

DX100 OPTIONS JARCR-XFB04 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: 156531-1CD
Revision: 0



MANDATORY

- This manual explains the JARCR-XFB04 board 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.

DX100

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.

DX100

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
JARCR-XFB04 board	XFB04 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.

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1 Outline

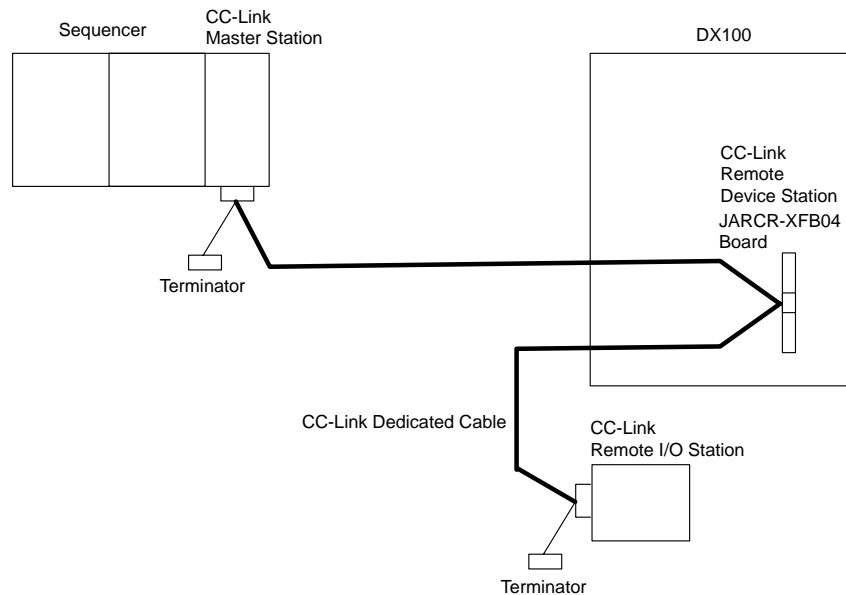
This manual describes the CC-Link I/O board JARCR-XFB04 (hereinafter called the XFB04 board) to be used in the DX100. The application of the XFB04 board enables the general-purpose I/O data exchange between a CC-linked device and the DX100.

The XFB04 board is used only as a remote device station. Cannot be used as a master station.

Note that the XFB04 board is not used for exchanging the register data of the remote device station.

1.1 System Configuration

The following shows an example of the configuration of a system with an XFB04 board.



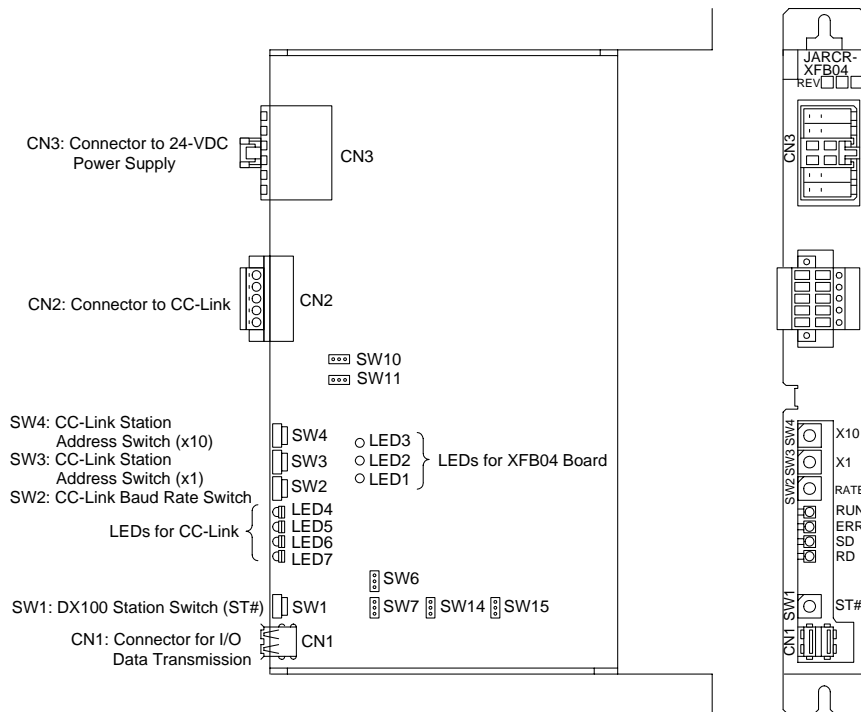
The CC-Link dedicated cable and the external terminator are not included with the XFB04 board.



