

FANUC Robot **series**

**R-30iB/R-30iB Mate/R-30iB Plus/R-30iB Mate Plus/
R-30iB Compact Plus/R-30iB Mini Plus CONTROLLER**

EtherCAT Communication Function OPERATOR'S MANUAL

B-83704EN/03

- **Original Instructions**

Thank you very much for purchasing FANUC Robot.

Before using the Robot, be sure to read the "FANUC Robot series SAFETY HANDBOOK (B-80687EN)" and understand the content.

- No part of this manual may be reproduced in any form.
- All specifications and designs are subject to change without notice.

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In this manual, we endeavor to include all pertinent matters. There are, however, a very large number of operations that must not or cannot be performed, and if the manual contained them all, it would be enormous in volume. It is, therefore, requested to assume that any operations that are not explicitly described as being possible are "not possible".

SAFETY PRECAUTIONS

This chapter describes the precautions which must be followed to enable the safe use of the robot. Before using the robot, be sure to read this chapter thoroughly.

For detailed functions of the robot operation, read the relevant operator's manual to understand fully its specification.

For the safety of the operator and the system, follow all safety precautions when operating a robot and its peripheral equipment installed in a work cell.

For safe use of FANUC robots, you must read and follow the instructions in the “FANUC Robot series SAFETY HANDBOOK (B-80687EN)”.

1 PERSONNEL

Personnel can be classified as follows.

Operator:

- Turns the robot controller power ON/OFF
- Starts the robot program from operator panel

Programmer or Teaching operator:

- Operates the robot
- Teaches the robot inside the safeguarded space

Maintenance technician:

- Operates the robot
 - Teaches the robot inside the safeguarded space
 - Performs maintenance (repair, adjustment, replacement)
-
- The operator is not allowed to work in the safeguarded space.
 - The programmer or teaching operator and maintenance technician are allowed to work in the safeguarded space. Work carried out in the safeguarded space include transportation, installation, teaching, adjustment, and maintenance.
 - To work inside the safeguarded space, the person must be trained on proper robot operation.

Table 1 (a) lists the work outside the safeguarded space. In this table, the symbol “○” means the work allowed to be carried out by the specified personnel.

Table 1 (a) List of work outside the Safeguarded Space

	Operator	Programmer or Teaching operator	Maintenance technician
Turn power ON/OFF to Robot controller	○	○	○
Select operating mode (AUTO/T1/T2)		○	○
Select remote/local mode		○	○
Select robot program with teach pendant		○	○
Select robot program with external device		○	○
Start robot program with operator's panel	○	○	○
Start robot program with teach pendant		○	○
Reset alarm with operator's panel		○	○
Reset alarm with teach pendant		○	○
Set data on teach pendant		○	○
Teaching with teach pendant		○	○
Emergency stop with operator's panel	○	○	○
Emergency stop with teach pendant	○	○	○
Operator's panel maintenance			○
Teach pendant maintenance			○

During robot operation, programming and maintenance, the operator, programmer, teaching operator and maintenance technician take care of their safety using at least the following safety protectors:

- Use clothes, uniform, overall adequate for the work
- Safety shoes
- Helmet

2 DEFINITION OF SAFETY NOTATIONS

To ensure the safety of users and prevent damage to the machine, this manual indicates each precaution on safety with "WARNING" or "CAUTION" according to its severity. Supplementary information is indicated by "NOTE". Read the contents of each "WARNING", "CAUTION" and "NOTE" before using the robot.



Symbol	Definitions
 WARNING	Used if hazard resulting in the death or serious injury of the user will be expected to occur if he or she fails to follow the approved procedure.
 CAUTION	Used if a hazard resulting in the minor or moderate injury of the user, or equipment damage may be expected to occur if he or she fails to follow the approved procedure.
NOTE	Used if a supplementary explanation not related to any of WARNING and CAUTION is to be indicated.

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1 SPECIFICATION

Item	Description
Data size	128,256,512,1024,2048,4096 points for each of input and output
Synchronous mode	Free Run mode (asynchronous) only. DC mode isn't supported.
Communication	PDO communication only

- Protocol "CAN application protocol over EtherCAT® (CoE)" is supported. This function supports as a slave and it does not support as a master.
- EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.



- Maximum number of slaves depends on EtherCAT master's performance. The greater of the input data size and the output data size is used for calculation of maximum number of slaves. For example, the combination of input 1024 / output 128 is equal to that of input 1024 / output 1024.
- To use this function, "EtherCAT slave board" is necessary. Only 1 board can be installed to the robot controller.
- To use this function, "EtherCAT slave function (J743)" should be ordered.
- To use this function, the system software version should be 7DC2/P11 or later. R-30iB Mate is supported by 7DC3 or later.
- To use safety function, the system software version should be 7DF5/P24 or later in R-30iB Plus. "EtherCAT slave function (J743)" and "EtherCAT safety slave (S532)" should be ordered. Refer to "Dual Check Safety Function OPERATOR'S MANUAL (B-83184EN)" for detail.
- DI/DO, GI/GO, UI/UO can be exchanged. Update unit is 16 points and each 16 points from start point 1 is updated by one update. Please take care of data tearing caused when 1 GI/GO is updated by more than one update.
- Acyclic communication (SDO communication), which communicates only when requested, is not supported.
- I/O update interval in robot is 8ms by default and it isn't synchronized to EtherCAT communication.
- The CiA402 drive profile is not supported. So the servo control with EtherCAT is not supported.
- ESI file for robot is available from FANUC. Except for 7DC2 series, ESI file can be output to any device from setup screen.

2 SETUP

2.1 SETUP SCREEN

You can display following SETUP SCREEN by MENU key -> 6 SETUP -> EtherCAT.

SETUP EtherCAT	
	1/5
1 Error one shot	: DISABLE
2 I/O safety value	: CLEAR
Process data size	
3 The number of input	: [1024]points
4 The number of output	: [1024]points
5 Output ESI file	: <Execute>
[TYPE]	>

Item	Description
Error one shot default: DISABLE	ENABLE: Pressing reset can release "PRIO-801 EtherCAT off line" regardless of EtherCAT communication status. This is used when robot should be moved even when EtherCAT communication is offline etc. Please use ENABLE only when robot is under setup because robot may move even when this function is in error status (e.g. EtherCAT communication is offline etc.). Use DISABLE normally. DISABLE: Pressing reset cannot release "PRIO-801 EtherCAT off line" until the cause of the error is solved.
I/O safety value default: CLEAR	This item decides if DI, GI, UI assigned to EtherCAT are kept or cleared when EtherCAT communication is offline.
The number of input/output default: 512 points	Process data size of EtherCAT communication. Select from 128,256,512,1024,2048,4096 points. PLC setting change is necessary when changing this setting.
Output ESI file (Except for 7DC2)	ESI file is output to the selected folder in selected device in the FILE screen, which is displayed from MENU key -> FILE. Please check whether ESI file is wrote because writing is missed when device is write protected even when prompt shows them as saved.

