252 ~ 6255	6252 ~ 6255

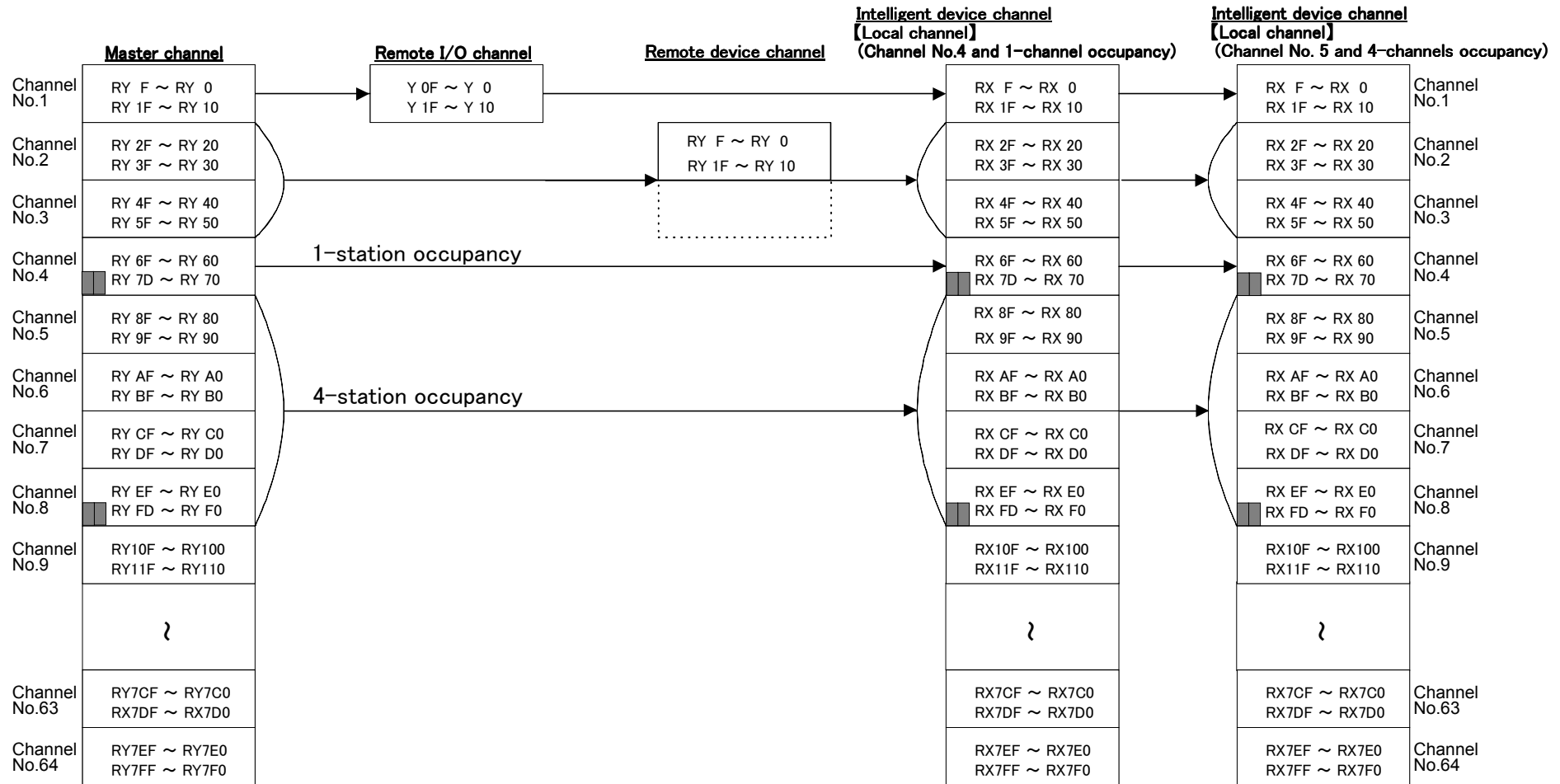
Either 1 channel or 4 channels can be set on Cc-Link interface board. (Set it with the switch on the card.)

- In case of 1-channel occupancy, 4 remote register points
- In case of 4-channel occupancy, 16 remote register points

1.3.3. Signal flow in the mixed system

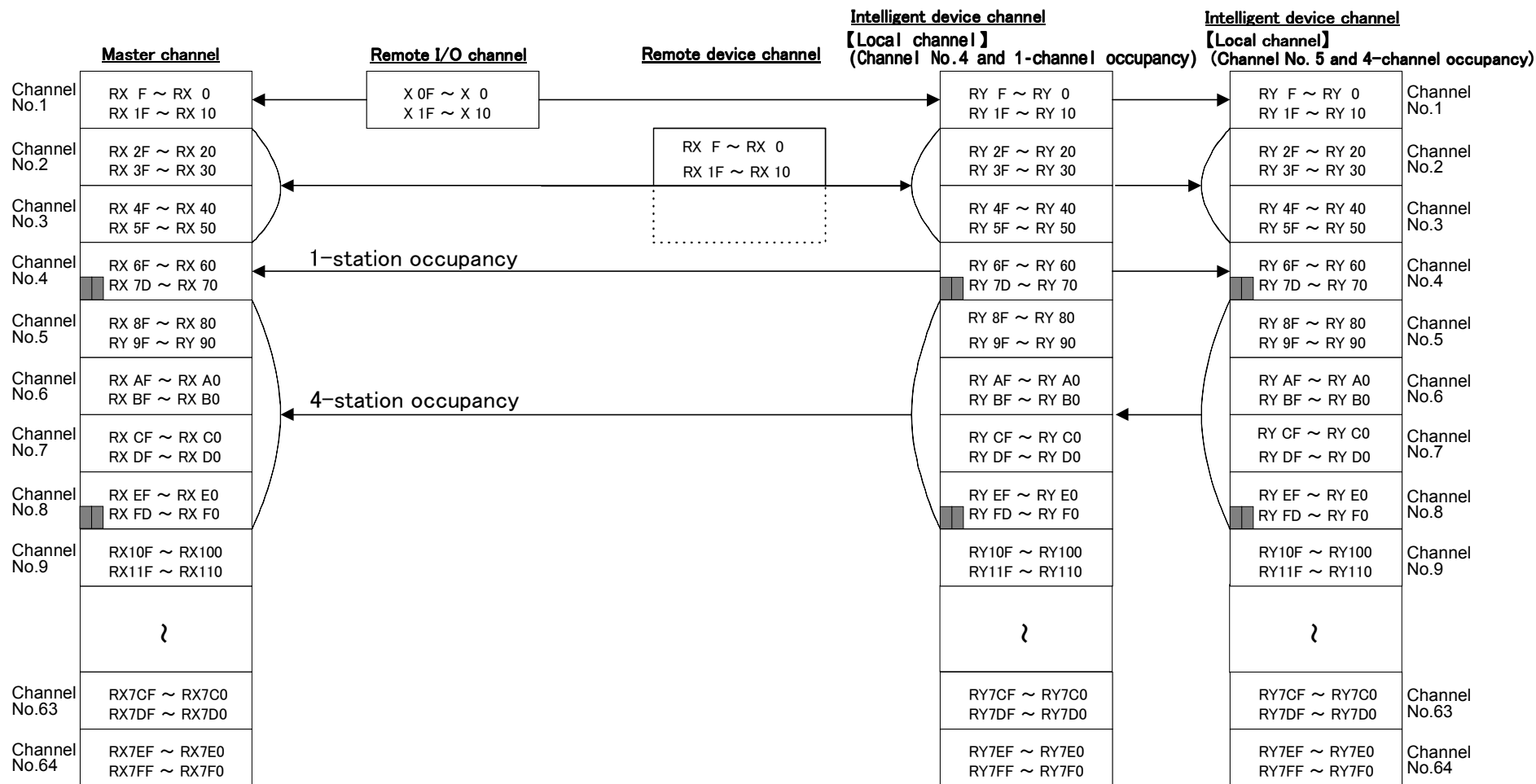
The signal flow in the mixed system (compound system of master channel, remote channel, remote device channel and intelligent device channel) is shown below.