When the XFB04 board is connected at the end of the network, connect the XFB04 board to the external terminator. If the terminator is not correctly connected, communications may not be performed. The amount of resistance and the connection method differ depending on the cable type and the cable connection method. For details, refer to *chapter 6 "Network Specifications"* at page 6-1.

2 Hardware Specifications

2.1 External View of the XFB04 Board



- SW10 : Switch for setting the number of CC-Link occupied stations (SENYU0)
- SW11 : Switch for setting the number of CC-Link occupied stations (SENYU1)
- SW6 : SYS/TEST mode selecting switch
- SW7 : 16/17 BYTE mode selecting switch
- SW14 : Maintenance switch reserved for the use of the manufacturer
- SW15 : Maintenance switch reserved for the use of the manufacturer

	2	Hardware Specifications
DX100	2.2	XFB04 Board Specifications

2.2 XFB04 Board Specifications

Items	Specifications
Interface to external device	CC-Link
Board mounting position	Optional board mounting space in the DX100
Error indicator	LED indicators
Number of transmission I/O points	<p>Maximum number of I/O points: Input: 112; Output: 112 (four CC-Link stations occupied)</p> <p>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)</p>

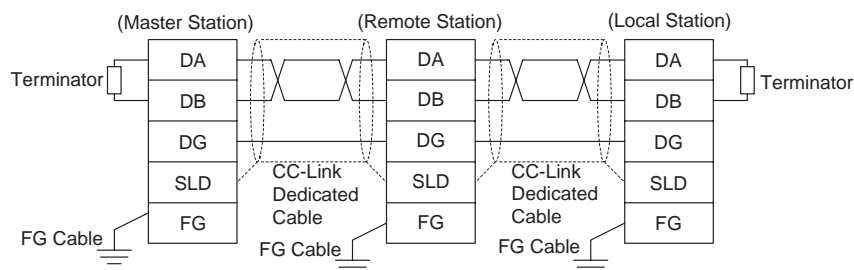
2.3 Communication Specifications

Items	Specifications												
Transmission speed	10Mbps / 5Mbps / 2.5Mbps / 625kbps / 156 kbps (Can be selected by switches.)												
Communication method	Polling method												
Transmission channel	Bus type												
Number of nodes	Maximally 64												
Maximum transmission distance	<table> <thead> <tr> <th>Transmission speed</th> <th>Maximum transmission distance</th> </tr> </thead> <tbody> <tr> <td>10Mbps</td> <td>100 m</td> </tr> <tr> <td>5Mbps</td> <td>150 m</td> </tr> <tr> <td>2.5Mbps</td> <td>200 m</td> </tr> <tr> <td>625kbps</td> <td>600 m</td> </tr> <tr> <td>156kbps</td> <td>1200 m</td> </tr> </tbody> </table> <p>The above distances are for when the CC-Link dedicated cable FANC-SB (110Ω) is used. For details, refer to <i>chapter 6 "Network Specifications"</i> at <i>page 6-1</i>.</p>	Transmission speed	Maximum transmission distance	10Mbps	100 m	5Mbps	150 m	2.5Mbps	200 m	625kbps	600 m	156kbps	1200 m
Transmission speed	Maximum transmission distance												
10Mbps	100 m												
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2.5Mbps	200 m												
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156kbps	1200 m												
Transmission cable	CC-Link dedicated cable (Shielded three-core twisted pair cable) <Example> FANC-SB (110Ω) manufactured by KURAMO Electric Co., Ltd. FANC-SBH (130Ω) manufactured by KURAMO Electric Co., Ltd.												
Terminator	Select the amount of resistance according to the cable to be connected and the connection method. (Connect between DA and DB on the units at both ends.) · 110Ω (Brown - Brown - Black - Black - Brown) · 130Ω (Brown - Orange - Black - Black - Brown)												

2.4 Connector

Table 2-1: CN2 (connector to CC-Link)

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 address.
- 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.

NOTE

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 min. Otherwise, the noise may cause a malfunction.

3 Setting the Functions

3.1 Function Setting Switches

The section explains the switches that set the functions of the XFB04 board. Be sure to follow the instructions below, and make the correct settings.

SW1: Sets the stations for the XFB04 board on the DX100.

The range for the station setting is from “1” (ST#01) to “D” (ST#13).
Do not set to “0” (ST#00), “E” (ST#14), and “F” (ST#15).

SW2: Sets a transmission baud rate for the CC-Link.

Choose from 0 (156 kbps) to 4 (10 Mbps). Other values are unavailable.

SW3 and SW4: Sets the CC-Link station address.

