

**Motoman NX100 Controller**

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**CC-Link**  
**Function Manual**  
for SST-CCS-PCU

Part Number: 152602-1CD  
Revision: 0



Motoman, Incorporated  
805 Liberty Lane  
West Carrollton, OH 45449  
TEL: (937) 847-6200  
FAX: (937) 847-6277  
24-Hour Service Hotline: (937) 847-3200

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## Chapter 1

# Introduction

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### 1.1 About This Document

This manual provides information for the CC-Link function and contains the following sections:

#### **CHAPTER 1 - INTRODUCTION**

Provides general information about the structure of this manual, a list of reference documents, and customer service information.

#### **CHAPTER 2 - SAFETY**

This section provides information regarding the safe use and operation of Motoman products.

#### **CHAPTER 3 - CC-LINK INSTRUCTIONS**

Provides detailed information for the CC-Link function.

### 1.2 Reference to Other Documentation

For additional information refer to the following:

- NXC100 Controller Manual (P/N 150975-1)
- Concurrent I/O Manual (P/N 149230-1)
- Operator's Manual for your application
- Vendor manuals for system components not manufactured by Motoman

### 1.3 Customer Service Information

If you are in need of technical assistance, contact the Motoman service staff at (937) 847-3200. Please have the following information ready before you call:

- Robot Type (HP3JC, EA1900N, HP20)
- Application Type (welding, handling, etc.)
- Robot Serial Number (located on back side of robot arm)
- Robot Sales Order Number (located on back of controller)

# Notes

## Chapter 2

# Safety

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### 2.1 Introduction

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**It is the purchaser's responsibility to ensure that all local, county, state, and national codes, regulations, rules, or laws relating to safety and safe operating conditions for each installation are met and followed.**

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We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems. This information can be obtained from the Robotic Industries Association by requesting ANSI/RIA R15.06-1999. The address is as follows:

**Robotic Industries Association**  
900 Victors Way  
P.O. Box 3724  
Ann Arbor, Michigan 48106  
TEL: (734) 994-6088  
FAX: (734) 994-3338  
INTERNET: [www.roboticsonline.com](http://www.roboticsonline.com)

Ultimately, the best safeguard is trained personnel. The user is responsible for providing personnel who are adequately trained to operate, program, and maintain the robot cell. **The robot must not be operated by personnel who have not been trained!**

We recommend that all personnel who intend to operate, program, repair, or use the robot system be trained in an approved Motoman training course and become familiar with the proper operation of the system.

This safety section addresses the following:

- Standard Conventions (Section 2.2)
- General Safeguarding Tips (Section 2.3)
- Mechanical Safety Devices (Section 2.4)
- Installation Safety (Section 2.5)
- Programming, Operation, and Maintenance Safety (Section 2.6)

## 2.2 Standard Conventions

This manual includes the following alerts – in descending order of severity – that are essential to the safety of personnel and equipment. As you read this manual, pay close attention to these alerts to insure safety when installing, operating, programming, and maintaining this equipment.



### **DANGER!**

Information appearing in a **DANGER** concerns the protection of personnel from the immediate and imminent hazards that, if not avoided, will result in immediate, serious personal injury or loss of life in addition to equipment damage.



### **WARNING!**

Information appearing in a **WARNING** concerns the protection of personnel and equipment from potential hazards that can result in personal injury or loss of life in addition to equipment damage.



### **CAUTION!**

Information appearing in a **CAUTION** concerns the protection of personnel and equipment, software, and data from hazards that can result in minor personal injury or equipment damage.



*Note: Information appearing in a Note provides additional information which is helpful in understanding the item being explained.*

## 2.3 General Safeguarding Tips

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. General safeguarding tips are as follows:

- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories should be permitted to operate this robot system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the robot cell.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- In accordance with ANSI/RIA R15.06-1999, section 4.2.5, Sources of Energy, use lockout/tagout procedures during equipment maintenance. Refer also to Section 1910.147 (29CFR, Part 1910), Occupational Safety and Health Standards for General Industry (OSHA).

## 2.4 Mechanical Safety Devices

The safe operation of the robot, positioner, auxiliary equipment, and system is ultimately the user's responsibility. The conditions under which the equipment will be operated safely should be reviewed by the user. The user must be aware of the various national codes, ANSI/RIA R15.06-1999 safety standards, and other local codes that may pertain to the installation and use of industrial equipment. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. The following safety equipment is provided as standard:

- Safety fences and barriers
- Light curtains and/or safety mats
- Door interlocks
- Emergency stop palm buttons located on operator station, robot controller, and programming pendant

Check all safety equipment frequently for proper operation. Repair or replace any non-functioning safety equipment immediately.

## 2.5 Installation Safety

Safe installation is essential for protection of people and equipment. The following suggestions are intended to supplement, but not replace, existing federal, local, and state laws and regulations. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. Installation tips are as follows:

- Be sure that only qualified personnel familiar with national codes, local codes, and ANSI/RIA R15.06-1999 safety standards are permitted to install the equipment.
- Identify the work envelope of each robot with floor markings, signs, and barriers.
- Position all controllers outside the robot work envelope.
- Whenever possible, install safety fences to protect against unauthorized entry into the work envelope.
- Eliminate areas where personnel might get trapped between a moving robot and other equipment (pinch points).
- Provide sufficient room inside the workcell to permit safe teaching and maintenance procedures.

## 2.6 Programming, Operation, and Maintenance Safety

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to program, operate, and maintain the system. All personnel involved with the operation of the equipment must understand potential dangers of operation.

- Inspect the robot and work envelope to be sure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Be sure that all safeguards are in place. Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Do not enter the robot cell while it is in automatic operation. Be sure that only the person holding the programming pendant enters the workcell.
- Check the E-STOP button on the programming pendant for proper operation before programming. The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- Back up all programs and jobs onto suitable media before program changes are made. To avoid loss of information, programs, or jobs, a backup must always be made before any service procedures are done and before any changes are made to options, accessories, or equipment.

- Any modifications to PART 1, System Section, of the robot controller concurrent I/O program can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to PART 1, System Section. Making any changes without the written permission of Motoman will VOID YOUR WARRANTY!
- Some operations require standard passwords and some require special passwords. Special passwords are for Motoman use only. YOUR WARRANTY WILL BE VOID if you use these special passwords.
- The robot controller allows modifications of PART 2, User Section, of the concurrent I/O program and modifications to controller parameters for maximum robot performance. Great care must be taken when making these modifications. All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot and other parts of the system. Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations.
- Check and test any new or modified program at low speed for at least one full cycle.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.
- Use proper replacement parts.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).

# Notes

# NX100 OPTIONS SST-CCS-PCU BOARD INSTRUCTIONS

FOR CC-LINK

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Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

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## MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS  
NX100 INSTRUCTIONS  
NX100 OPERATOR'S MANUAL  
MOTOMAN MAINTENANCE MANUAL

The NX100 operator's manual above corresponds to specific usage.  
Be sure to use the appropriate manual.





## MANDATORY

- This manual explains the SST-CCS-PCU board (manufactured by Woodhead Industries, Inc.) of the NX100 system and general operations. Read this manual carefully and be sure to understand its contents before handling the NX100.
- General items related to safety are listed in Section 1: Safety of the NX100 Instructions. To ensure correct and safe operation, carefully read the NX100 Instruction before reading this manual.



## CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.

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## NOTES FOR SAFE OPERATION

Read this manual carefully before installation, operation, maintenance, or inspection of the NX100.

In this manual, the Notes for Safe Operation are classified as “WARNING”, “CAUTION”, “MANDATORY”, or “PROHIBITED”.



### WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.



### CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.



### MANDATORY

Always be sure to follow explicitly the items listed under this heading.



### PROHIBITED

Must never be performed.

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.



To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “CAUTION” and “WARNING”.



### PROHIBITED

- Do not use or keep the board in the following environmental conditions.
  - Where exposed to direct sunshine
  - Where vibration or impact occurs
  - Where high humidity exists
  - Where a strong magnetic field exists
  - Where much dust exists
  - Where a sudden change in the temperature occurs
  - Where corrosive gases occur
  - Where condensation occurs

Improper usage of the board may damage the board.

Descriptions of the programming pendant keys, buttons, and displays are shown as follows:

Equipment		Manual Designation
Programming Pendant	Character Keys	The keys which have characters printed on them are denoted with [ ]. ex. [ENTER]
	Symbol Keys	The keys which have a symbol printed on them are not denoted with [ ] but depicted with a small picture.  ex. page key  The cursor key is an exception, and a picture is not shown.
	Axis Keys Numeric Keys	“Axis Keys” and “Numeric Keys” are generic names for the keys for axis operation and number input.
	Keys pressed simultaneously	When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, ex. [SHIFT]+[COORD]
	Displays	The menu displayed in the programming pendant is denoted with { }. ex. {JOB}

## Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select •••" means that the cursor is moved to the object item and the SELECT key is pressed, or that the item is directly selected by touching the screen.

## Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of ® and ™ are omitted.

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<b>1</b>	<b>Outline</b>	
1.1	System Configuration.....	1-1
<b>2</b>	<b>Hardware Specifications</b>	
2.1	External View of the SST-CCS-PCU Board .....	2-1
2.2	SST-CCS-PCU Specifications .....	2-2
2.3	Communication Specifications .....	2-3
2.4	Connector .....	2-5
<b>3</b>	<b>Mounting the SST-CCS-PCU Board</b>	
3.1	Opening the Front Door of the NX100 .....	3-2
3.2	Mounting the SST-CCS-PCU Board on the NX100.	3-3
3.3	Cable Connection .....	3-4
3.4	Closing the Front Door of the NX100.....	3-5
<b>4</b>	<b>I/O Signal Allocation</b>	
4.1	Setting of Optional Board and I/O Module.....	4-1
4.2	Transmitting Data .....	4-6
4.3	I/O Allocation Examples .....	4-9
<b>5</b>	<b>Network Specifications</b>	
5.1	CC-Link Terminal Units .....	5-1
5.2	Number of Connected Stations of Each Terminal Unit .....	5-2
5.3	Communication Speed and Cable Length.....	5-3
<b>6</b>	<b>Error Indication</b>	
6.1	LED Indicators.....	6-1

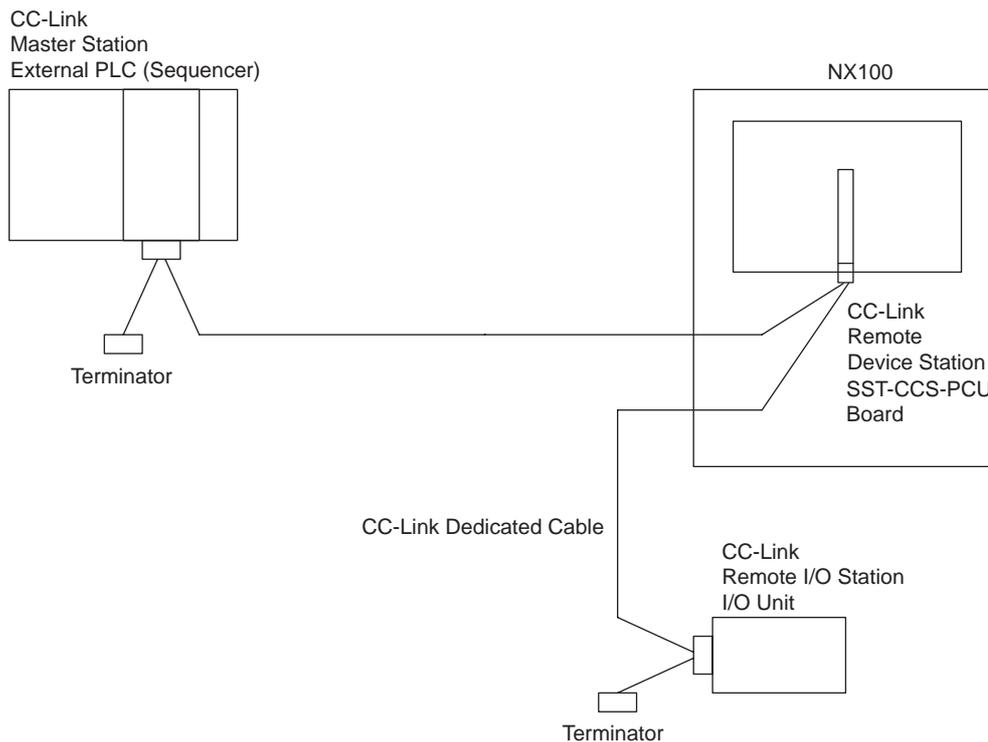
# 1 Outline

This manual describes the CC-Link<sup>\*1</sup> I/O board SST-CCS-PCU (manufactured by Woodhead Industries, Inc.) to be used in the NX100. The application of the SST-CCS-PCU board enables the exchange of general-purpose I/O data and register data between a CC-link device and the NX100. The SST-CCS-PCU board is designed only as a remote device station and cannot be used as a master station. Note that the SST-CCS-PCU board conforms to CC-Link ver1.10.

**\*1** CC-Link is a registered trademark of CLPA (CC-Link Partner Association).

## 1.1 System Configuration

The following diagram shows an example of the configuration of a system with an SST-CCS-PCU board.



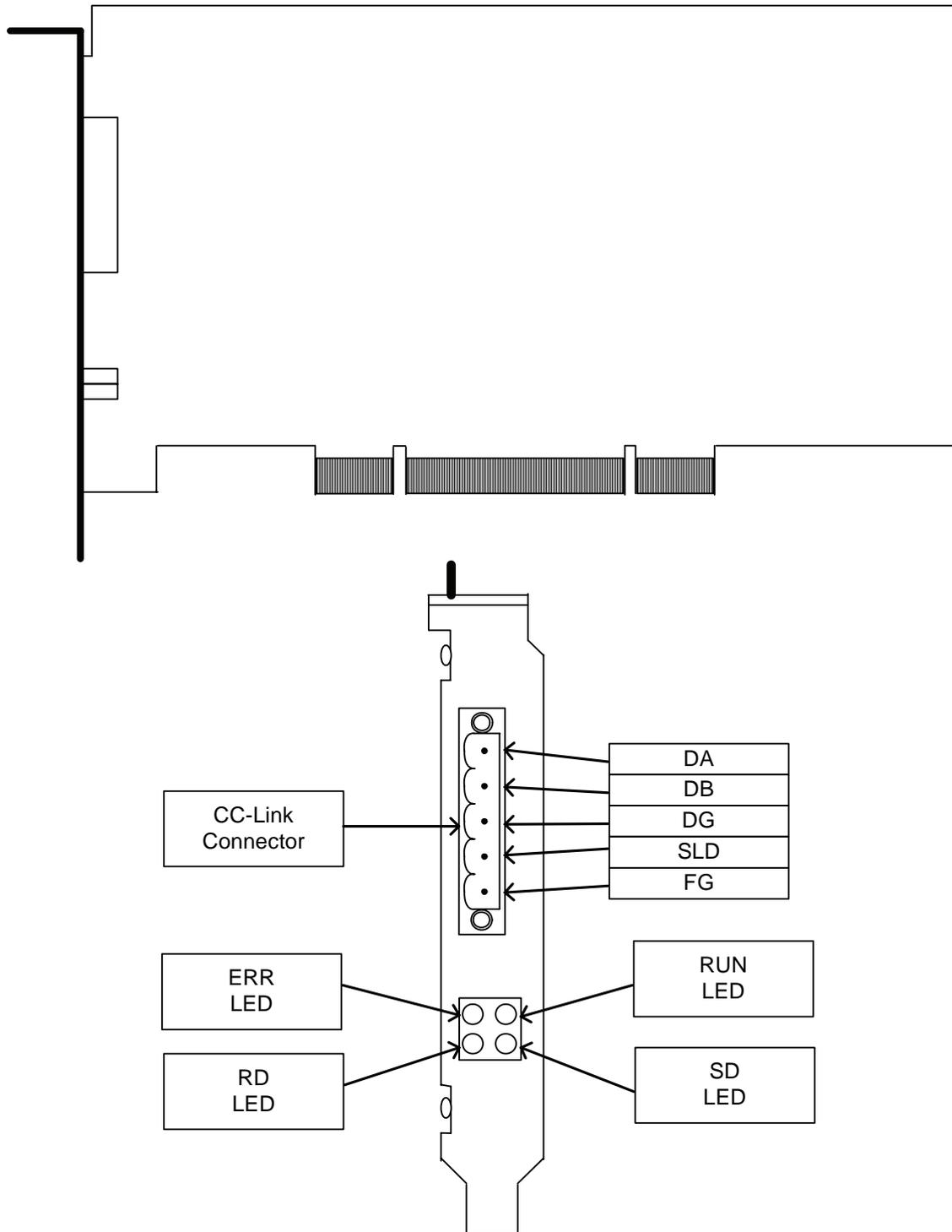
**The SST-CCS-PCU board does not include a CC-Link dedicated cable or an external terminator.**

**NOTE**

- When the SST-CCS-PCU board is connected at the end of the network, connect the external terminator to the SST-CCS-PCU board. If the terminator is not correctly connected, communications may not be performed. The value of resistance and the connection method differ depending on the cable type and the cable connection method. For details, refer to " 5 Network Specifications ".
- Following system versions support the SST-CCS-PCU board. The SST-CCS-PCU board operates in the following software versions only; the SST-CCS-PCU board does not operate in the older versions except the following:
  - NS3.20.00A(\*\*)-00 or all the versions that follow.
  - NS2.0N.00A(\*\*)-00 or all the versions that follow, and designated as NS2.0□.00A(\*\*)-00.

