

DX100 OPTIONS SST-CCS-PCU BOARD INSTRUCTIONS

FOR CC-Link

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

MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS
DX100 INSTRUCTIONS
DX100 OPERATOR'S MANUAL
DX100 MAINTENANCE MANUAL

The DX100 operator's manuals above correspond to specific usage.
Be sure to use the appropriate manual.

Part Number: 157176-1CD
Revision: 0





MANDATORY

- This manual explains the SST-CCS-PCU board (manufactured by Molex Inc.) of the DX100 system and general operations. Read this manual carefully and be sure to understand its contents before handling the DX100.
- General items related to safety are listed in Chapter 1: Safety of the DX100 Instructions. To ensure correct and safe operation, carefully read the DX100 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.

Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the DX100.

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.



WARNING

- Before operating the manipulator, check that servo power is turned OFF when the emergency stop buttons on the front door of the DX100 and programming pendant are pressed. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.

Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.

Fig. : Emergency Stop Button



- Once the emergency stop button is released, clear the cell of all items which could interfere with the operation of the manipulator. Then turn the servo power ON.

Injury may result from unintentional or unexpected manipulator motion.

Fig. : Release of Emergency Stop



- Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator
 - View the manipulator from the front whenever possible.
 - Always follow the predetermined operating procedure.
 - Keep in mind the emergency response measures against the manipulator's unexpected motion toward you.
 - Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

- Confirm that no persons are present in the P-point maximum envelope of the manipulator and that you are in a safe location before:
 - Turning ON the DX100 power
 - Moving the manipulator with the programming pendant
 - Running the system in the check mode
 - Performing automatic operations
- Injury may result if anyone enters the P-point maximum envelope of the manipulator during operation. Always press an emergency stop button immediately if there are problems. The emergency stop buttons are located on the right of the front door of the DX100 and the programming pendant.



WARNING

- 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

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
 - Check for problems in manipulator movement.
 - Check for damage to insulation and sheathing of external wires.
- Always return the programming pendant to the hook on the cabinet of the DX100 after use.

The programming pendant can be damaged if it is left in the manipulator's work area, on the floor, or near fixtures.

Read and understand the Explanation of Warning Labels in the DX100 Instructions before operating the manipulator:

- The wiring and mounting must be performed by 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 the board.

- Make sure that there is no damage or deflection of parts on the board.

In case of malfunction, etc. it may result in an injury or damage the board.

- Correctly connect each cable and connector.

Failure to observe this caution may result in a fire or damage the board.

- Set the switches, etc. correctly.

Malfunction, caused by an incorrect setting, may result in an injury or damage the board.

- Never touch the mounting surfaces of the board parts directly with fingers.

The generated static electricity may damage the IC.

- Never touch the soldered surfaces of the board directly with fingers. Protrusions on the soldered surface may result in an injury.

- No shock to the board.

The shock may damage the board.

Definition of Terms Used Often in This Manual


The MOTOMAN is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the controller, the programming pendant, and supply cables.

In this manual, the equipment is designated as follows.

Equipment	Manual Designation
DX100 Controller	DX100
DX100 Programming Pendant	Programming Pendant
Cable between the manipulator and the controller	Manipulator cable

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.

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1 Outline

This manual describes the CC-Link I/O board SST-CCS-PCU (manufactured by Molex Inc.) to be used in the DX100.

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 DX100.

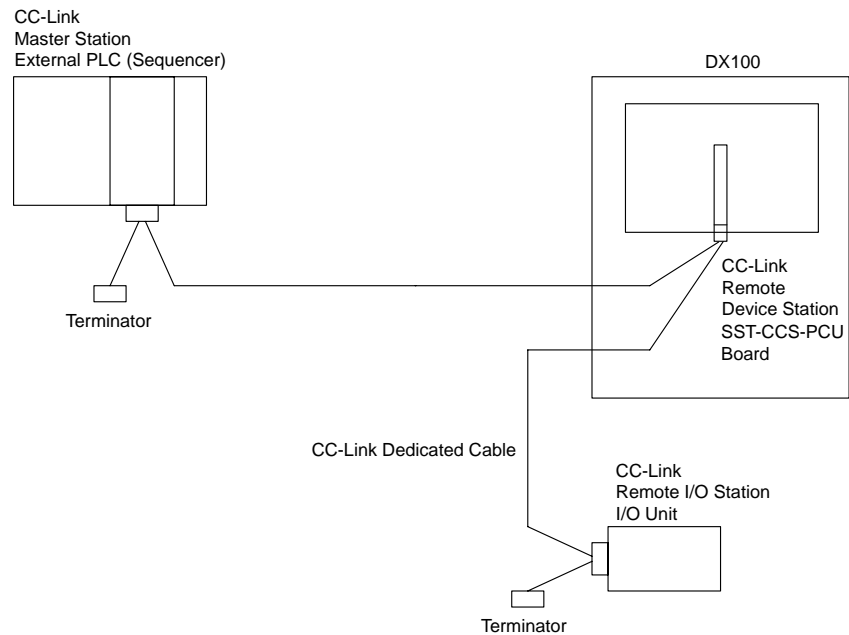
The SST-CCS-PCU board is designed only as a remote device station.

The SST-CCS-PCU board cannot be used as a master station.

The SST-CCS-PCU board conforms to CC-Link ver1.10.