The setting range for the station address is from 1 to 64. Other values are unavailable.

SW6 (SYS/TEST): Sets the operation mode of the XFB04 board.

Make sure to set SW6 to “SYS”.

Never set it to “TEST” since it is for maintenance purpose only.

SW7 (16BYTE/17BYTE): Sets the transmission mode.

Make sure to set SW7 to “17BYTE”.

Do not set it to “16BYTE”.

SW10 and SW11 (OFF/ON): Sets the number of CC-Link occupied stations.

The setting range is from 1 to 4.

Set the switch to a value from 1 to 4 made from the OFF/ON of combinations of SW10 and SW11.

SW14 and SW15 (1/0): Reserved for the use of the manufacturer.



Make sure to set SW14 and SW15 to “1.”

Never set them to “0” since it is for maintenance purpose only.

DX100

3 Setting the Functions
3.2 Switch Setting Method

3.2 Switch Setting Method


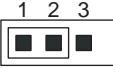
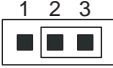
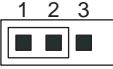
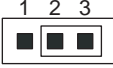
Switches	Setting Method																
SW1 (ST#) Setting of the station on the DX100	 <p>Sets the station on the DX100. Turn the arrows to the numbers corresponding to the desired station number. Use a flat tip screwdriver.</p> <p>The relation between the switch settings and the station is indicated as follows:</p> <table> <tbody> <tr> <td>0: Unavailable</td> <td>8: ST#08</td> </tr> <tr> <td>1: ST#01</td> <td>9: ST#09</td> </tr> <tr> <td>2: ST#02</td> <td>A: ST#10</td> </tr> <tr> <td>3: ST#03</td> <td>B: ST#11</td> </tr> <tr> <td>4: ST#04</td> <td>C: ST#12</td> </tr> <tr> <td>5: ST#05</td> <td>D: ST#13</td> </tr> <tr> <td>6: ST#06 (default setting)</td> <td>E: Unavailable</td> </tr> <tr> <td>7: ST#07</td> <td>F: Unavailable</td> </tr> </tbody> </table> <p>The value of station number (ST#) is the station number displayed on the programming pendant of the DX100 when setting the I/O modules.</p>	0: Unavailable	8: ST#08	1: ST#01	9: ST#09	2: ST#02	A: ST#10	3: ST#03	B: ST#11	4: ST#04	C: ST#12	5: ST#05	D: ST#13	6: ST#06 (default setting)	E: Unavailable	7: ST#07	F: Unavailable
0: Unavailable	8: ST#08																
1: ST#01	9: ST#09																
2: ST#02	A: ST#10																
3: ST#03	B: ST#11																
4: ST#04	C: ST#12																
5: ST#05	D: ST#13																
6: ST#06 (default setting)	E: Unavailable																
7: ST#07	F: Unavailable																
SW2 (RATE) Setting of the CC-Link baud rate	 <p>Sets the baud rate of the CC-Link. Turn the arrows to the numbers corresponding to the desired baud rate. Use a flat tip screwdriver.</p> <p>The relation between the switch settings and the baud rate is indicated as follows:</p> <p>0: 156kbps (default setting) 1: 625kbps 2: 2.5Mbps 3: 5Mbps 4: 10Mbps</p> <p>If the setting is different than those listed above, the ERR LED lights up (setting error).</p>																



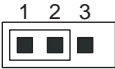
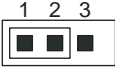
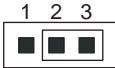
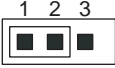

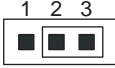
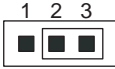
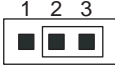
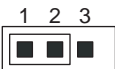
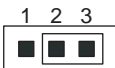
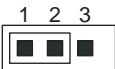
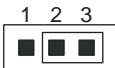
SW1 cannot be set to 0, E, or F.

Do not assign more than one board to the same station number (ST#).