(1) Input to robot Cc-Link (Master channel → Remote I/O channel/Remote device channel/Local channel)



Note: Keep in mind that the bits marked with ■ (the last two bits between master channel and local channel) can not be used.

(2) Output from robot Cc-Link (Master channel ← Remote I/O channel/remote device channel/local channel)

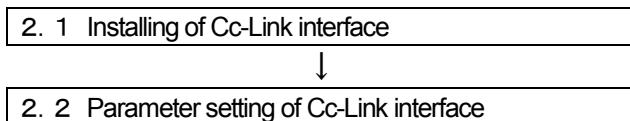


Note: Keep in mind that the bits marked with ■ (the last two bits between master channel and local channel) can not be used.

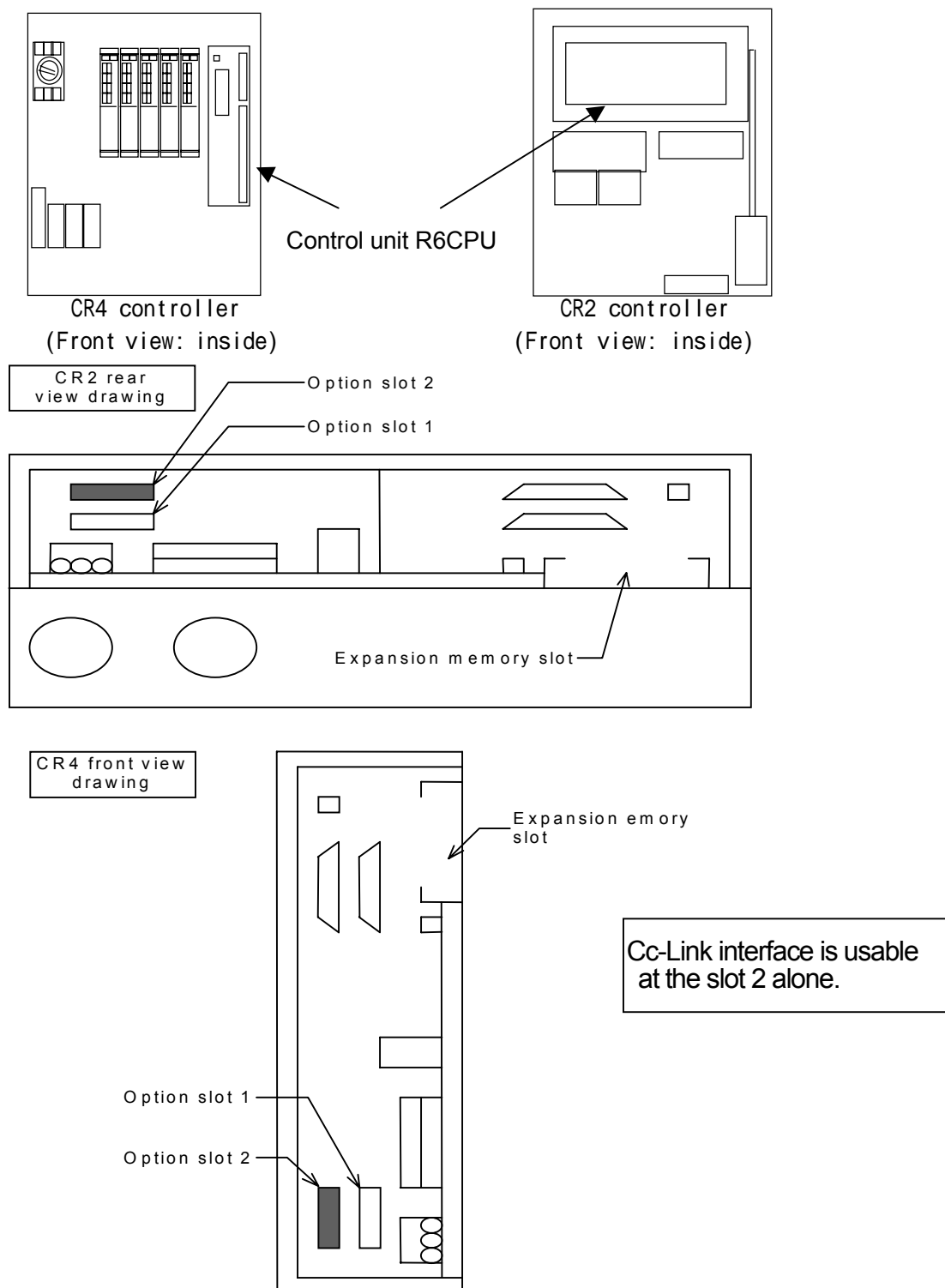
* The intelligent device channel (local channel) can read the data of 64 channels. In other words, the data of the input/output signals used in another channel can be read if the content of the data is specified for reading. However, regarding writing, the assigned signal alone can be rewritten.
The small number of signals assigned to Cc-Link can be compensated

2. Preparation before use

What to do before use is described.



The installing section of the robot controller which Cc-Link interface card is mounted with is shown below.



2.1. Installing of Cc-Link interface

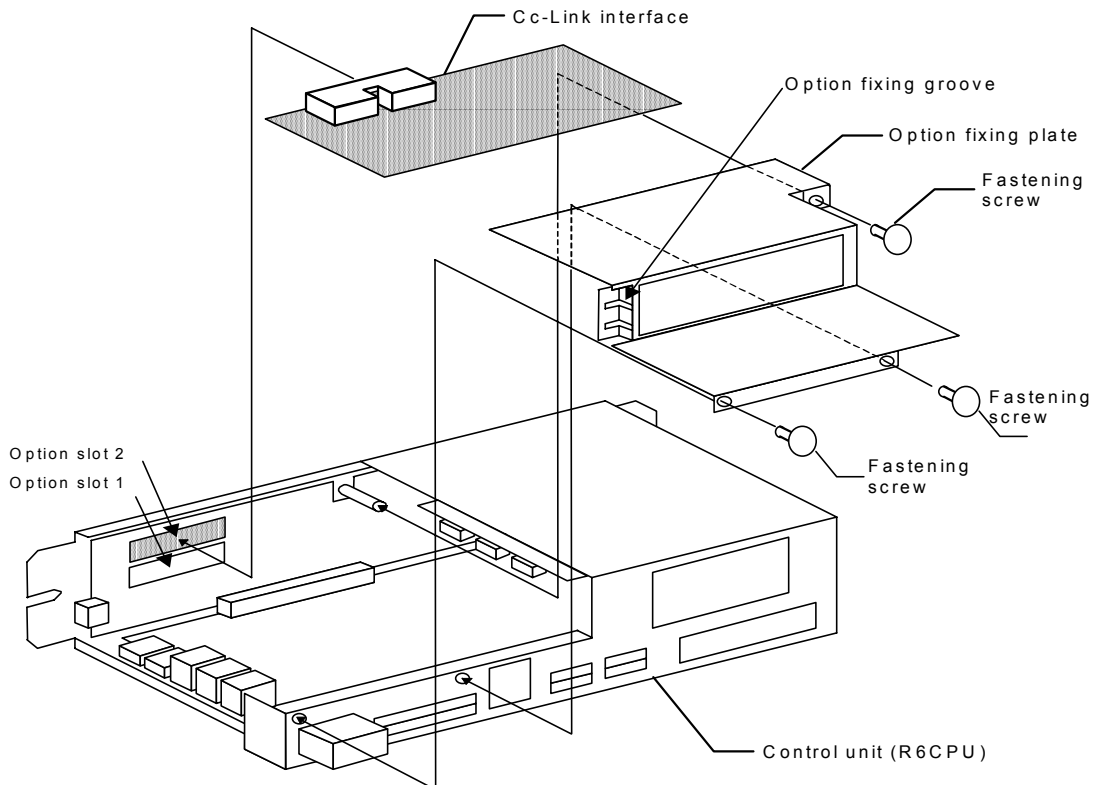
The procedure to install the Cc-Link interface is described below.

When using the CR1 controller, refer to "Installation of optional device" of "Controller setup, basic operation and maintenance" in the instruction manual of CR1 controller.