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

The maximum number of this board mountable in the DX100 is one.

Mounting more than one piece of this board causes malfunctioning of the DX100.



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.

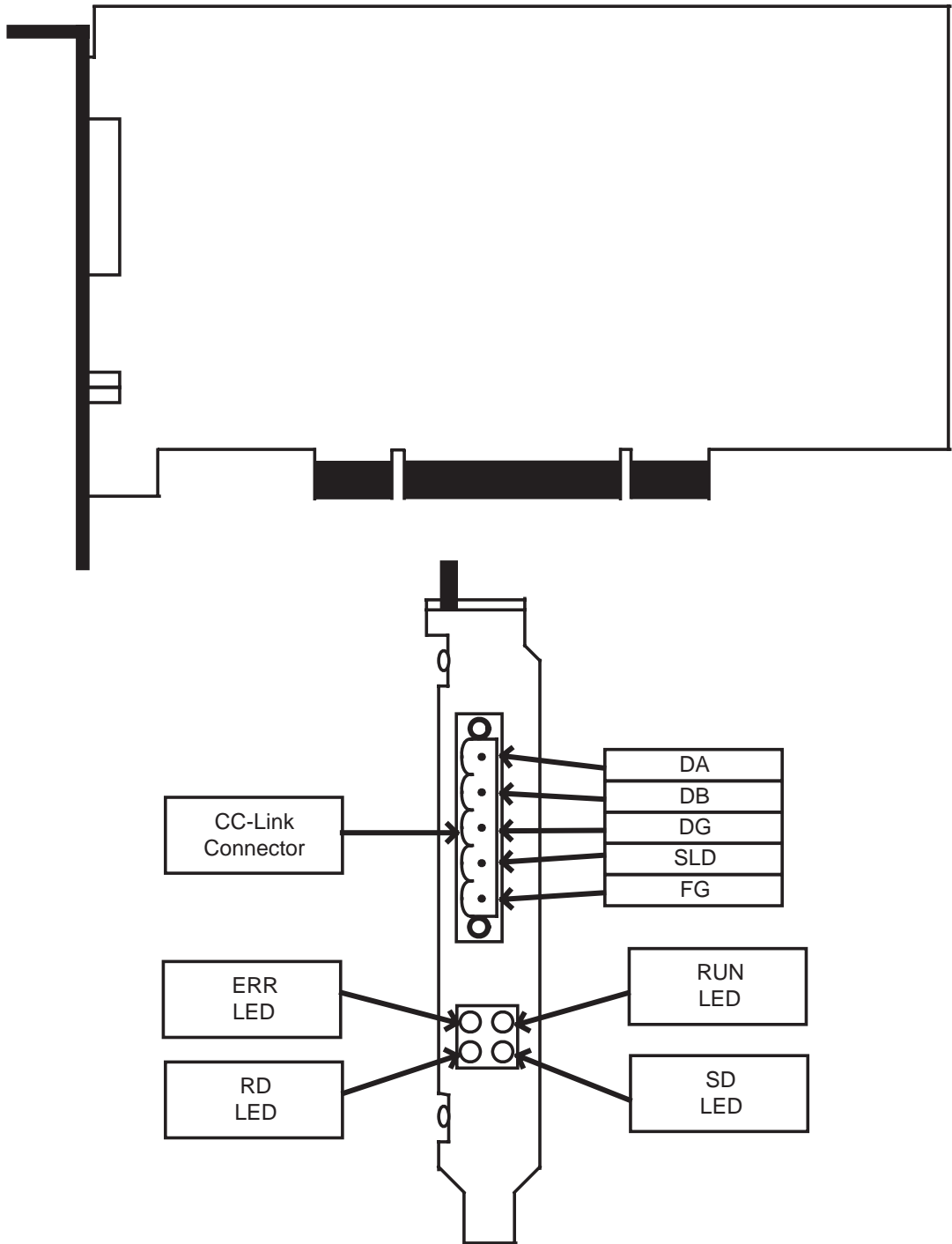
The value of resistance and the connection method differ depending on the cable type and the cable connection method.

For details, refer to *chapter 5 "Network Specifications"* at *page 5-1*.

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

2 Hardware Specifications

2.1 External View of the SST-CCS-PCU Board



DX100	2 Hardware Specifications 2.2 SST-CCS-PCU Specifications
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2.2 SST-CCS-PCU Specifications