To initialize the setting, set default value above to each items.

NOTE

About ESI file, "fanuc_rs_esi0002.xml" is output in 7DF5/24 or later.
"fanuc_rs_esi0001.xml" is output in a series other than 7DF5, and 7DF5/23 or earlier.

2.2 DETAIL OF THE SETTING

- In DI/DO config screen, rack 106, slot 1(fixed) is for EtherCAT.
- To use DI/DO more than default, you can change the number of DI/DO in the Max. number setting screen of the controlled start menu. Refer to “OPERATOR'S MANUAL (Basic Function) (B-83284EN)” for detail.
- Before changing the setting of assignment or size, the following clear operation for I/O assignments may be necessary. Try if it doesn't work out after changing the setting, or try wherever possible. In EtherCAT setup screen, press [NEXT] key and [F1] CLR_ASG, “Clear ALL I/O assignments?” is displayed and press [F4] “YES” then all I/O assignments are cleared.
- The settings in this screen are saved as “ETHERCAT.SV”. You can save by displaying EtherCAT screen -> [FCTN] key -> “0 -- NEXT --” -> “2 SAVE” or FILE screen -> [F4] key [BACKUP] -> “1 System files” or “8 All of above”. Please check whether the file is written because writing is missed when device is write protected even when prompt shows them as saved.

2.3 SETTING OF OMRON PLC

OMRON supplies following connection guide about Communication settings for OMRON PLC and FANUC robot. See following documents for setting of PLC.

Machine Automation Controller NJ-series
 EtherCAT® Connection Guide
 FANUC CORPORATION
 R-30iB Robot Controller
 SBCX-005B

EtherCAT address of robot is set from PLC. OMRON PLC can set as following.

- 1 Connect IN port of EtherCAT board, which is inserted to robot, and PLC, and power-on robot.
- 2 Open Sysmac Studio and change ONLINE and double click “EtherCAT” in left pane -> Right click “Master” in center pane -> Select Slave address writing and set address to setting value and click write. At this junction, error automatic correction can be selected from right click.
- 3 Cycle power is necessary after writing.

2.4 SETTING OF BECHOFF PLC

Please set as following to identify the robot controller in the Beckhoff PLC configuration software (TwinCAT3).

- 1 Connect IN port of EtherCAT board, which is inserted to robot, and PLC, and power-on robot.
- 2 Open TwinCAT3 project, and right click “I/O” -> “Devices” in left pane, and click “Scan”.
- 3 Select port of PLC, which is connected to EtherCAT board. If you cannot see the device, check the network adapter setting.
- 4 When the scan finishes, the FANUC R-30iB or FANUC R-30iB Plus is added to the device. If the device is not added, check that ESI file for robot is stored in the specified folder. Refer to Beckhoff manual for detail.

3 STATUS SCREEN

3.1 STATUS SCREEN

You can display following STATUS SCREEN by MENU key -> 0 -- NEXT -- -> 4 STATUS -> F1 key [TYPE] -> EtherCAT.

```

STATUS EtherCAT
                                                    1/18
1 ECAT RUN : OP
2 ECAT ERR : NO ERROR
3 AL Status : 0x8
4 AL Status Code : 0x0
5 Port1 Invalid frame counter : 0
6 Port1 Rx Error counter      : 0
7 Port2 Invalid frame counter : 0
8 Port2 Rx Error counter      : 0
9 Forwarded Rx Error Counter
  Port1 : 0
  Port2 : 0
10 ECAT Processing Unit Error Counter
   0
11 PDI Error Counter : 0
12 Lost Link Counter
   Port1 : 0
   Port2 : 0
13 VendorID   : 0x691
14 Product code : 0x10001
15 Revision   : 0x10000
16 Node address : 1
17 RxPDO 1st index : 0x1602
18 TxPDO 1st index : 0x1A02

[ TYPE ]

```

item	Description
ECAT RUN	INIT : During communication initialization. No data communication is available. PREOP : Pre operational. No data communication is available. BOOTSTRAP : Firmware update. No data communication is available. SAFEOP : Safe operational. Only sending data is available. OP : Operational. Sending and receiving data are available. Normal communication status.

item	Description
ECAT ERR	NO ERROR : No Error. INVALID CONFIG : Invalid configuration. (e.g. Invalid mailbox configuration, Invalid Input configuration, Invalid Input configuration) Invalid mailbox configuration : The mailbox SyncManager configuration is invalid. Invalid Input configuration : SyncManager configuration for input process data is invalid. Invalid Output configuration : SyncManager configuration for output process data is invalid. WATCHDOG TIMEOUT : EtherCAT Watchdog Timeout. (i.e. Process Data Watchdog) Process Data Watchdog : No process data received yet (S->O) or not received within a specified timeout value. LOCAL ERROR : This is due to internal error in the EtherCAT slave board.
AL Status	When bit 4(0x10) is on, error is present.

4 EtherCAT COMMUNICATION SOFT UPDATE

This chapter explains how to update EtherCAT communication software and EEPROM image on EtherCAT board.

Procedure except for 7DC2

- 1 Turn off the robot controller.
 - 2 Set SMODE switch on EtherCAT board to C.
 - 3 Turn on the robot controller.
 - 4 After robot controller starts up, check “PRIO-804 EtherCAT Com Soft Update Mode” and “PRIO-807 EtherCAT Update finished” in alarm history.
 - 5 Turn off the robot controller.
 - 6 Set SMODE switch on EtherCAT board to E.
 - 7 Turn on the robot controller.
 - 8 After robot controller starts up, check “PRIO-805 EtherCAT EEPROM Update Mode” and “PRIO-807 EtherCAT Update finished” in alarm history.
 - 9 Turn off the robot controller.
 - 10 Set SMODE switch on EtherCAT board to 0.
-

Procedure for 7DC2

- 1 Get EtherCAT communication software and EEPROM image from FANUC.
- 2 Copy the software and image to USB memory, memory card, or the directory which can be accessed from robot controller FTP.
- 3 Set the location of EtherCAT communication software to \$ECAT.\$ECAT_SOFT.
- 4 Set the location of EEPROM image to \$ECAT.\$EEPROM_IMG.
- 5 Go to “Procedure except for 7DC2”.

5 SYSTEM VARIABLES

In this chapter, change of system variable is valid after cycle power unless otherwise described.

5.1 SYSTEM VARIABLES UNDER \$ECAT

\$ASGUOP default 1

0: EtherCAT isn't assigned to UOP automatically.

1: EtherCAT is assigned to UOP automatically.

\$SCAN_TIME default 4 (8ms)

Scan interval between EtherCAT slave board and I/O of robot. Unit is 2ms.

\$WARNINGENB default 1

0: "PRIO-800 EtherCAT Board not installed" doesn't show up.