## 2 Hardware Specifications

### 2.1 External View of the SST-CCS-PCU Board



## 2.2 SST-CCS-PCU Specifications

Items	Specifications
Interface to external device	CC-Link
Board mounting position	PCI slot in the NX100
Error indicator	LED indicators
Number of transmission I/O points	Maximum number of I/O points: Input: 112; Output: 112 (four CC-Link stations occupied)  Selectable number of I/O points (one of the followings can be selected): Input: 16; Output: 16 (one CC-Link station occupied) Input: 48; Output: 48 (two CC-Link stations occupied) Input: 80; Output: 80 (three CC-Link stations occupied) Input: 112; Output: 112 (four CC-Link stations occupied) *Excludes the CC-Link system area.

## 2.3 Communication Specifications

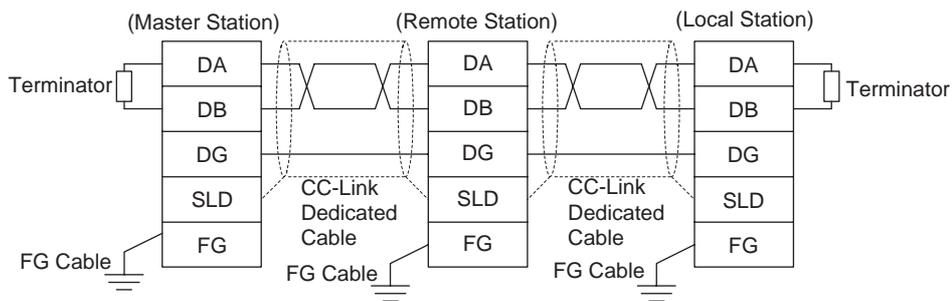
Items	Specifications																								
Transmission speed	10Mbps / 5Mbps / 2.5Mbps / 625kbps / 156 kbps																								
Communication method	Broadcast polling method																								
Transmission channel	Bus type																								
Number of nodes	Maximally 64																								
Maximum transmission distance	<ul style="list-style-type: none"> <li>When the CC-Link Ver1.00 dedicated cable FANC-SB, etc. is used, the transmission distances are as follows. <table border="1"> <thead> <tr> <th>Transmission speed</th> <th>Maximum transmission distance</th> </tr> </thead> <tbody> <tr> <td>10 Mbps</td> <td>100 m</td> </tr> <tr> <td>5 Mbps</td> <td>150 m</td> </tr> <tr> <td>2.5 Mbps</td> <td>200 m</td> </tr> <tr> <td>625 kbps</td> <td>600 m</td> </tr> <tr> <td>156 kbps</td> <td>1200 m</td> </tr> </tbody> </table> </li> <li>When the CC-Link Ver1.10 dedicated cable FANC-110SBH, etc. is used, the transmission distances are as follows. <table border="1"> <thead> <tr> <th>Transmission speed</th> <th>Maximum transmission distance</th> </tr> </thead> <tbody> <tr> <td>10 Mbps</td> <td>100 m</td> </tr> <tr> <td>5 Mbps</td> <td>160 m</td> </tr> <tr> <td>2.5 Mbps</td> <td>400 m</td> </tr> <tr> <td>625 kbps</td> <td>900 m</td> </tr> <tr> <td>156 kbps</td> <td>1200 m</td> </tr> </tbody> </table> </li> </ul> <p>For details, refer to " 5 Network Specifications ".</p>	Transmission speed	Maximum transmission distance	10 Mbps	100 m	5 Mbps	150 m	2.5 Mbps	200 m	625 kbps	600 m	156 kbps	1200 m	Transmission speed	Maximum transmission distance	10 Mbps	100 m	5 Mbps	160 m	2.5 Mbps	400 m	625 kbps	900 m	156 kbps	1200 m
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Transmission cable	<p>CC-Link dedicated cable (Shielded three-core twisted pair cable) e.g.</p> <ul style="list-style-type: none"> <li>• CC-Link Ver1.00 dedicated cable (FANC-SB, manufactured by KURAMO Electric Co., Ltd.)</li> <li>• CC-Link Ver1.00 dedicated high-performance cable (FANC-SBH, manufactured by KURAMO Electric Co., Ltd.)</li> <li>• CC-Link Ver1.10 dedicated cable (FANC-110SBH, manufactured by KURAMO Electric Co., Ltd.)</li> </ul>																								

Items	Specifications
Terminator	<p>Select the value of resistance according to the cable to be connected and the connection method. (Connect between DA and DB on the units at both ends.)</p> <ul style="list-style-type: none"><li>• 110 <math>\Omega</math> (CC-Link Ver1.00 dedicated cable)</li><li>• 130 <math>\Omega</math> (CC-Link Ver1.00 dedicated high-performance cable)</li><li>• 110 <math>\Omega</math> (CC-Link Ver1.10 dedicated cable)</li></ul> <p>* 110 <math>\Omega</math> (Brown - Brown - Black - Black - Brown) 130 <math>\Omega</math> (Brown - Orange - Black - Black - Brown)</p>

## 2.4 Connector

CC-Link Connector

Terminal No.	Signal Name	Meaning
1	DA	Data transmission line
2	DB	Data transmission line
3	DG	Signal ground
4	SLD	Shield ground
5	FG	Frame ground



- The stations can be connected in any order regardless of the station number.
- Be sure to connect a terminator to the stations on both ends.
- The master stations can be connected either on the end or in the middle.



The transmission cable must not be bound together with or laid close to the main circuit and power lines. Separate the transmission cable from the main circuit and power lines by 100 mm or more. Otherwise, the noise may cause a malfunction.

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## 3 Mounting the SST-CCS-PCU Board



### WARNING

- Before wiring, be sure to turn OFF the power supply and put up a warning sign, such as "DO NOT TURN ON THE POWER".  
Failure to observe this warning may result in an electric shock or an injury.
- Do not touch the inside of the panel for 5 minutes after the power is turned OFF.  
The remaining charged voltage in the capacitor may cause an electric shock or an injury.
- Be sure to close the door and install the protection cover while the power is turned ON.  
Failure to observe this warning may result in a fire or an electric shock.



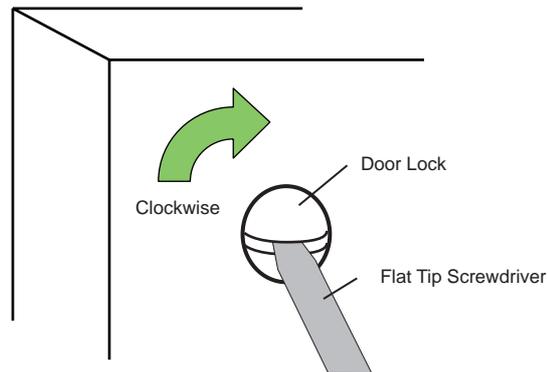
### CAUTION

- The wiring and mounting must be performed by the authorized and qualified personnel.  
Failure to observe this caution may result in a fire or an electric shock.
- Make sure that there is no foreign matter such as metal chips on the board.  
In case of malfunction, etc., it may result in an injury or damage to the board.
- Make sure that there is no damage or deflection of parts of the board.  
In case of malfunction, etc., it may result in an injury or damage to the board.
- Correctly connect each cable and connector.  
Failure to observe this caution may result in a fire or damage to the board.
- Set the switches, etc. correctly.  
In case of malfunction, etc., it may result in an injury or damage to the board.
- Never touch the mounting surfaces and the soldered surfaces of the board parts directly with fingers.  
The generated static electricity may damage the IC, and protrusions on the soldered surface may result in an injury.
- Never give any shock to the board.  
The shock may damage the board.

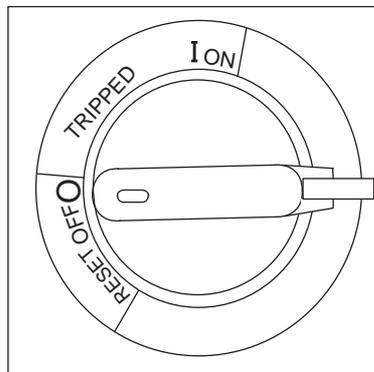
## 3.1 Opening the Front Door of the NX100

Mount the SST-CCS-PCU board in the following manner.