The Cc-Link interface is installed in the control unit (R6CPU unit) of the controller or in the optional slot 2 (OPT2) of the expansion optional box. For details of the control unit (R6CPU unit), refer to the instruction manual "Controller setup, basic operation and maintenance".

Procedure to install Cc-Link interface

- (1) Remove the optional fixing plate of the control unit (R6CPU). (Three fastening screws)
- (2) Insert Cc-Link interface into the optional slot 2 (OPT2).
- (3) Install the optional fixing plate, engaging the end of Cc-Link interface into the optional fixing groove.
Reversing procedure (1), tighten the fastening screws (3 places) for fixation.
- (4) Connect Cc-Link cable to Cc-Link interface.
- (5) Process the outlet port of Cc-Link cable connected. For details, refer to the instruction manual "Controller setup, basic operation and maintenance" of each controller.



2.2. Parameter setting of Cc-Link interface

The parameter setting with rotary switch and dip switches on the Cc-Link interface card are shown below.

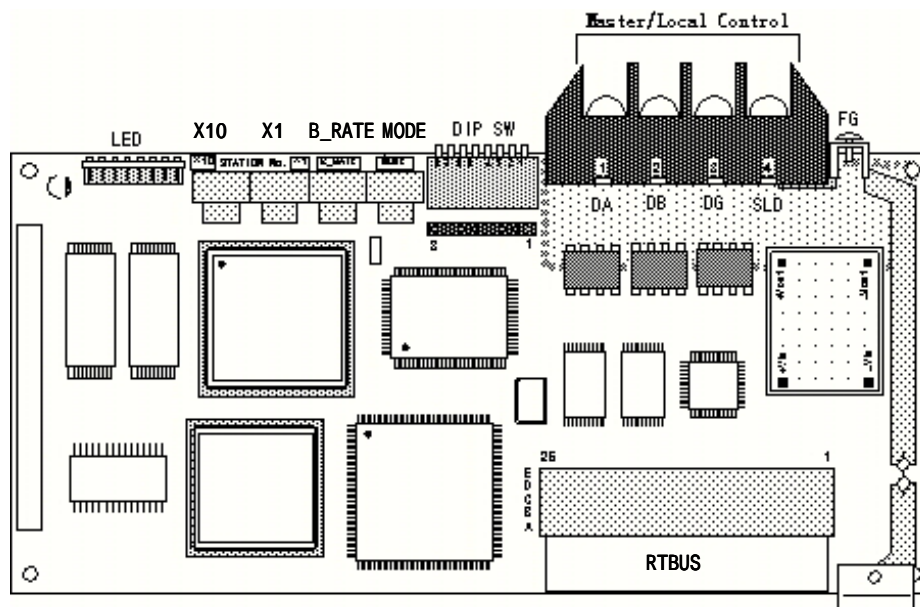


Figure of whole board

Table: Details of board content

Name	Description
LED	LED displays the state of the board.
X10 X1	Channel No. setting Two rotary switches set the orders of 10 and 1. Master channel: "0" Local channel: "1" to "64"
B_RATE	Baud rate setting 156[kbps], 625[kbps], 2.5[Mbps], 5[Mbps], 10[Mbps] ... 0, 1, 2, 3, 4
MODE	Mode switch The mode is selected. (For details, refer to list mode details.)
DIP SW	Dip switch Sets the parameter. (For details, refer to list dip switch details.)
Master/local Control	Connector It is connected to another Cc-Link. Use the dedicated Cc-Link cable, and connect DA, DB, DG and SLD.
RTBUS	Bus The connector connects the robot controller.

Figure: Details of LED

RUN	■	■	SW
ERR	■	■	M/S
MST	■	■	PRM
S MST	■	■	TIME
LOCAL	■	■	LINE
CPU R/W	■	■	
L RUN	■	■	SD
L ERR	■	■	RD

Table: Details of LED names

LED name	Description
RUN	Normal unit, - Light.
ERR	Abnormal communication, - Light.
MST	Master channel specified, - Light.
S MST	Waiting master channel specified, - Light.
LOCAL	Local channel specified, - Light.
CPU R/W	Communicating with CPU unit, - Light.
E SW	Switch setting disable, - Light.
R M/S	Same channel No. in the same line, - Light.
R PRM	Abnormal parameter, - Light.
O TIME	Data link monitor timer activated, - Light.
R LINE	Broken cable, - Light.
L RUN	Normal communication, - Light.
L ERR	Communication data error, - Light.

* The rotary switch side is upper.

Table: Mode details

No.	Name	Description	Master	Local	Waiting
0	On-line	Ordinary operation mode (Provided with self reset parallel string function)	○	○	○
1	''	(Reserved)	○	×	×
2	Off line	Parallel-off mode	○	○	○
3	test 1	Line test 1 mode (data link test)	○	×	×
4	test 2	Line test 2 mode (remote channel mode)	○	×	×
5	test 3	Setting parameter confirmation mode	○	×	×
6	test 4	Single unit H/W operation confirmation mode	○	○	○
7	Not used	Switch setting error	×	×	×
8	test 5	(Reserved)	○	○	○
9	test 6	(Reserved)	○	○	○
A	test 7	(Reserved)	○	×	×
B	Not used	Switch setting error	×	×	×

Table: Dip switch details

No.	Setting item	Description	Setting switch state	
			OFF (silk)	ON (silk)
SW1	Channel type	Master channel/local channel or waiting master channel is selected.	Master channel/local channel (ML)	Waiting master channel (S MST)
SW2	Reserved	—	—	—
SW3	Reserved	—	—	—
SW4	Input data clear is specified during error.	Whether input data is cleared or held is selected when an error occurs.	Clear (CLEAR)	Hold (HOLD)
SW5	Specification of number of occupied channels	1 channel: 32 points 4 channels: 128 points	1 channel (1)	4 channels (4)
SW6	Reserved	—	—	—
SW7	Reserved	—	—	—
SW8	Unit mode	Intelligent or remote I/O transmission is selected.	(Reserved)	Fixed at I/O mode (SFM)

Set the board setting shown above equal to the parameter setting in master channel.
 Or set the dip switches according to the application and reflect them on the master channel.

2.3. Connection confirmation

Before use, reconfirm the following items.

Table: Connection confirmation

No.	Confirmation item	Check
1	Is Cc-Link interface securely installed in the slot of the controller?	
2	Is Cc-Link interface properly connected to the prepared external device with the communication cable?	
3	Are peripheral devices and PLC powered?	
4	Does PLC run?	
5	Are the channel No. and mode, etc. of the card properly set?	
6	Is Cc-Link cable which is connected to the card properly connected?	
7	Is the PLC program which set the parameters of the master channel proper?	

2.4. Assignment of dedicated input/output signals and dedicated register for robot

The parameter setting to execute the following operation from Cc-Link is shown below.