1: The alarm above shows up.

\$DEAD_BAND default 0

During this time from specific timing in power-on, "PRIO-801 EtherCAT off line" doesn't show up. Unit is 2ms.

\$ECAT_SOFT default except for 7DC2 series FRS:¥ecat.bin 7DC2 series UD1:¥ecat.bin

Set the location of EtherCAT communication software.

\$EEPROM_IMG default except for 7DC2 series FRS:¥ecat_epr.bin 7DC2 series

UD1:¥ecat_epr.bin

Set the location of EEPROM image.

6 ALARM

6.1 ALARM IN ROBOT CONTROLLER

PRIO-800 WARN EtherCAT Board not installed

Cause: No EtherCAT PCB is installed.

Remedy: Install EtherCAT PCB.

PRIO-801 STOP EtherCAT off line

Cause: EtherCAT becomes off line.

Remedy: Check EtherCAT settings and cable. Remove EtherCAT PCB from the robot controller, if you don't use EtherCAT.

PRIO-802 STOP EtherCAT input size different

Cause: EtherCAT input size is different from master.

Remedy: Check EtherCAT settings.

PRIO-803 STOP EtherCAT output size different

Cause: EtherCAT output size is different from master.

Remedy: Check EtherCAT settings.

PRIO-804 STOP EtherCAT Com Soft Update Mode

Cause: Mode switch on EtherCAT board is communication software update mode.

Remedy: Change mode switch on EtherCAT board to 0 to change normal mode and cycle power.

PRIO-805 STOP EtherCAT EEPROM Update Mode

Cause: Mode switch on EtherCAT board is EEPROM update mode.

Remedy: Change mode switch on EtherCAT board to 0 to change normal mode and cycle power.

PRIO-806 STOP EtherCAT Update file not found

Cause: EtherCAT update file is not found.

Remedy: Check system variables \$BOOT2 \$BOOT3 \$ECAT_SOFT \$EEPROM_IMG under \$ECAT and check the file.

PRIO-807 STOP EtherCAT Update finished

Cause: Update for EtherCAT communication software or EEPROM is finished.

Remedy: Change mode switch on EtherCAT board to 0 to change normal mode and cycle power.

PRIO-808 STOP EtherCAT comm. error %x

Cause: EtherCAT communication error occurs.

Remedy: Please contact FANUC. Report the number displayed.

PRIO-809 STOP EtherCAT system error %x

Cause: EtherCAT system error occurs.

Remedy: Please contact FANUC. Report the number displayed.

PRIO-810 WARN %s

Cause: See the message displayed.

Remedy: This alarm displays the detail of alarm.

PRIO-811 STOP EtherCAT Com Soft mismatch

Cause: EtherCAT communication software on EtherCAT slave board is older or newer than the robot software.

Remedy: Update EtherCAT communication software and EEPROM image by the procedure written in EtherCAT operation manual.

PRIO-812 WARN**Required %s, Current %s**

Cause: This message shows up together with PRIO-811 to inform the required and the current version of EtherCAT communication software.

Remedy: Update EtherCAT communication software and EEPROM image by the procedure written in EtherCAT operation manual.

6.2 ALARM IN MASTER

- When process data size in robot controller and master are different

Slave application abnormal (error code 0x0020) is reported to master. Correct the process data size and cycle power.

- Input or output size is changed by master

Robot should be cycle powered when EtherCAT communication data size is changed after communication is once established.

In this case, slave application abnormal (error code 0x0020) is reported to master.

- When watch dog error occurs

When a fault, such as communication CPU failure, occurs in robot controller, slave application abnormal (error code 0x0020) is reported to master.

7 INSTALLATION

This chapter provides information required for installation of the EtherCAT slave board.

7.1 SPECIFICATIONS

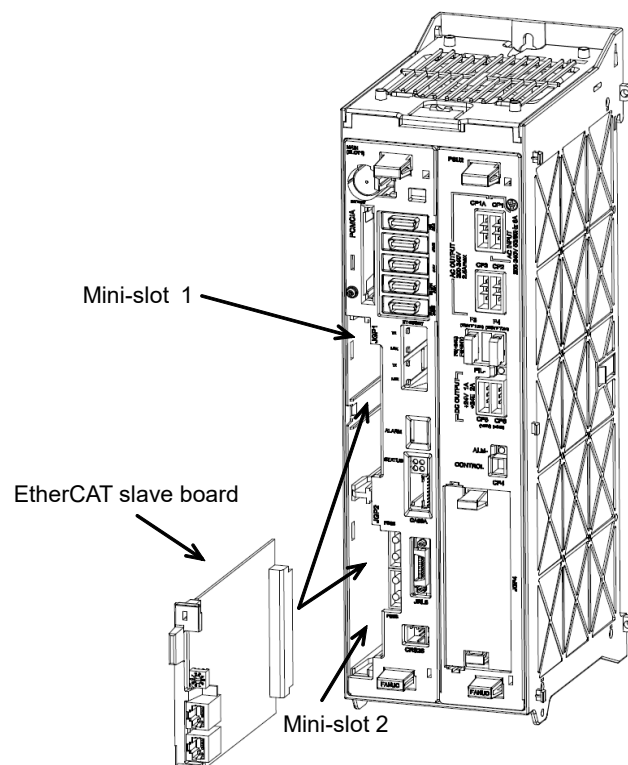
The specifications of the EtherCAT slave board are described below.

Name	EtherCAT slave board
Ordering code	A05B-*-J120 (R-30iB, R-30iB Mate, R-30iB Mate Open Air, R-30iB Plus, R-30iB Mate Plus)
Board drawing number	A20B-8101-0821