1. Turn the two door locks on the front face of the NX100 clockwise for 90° with a coin or a flat tip screwdriver.



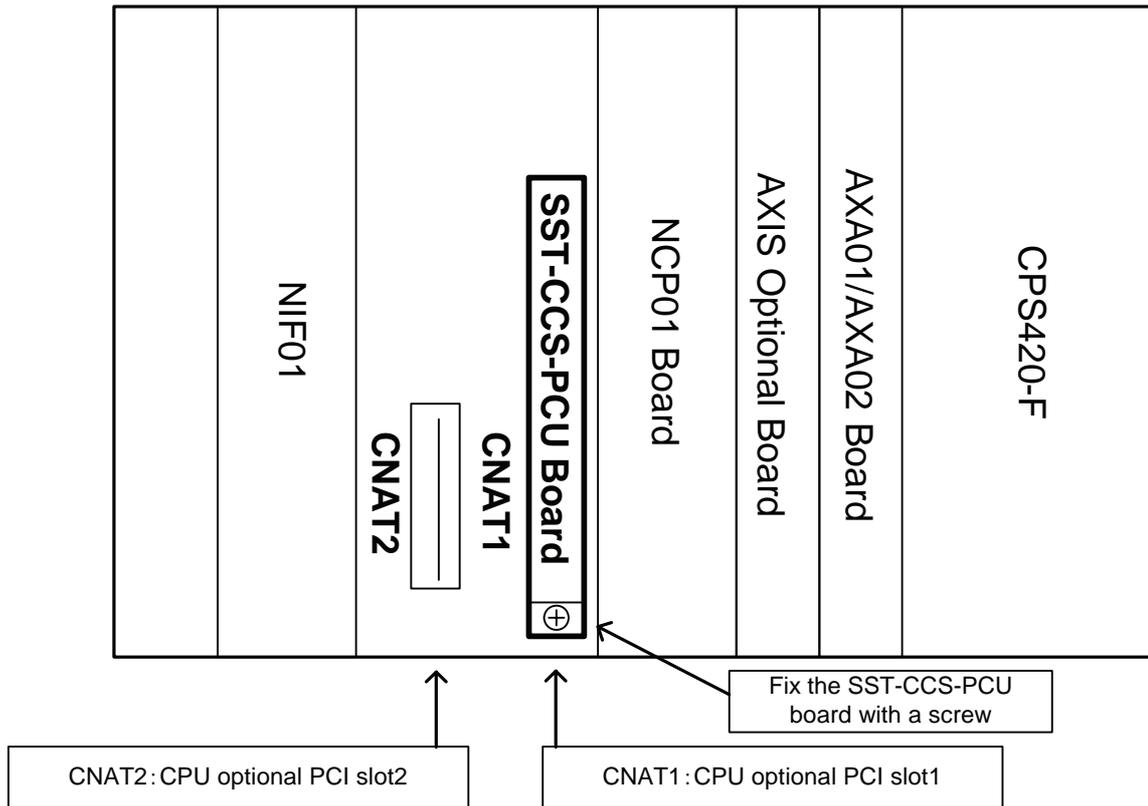
2. With the door locks turned clockwise for 90°, turn the main switch handle to the “OFF” position, and slowly open the door.



## 3.2 Mounting the SST-CCS-PCU Board on the NX100

Insert the SST-CCS-PCU board into the PCI slot on the NX100, then securely tighten the SST-CCS-PCU board with the board fixing screws.

(Mounting Example) When the SST-CCS-PCU board is inserted into CNAT1: slot1



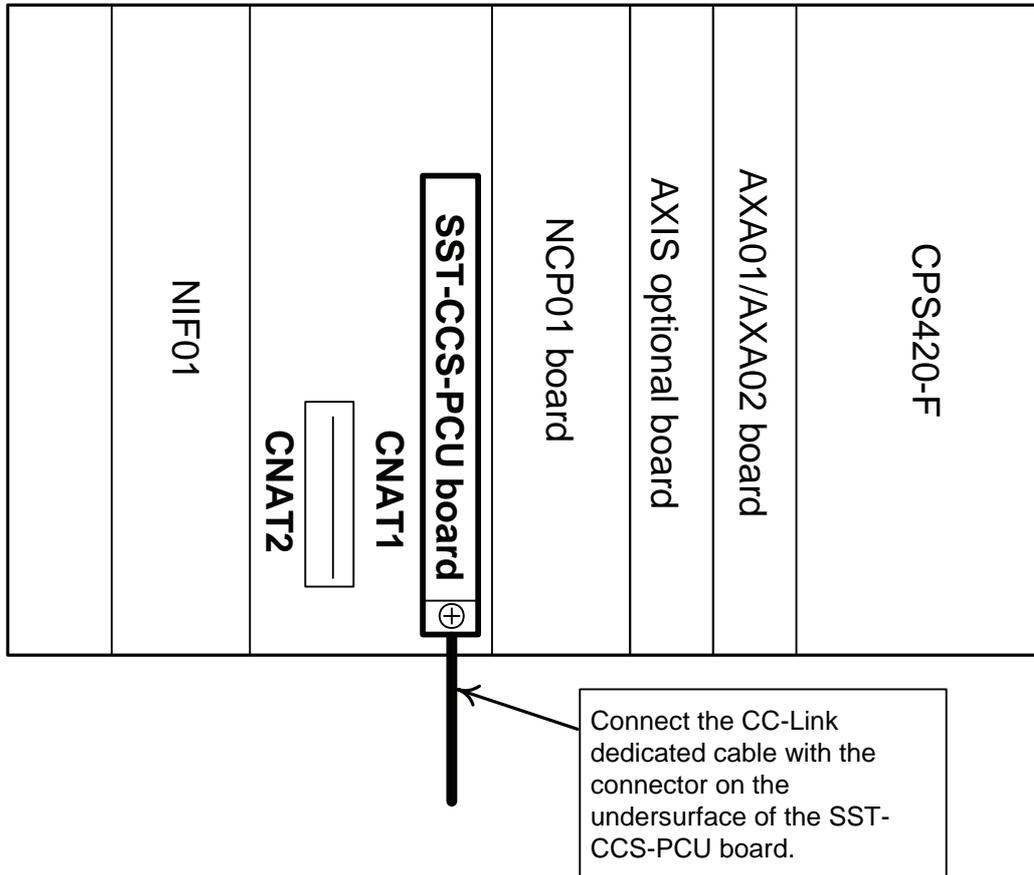
### NOTE

- Make sure to insert the SST-CCS-PCU board into the slot1 first when you use the PCI slot on the NX100 for mounting the board. If you insert the SST-CCS-PCU board into the slot2 with the slot1 empty, the board may not be recognized and the system may not correctly operate.
- If other optional board is already inserted into the slot1, use the slot2 to mount the SST-CCS-PCU board.

## 3.3 Cable Connection

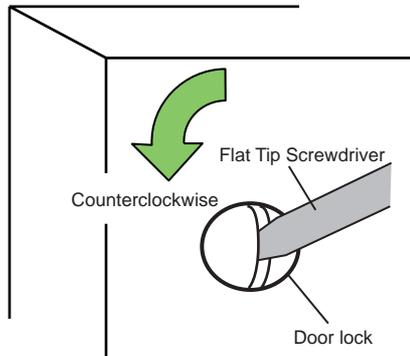
Connect the CC-Link dedicated cable with the SST-CCS-PCU board connector.

(Mounting Example) When the SST-CCS-PCU board is inserted into CNAT1: slot1



## 3.4 Closing the Front Door of the NX100

1. Close the door gently.
2. Turn the two door locks counterclockwise for 90° with a coin or a flat tip screwdriver.



# 4 I/O Signal Allocation

## 4.1 Setting of Optional Board and I/O Module

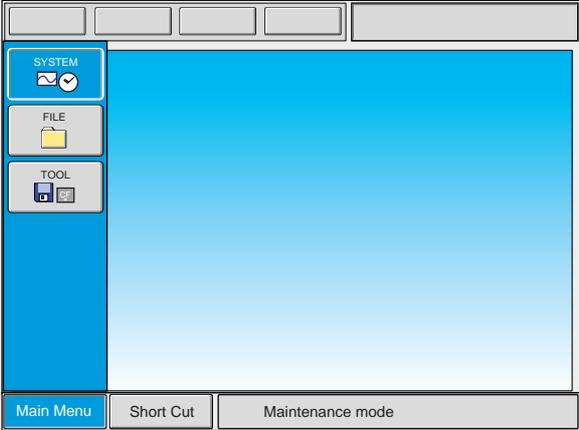
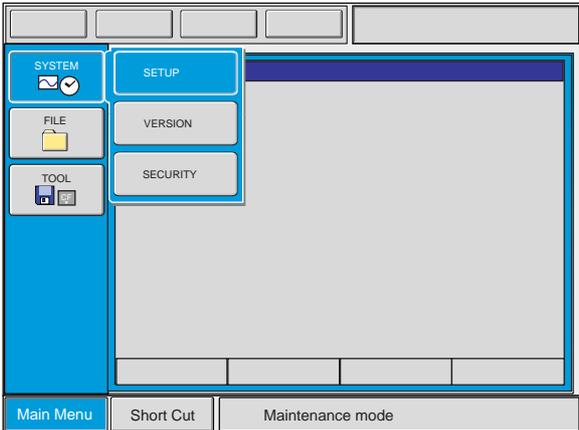
In order to use the SST-CCS-PCU board on the NX100, perform the setting of the optional board and I/O module in the following manner.