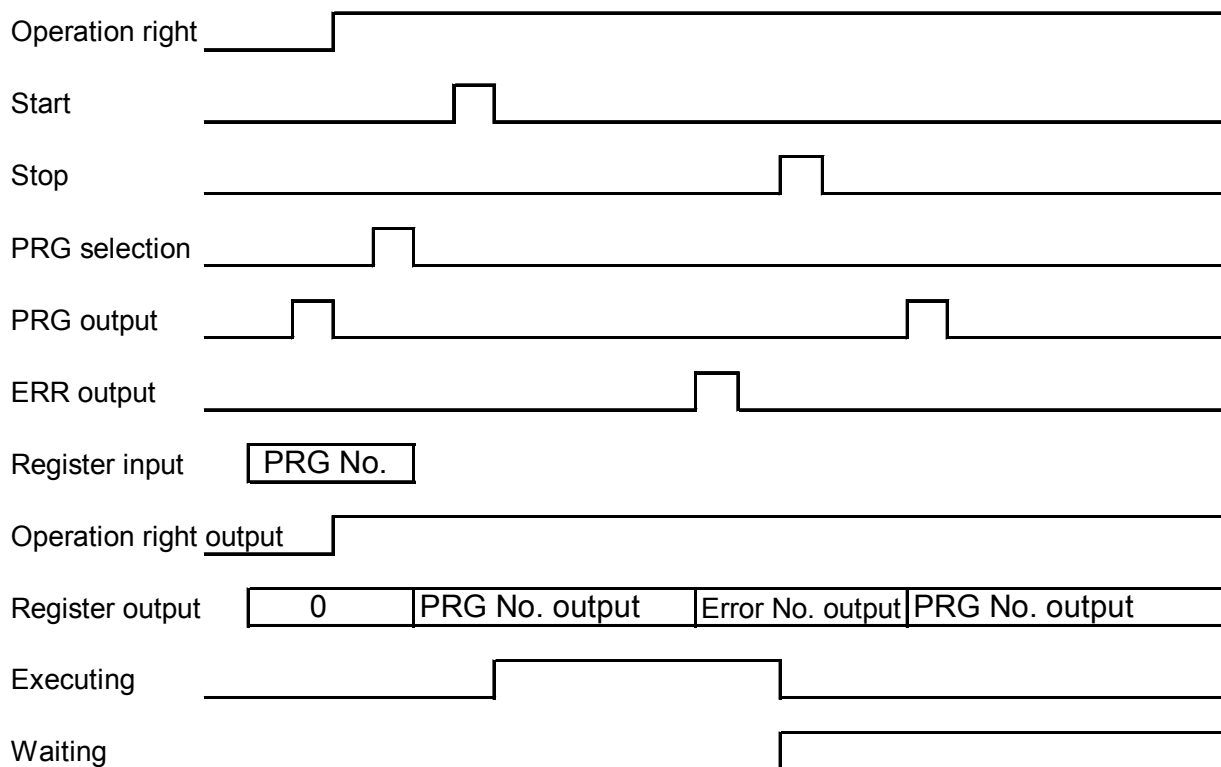


Table: Example of parameter setting

Parameter name	Parameter setting value	Division	Name	Remarks
AUTOENA	6000	Input	Automatic execution enable input	
	6000	Output	Automatic execution enable output	
IOENA	6001	Input	Operation right input	
	6001	Output	Operation right output	
SLOTINIT	6002	Input	Program reset	
	6002	Output	Program selection enable	
SRVON	6003	Input	Servo ON	
	6003	Output	During servo ON	
SRVOFF	6004	Input	Servo OFF	
	6004	Output	Servo ON disable	
IODATA	6005、6012	Input	Numerical value input	
	6005、6012	Output	Numerical value output	
START	6013	Input	Start input	
	6013	Output	Executing output	
PRGOUT	6014	Input	Program No. output request	Program No. is output to address 6000 of the numerical value output register.
PRGSEL	6015	Input	Program selection input	Program No. selects the numerical value at address 6000 of the numerical value input register.
STOP	0 (Fixed)	Input	Stop input	
	6020	Output	Waiting	
STOP2	6021	Input	Stop input	
	6021	Output	Waiting output	
ERROUT	6025	Input	Error No. output request	The error No. is output to address 6000 of the numerical value output register.
DIODATA	6000	Register input	Numerical value input register	Before PRGSEL signal is input, data is set.
	6000	Register output	Numerical value output register	If PRGOUT signal is input, the program No. is output. If ERRROUT signal is input, the error No. is output.

*1 For variation of the dedicated input/output signals, refer to the standard instruction manual.

*2 On Cc-Link, it can be used with the parameter DIODATA (register input/register output) added.

The parameter DIODATA has two elements, and the register input No. is assigned to the 1st element and the register output No. is assigned to the 2nd element.

The register can switch the meaning with the input signal.

On the register input, the numerical value of the register is read and selected at the leading edge of the signal assigned to PRGSEL or OVRDSEL. On the register output, the content is output to the register at the leading edge of the signal assigned to RRGOUT, OVRDOUT, LINEOUT and ERRROUT.

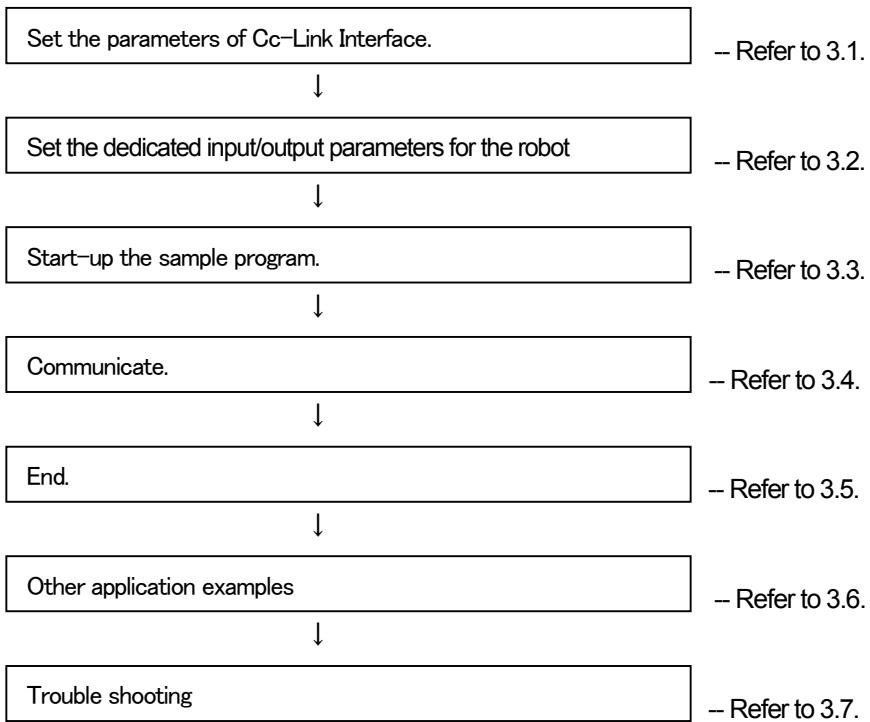
*3 Since address 0 of the standard parallel input signal is fixed (for safety, No. 0 is assigned to the stop input which fixes address No.) regarding the stop input signal, use the parameter "STOP2" for the stop input of Cc-Link.

3. Operation

This chapter describes the operation methods up to the communication by operating the appended sample program with the system in which Cc-Link interface and PLC master channel are connected to each other one-to-one with Cc-Link cable.

In this system, it shows such an example as the remote I/O 126 points and remote register 16 points are used to operate the robot from PLC (programmable logic controller).

Since the appended sample program starts-up address 1 of the robot program, take care at the time of start.



3.1. Set the parameters of Cc-Link Interface.

Referring to 2.2. parameter setting of Cc-Link interface, set the conditions desired for communication. Here, in the system shown below, the setting in the following list is used as an example for explanation.

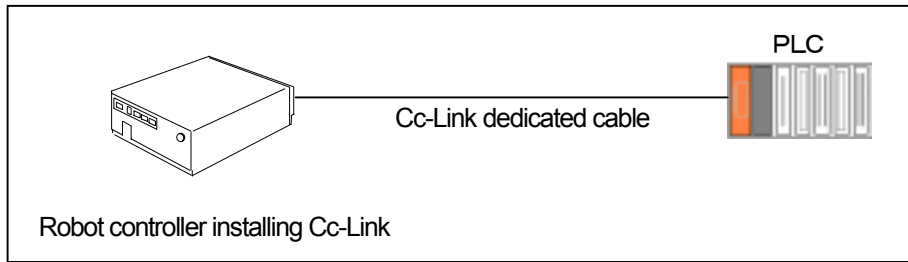


Table: Setting content of rotary switch and dip switch

Item		Local channel (robot controller)	Master channel (PLC)
Channel No.	Rotary switch	X10 : 0 X1 : 1 Set it for one local channel.	X10 : 0 X1 : 0 Set it for the master channel.
Baud rate		B_RATE : 10Mbps ... 4	B_RATE : 10Mbps ... 4
Mode		MODE : On line ... 0	MODE : On line ... 0
Channel type	Dip switch	OFF (Master channel/local channel)	Since it is set for the master channel, any setting is regardless.
Data clear in the case of an error		OFF (Clear)	
Number of occupied channels		ON (4-channel occupancy)	
Unit mode		ON (I/O mode)	

Due to the setting in the list above, 126 points (the last 2 points are not usable among 128 points) are usable for input/output of the remote I/O and 16 points are usable for input/output of the remote register. If one channel is occupied by turning off the number of occupied channels, 30 points (the last 2 points are not usable among 32 points) are usable for input/output of the remote I/O, and 4 points are usable for input/output of the remote register.