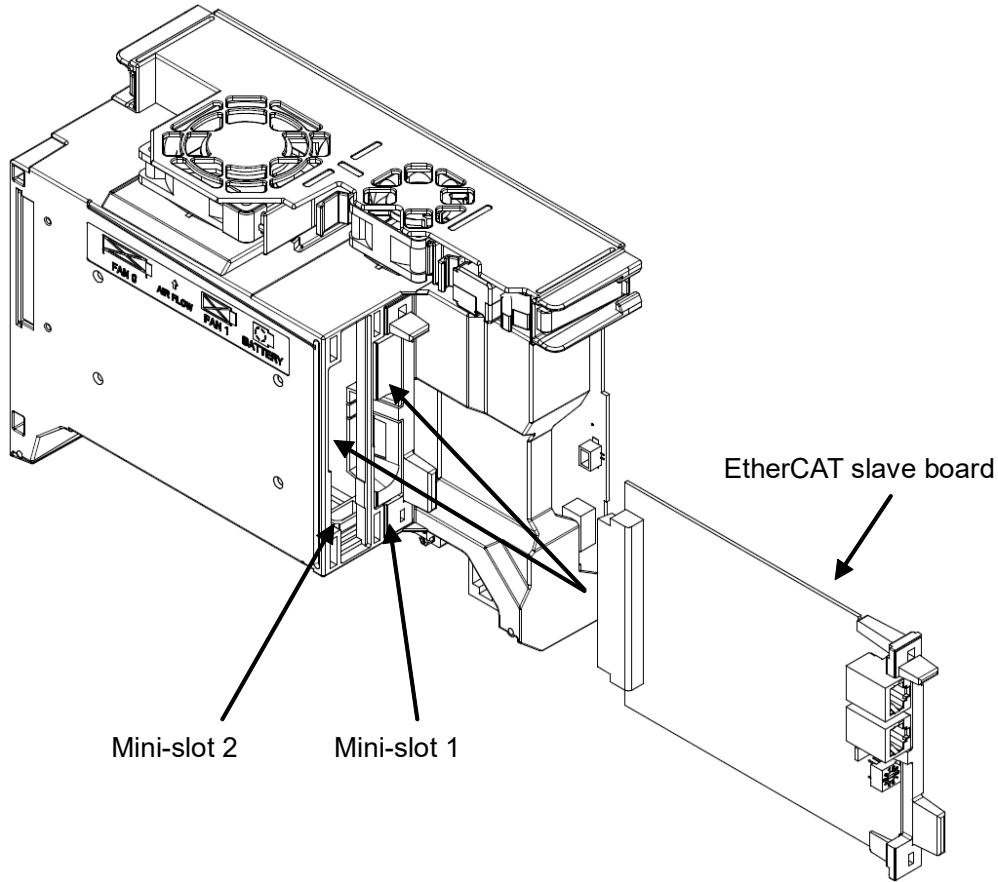
7.2 INSTALLATION

This section describes information about the installation of the EtherCAT slave board. The maximum number of EtherCAT slave board in the controller is 1.

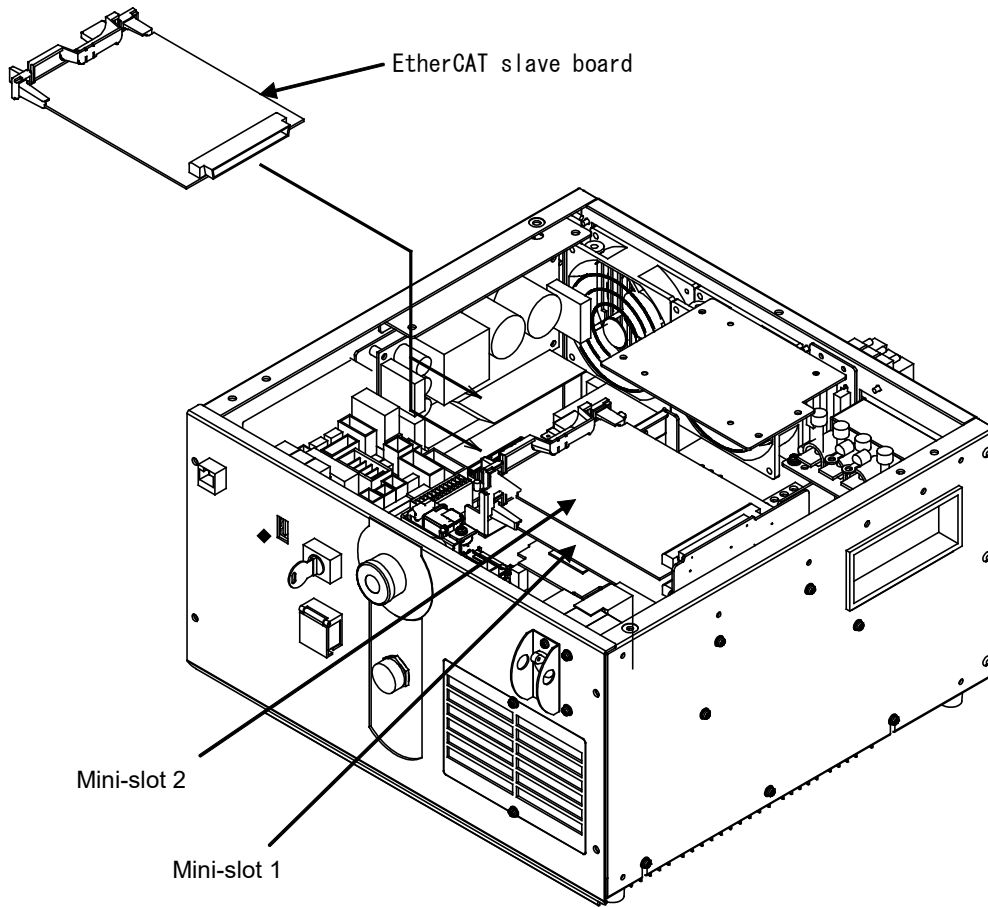
In the R-30iB/R-30iB Plus controller, an EtherCAT slave board can be installed to an option slot like the figure below.



In the R-30iB Mate/R-30iB Mate Plus controller, an EtherCAT slave board can be installed to an option slot like the figure below.



In the R-30iB Mate Open Air controller, an EtherCAT slave board can be installed to an option slot like the figure below.



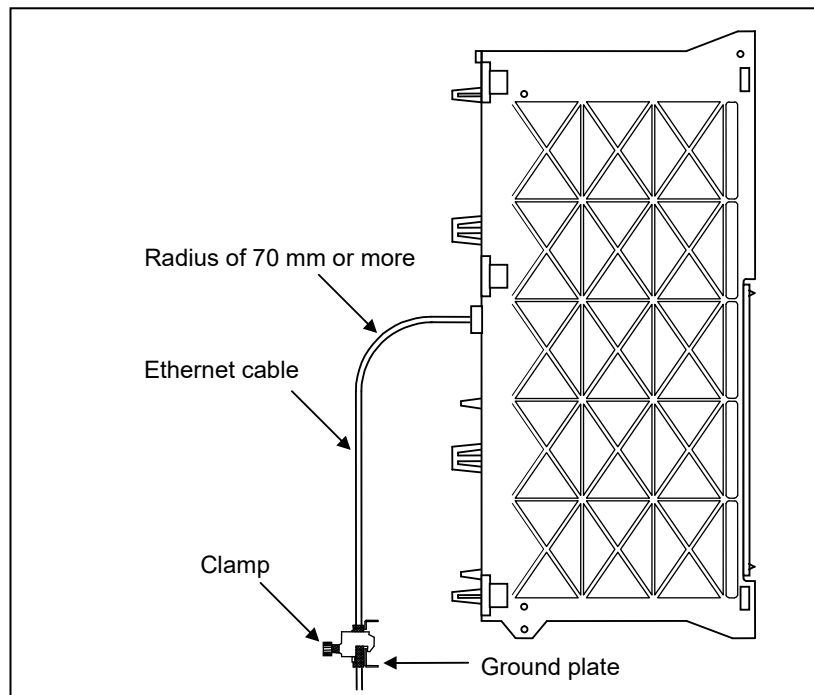
8 CONNECTION

This chapter provides information required for Ethernet connection of the EtherCAT slave board.