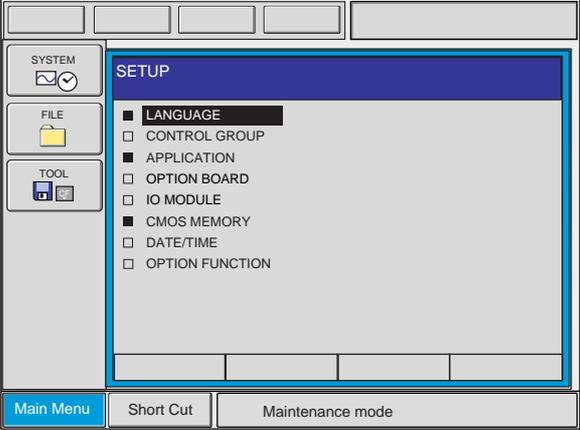
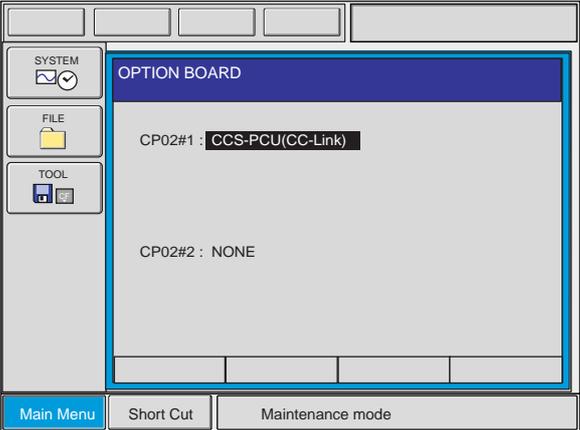
Before setting the optional board and I/O module;

1. Make sure that the power supply to the NX100 is OFF.
2. Insert the SST-CCS-PCU board into the PCI slot on the NX100. For the board mounting, refer to " 3 Mounting the SST-CCS-PCU Board ".

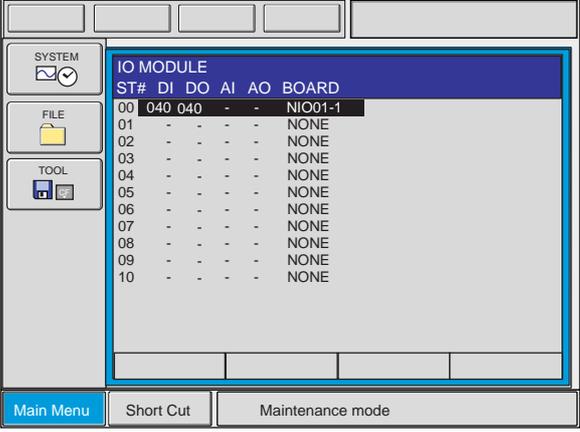


Set the optional board and I/O module in the management mode.  
In the operation mode and the editing mode, the settings are for reference only.

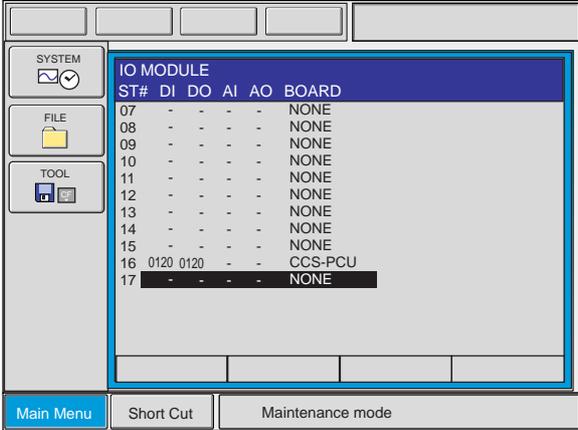
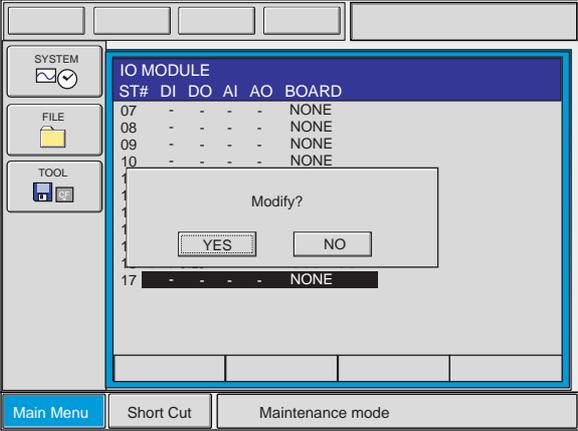
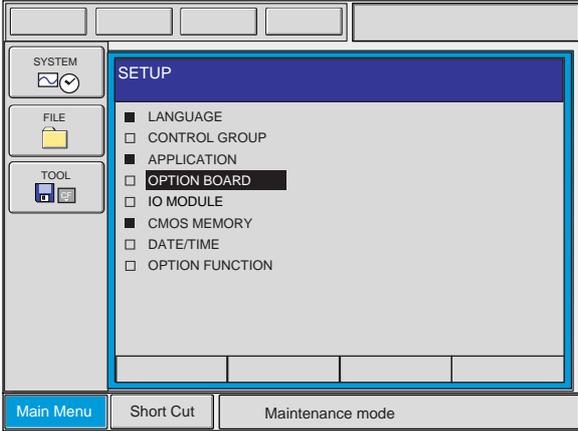
	Operation	Explanation
1	Turn ON the power supply while pressing [MAIN MENU].	The main menu appears. 
2	Select {SYSTEM} under the main menu	The sub menu appears. 

	Operation	Explanation
3	Set the security mode to the "MANAGEMENT MODE".	
4	Press {SETUP}.	<p>The SETUP display appears.</p> 
5	Select "OPTION BOARD".	<p>The OPTION BOARD display appears.</p> 

	Operation	Explanation
6	Select "CCS-PCU(CC-Link)".	<p>The CCS-PCU(CC-Link) setup display appears.</p> <p>Set the following items:</p> <ul style="list-style-type: none"> <li>• CCS-PCU</li> <li>• Occupied stations</li> <li>• Station number</li> <li>• Communication speed</li> <li>• Remote register (RWw) allocation</li> <li>• Remote register (RWr) allocation</li> </ul> <div data-bbox="683 562 1262 994" style="border: 1px solid black; padding: 5px; margin: 10px 0;"> </div> <p>Explanation of Setup Items</p> <ol style="list-style-type: none"> <li>① CCS-PCU Selects whether to use the SST-CCS-PCU board or not.</li> <li>② OCCUPIED STATIONS Sets the number of the CC-Link occupied station. Selects the station among 1 occupied station, 2 occupied stations, 3 occupied stations, and 4 occupied stations.</li> <li>③ STATION NUMBER Sets the CC-Link station number. The station number can be set by numbers from 1 to 64.</li> <li>④ COMMUNICATION SPEED Sets the CC-Link communication speed. Selects the speed among 125k/625k/2.5M/5M/10M/bps.</li> <li>⑤ REMOTE REGISTER (RWw) ALLOCATION Allocates the CC-Link remote register (RWw) to the NX100 M-register by numbers from 0 to 299. (RWw) is the data sent from the master station to the remote device station.</li> <li>⑥ REMOTE REGISTER (RWr) ALLOCATION Allocates the CC-Link remote register (RWr) to the NX100 M-register by numbers from 0 to 499. (RWr) is the data sent from the remote device station to the master station.</li> </ol> <div data-bbox="592 1809 1361 2038" style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p><b>NOTE</b> Before allocating the CC-Link remote register to the M-register, make sure to use the M-register No. that is not used for other applications. If the M-register is duplicated, the remote register data may not be correctly transmitted between the master station and the remote device station.</p> </div>