Items	Specifications
Interface to external device	CC-Link
Board mounting position	PCI slot in the DX100
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 Input: 16 Output: 16 (one CC-Link station occupied)
	(one of the followings Input: 48 Output: 48 can be selected) (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	When the CC-Link Ver1.00 dedicated cable FANC-SB, etc. is used, the transmission distances are as follows.											
	<table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Transmission speed</th> <th style="text-align: center;">Maximum transmission distance</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">10 Mbps</td> <td style="text-align: center;">100 m</td> </tr> <tr> <td style="text-align: center;">5 Mbps</td> <td style="text-align: center;">150 m</td> </tr> <tr> <td style="text-align: center;">2.5 Mbps</td> <td style="text-align: center;">200 m</td> </tr> <tr> <td style="text-align: center;">625 kbps</td> <td style="text-align: center;">600 m</td> </tr> <tr> <td style="text-align: center;">156 kbps</td> <td style="text-align: center;">1200 m</td> </tr> </tbody> </table>	Transmission speed	Maximum transmission distance	10 Mbps	100 m	5 Mbps	150 m	2.5 Mbps	200 m	625 kbps	600 m	156 kbps
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											
Maximum transmission distance	When the CC-Link Ver1.10 dedicated cable FANC-110SBH, etc. is used, the transmission distances are as follows.											
	<table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Transmission speed</th> <th style="text-align: center;">Maximum transmission distance</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">10 Mbps</td> <td style="text-align: center;">100 m</td> </tr> <tr> <td style="text-align: center;">5 Mbps</td> <td style="text-align: center;">160 m</td> </tr> <tr> <td style="text-align: center;">2.5 Mbps</td> <td style="text-align: center;">400 m</td> </tr> <tr> <td style="text-align: center;">625 kbps</td> <td style="text-align: center;">900 m</td> </tr> <tr> <td style="text-align: center;">156 kbps</td> <td style="text-align: center;">1200 m</td> </tr> </tbody> </table>	Transmission speed	Maximum transmission distance	10 Mbps	100 m	5 Mbps	160 m	2.5 Mbps	400 m	625 kbps	900 m	156 kbps
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156 kbps	1200 m											
For details, refer to <i>chapter 5 "Network Specifications"</i> at page 5-1.												

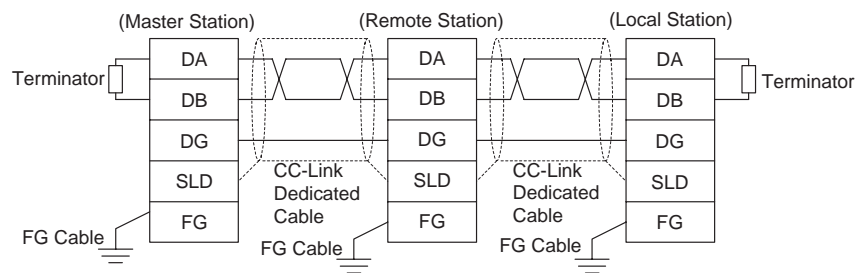
DX100	2	Hardware Specifications
	2.3	Communication Specifications

Items	Specifications
Transmission cable	CC-Link dedicated cable (Shielded three-core twisted pair cable) e.g. <ul style="list-style-type: none"> • CC-Link Ver1.00 dedicated cable (FANC-SB, manufactured by KURAMO Electric Co., Ltd.) • CC-Link Ver1.00 dedicated high-performance cable (FANC-SBH, manufactured by KURAMO Electric Co., Ltd.) • CC-Link Ver1.10 dedicated cable (FANC-110SBH, manufactured by KURAMO Electric Co., Ltd.)
Terminator	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.) <ul style="list-style-type: none"> • 110 Ω (CC-Link Ver1.00 dedicated cable) • 130 Ω (CC-Link Ver1.00 dedicated high-performance cable) • 110 Ω (CC-Link Ver1.10 dedicated cable) * 110 Ω (Brown - Brown - Black - Black - Brown) 130 Ω (Brown - Orange - Black - Black - Brown)

2.4 Connector

Table 2-1: 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.

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 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 the board.

- Make sure that there is no damage or deflection of parts on the board.

In case of malfunction, etc. it may result in an injury or damage the board.

- Correctly connect each cable and connector.

Failure to observe this caution may result in a fire or damage the board.

- Set the switches, etc. correctly.

Malfunction, caused by an incorrect setting, may result in an injury or damage the board.

- Never touch the mounting surfaces of the board parts directly with fingers.

The generated static electricity may damage the IC.

- Never touch the soldered surfaces of the board directly with fingers.

Protrusions on the soldered surface may result in an injury.

- No shock to the board.

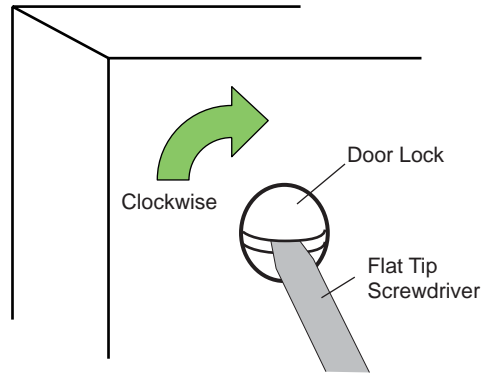
The shock may damage the board.

3.1 Opening the Front Door of the DX100

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

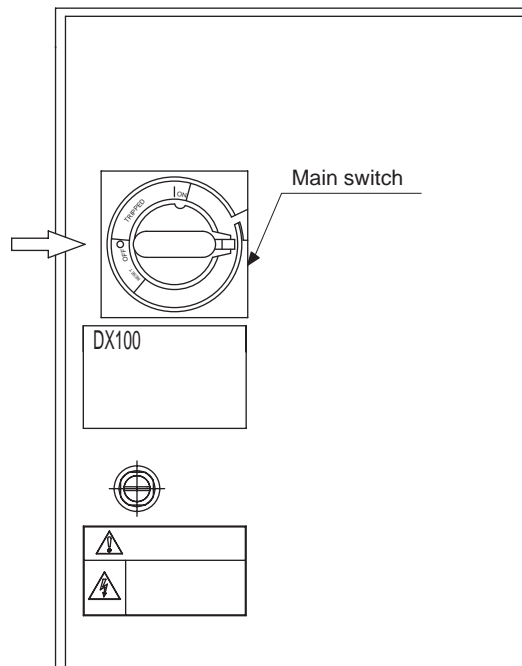
1. Open the front door of DX100.
 - (1) Turn the two door locks on the front face of the DX100 clockwise for 90 ° with a coin or a flat tip screwdriver.