 3 Setting the Functions
 DX100 3.2 Switch Setting Method

Switches	Setting Method																					
SW3 (×1) SW4 (×10) Setting of the CC-Link station address	 <p>Sets the CC-Link station address. Turn the arrows to the numbers corresponding to the desired station address. Use a flat tip screwdriver.</p> <p>The relation between the switch settings and the I/O points is indicated as follows.</p> <p>(Example)</p> <table border="1" data-bbox="560 555 1034 763"> <thead> <tr> <th>SW4</th> <th>SW3</th> <th>Station address</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> <td>: 1 (default setting)</td> </tr> <tr> <td>0</td> <td>2</td> <td>: 2</td> </tr> <tr> <td>0</td> <td>8</td> <td>: 8</td> </tr> <tr> <td>1</td> <td>6</td> <td>: 16</td> </tr> <tr> <td>3</td> <td>2</td> <td>: 32</td> </tr> <tr> <td>6</td> <td>4</td> <td>: 64</td> </tr> </tbody> </table> <p>Set the station address to a value in the range from 1 to 64 so that the address does not overlap the address of another terminal unit. When the address is set to 0 or a number more than 64, the ERR LED lights up (setting error).</p>	SW4	SW3	Station address	0	1	: 1 (default setting)	0	2	: 2	0	8	: 8	1	6	: 16	3	2	: 32	6	4	: 64
SW4	SW3	Station address																				
0	1	: 1 (default setting)																				
0	2	: 2																				
0	8	: 8																				
1	6	: 16																				
3	2	: 32																				
6	4	: 64																				
SW6 (SYS/TEST) Setting of the XFB04 operation mode	 <p><u>Short-circuited between 1 and 2: system mode (SYS)</u> <u>(Default setting)</u> *Setting indispensable</p>  <p>Short-circuited between 2 and 3: test mode (TEST) *Setting unavailable</p> <p><u>Be sure to set the mode to “SYS.”</u> Never set the mode to “TEST” since “TEST” is for maintenance only.</p>																					
SW7 (16BYTE/17BYTE) Setting of communication byte mode	 <p>Short-circuited between 1 and 2: 16-byte mode (16BYTE) (Default setting) *Setting unavailable.</p>  <p><u>Short-circuited between 2 and 3: 17-byte mode (17BYTE)</u> *Setting indispensable.</p> <p><u>Be sure to set the mode to “17BYTE.”</u> As the mode is set as “16BYTE” upon the shipment, reset the mode to “17BYTE.”</p>																					

DX100	3	Setting the Functions
	3.2	Switch Setting Method

Switches	Setting Method
SW10 (OFF/ON) SW11 (OFF/ON) Number of stations connected to the CC-Link	<p>Sets the number of CC-Link occupied stations:</p> <p>1 occupied station (Input 16 points, Output 16 points)</p> <p> SW10: Short-circuited between 1 and 2 (OFF)</p> <p> SW11: Short-circuited between 1 and 2 (OFF)</p> <p>2 occupied stations (Input 48 points, Output 48 points)</p> <p> SW10: Short-circuited between 2 and 3 (ON)</p> <p> SW11: Short-circuited between 1 and 2 (OFF)</p> <p>3 occupied stations (Input 80 points, Output 80 points)</p> <p> SW10: Short-circuited between 1 and 2 (OFF)</p> <p> SW11: Short-circuited between 2 and 3 (ON)</p> <p>4 occupied stations (Input 112 points, Output 112 points)</p> <p> SW10: Short-circuited between 2 and 3 (ON) (Default setting)</p> <p> SW11: Short-circuited between 2 and 3 (ON) (Default setting)</p>
SW14 (1/0) Reserved for the manufacturer	<p> <u>Short-circuited between 1 and 2: 1 (standard) (Default setting)</u> *Setting indispensable.</p> <p> Short-circuited between 2 and 3: 0 (for maintenance) *Setting unavailable.</p> <p><u>Be sure to set the mode to "1."</u> Never set the mode to "0" since "0" is for maintenance only.</p>
SW15 (1/0) Reserved for the manufacturer	<p> <u>Short-circuited between 1 and 2: 1 (standard) (Default setting)</u> *Setting indispensable.</p> <p> Short-circuited between 2 and 3: 0 (for maintenance) *Setting unavailable.</p> <p><u>Be sure to set the mode to "1."</u> Never set the mode to "0" since "0" is for maintenance only.</p>

4 Mounting the XFB04 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.

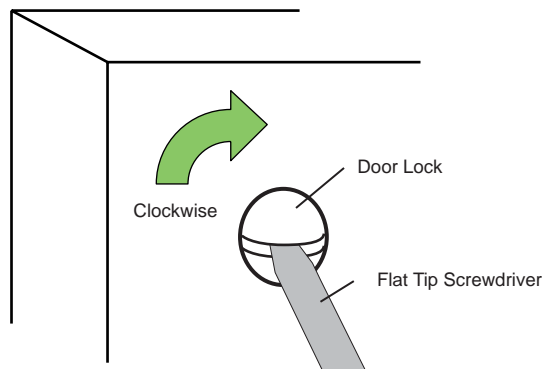
The shock may damage the board.