	Operation	Explanation																																																																								
7	Press [ENTER].	<p>The confirmation dialog box appears.</p> 																																																																								
8	Press "YES".	<p>The IO MODULE display appears.</p>  <table border="1" data-bbox="869 907 1332 1243"> <thead> <tr> <th>ST#</th> <th>DI</th> <th>DO</th> <th>AI</th> <th>AO</th> <th>BOARD</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>040</td> <td>040</td> <td>-</td> <td>-</td> <td>NIO01-1</td> </tr> <tr> <td>01</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>NONE</td> </tr> <tr> <td>02</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>NONE</td> </tr> <tr> <td>03</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>NONE</td> </tr> <tr> <td>04</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>NONE</td> </tr> <tr> <td>05</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>NONE</td> </tr> <tr> <td>06</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>NONE</td> </tr> <tr> <td>07</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>NONE</td> </tr> <tr> <td>08</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>NONE</td> </tr> <tr> <td>09</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>NONE</td> </tr> <tr> <td>10</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>NONE</td> </tr> </tbody> </table>	ST#	DI	DO	AI	AO	BOARD	00	040	040	-	-	NIO01-1	01	-	-	-	-	NONE	02	-	-	-	-	NONE	03	-	-	-	-	NONE	04	-	-	-	-	NONE	05	-	-	-	-	NONE	06	-	-	-	-	NONE	07	-	-	-	-	NONE	08	-	-	-	-	NONE	09	-	-	-	-	NONE	10	-	-	-	-	NONE
ST#	DI	DO	AI	AO	BOARD																																																																					
00	040	040	-	-	NIO01-1																																																																					
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## 4.1 Setting of Optional Board and I/O Module

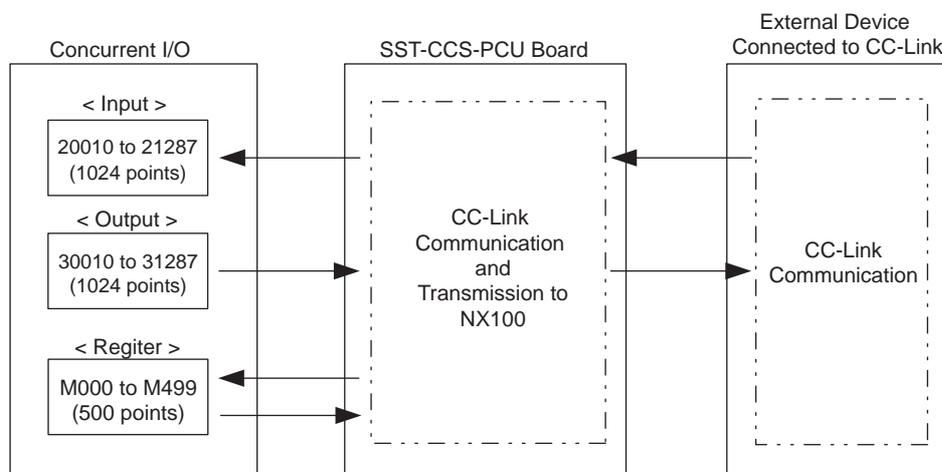
	Operation	Explanation
9	Press [ENTER].	<p>The rest of the I/O module display appears, and "CCS-PCU" is displayed.</p> <p>The I/O points is displayed under "DI/DO" according to the number of the occupied station that is set on the "OPTION BOARD" display.</p>  <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> The DI/DO points can be found using the following equation;</p> <ul style="list-style-type: none"> <li>• DI/DO points = (the number of occupied station × 32 - 16) + 8</li> </ul> <p>" + 8 " : the I/O points for status</p> </div>
10	Press [ENTER].	<p>The confirmation dialog box appears.</p> 
11	Press "YES".	<p>The SETUP display appears.</p> 

## 4.2 Transmitting Data

The data to be transmitted from the SST-CCS-PCU board to inside of the NX100 is not only the I/O data from the external device connected to the CC-Link, but also the status of the SST-CCS-PCU board.

Therefore, inside the NX100, 8 points (1 byte) for both input and output are reserved for the status of the SST-CCS-PCU board beside the area for the digital data. The output area, however, cannot be used.

The transmission data from the SST-CCS-PCU board are allocated to the external I/O signals of concurrent I/O and the M-registers.



Where only an SST-CCS-PCU (four occupied stations) is mounted as an optional I/O board, the concurrent I/O allocation of each board is shown in the following table.

Furthermore, the following table shows the remote register allocation of word data when the remote register allocation (RWw) is set to M000 and the remote register allocation (RWr) is set to M016.

## 4.2 Transmitting Data

(20010 to 20057 are used for the general I/O board (JANCD-JANCD-NIO01 or JANCD-NIO02) of the NX100.)

Type of Data	Input		Output	
I/O Data	20060 to 20067	Board status *1	30060 to 30067	Cannot be used
	20070 to 20077	Input data (1)	30070 to 30077	Output data (1)
	20080 to 20087	Input data (2)	30080 to 30087	Output data (2)
	20090 to 20097	Input data (3)	30090 to 30097	Output data (3)
	20100 to 20107	Input data (4)	30100 to 30107	Output data (4)
	20110 to 20117	Input data (5)	30110 to 30117	Output data (5)
	20120 to 20127	Input data (6)	30120 to 30127	Output data (6)
	20130 to 20137	Input data (7)	30130 to 30137	Output data (7)
	20140 to 20147	Input data (8)	30140 to 30147	Output data (8)
	20150 to 20157	Input data (9)	30150 to 30157	Output data (9)
	20160 to 20167	Input data (10)	30160 to 30167	Output data (10)
	20170 to 20177	Input data (11)	30170 to 30177	Output data (11)
	20180 to 20187	Input data (12)	30180 to 30187	Output data (12)
	20190 to 20197	Input data (13)	30190 to 30197	Output data (13)
	20200 to 20207	Input data (14)	30200 to 30207	Output data (14)
Word Data	M000	Input word data (1)	M016	Output word data (1)
	M001	Input word data (2)	M017	Output word data (2)
	M002	Input word data (3)	M018	Output word data (3)
	M003	Input word data (4)	M019	Output word data (4)
	M004	Input word data (5)	M020	Output word data (5)
	M005	Input word data (6)	M021	Output word data (6)
	M006	Input word data (7)	M022	Output word data (7)
	M007	Input word data (8)	M023	Output word data (8)
	M008	Input word data (9)	M024	Output word data (9)
	M009	Input word data (10)	M025	Output word data (10)
	M010	Input word data (11)	M026	Output word data (11)
	M011	Input word data (12)	M027	Output word data (12)
	M012	Input word data (13)	M028	Output word data (13)
	M013	Input word data (14)	M029	Output word data (14)
	M014	Input word data (15)	M030	Output word data (15)
	M015	Input word data (16)	M031	Output word data (16)

**\*1** [CCS-PCU Board Status]

The status of the CCS-PCU board (the first 8 points of the allocation area) is indicated as follows.

The value “xxx” of the allocated input signals in the table indicates the first number of the CCS-PCU board allocated number. In the table above, where the allocation numbers were 20060 to 20067, “xxx” would be “006.”

Signal	Contents
2xxx0	Indicates the CC-Link communication status. Normal: 0 Error: 1
2xxx1	Indicates the CPU status of the CC-Link master station sequencer. Normal: 0 Error: 1
2xxx2	Indicates setting status of the CC-Link station number and communication speed to see if it is out of the setting range or not. Normal: 0 Error: 1
2xxx3	Unavailable
2xxx4 to 2xxx7	Reserved for the manufacturer. The user cannot use these signals.

## 4.3 I/O Allocation Examples

Example 1: When only the SST-CCS-PCU (four occupied stations) is mounted  
 (The JANCD-NIO01 board is the general I/O board of the NX100.)

Input	Output
20010 to 20057: JANCD-NIO01 board 20060 to 20207: SST-CCS-PCU board	30010 to 30057: JANCD-NIO01 board 30060 to 30207: SST-CCS-PCU board

Example 2: When the JARCR-XOI01 board and the SST-CCS-PCU board (four occupied stations) are mounted  
 (provided that the NX station number of the JARCR-XOI01 board is smaller than that of the SST-CCS-PCU board, for example, the NX station number of the JARCR-XOI01 board is ST#01 and that of the SST-CCS-PCU board is ST#16.)

Input	Output
20010 to 20057: JANCD-NIO01 board 20060 to 20107: JARCR-XOI01 board 20110 to 20257: SST-CCS-PCU board	30010 to 30057: JANCD-NIO01 board 30060 to 30107: JARCR-XOI01 board 30110 to 30257: SST-CCS-PCU board

## 5 Network Specifications

### 5.1 CC-Link Terminal Units

CC-Link terminal units are assigned to the following CC-Link stations.