Fig. 3-1: Door unlock



- (2) With the door locks turned clockwise for 90 °, turn the main switch handle to the "OFF" position, and slowly open the door.

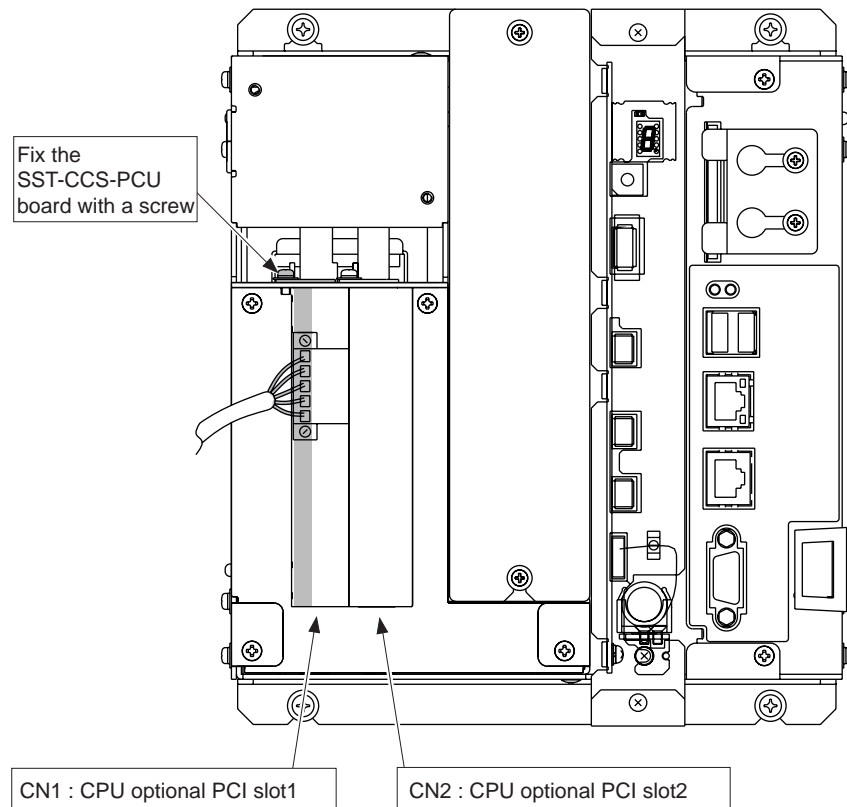
Fig. 3-2: Open the door "OFF" position (horizontal)



3.2 Mounting the SST-CCS-PCU Board on the DX100

1. Remove the riser card from the CPU rack.
2. Insert the SST-CCS-PCU board into the PCI slot of the riser card, then securely tighten the SST-CCS-PCU board with the metal support.
3. Mount the riser card in the CPU rack.

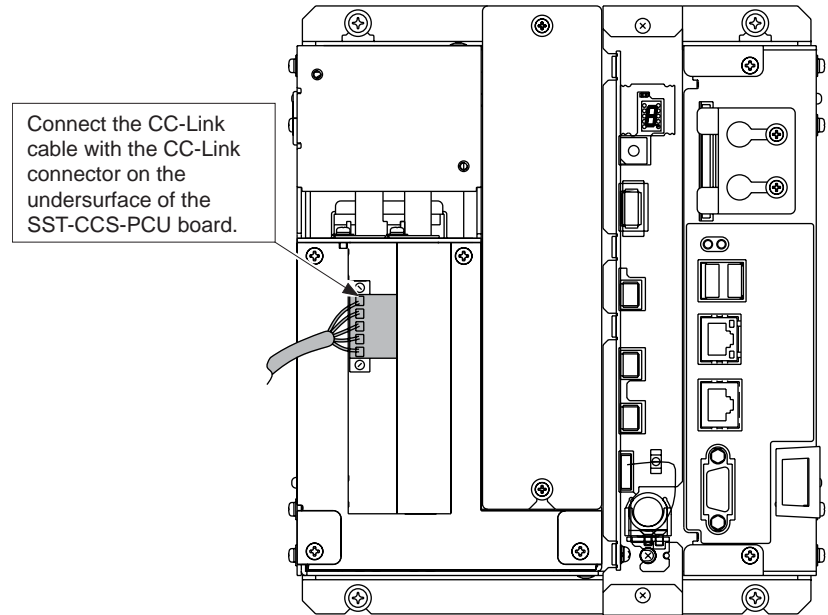
Fig. 3-3: (Mounting Example) When the SST-CCS-PCU board is inserted into CN1: slot1



3.3 Cable Connection

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

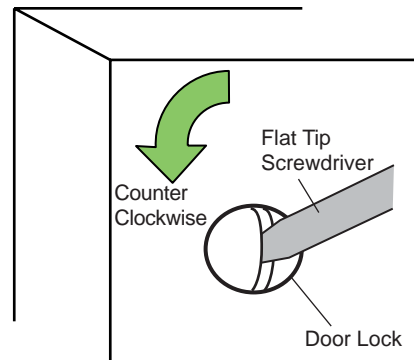
Fig. 3-4: (Mounting Example) When the SST-CCS-PCU board is inserted into CN1: slot1



3.4 Closing Front Door of the DX100

1. Close the front door of DX100.
 - (1) Close the door gently.
 - (2) Turn the two door locks on the front face of the DX100 counter-clockwise for 90 ° .