However, to change the parameters, change the parameter setting area of the sample program. The changed area is shown below.

Setting item	Example	Changed description
Number of Connected devices	[MOV K1 D1]	Corresponding to the number of devices, change K1. (Example) K3 for 3 units
Slave channel setting information	[MOV H2401 D2]	Change it to match the parameter setting H2401. (Example) If 5 is selected as the channel No. in 1-channel occupancy, select H2105. For details of the setting, refer to Chapter 3.7 Such a case.

3.2. Set the parameter of dedicated input/output for the robot controller.

The robot can be operated from Cc-Link by setting the dedicated input/output parameters of the robot controller like Chapter 2.4 Example of parameter setting.

For the methods to set the parameter of dedicated input/output, refer to the instruction manual of NARC controller.

3.3. Start-up the sample program.

Install the sample program of appendix 1 into the PLC CPU which is the master channel, and turn the key switch of the PLC to "RUN". If "ERR" of the PLC is light at the time, correct the sample program to the program which matches the system.

In this sample program, the remote I/O and remote register are assigned as shown below. To change the assignment, refer to "RLPA" command of the user's manual which is appended to Cc-Link PLC when it is supplied.

Signal name	Occupied channels	Input device	Output device
Remote I/O	1-channel	30 points from B0 device	30 points from B800 device
	4-channel s	126 points from B0 device	126 points from B800 device
Remote register	1-channel	4 points from W100 device	4 points from W0 device
	4-channel s	16 points from W100 device	16 points from W0 device

3.4. Communicate.

After confirming that the sample program properly operates, turn the power supply of the robot controller ON. If any error does not occur from the robot controller, turn X30 of the sample program ON. When X30 is turned ON, the cyclic transmission (communication) will start. If any error occurs from the robot controller, refer to chapter "Trouble shooting". To start-up the robot program No. 1, turn X35 ON.

Note: Since the robot program No. 1 starts-up when X35 of the sample program is turned ON, turn X35 ON after confirming whether peripheral device is safe or not.

3.5. End.

Press the stop button of the robot controller, and it will stop.

3.6. Other application examples

Though chapters 3.3 to 3.5 describes such a example as the robot program No. 1 is started-up by using the dedicated input/output signal, this chapter describes the picking work and placing work which are done with the signal in the robot program.

3.6.1. Signal assignment

The signals for the picking and placing works are allocated as shown in the following list.

Table: Signal allocation (Input/output of robot)

Input signal No.	Signal name	Output signal No.	Signal name	Description
6100	Take-out command	6100	Report of take-out complete	The workpiece is taken out at the place which is specified by the take-out command from PLC. After it is taken out, the report of the take-out complete is turned on.
6101	Installation command	6101	Report of installation complete	The workpiece is installed (placed) at the place which is specified by the installation command from PLC. After it is installed, the report of the installation complete is turned on.

Register input No.	Signal name	Description
6000	Specified place	Place where the take-out work and installation work are carried out (the place which the robot moves to)

3.6.2. Operate the robot.

If assignment of the signals is determined as shown in table in section "3.6.1", an example to operate the robot is shown below.

(1) The workpiece is taken out at the specified place 3.

Sequence No.	PLC (programmable logic controller)	Robot program
1	After 3 is input into the register 6000, 6100 (take-out command) is turned ON.	It executes the take-out work of the workpiece from the specified place 3. After the work completed, 6100 (report of take-out complete) is turned on. *1
2	0 is input into the register 6000 and 6100 (take-out command) is turned OFF.	6100 (report of take-out complete) is turned OFF. *2

*1 – Specified place acquired: M_DIN(6000) Take-out command is received. : IF M_IN(6100) = 1 THEN take-out work
Report of take-out complete ON : M_OUT(6100) = 1

*2 – Report of taken-out complete OFF : M_OUT(6100) = 0

(2) The workpiece is installed at the specified place 10.

Sequence No.	PLC (programmable logic controller)	Robot program
1	After 10 is input into the register 6000, 6101 (Installation command) is turned ON.	Installation work of the workpiece at the specified place 10 is executed. After the work completed, 6101 (Report of installation complete) is turned on. *3
2	0 is input into the register 6000 and 6101 (Installation command) is turned OFF.	6101 (Report of installation complete) is turned OFF. *4

*3 – Specified place acquired : M_DIN(6000) Installation command is received. : IF M_IN(6101) = 1 THEN installation work
Report of installation complete ON: M_OUT(6101)=1

*4 – Report of installation complete OFF: M_OUT(6101) = 0

3.7. Trouble shooting

Before regarding it as fault, first confirm the following.

3.7.1. E7730 error occurs and Cc-Link can not be linked.

(1) Does any parameter setting of the master channel match Cc-Link interface of the robot?

- . Is the number of connected devices proper? (Value of PLC buffer address 1H)
- . Is channel information proper? Is any data set to match the number of connected devices? (Value from the PLC buffer address 20H)

. Does parameter match the channel information and Cc-Link interface?

Channel No. – For Cc-Link interface setting, refer to the board details in chapter 2.2, and for the PLC, refer to the following table.

Baud rate – Refer to the board details in chapter 2.2..

MODE – Refer to the mode details in chapter 2.2.

1-channel occupancy/4-channels occupancy — For Cc-Link interface setting, refer to the dip switch details in chapter 2.2, and for the PLC, refer to the following table.

Master channel/local channel/waiting master channel – Refer to the dip switch details in chapter 2.2.

Table: Setting content in the PLC content

Setting item	Description	Buffer address			
Number of connected devices	Set the number of devices in the remote channel and intelligent device channel connected to the master channel. Default: 64 units Setting range : 1 to 64 units	1H			
Channel information	Set the types of the remote channel and intelligent device channel connected. B15 to B12 B11 to B8 B7 to B0 <table border="1" style="margin-left: 20px;"> <tr> <td style="width: 20%;">Station type</td> <td style="width: 30%;">Number of occupied stations</td> <td style="width: 50%;">Station No.</td> </tr> </table> <p style="margin-left: 20px;"> 1: 1-channel occupancy 4: 4-channels occupancy 2: Intelligent device channel (Cc-Link interface) </p>	Station type	Number of occupied stations	Station No.	20H to 5FH
Station type	Number of occupied stations	Station No.			
Others	For the other setting content, refer to the chapter of the parameter setting of Cc-Link user's manual.	—			

(2) Are the cables properly connected to the Cc-Link interface and PLC Cc-Link?

- . Are the terminals DA, DB, DG and SLD connected as their respective pairs?
- . Are the terminating resistors connected to DA and DB in any much noisy place?

3.7.2. It is linked but it does not communicate.

(1) Is the refresh instruction output on the master channel side?

(2) Is X30 turned ON in the sample program?