8.1 ROUTING OF THE ETHERNET CABLE

The Ethernet cable can be routed only from the front of the control unit.

For connector location information, see the layout of components of EtherCAT slave board.



The Ethernet cable needs to be secured with a clamp so that no tension is applied to the connector (RJ-45) installed at the end of the cable even if the cable is pulled. This clamping also serves as the grounding of the cable shield.

NOTE

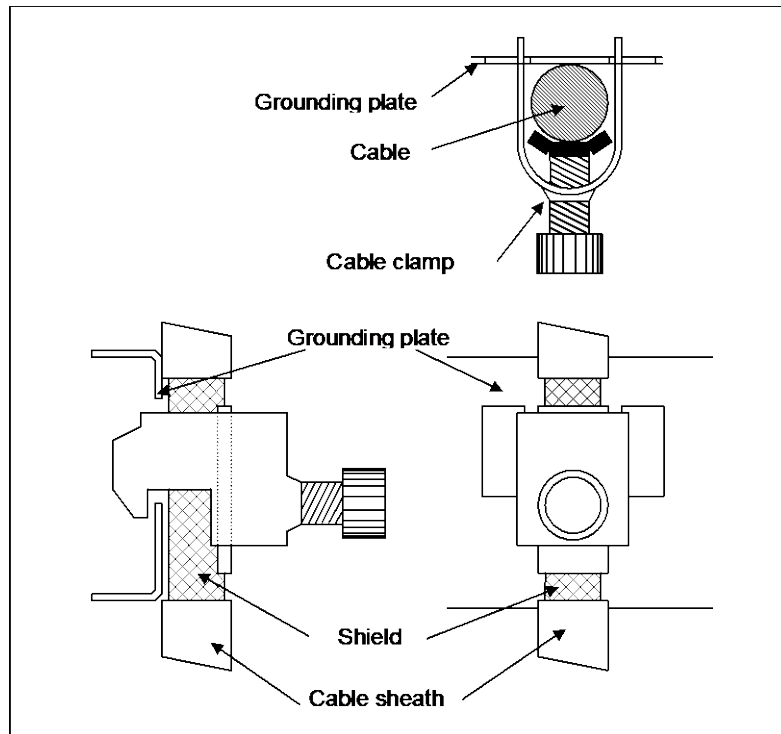
In EtherCAT communication, be sure to use twisted pair cables with a common shield in category 5 or more (STP cables).

8.2 ANTI-NOISE MEASURES

8.2.1 Clamping and Shielding of Cables

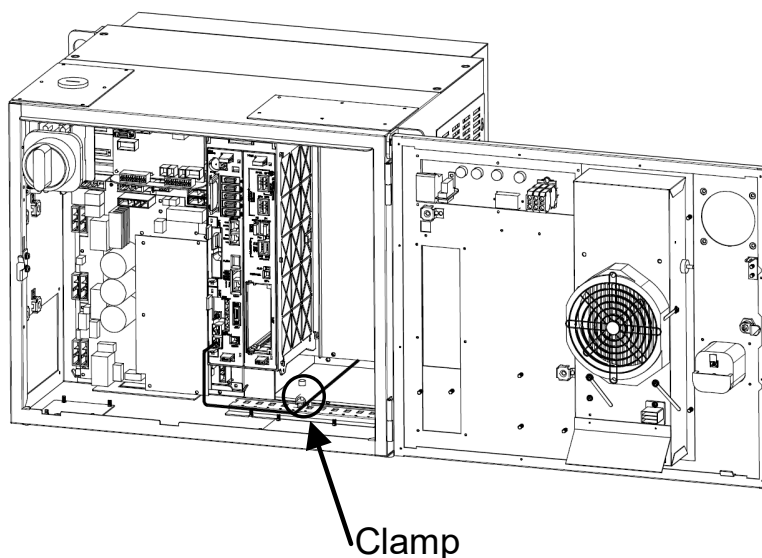
The Ethernet twisted pair cable needs to be clamped in the same way as the cables need to be shielded, as shown below. The clamping is required to shield and fix the cable. Be sure to perform the clamping to ensure the stable operation of the system.

As shown in the figure, strip a part of the cable sheath to expose the metal shield and push the shield against the grounding plate with the clamping hardware.

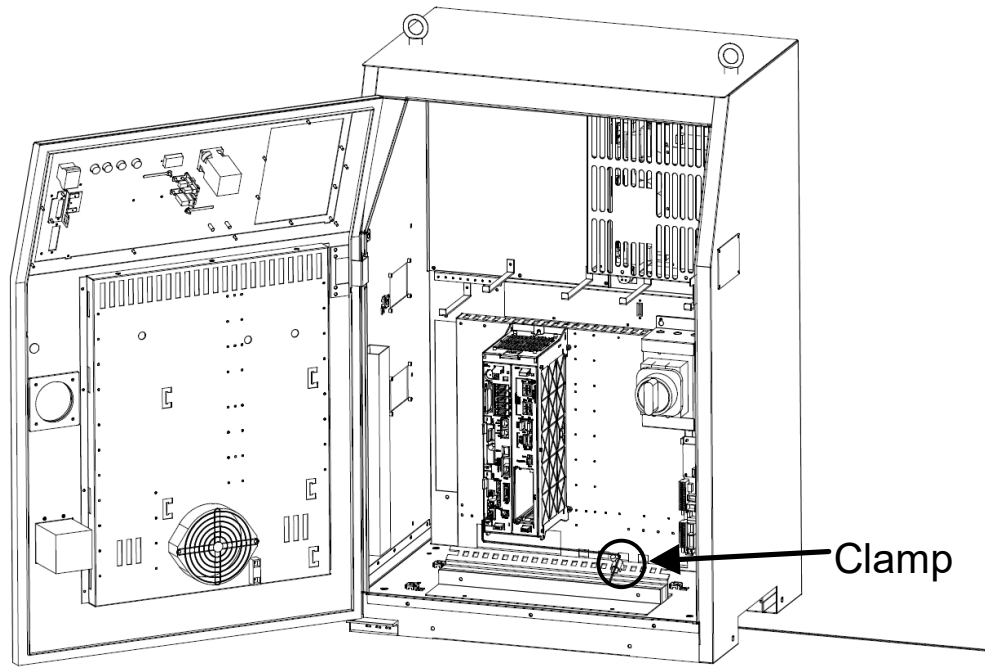
**NOTE**

- 1 Be sure to clamp and shield the cable to ensure the stable operation of the system.
- 2 Refer to the manual of master for master's shielding.
- 3 Unlike general Ethernet communication, EtherCAT communication does not perform retransmission at intervals of several seconds to achieve high responsibility. Accordingly, severer anti-noise measures must be taken as compared with general Ethernet wiring.
- 4 Upon completion of cabling, perform a communication test sufficiently not only before but also after system operation to ensure anti-noise measures.