CC-Link Station name		Meaning
Master station		Controls both remote stations and local stations.
Standby master station		Continues the data link in the place of the master station if a failure occurs in the master station.
Local station		Communicates with the master station and other local stations with its own sequencer CPU.
Remote station	Remote I/O station	Transmits only bit information.
	Remote device station	Transmits both bit and word information.
	Intelligent device station	Executes transient transmissions.



The CCS-PCU board is assigned to a remote device station.

## 5.2 Number of Connected Stations of Each Terminal Unit

The number of stations connected to the CC-Link of each unit must satisfy the equations ① and ②.

$$\textcircled{1} (1 \times a) + (2 \times b) + (3 \times c) + (4 \times d) \leq 64 \text{ stations}$$

a: Number of units occupied by one station

b: Number of units occupied by two stations

c: Number of units occupied by three stations

d: Number of units occupied by four stations

$$\textcircled{2} (16 \times A) + (54 \times B) + (88 \times C) \leq 2304$$

A: Number of remote I/O stations. Maximum 64 stations

B: Number of remote device stations. Maximum 42 stations

C: Number of local stations, standby master stations, and intelligent device stations.  
Maximum 26 stations

Example: When the conditions are as follows:

Remote I/O station (occupied by one station): 22 stations

Remote device station (occupied by two stations): 8 stations

Local station (occupied by four stations): 5 stations

The equations will be as follows:

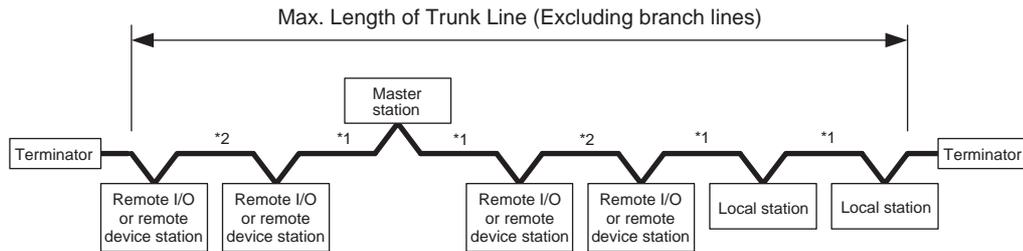
$$\text{Equation } \textcircled{1} \quad 1 \times 22 + 2 \times 8 + 4 \times 5 = 58 \leq 64$$

$$\text{Equation } \textcircled{2} \quad 16 \times 22 + 54 \times 8 + 88 \times 5 = 1224 \leq 2304$$

## 5.3 Communication Speed and Cable Length



The CC-Link dedicated cable cannot be used together with the CC-Link dedicated high-performance cable.



### Using the CC-Link (Ver.1.00) Dedicated Cable (with a characteristic impedance of 100Ω)

Communication Speed	Cable Length between Stations			Max. Transmission Distance
	Length①	Length②	Length③	
156 kbps	1 m or more	2 m or more	30 cm or more	1200 m
625 kbps				600 m
2.5 Mbps				200 m
5 Mbps			60 cm or more	150 m
			30 cm to 59 cm	110 m
10 Mbps			1 m or more	100 m
			60 cm to 99 cm	80 m
			30 cm to 59 cm	50 m

Note: Length① indicates the cable length between a specified station such as the master, the local, or the intelligent device station and the next station\*<sup>1</sup> when only the remote I/O or the remote device station is used.

Length ② indicates the cable length between a specified station such as the master, the local, or the intelligent device station and the next station\*<sup>1</sup> when the local or the intelligent device station is used.

Length ③ indicates the cable length between the remote I/O and the remote device station (minimum length).\*<sup>2</sup>

### Using the CC-Link (Ver.1.00) Dedicated High-Performance Cable (with a characteristic impedance of 130Ω)

Communication Speed	Cable Length between Stations			Max. Transmission Distance		Max. Number of Remote Stations
	Length①	Length②	Length③	Length④	Length⑤	
156 kbps	1 m or more	2 m or more	30 cm or more	1200 m	1200 m	64
625 kbps				900 m	600 m	
2.5 Mbps				400 m	200 m	
5 Mbps			60 cm or more	-	150 m	
			30 cm or more	160 m	110 m	
10 Mbps			1.0 m or more	-	80 m	
			70 cm or more	100 m	50 m	
			40 cm to 69 cm	30 m	-	
			30 cm to 39 cm	20 m	-	
			40 cm or more	100 m	-	
	30 cm to 39 cm	80 m	-			
	30 cm or more	100 m	-	32		

Note: Length① indicates the cable length between a specified station such as the master, the local, or the intelligent device station and the next station\*<sup>1</sup> when only the remote I/O or the remote device station is used.

Length ② indicates the cable length between a specified station such as the master, the local, or the intelligent device station and the next station\*<sup>1</sup> when the local or the intelligent device station is used.

Length ③ indicates the cable length between the remote I/O and the remote device station (minimum length).\*<sup>2</sup>

Length ④ indicates the maximum transmission distance only for the remote I/O or the remote device stations.

Length ⑤ indicates the maximum transmission distance for the local or the intelligent device station and may or may not also include the remote I/O or the remote device stations.

**Using the CC-Link (Ver.1.10) Dedicated Cable (with a characteristic impedance of 110Ω)**

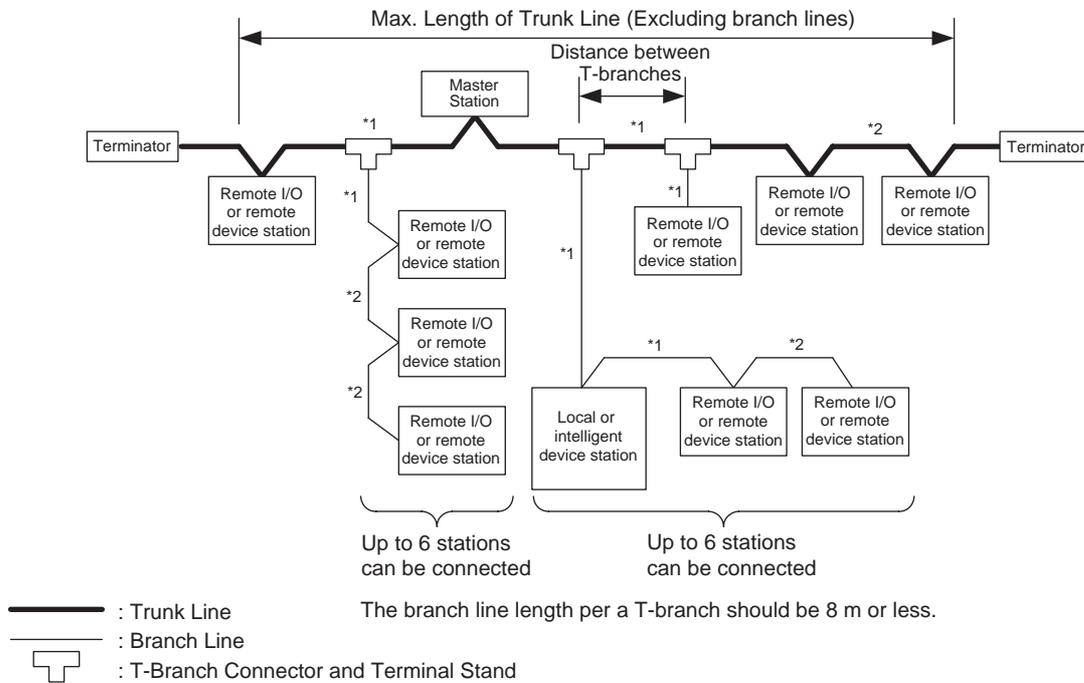
Communication Speed	Cable Length between Stations	Max. Transmission Distance
156 kbps	20 cm or more	1200 m
625 kbps	20 cm or more	900 m
2.5 Mbps	20 cm or more	400 m
5 Mbps	20 cm or more	160 m
10 Mbps	20 cm or more	100 m

### Using a T-branch Connection



Use the following connection cable:

- CC-Link (Ver.1.10) dedicated cable (with a characteristic impedance of 110Ω)
- CC-Link (Ver.1.00) dedicated cable (with a characteristic impedance of 100Ω)



The branch line length per a T-branch should be 8 m or less.

Communication Speed	Cable Length between Stations			Max. Length of the Trunk Line **1	Distance between T-branches	Max Length. of the Branch Line **2	Total Length of the Branch Lines **3
	Length①	Length②	Length③				
156 kbps	1 m or more	2 m or more	30 cm or more	500 m	Not limited	8 m	200 m
625 kbps				100 m			50 m

\*\*1: Indicates the cable length between the terminators on both ends. The cable length of the branch line of the T-branch is excluded.