4. Appendix

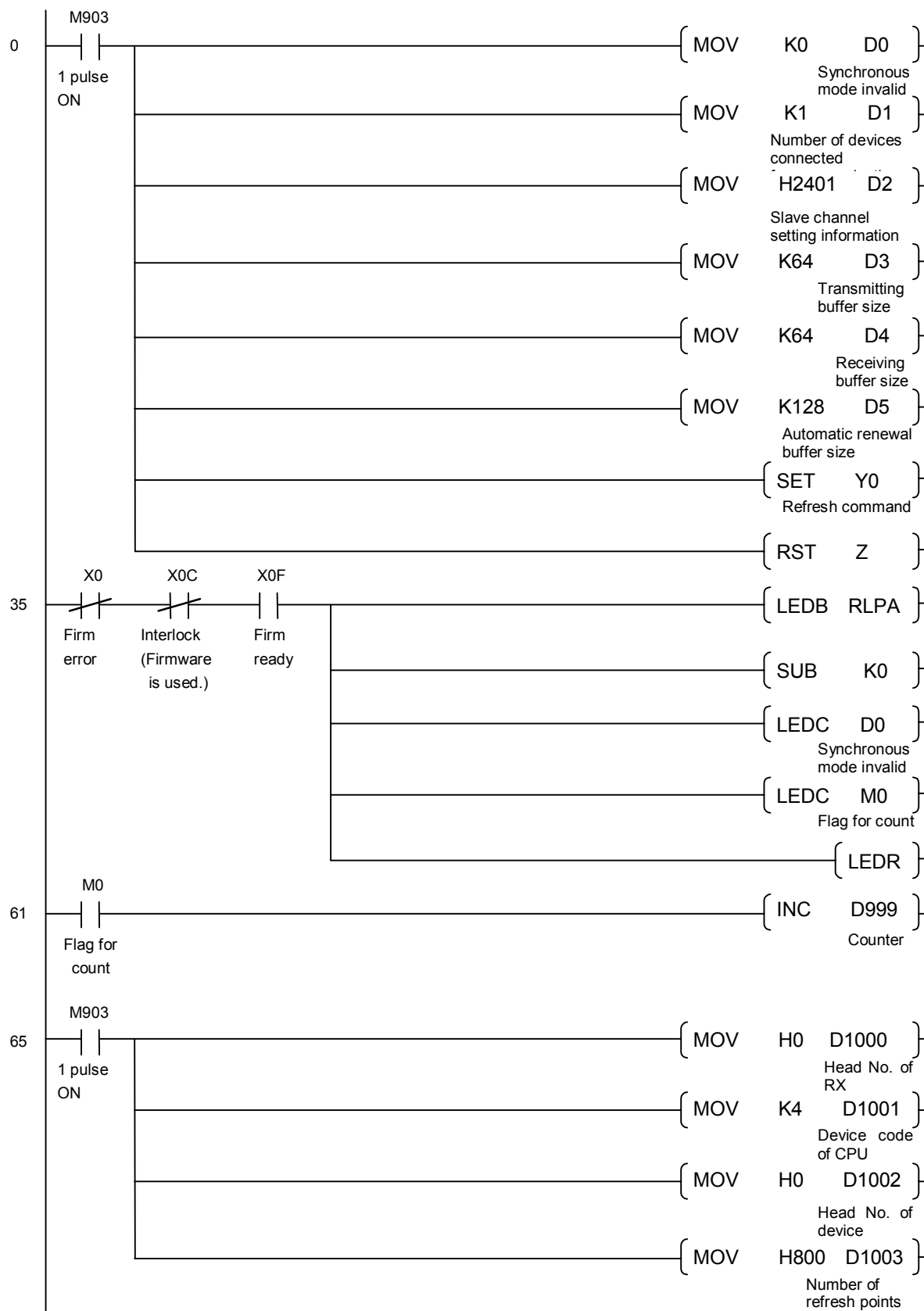
4.1. Error list

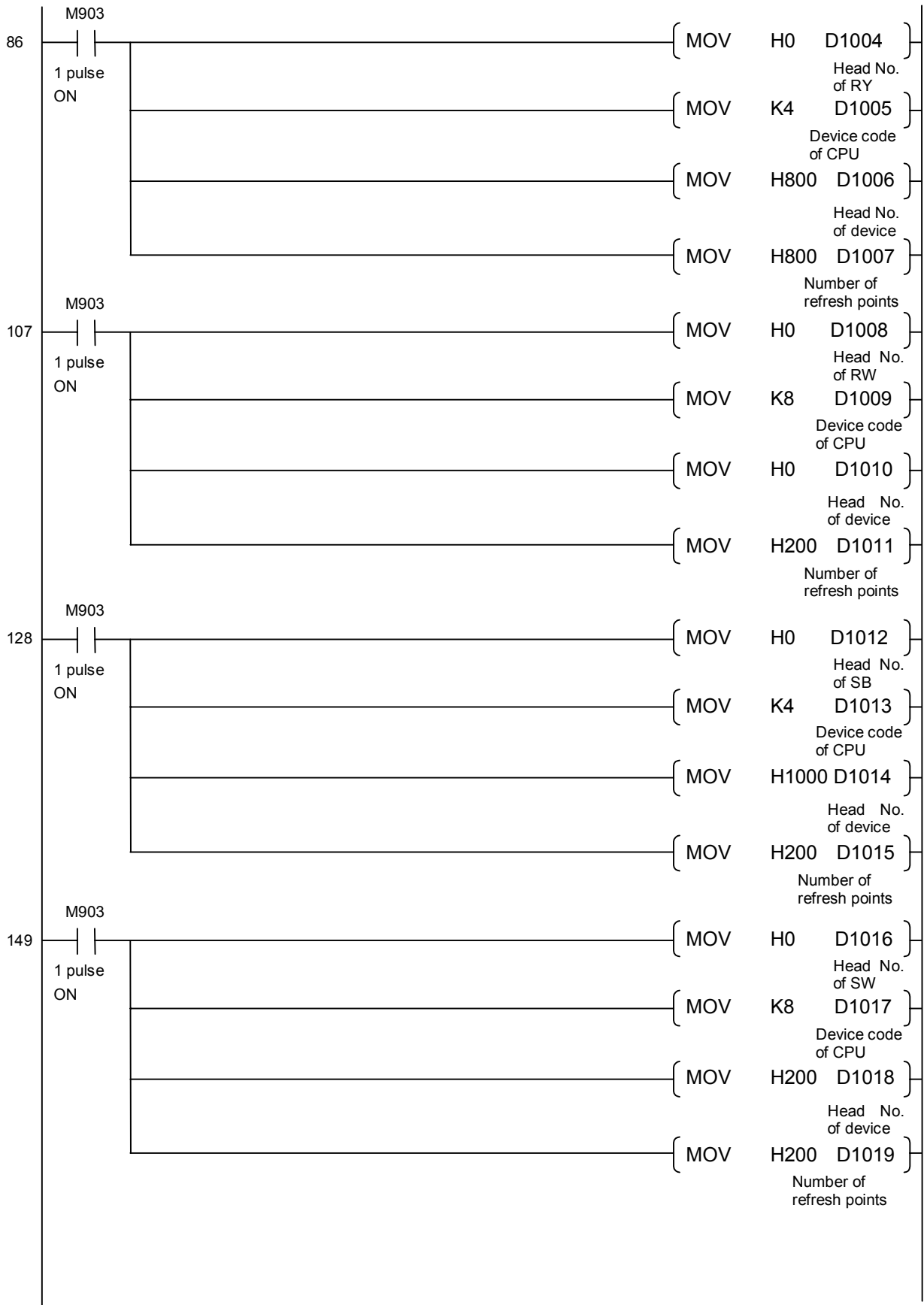
Table: 4-1 Error list

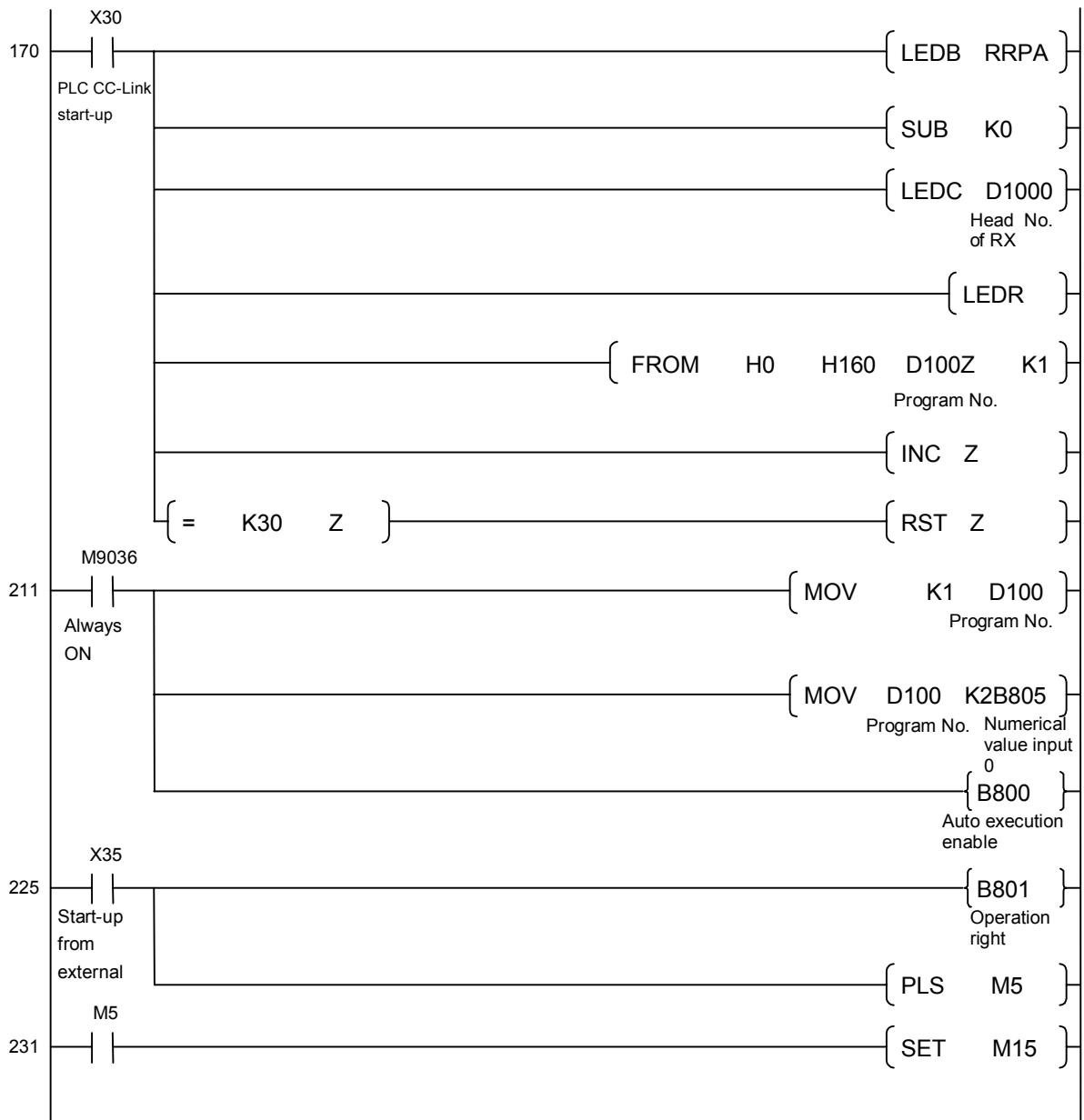
Alarm No.	Alarm message	Cause	Remedy
7700	Slot 1 Cc-Link card cannot be installed.	Cc-Link card is installed in the slot 1.	Install Cc-Link card into the slot 2.
7710	Cc-Link master channel cannot be set.	The master channel is set with the rotary switch.	Set the rotary switch at another except 0.
7720	Two Cc-Link interfaces are installed.	Install one interface into the slot 2.	Install this card into the slot 2.
7730	Cc-Link data link error	Line error or parameter error	Reconfirm the line and parameter.
7750	(Cc-Link) cable is not connected or the parameter does not match.	Any cable is not connected or any parameter does not match.	Reset the power supply and restart-up the system.