Fig. 3-5: Lock the door



4 I/O Signal Allocation

4.1 Setting of Option Board and I/O Module

In order to use the SST-CCS-PCU board on the DX100, perform the setting of the option board and I/O module in the following manner.



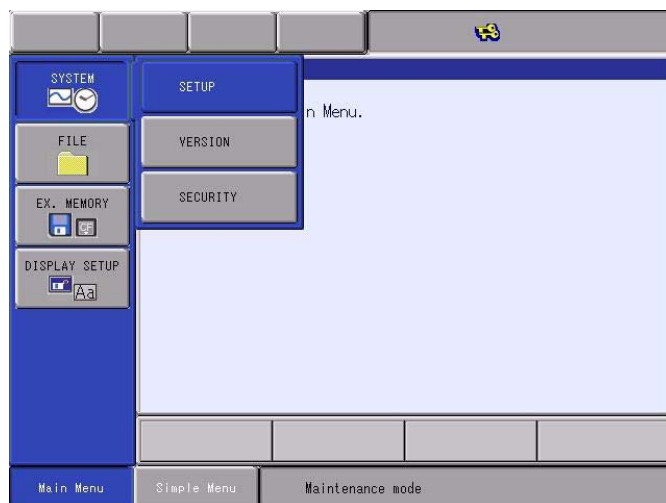
Set the option board and I/O module in the management mode.

In the operation mode and the editing mode, the settings are for reference only.

1. Turn ON the power supply while pressing [MAIN MENU].
 - The main menu appears.



2. Set the security mode to the "MANAGEMENT MODE".
3. Select {SYSTEM} under the main menu.
 - The sub menu appears.



- 4. Press {SETUP}.
- The SETUP display appears.



- 5. Select "OPTION BOARD".
- The OPTION BOARD display appears.



6. Select "CCS-PCU".
- The CCS-PCU setup display appears.
 - Set the following items:
 - CCS-PCU
 - Occupied stations
 - Station number
 - Communication speed
 - Remote register allocation
 - Remote register (RWw) allocation
 - Remote register (RWr) allocation



Explanation of Setup Items

① CCS-PCU

Sets whether to use the SST-CCS-PCU board or not.
Set "USED".

② OCCUPIED STATIONS

Sets the number of the CC-Link occupied station.
Set the station among 1 occupied station, 2 occupied stations, 3 occupied stations, and 4 occupied stations.

③ STATION NUMBER

Sets the number of the CC-Link occupied station.
The station number can be set by numbers from 1 to 64.

④ COMMUNICATION SPEED

Sets the CC-Link communication speed.
Set the speed among 156k/625k/2.5M/5M/10M/bps.

⑤ REMOTE REGISTER

You can enable/disable the remote register allocation.
Set this to [ENABLE] to enable the settings in ⑥ and ⑦ below.

⑥ REMOTE REGISTER (RWw) ALLOCATION

Allocates the CC-Link remote register (RWw) to the DX100 M-register by numbers from 0 to 599.

(RWw) is the data sent from the master station to the remote device station.

⑦ REMOTE REGISTER (RWr) ALLOCATION

Allocates the CC-Link remote register (RWr) to the DX100 M-register by numbers from 0 to 999.

(RWr) is the data sent from the remote device station to the master station.

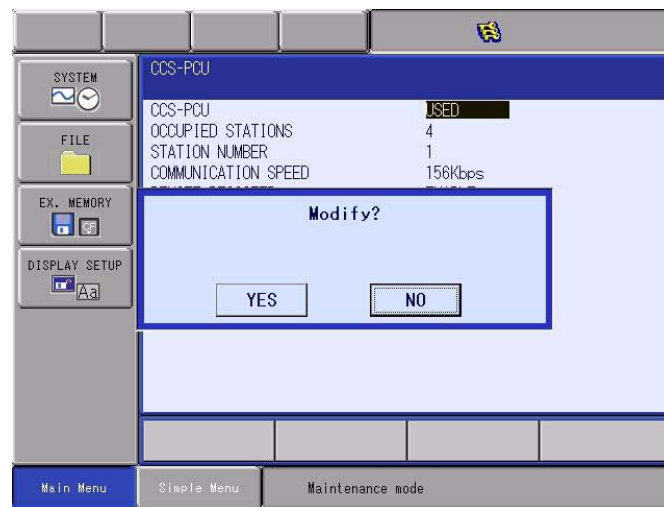


Before allocating the CC-Link remote register to the M-register, make sure to use the M-register No. that is not used for other applications.

If the M-register is duplicated, the remote register data may not be correctly transmitted between the master station and the remote device station.

7. Press [ENTER].

– The confirmation dialog box appears.



8. Press "YES".

– The IO MODULE display appears.



9. Press [ENTER].

- The rest of the I/O module display appears, and "CCS-PCU" is displayed.
- 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.