\*\*2: Indicates the cable length per a T-branch.

\*\*3: Indicates the total cable length of all the branch lines.

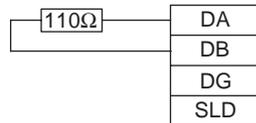
Notes 1: The communication speeds of 10 Mbps, 5 Mbps, and 2.5 Mbps are not available.

2: Length① indicates the cable length between a specified station such as the master, the local, or the intelligent device station and the next station\*1 when only the remote I/O or the remote device station is used.

Length ② indicates the cable length between a specified station such as the master, the local, or the intelligent device station and the next station\*1 when the local or the intelligent device station is used.

Length ③ indicates the cable length between the remote I/O and the remote device station (minimum length).<sup>\*2</sup>

- Maximum number of connected stations on the branch line: 6  
(Indicates the maximum number of stations per T-branch.)
- T-branch terminal stand: standard terminal stand
- T-branch connector: Connector for FA sensor  
Keep as much of the sheath on the terminal side of the cable as possible.
- Terminator: The connection method differs depending on the type of master unit. Refer to the manual for each master unit. Use the standard terminator of  $110\Omega$ , 1/2W.

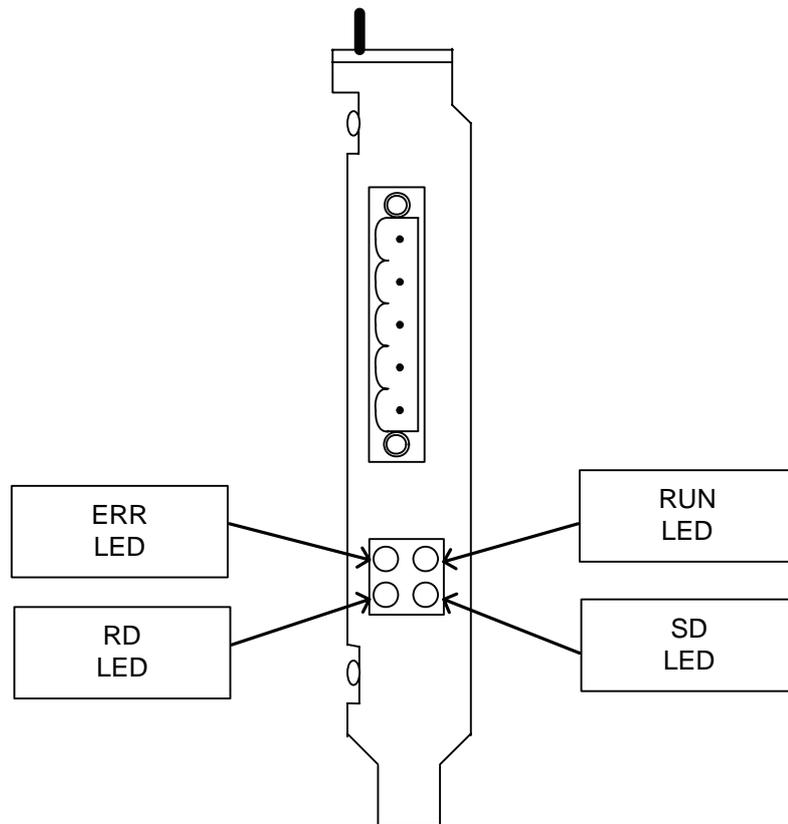


## 6 Error Indication

### 6.1 LED Indicators

Four LEDs are provided on the front of the SST-CCS-PCU board to indicate the status of CC-Link communications.

LED Indicator	Lit	Unlit	Flashing
RUN (green)	Normal status (Connected in the network)	<ul style="list-style-type: none"> <li>• Offline from network or unable to detect carriers</li> <li>• Time over</li> <li>• Board is powered off or reset</li> </ul>	-
ERR (red)	<ul style="list-style-type: none"> <li>• At occurrence of CRC error</li> <li>• CC-Link station number setting out of the range (0 or greater than 64)</li> <li>• Communication speed setting out of the range</li> </ul>	<ul style="list-style-type: none"> <li>• Normal</li> <li>• Resetting board</li> </ul>	Either the station address data or the communication speed data may have been rewritten after power was supplied to the board. (This event cannot occur normally.) (Flashes every 0.4 seconds.)
SD (green)	Sending data	<ul style="list-style-type: none"> <li>• Not sending data</li> <li>• Resetting board</li> </ul>	-
RD (green)	Receiving data	<ul style="list-style-type: none"> <li>• Not receiving data</li> <li>• Resetting board</li> </ul>	-



LED indications during normal CC-Link communications

- RUN: Lit
- ERR: Unlit
- SD: Lit
- RD: Lit



Check the following items when an LED for the CC-Link indicates that an error or a communication error is occurring.

**The ERR LED is flashing.**

- ① Either the station address data or the communication speed data may have been rewritten after power was supplied to the board. (This event cannot occur normally.)  
Check the setting of each SST-CCS-PCU board in the maintenance mode, and then turn ON the power again.

**The ERR LED is lit.**

- ① Either the CC-Link communication speed data or CC-Link station address data may not be correctly recognized; the communication speed or the station address is set to "0", or 65 or more.  
Check the setting of each SST-CCS-PCU board in the maintenance mode, and then turn ON the power again. (Refer to " 4 I/O Signal Allocation ".)
- ② Electric noise may affect communications. Check the following items:  
(Refer to " 2 Hardware Specifications " and " 5 Network Specifications ".)
  - Check if the correct terminator is set at the correct positions and if the resistance is the correct value.  
(The value of resistance differs depending on the type of the dedicated cable and the cable connection method.)
  - Check the shield grounding and the frame grounding of the dedicated cable.
  - Change the layout of the dedicated cable to check the communication status.

**Communications are disabled, and the ERR LED is not lit.**

- ① The communication settings disagree with those of the master PLC. Check the settings of both the SST-CCS-PCU board and the master PLC. (Refer to " 4 I/O Signal Allocation ".)
- ② The SST-CCS-PCU board may be poorly connected to the PCI slot. Check the connection by pulling out and inserting the SST-CCS-PCU board. (Refer to " 3 Mounting the SST-CCS-PCU Board ".)
- ③ The CC-Link dedicated cable may be disconnected or may be not correctly connected. Check the conduction of the cable and the connection of the cable to the CC-Link connector. (Refer to " 2 Hardware Specifications ".)

# NX100 OPTIONS SST-CCS-PCU BOARD INSTRUCTIONS

FOR CC-LINK

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## HEAD OFFICE

2-1 Kurosaki-Shiroishi, Yahatanishi-ku, Kitakyusyu-shi, 806-0004, Japan  
Phone 81-93-645-7745 Fax 81-93-645-7746

## MOTOMAN INC. HEADQUARTERS

805 Liberty Lane West Carrollton, OH 45449, U.S.A.  
Phone 1-937-847-6200 Fax 1-937-847-6277

## YASKAWA MOTOMAN CANADA LTD.

3530 Laird Road, Unit 3, Mississauga, Ontario, L5L 5Z7, Canada  
Phone 1-905-569-6686 Fax 1-905-813-5911

## MOTOMAN ROBOTICS EUROPE AB

Franska Vagen 1039854, Kalmar, Sweden  
Phone 46-480-417800 Fax 46-480-417999

## MOTOMAN ROBOTEC GmbH

Kammerfeld strasse 1, DE-85391 Allershausen, Germany  
Phone 49-8166-90100 Fax 49-8166-90103

## YASKAWA ELECTRIC KOREA CORPORATION

1F Samyang Bldg. 89-1, Shinchun-dong, Donk-Ku, Daegu, Korea  
Phone 82-53-745-7844 Fax 82-2-784-8495

## YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.

151 Lorong Chuan, #04-01, New Tech Park, Singapore 556741, Singapore  
Phone 65-6282-3003 Fax 65-6289-3003

## YASKAWA ELECTRIC (MALAYSIA) SDN. BHD.

No.71, Jalan Bandar Rawang 2, 48000 Rawang, Selangor D.E., Malaysia  
Phone 60-3-6092-1377 Fax 60-3-6092-6377

## YASKAWA ELECTRIC TAIWAN CORPORATION

9F, 16 Nanking E. Rd., Sec. 3, Taipei, Taiwan  
Phone 886-2-2502-5003 Fax 886-2-2505-1280

## SHOUGANG MOTOMAN ROBOT CO., LTD.

7, Yongchang-North Road, Beijing Economic & Technological Development Area, Beijing 100076, China  
Phone 86-10-6788-0541 Fax 86-10-6788-2878



YASKAWA ELECTRIC CORPORATION

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