7760	Cc-Link initialization error	Any master channel parameter does not match.	Match the parameter and restart-up the system.
7780	Cc-Link register No. is out of the range.	The input register No. is out of the range.	Input the correct value.
7781	Input signal No. is for CC-Link	Input signal No. is for CC-Link	Install Cc-Link card .
7799	Cc-Link system error	Cc-Link system error	Confirm the program.

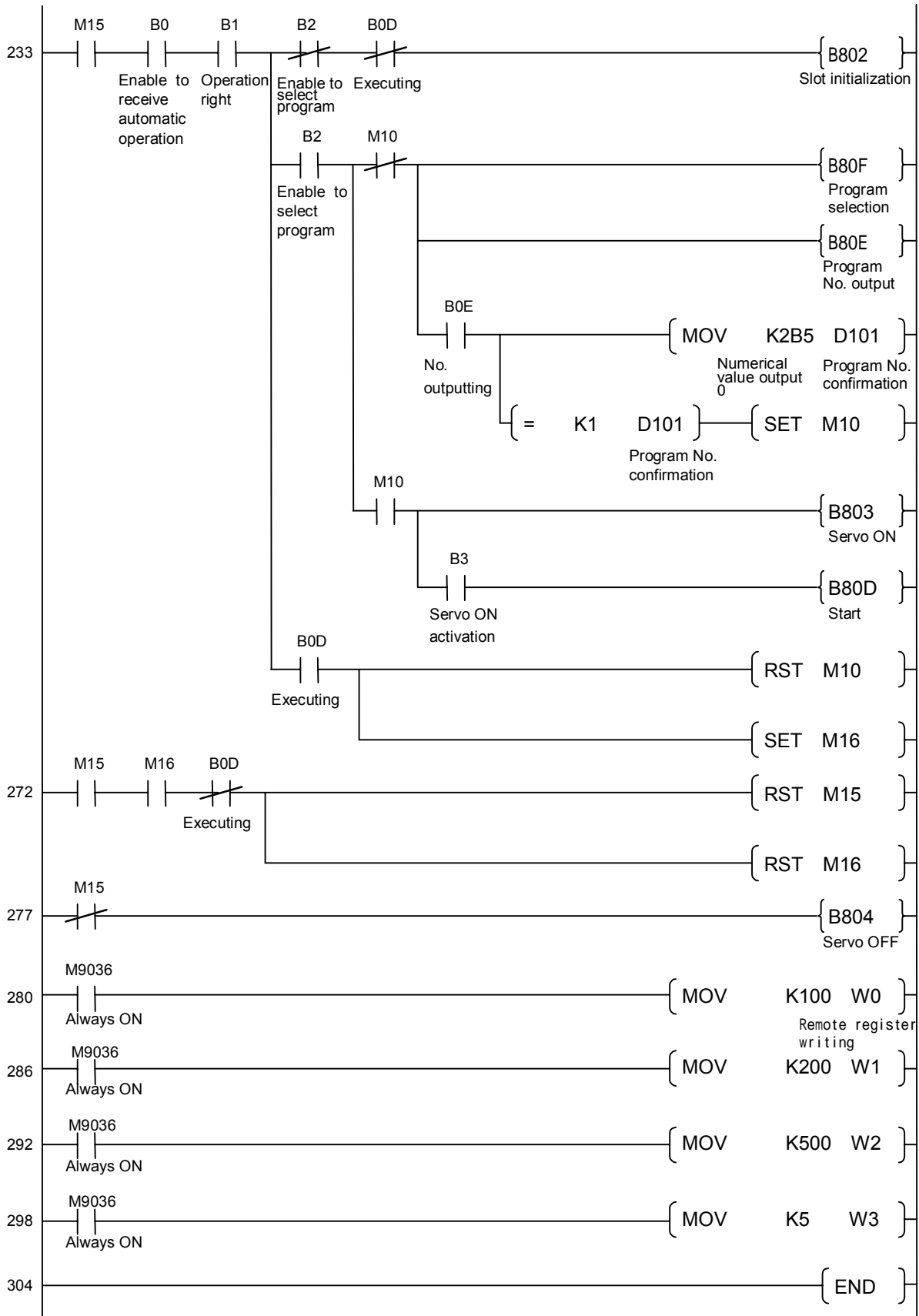
*** If the E7730 occurs, refer to chapter 3.7 "Trouble shooting".**

4.3. Sample program









HEADQUARTERS

MITSUBISHI ELECTRIC EUROPE B.V. **EUROPE**
 German Branch
 Gothaer Straße 8
D-40880 Ratingen
 Phone: +49 (0)2102 / 486-0
 Fax: +49 (0)2102 / 486-1120

MITSUBISHI ELECTRIC EUROPE B.V.-org.sl. **CZECH REP.**
 Czech Branch
 Avenir Business Park, Radlická 714/113a
CZ-158 00 Praha 5
 Phone: +420 (0)251-551 470
 Fax: +420 (0)251-551-471