The following figure is how to lead the cable into the R-30iB/R-30iB Plus controller.

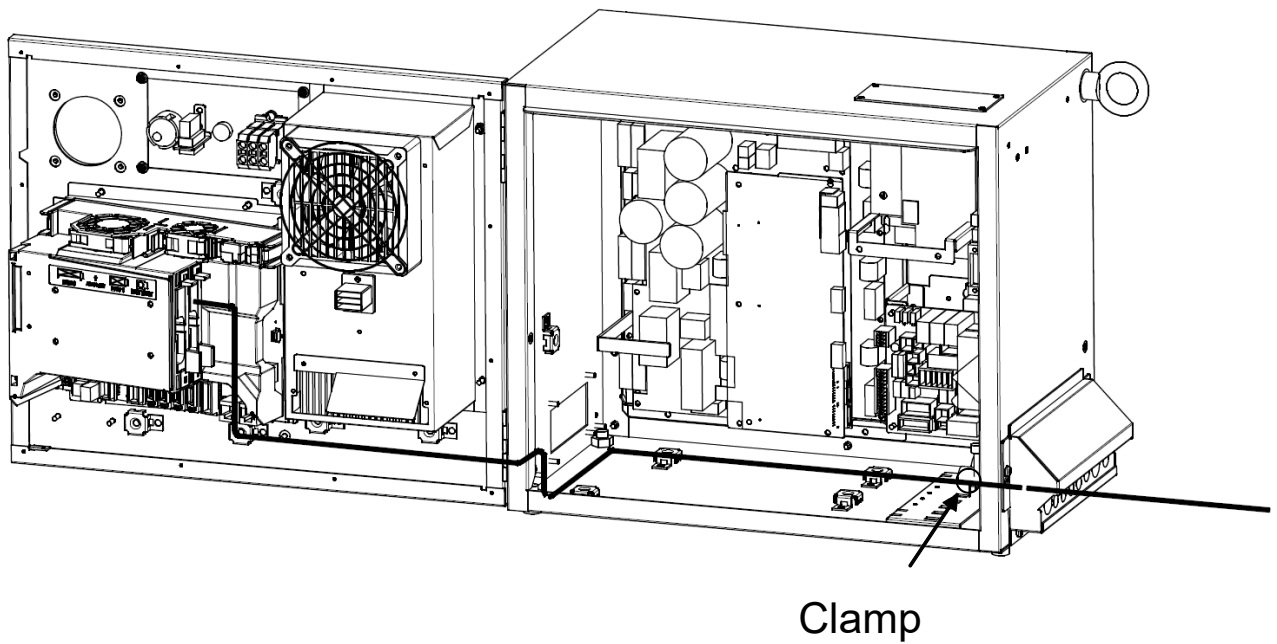


A-cabinet

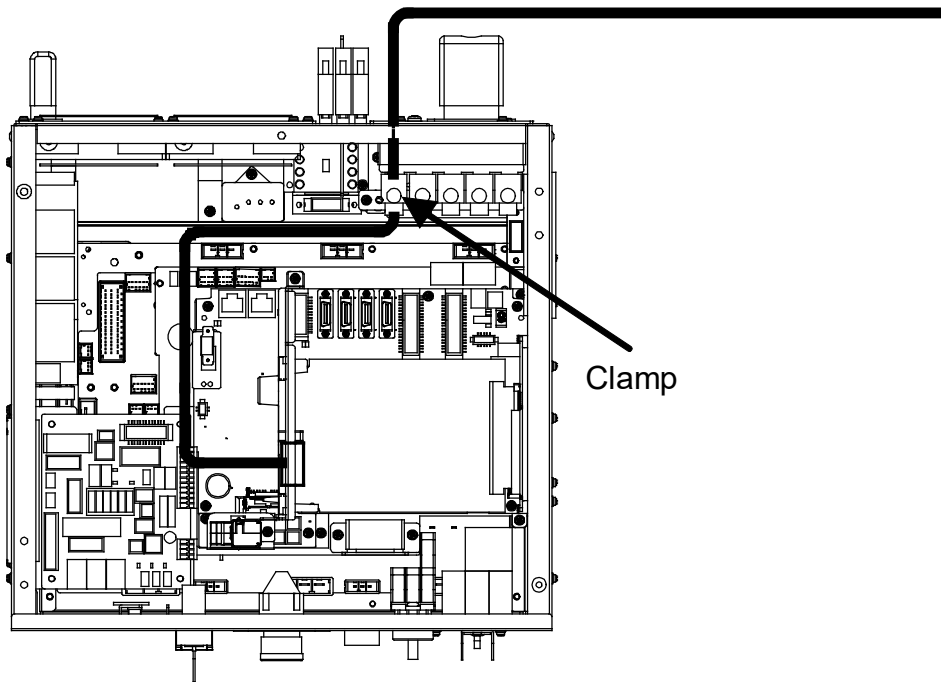


B-cabinet

The following figure is how to lead the cable into the R-30iB Mate/R-30iB Mate Plus controller.



The following figure is how to lead the cable into the R-30iB Mate Open Air controller.