ST#	DI	DO	AI	AO	BOARD
05	-	-	-	-	NONE
06	-	-	-	-	NONE
07	-	-	-	-	NONE
08	-	-	-	-	NONE
09	-	-	-	-	NONE
10	-	-	-	-	NONE
11	-	-	-	-	NONE
12	-	-	-	-	NONE
13	-	-	-	-	NONE
14	0040	0040	-	-	YIU01
15	-	-	-	-	NONE
16	0120	0120	-	-	CCS-PCU
17	-	-	-	-	NONE
18	-	-	-	-	NONE
19	-	-	-	-	NONE

NOTE

The DI/DO points can be found using the following equation;

$$\text{DI/DO points} = (\text{the number of occupied station} \times 32 - 16) + 8$$

"+ 8" : the I/O points for status

10. Press [ENTER].

- The confirmation dialog box appears.

ST#	DI	DO	AI	AO	BOARD
05	-	-	-	-	NONE
06	-	-	-	-	NONE
07	-	-	-	-	NONE
08	-	-	-	-	NONE
16	0120	0120	-	-	CCS-PCU
17	-	-	-	-	NONE
18	-	-	-	-	NONE
19	-	-	-	-	NONE

11. Press "YES".

– The SETUP display appears.

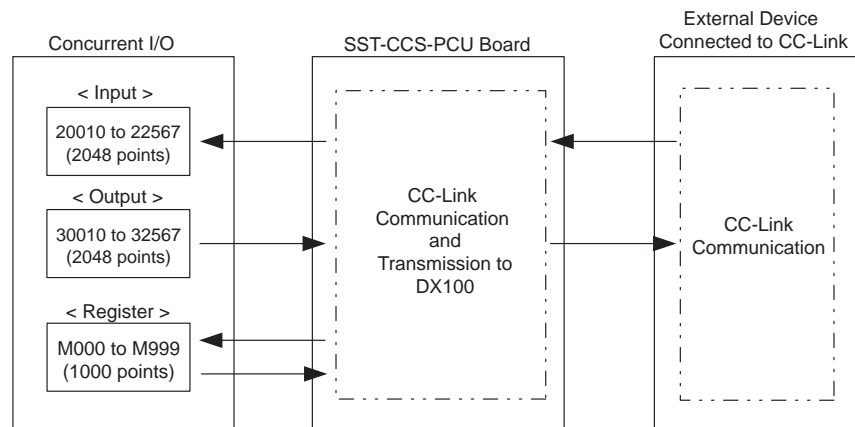


4.2 Transmitting Data

The data to be transmitted from the SST-CCS-PCU board to inside of the DX100 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 DX100, 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.

(20010 to 20057 are used for the general I/O board (JANCD-NIO01 or JANCD-NIO02) of the DX100.)

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

Table 4-1: Example 1: When only the SST-CCS-PCU (four occupied stations) is mounted

Input	Output
20010 to 20057: YIU01 unit	30010 to 30057: YIU01 unit
20060 to 20207: SST-CCS-PCU board	30060 to 30207: SST-CCS-PCU board

Table 4-2: Example 2: When the JARCR-XOI01 board and the SST-CCS-PCU board (four occupied stations) are mounted

Input	Output
20010 to 20057: YIU01 unit	30010 to 30057: YIU01 unit
20060 to 20107: XOI01 board	30060 to 30107: XOI01 board
20110 to 20257: SST-CCS-PCU 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 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

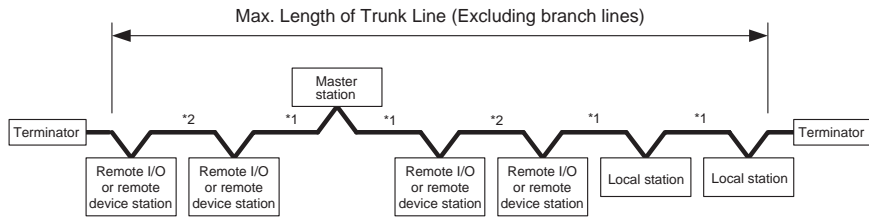


Table 5-1: Using the CC-Link (Ver.1.00) Dedicated Cable (with a characteristic impedance of 100Ω)

Communication Speed (bps)	156k	625k	2.5M	5M	10M			
The cable length between a specified station such as the master, the local, or the intelligent device station and the next station *1 <u>When only the remote I/O or the remote device station is used.</u>	1 m or more							
The cable length between a specified station such as the master, the local, or the intelligent device station and the next station *1 <u>When the local or the intelligent device station is used.</u>	2 m or more							
The cable length between the remote I/O and the remote device station (minimum length). *2	30 cm or more	30 cm or more	30 cm or more	60 cm or more	30 cm to 59 cm	1 m or more	60 cm to 99 cm	30 cm to 59 cm
Max. Transmission Distance	1200m	600m	200m	150m	110m	100m	80m	50m

Table 5-2: Using the CC-Link (Ver.1.00) Dedicated High-Performance Cable (with a characteristic impedance of 130Ω)