MITSUBISHI ELECTRIC EUROPE B.V. **FRANCE**
 French Branch
 25, Boulevard des Bouvets
F-92741 Nanterre Cedex
 Phone: +33 (0)1 / 55 68 55 68
 Fax: +33 (0)1 / 55 68 57 57

MITSUBISHI ELECTRIC EUROPE B.V. **IRELAND**
 Irish Branch
 Westgate Business Park, Ballymount
IRL-Dublin 24
 Phone: +353 (0)1 4198800
 Fax: +353 (0)1 4198890

MITSUBISHI ELECTRIC EUROPE B.V. **ITALY**
 Italian Branch
 Viale Colleoni 7
I-20041 Agrate Brianza (MB)
 Phone: +39 039 / 60 53 1
 Fax: +39 039 / 60 53 312

MITSUBISHI ELECTRIC EUROPE B.V. **POLAND**
 Poland Branch
 Krakowska 50
PL-32-083 Balice
 Phone: +48 (0)12 / 630 47 00
 Fax: +48 (0)12 / 630 47 01

MITSUBISHI ELECTRIC EUROPE B.V. **RUSSIA**
 52, bid. 3 Kosmodamianskaya nab 8 floor
RU-115054 Moscow
 Phone: +7 495 721-2070
 Fax: +7 495 721-2071

MITSUBISHI ELECTRIC EUROPE B.V. **SPAIN**
 Spanish Branch
 Carretera de Rubí 76-80
E-08190 Sant Cugat del Vallés (Barcelona)
 Phone: 902 131121 // +34 935653131
 Fax: +34 935891579

MITSUBISHI ELECTRIC EUROPE B.V. **UK**
 UK Branch
 Travellers Lane
UK-Hatfield, Herts. AL10 8XB
 Phone: +44 (0)1707 / 27 61 00
 Fax: +44 (0)1707 / 27 86 95

MITSUBISHI ELECTRIC CORPORATION **JAPAN**
 Office Tower "Z" 14 F
 8-12,1 chome, Harumi Chuo-Ku
Tokyo 104-6212
 Phone: +81 3 622 160 60
 Fax: +81 3 622 160 75

MITSUBISHI ELECTRIC AUTOMATION, Inc. **USA**
 500 Corporate Woods Parkway
Vernon Hills, IL 60061
 Phone: +1 847 478 21 00
 Fax: +1 847 478 22 53

EUROPEAN REPRESENTATIVES

GEVA **AUSTRIA**
 Wiener Straße 89
AT-2500 Baden
 Phone: +43 (0)2252 / 85 55 20
 Fax: +43 (0)2252 / 488 60

Koning & Hartman b.v. **BELGIUM**
 Woluwelaan 31
BE-1800 Vilvoorde
 Phone: +32 (0)2 / 257 02 40
 Fax: +32 (0)2 / 257 02 49

INEA BH d.o.o. **BOSNIA AND HERZEGOVINA**
 Aleja Lipa 56
BA-71000 Sarajevo
 Phone: +387 (0)33 / 921 164
 Fax: +387 (0)33 / 524 539

AKHNATON **BULGARIA**
 4 Andrej Ljapchev Blvd. Pb 21
BG-1756 Sofia
 Phone: +359 (0)2 / 817 6044
 Fax: +359 (0)2 / 97 44 06 1

AutoCont C.S. s.r.o. **CZECH REPUBLIC**
 Technologická 374/6
CZ-708 00 Ostrava-Pustkovec
 Phone: +420 595 691 150
 Fax: +420 595 691 199

Beijer Electronics A/S **DENMARK**
 Lykkegårdsvej 17
DK-4000 Roskilde
 Phone: +45 (0)46 / 75 76 66
 Fax: +45 (0)46 / 75 56 26

Beijer Electronics OY **FINLAND**
 Peltoie 37
FIN-28400 Ulvila
 Phone: +358 (0)207 / 463 540
 Fax: +358 (0)207 / 463 541

UTEKO **GREECE**
 5, Mavrogenous Str.
GR-18542 Piraeus
 Phone: +30 211 / 1206 900
 Fax: +30 211 / 1206 999

AXICONT AUTOMATIKA Kft. **HUNGARY**
 (ROBOT CENTER) Reitter F. U. 132
HU-1131 Budapest
 Phone: +36 1 / 412-0882
 Fax: +36 1 / 412-0883

ALFATRADE Ltd. **MALTA**
 99, Paola Hill
Malta- Paola PLA 1702
 Phone: +356 (0)21 / 697 816
 Fax: +356 (0)21 / 697 817

HIFLEX AUTOM. TECHNIEK B.V. **NETHERLANDS**
 Wolweverstraat 22
NL-2984 CD Ridderkerk
 Phone: +31 (0)180 - 46 60 04
 Fax: +31 (0)180 - 44 23 55

EUROPEAN REPRESENTATIVES

Koning & Hartman b.v. **NETHERLANDS**
 Haarlerbergweg 21-23
NL-1101 CH Amsterdam
 Phone: +31 (0)20 / 587 76 00
 Fax: +31 (0)20 / 587 76 05

Beijer Electronics AS **NORWAY**
 Postboks 487
NO-3002 Drammen
 Phone: +47 (0)32 / 24 30 00
 Fax: +47 (0)32 / 84 85 77

Fonseca S.A. **PORTUGAL**
 R. João Francisco do Casal 87/89
PT - 3801-997 Aveiro, Esgueira
 Phone: +351 (0)234 / 303 900
 Fax: +351 (0)234 / 303 910

SIRIUS TRADING & SERVICES SRL **ROMANIA**
 Aleea Lacul Morii Nr. 3
RO-060841 Bucuresti, Sector 6
 Phone: +40 (0)21 / 430 40 06
 Fax: +40 (0)21 / 430 40 02

INEA SR d.o.o. **SERBIA**
 Izletnicka 10
SER-113000 Smederevo
 Phone: +381 (0)26 / 617 163
 Fax: +381 (0)26 / 617 163

SIMAP s.r.o. **SLOVAKIA**
 Jána Derku 1671
SK-911 01 Trenčín
 Phone: +421 (0)32 743 04 72
 Fax: +421 (0)32 743 75 20

PROCONT, spol. s r.o. Prešov **SLOVAKIA**
 Kúpeľná 1/A
SK-080 01 Prešov
 Phone: +421 (0)51 7580 611
 Fax: +421 (0)51 7580 650

INEA d.o.o. **SLOVENIA**
 Stegne 11
SI-1000 Ljubljana
 Phone: +386 (0)1 / 513 8100
 Fax: +386 (0)1 / 513 8170

Beijer Electronics Automation AB **SWEDEN**
 Box 426
SE-20124 Malmö
 Phone: +46 (0)40 / 35 86 00
 Fax: +46 (0)40 / 93 23 01

Robotronic AG **SWITZERLAND**
 Schlachthofstrasse 8
CH-8406 Winterthur
 Phone: +41 (0)52 / 267 02 00
 Fax: +41 (0)52 / 267 02 01

GTS **TURKEY**
 Bayraktar Bulvari Nutuk Sok. No:5
TR-34775 Yukarı Dudullu-Ümraniye-İSTANBUL
 Phone: +90 (0)216 526 39 90
 Fax: +90 (0)216 526 39 95

CSC Automation Ltd. **UKRAINE**
 4-B, M. Raskovoyi St.
UA-02660 Kiev
 Phone: +380 (0)44 / 494 33 55
 Fax: +380 (0)44 / 494-33-66

MIDDLE EAST REPRESENTATIVE

ILAN & GAVISH Ltd. **ISRAEL**
 24 Shenkar St., Kiryat Arie
IL-49001 Petaht-Tiqva
 Phone: +972 (0)3 / 922 18 24
 Fax: +972 (0)3 / 924 0761

AFRICAN REPRESENTATIVE

CBI Ltd. **SOUTH AFRICA**
 Private Bag 2016
ZA-1600 Isando
 Phone: + 27 (0)11 / 977 0770
 Fax: + 27 (0)11 / 977 0761