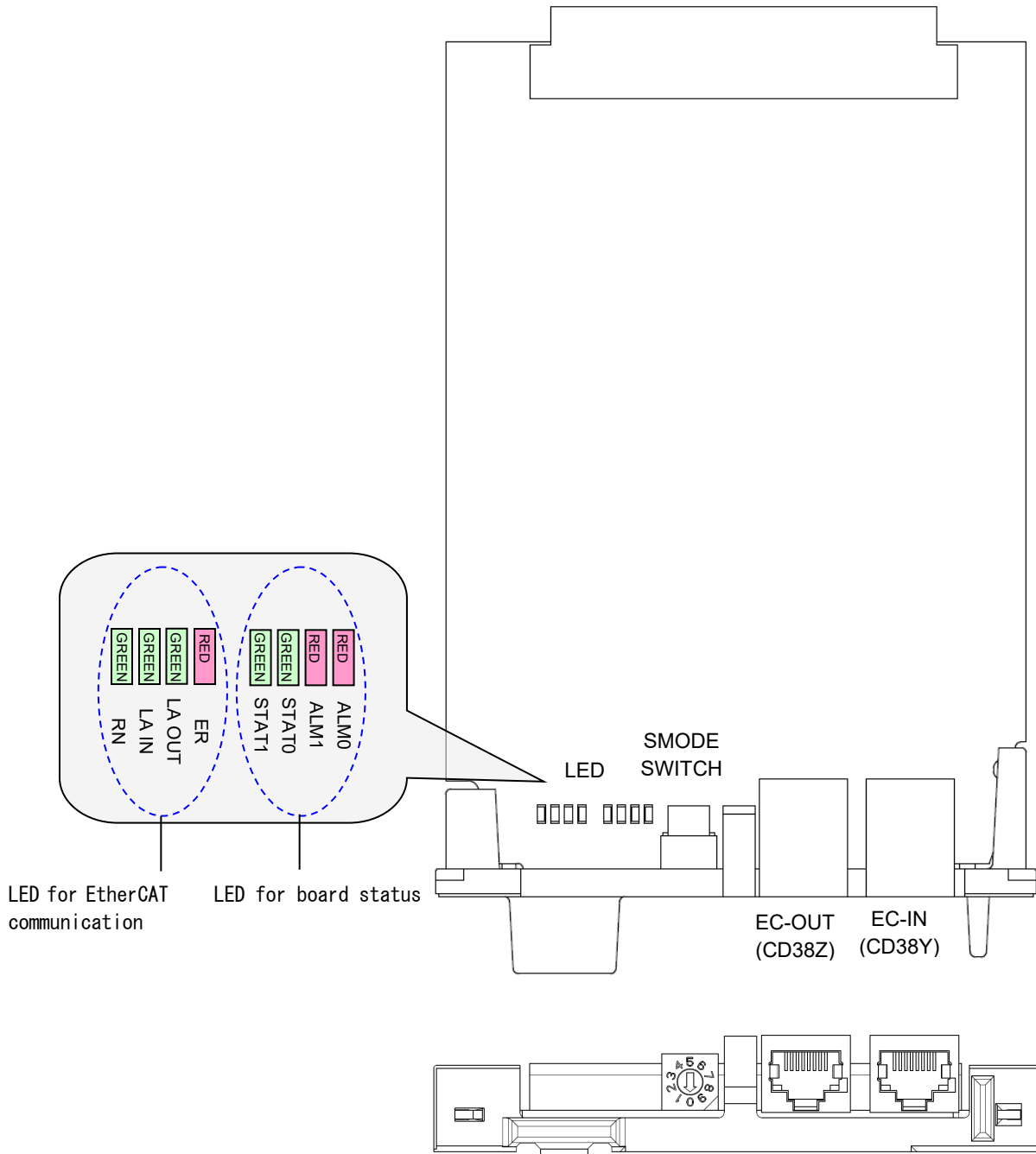


9 HARDWARE

This chapter provides hardware information required for the maintenance of the EtherCAT slave board.

9.1 LAYOUT OF COMPONENTS

The EtherCAT slave board has LEDs as the following figure.

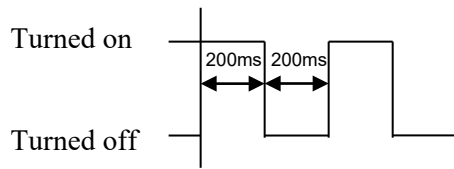


Name	PCB drawing number
EtherCAT slave board	A20B-8101-0821

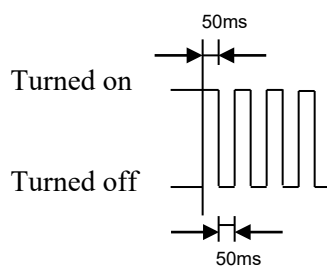
9.1.1 LED States

LED states have the following states in addition to turned on and turned off.

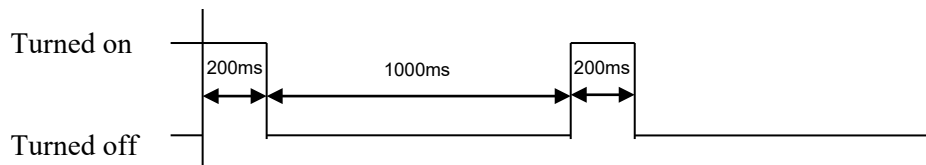
Blinking



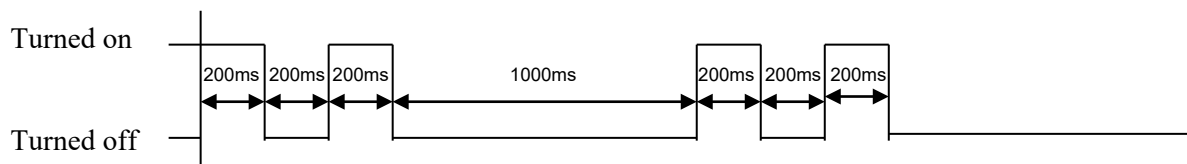
Flickering



Single flash



Double flash



9.1.2 LED Indication for EtherCAT Communication

The following shows the LED indication for the EtherCAT communication.

RN, ER

Name	Color	State	Description
RN	Green	Turned Off	Initialization state
		Blinking	PRE-OPERATIONAL state
		Single Flash	SAFE-OPERATIONAL state
		Turned On	OPERATIONAL state
ER	Red	Turned Off	The EtherCAT communication of the device is in working condition
		Blinking	General configuration error
		Single Flash	Slave device application has changed the EtherCAT state autonomously, due to local error.
		Double Flash	An application watchdog timeout has occurred.

LA IN, LA OUT

Name	Color	State	Description
LA IN	Green	Turned Off	Port closed
		Flickering	Port open
		Turned On	Port open, Not activity
LA OUT	Green	Turned Off	Port closed
		Flickering	Port open
		Turned On	Port open, Not activity

9.1.3 LED Indication for Board Status

The following shows the LED indication for the board status.

In the description below, the following marks are used to represent the display states of each LED:

□ : Turned Off / ■ : Turned On / ☆ : Blinking / ★ : Flickering / △ : Single Flash / ▲ : Double Flash
 / - : Don't care

LED indication after completion of start-up for EtherCAT slave board

LED indication	Description
STAT1 (Green) STAT0 (Green) ALM1 (Red) ALM0 (Red)	
□ ■ □ □	Normal operation (communication mode)
- - ☆ ☆	The firmware of the EtherCAT slave board detected an abnormal. The EtherCAT communication state is initialization (INIT). The EtherCAT communication is not in working condition.
- - ★ ★	The firmware of the EtherCAT slave board detected an abnormal. The EtherCAT communication state is initialization (INIT). The EtherCAT communication is not in working condition. The seven segment LED indication of robot controller may be abnormal.

LED indication before completion of start-up for EtherCAT slave board

LED Indication	Description
STAT1 (Green) STAT0 (Green) ALM1 (Red) ALM0 (Red)	
■ □ □ □	The EtherCAT slave board is updating the software.
△ □ □ □	The EtherCAT slave board completes software update. Set SMODE switch to normal mode "0".
□ □ ■ ■	The EtherCAT slave board is updating the EEPROM data.
△ □ ■ ■	The EtherCAT slave board completes EEPROM data update. Set SMODE switch to normal mode "0".