Communication Speed (bps)	156k	625k	2.5M	5M	10M							
The cable length between a specified station such as the master, the local, or the intelligent device station and the next station *1 <u>When only the remote I/O or the remote device station is used.</u>	1 m or more											
The cable length between a specified station such as the master, the local, or the intelligent device station and the next station *1 <u>When the local or the intelligent device station is used.</u>	2 m or more											
Te cable length between the remote I/O and the remote device station (minimum length).*2	30 cm or more	30 cm or more	30 cm or more	60 cm or more	30 cm or more	1.0 m or more	70 cm or more	40 cm to 69 cm	30 cm to 39 cm	40 cm or more	30 cm to 39 cm	30 cm or more
Max. Number of Remote Stations	64	64	64	64	64					48		32
Max. Transmission Distance*	1200 m	900m	400m	-	160m	-	100m	30m	20m	100m	80m	100m
	1200 m	600m	200m	150m	110m	80m	50m	-	-	-	-	-

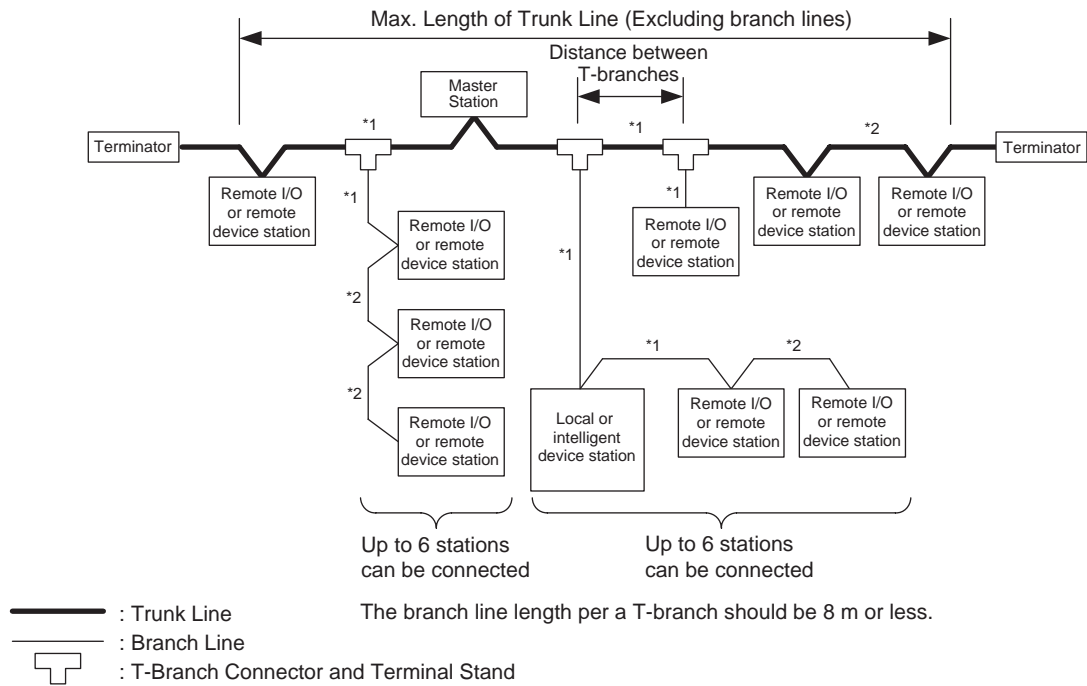
*: The upper row indicates the distance only for the remote I/O or the remote device stations. The lower row indicates the distance for the local or the intelligent device station and may or may not also include the remote I/O or the remote device stations.

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

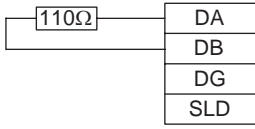
Table 5-3: Using the CC-Link (Ver.1.10) Dedicated Cable (with a characteristic impedance of 110Ω)

Communication Speed (bps)	156k	625k	2.5M	5M	10M
Cable Length between Stations	20 cm or more	20 cm or more	20 cm or more	20 cm or more	20 cm or more
Max. Transmission Distance	1200 m	900 m	400 m	160 m	100 m

Fig. 5-1: Using a T-branch Connection



Communication Speed	156kbps	625kbps	The communication speeds of 10 Mbps, 5 Mbps, and 2.5 Mbps are not available.
The cable length between a specified station such as the master, the local, or the intelligent device station and the next station *1	1 m or more		When only the remote I/O or the remote device station is used.
The cable length between a specified station such as the master, the local, or the intelligent device station and the next station *1	2 m or more		When the local or the intelligent device station is used.
The cable length between the remote I/O and the remote device station (minimum length). *2	30 cm or more		
Maximum number of connected stations on the branch line (Indicates the maximum number of stations per T-branch.)	6		
Max. Length of the Trunk Line	500m	100m	Indicates the cable length between the terminators on both ends. The cable length of the branch line of the T-branch is excluded.

Distance between T-branches	Not limited		
Max Length. of the Branch Line	8m		Indicates the cable length per a T-branch.
Total Length of the Branch Lines	200m	50m	Indicates the total cable length of all the branch lines.
Terminator			<p>The connection method differs depending on the type of master unit. Refer to the manual for each master unit.</p> <p>Use the standard terminator of 110Ω, 1/2W.</p>
T-branch Terminal stand/ Connector	Terminal stand: standard terminal stand Connector: Connector for FA sensor		Keep as much of the sheath on the terminal side of the cable as possible.