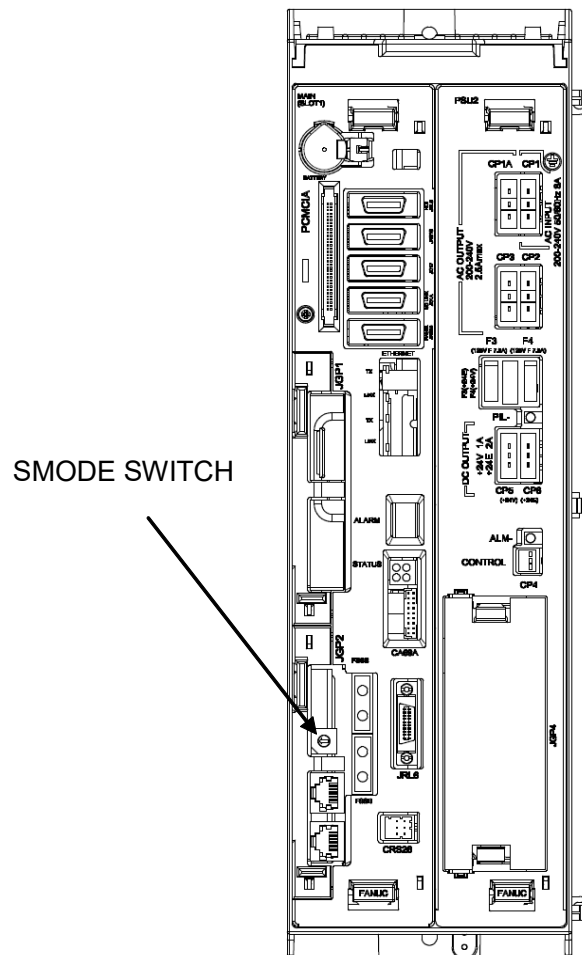
LED Indication STAT1 (Green) STAT0 (Green) ALM1 (Red) ALM0 (Red)	Description
□ □ □ ★	The SMODE switch is set to unsupported position. Set SMODE switch to normal mode "0" normally. Set SMODE switch to updating mode "C" when software of EtherCAT has to be updated. Set SMODE switch to EEPROM updating mode "E" when EEPROM data has to be updated.
□ □ □ △	The software version of EtherCAT slave board is old. The software of EtherCAT has to be updated by setting SMODE switch to updating mode "C". Set SMODE switch to updating mode "C" and update the software of EtherCAT (7DC3 or later).
□ □ □ ▲	The software version of EtherCAT slave board is new. The software of EtherCAT has to be updated by setting SMODE switch to updating mode "C". Set SMODE switch to updating mode "C" and update the software of EtherCAT (7DC3 or later).
□ □ △ □	The updating of software of EtherCAT slave board is failed or the updating of the EEPROM data of the EtherCAT slave board is failed. Please try updating operation again after restarting the robot controller. If the updating fails again, the EtherCAT slave board may have broken. Replace the EtherCAT slave board.
■ ■ ■ ■	Initializing. If the LED of the EtherCAT slave board does not change for a while, please restart the robot controller. If a similar phenomenon occurs again, the EtherCAT slave board may have broken. Replace the EtherCAT slave board.

⚠ CAUTION

Please do not turn off the power during the software updating or the EEPROM data updating for the EtherCAT slave board.
 If the power turned off during the software updating, the internal ROM or EEPROM data of EtherCAT slave board may have broken.
 If the internal ROM or EEPROM data of EtherCAT slave board is broken, EtherCAT slave board can not communicate.
 In this case, replace the EtherCAT slave board.
 After confirm that the LED state is normal or flashing (blinking, flickering, single flash, double flash), turn off the power.

9.2 SMODE SWITCH

By setting the following switch, the communication software for the EtherCAT slave function can be updated.



NOTE

The updating mode and EEPROM updating mode are not used normally.

SMODE Switch	Mode	Description
0	Normal mode	In this mode, EtherCAT communication is possible. The robot controller normally starts in this mode.
C	Updating mode	In this mode, updating communication software for EtherCAT slave function is possible.
E	EEPROM updating mode	In this mode, updating EEPROM data is possible

APPENDIX

A EtherCAT I/O DATA

Mapping object			Object dictionary				
Name	Index	Subindex	Index	Subindex	Direction	Data type	Robot assignment
OUT128	1600H	1	2100H	1	OUT	Bit array[128]	DI, UI, GI
OUT256	1601H	1-2	2101H	1-2	OUT	Bit array[128]	DI, UI, GI
OUT512	1602H	1-4	2102H	1-4	OUT	Bit array[128]	DI, UI, GI
OUT1024	1603H	1-8	2103H	1-8	OUT	Bit array[128]	DI, UI, GI
OUT2048	1604H	1-16	2104H	1-16	OUT	Bit array[128]	DI, UI, GI
OUT4096	1605H	1-32	2105H	1-32	OUT	Bit array[128]	DI, UI, GI
IN128	1A00H	1	3100H	1	IN	Bit array[128]	DO, UO, GO
IN256	1A01H	1-2	3101H	1-2	IN	Bit array[128]	DO, UO, GO
IN512	1A02H	1-4	3102H	1-4	IN	Bit array[128]	DO, UO, GO
IN1024	1A03H	1-8	3103H	1-8	IN	Bit array[128]	DO, UO, GO
IN2048	1A04H	1-16	3104H	1-16	IN	Bit array[128]	DO, UO, GO
IN4096	1A05H	1-32	3105H	1-32	IN	Bit array[128]	DO, UO, GO
Outputs	1610H	1-70	7000H	1-6	OUT	USINT[1], UINT[5]	CSI
			7001H	1-64		Bit array[64]	
Inputs	1A10H	1-70	6000H	1-6	IN	USINT[1], UINT[5]	CSO
			6001H	1-64		Bit array[64]	

- 1600H, 1601H, 1602H, 1603H, 1604H, 1605H are exclusive, only 1 item can be selected.
- 1A00H, 1A01H, 1A02H, 1A03H, 1A04H, 1A05H are exclusive, only 1 item can be selected.
- Bit array of 128bits are assigned for robot as 1bit = 1 point.
- 1610H, 1A10H are displayed in the PLC configuration software, if the ESI file fanuc_rs_esi0002.xml is used. These are used as the safety communication message data. If S532 is not ordered, the safety communication can not be used even if the data is configured.

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REVISION RECORD

Edition	Date	Contents
03	Feb., 2022	Support R-30iB Compact Plus, R-30iB Mini Plus. Safety function, ESI file, Setting of Beckhoff PLC, PDO mapping etc.
02	Sep., 2017	Support R-30iB Plus, R-30iB Mate Plus. OMRON Connection Guide, Address setting, Clear assignment etc.
01	Jun., 2014	

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