Use the following connection cable:

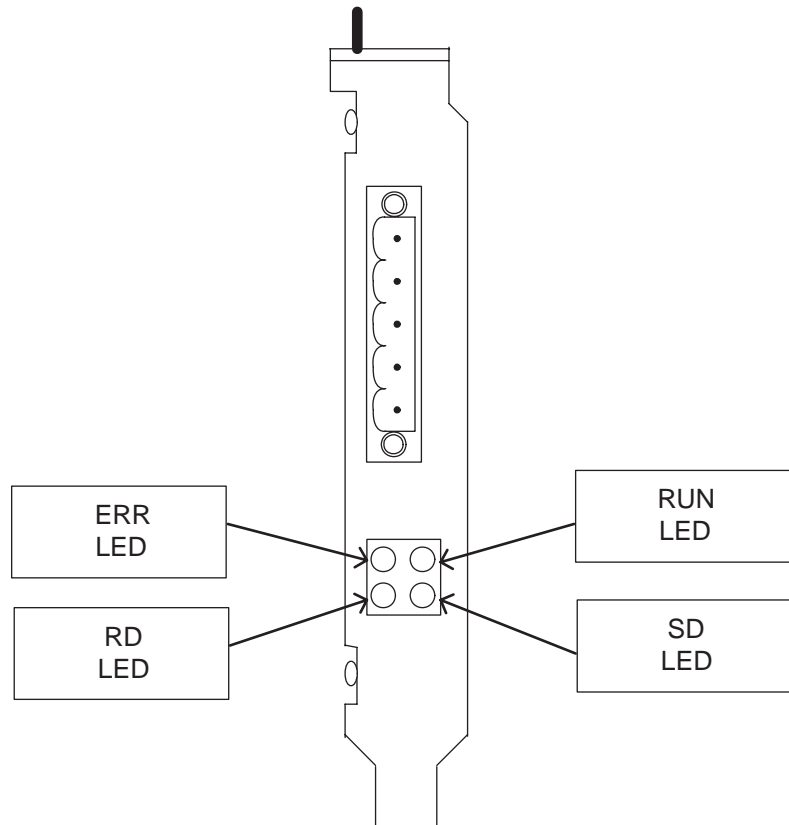
- CC-Link (Ver.1.10) dedicated cable (with a characteristic impedance of 110Ω)
- CC-Link (Ver.1.00) dedicated cable (with a characteristic impedance of 100Ω)

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)	<ol style="list-style-type: none"> 1. Offline from network or unable to detect carriers 2. Time over 3. Board is powered off or reset 	
ERR (red)	<ol style="list-style-type: none"> 1. At occurrence of CRC error 2. CC-Link station number setting out of the range (0 or greater than 64) 3. Communication speed setting out of the range 	<ol style="list-style-type: none"> 1. Normal 2. Resetting board 	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	<ol style="list-style-type: none"> 1. Not sending data 2. Resetting board 	
RD (green)	Receiving data	<ol style="list-style-type: none"> 1. Not receiving data 2. Resetting board 	



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 *chapter 4 "I/O Signal Allocation" at page 4-1.*)
- ② Electric noise may affect communications. Check the following items:
(Refer to *chapter 2 "Hardware Specifications" at page 2-1* and *chapter 5 "Network Specifications" at page 5-1.*)
 - 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 *chapter 4 "I/O Signal Allocation" at page 4-1.*)
- 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 *chapter 3 "Mounting the SST-CCS-PCU Board" at page 3-1.*)
- 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 *chapter 2 "Hardware Specifications" at page 2-1.*)

DX100 OPTIONS SST-CCS-PCU BOARD INSTRUCTIONS

FOR CC-LINK

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

MOTOMAN ROBOTICS EUROPE AB

Franska Vagen 10, Box 4004, SE-390 04 Kalmar, Sweden
Phone +46-480-417800 Fax +46-480-417999

MOTOMAN ROBOTEC GmbH

Kammerfeld strasse 1, 85391 Allershausen, Germany
Phone +49-8166-90-100 Fax +49-8166-90-103

YASKAWA ELECTRIC KOREA CORPORATION

1F, Samyang Bldg. 89-1, Shinchun-dong, Donk-Ku, Daegu, Korea
Phone +82-53-382-7844 Fax +82-53-382-7845

YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.

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

YASKAWA ELECTRIC (MALAYSIA) SDN. BHD.

Unit 47-1 and 2, Jalan PJU 5/9, Dataran Sunway, Kota Damansara, 47810, Petaling Jaya Selangor, Malaysia
Phone +60-3614-08919 Fax +60-3614-08929

YASKAWA ELECTRIC (THAILAND) CO., LTD.

252/246, 4th Floor, Muang Thai-Phatra office Tower II Rechadapisek Road, Huaykwang Bangkok 10320, Thailand
Phone +66-2-693-2200 Fax +66-2-693-4200

SHOUGANG MOTOMAN ROBOT CO., LTD.

No.7, Yongchang-North Road, Beijing Economic and Technological and Development Area, Beijing 100076, China
Phone +86-10-6788-0541 Fax +86-10-6788-0542

MOTOMAN MOTHERSON ROBOTICS LTD.

Plot Number 195-196, First Floor, Imt Manesar -Sector 4, Gurgaon (Haryana), Pin-122050, India
Phone +91-124-475-8500 Fax +91-124-475-8542



YASKAWA ELECTRIC CORPORATION

YASKAWA