- 4 Mounting the XFB04 Board
- 4.1 Opening the Front Door of the DX100

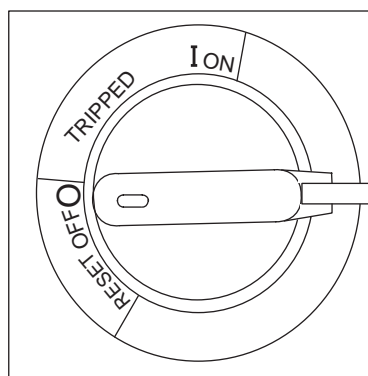
4.1 Opening the Front Door of the DX100

Mount the XFB04 board in the following manner.

1. Turn the two door locks on the front face of the DX100 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.



4.2 Confirming the Switch Settings on the XFB04 Board

1. Be sure that the main power supply is turned OFF.
2. Be sure that the settings of switches on the XFB04 board are correct.
3. For the switch settings, refer to *chapter 3 “Setting the Functions” at page 3-1*.

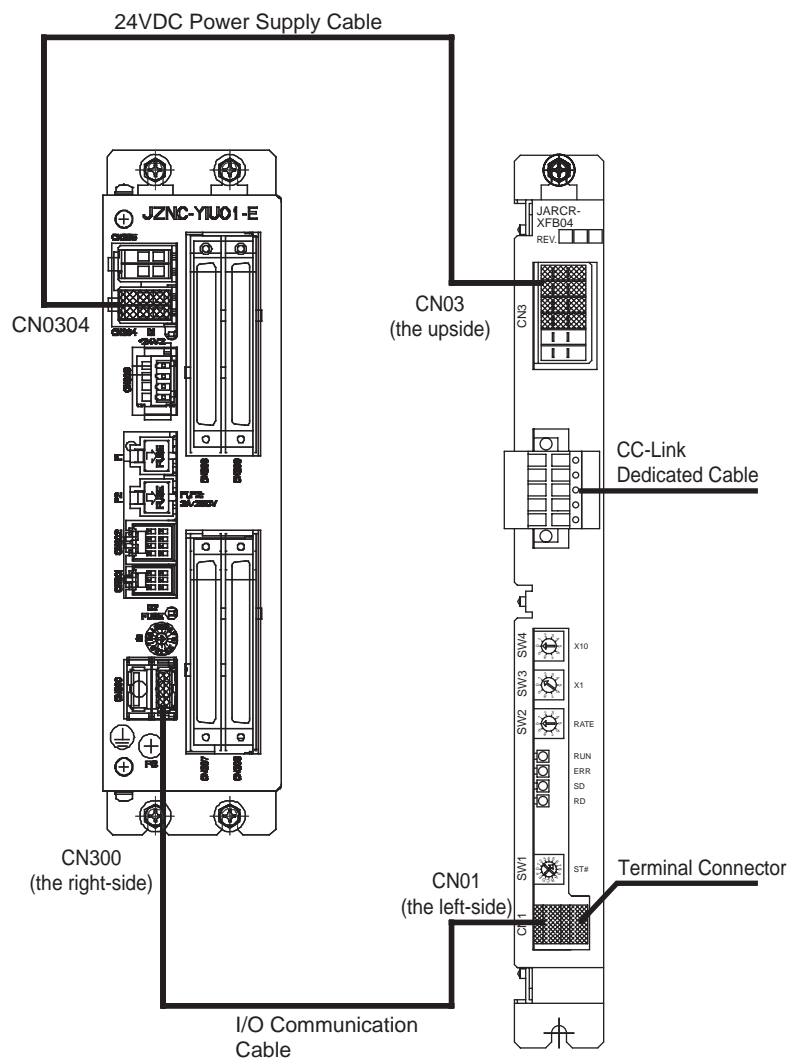
4.3 Mounting the XFB04 Board on the DX100

1. Fix the XFB04 board on the DX100 with the board fixing screws securely tightened.

4.4 Connecting Each Cable

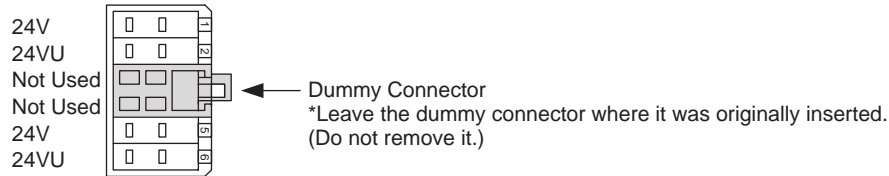
1. Connect the 24 VDC power supply cable to the CN3 on the XFB04 board.
2. Connect the I/O communication cable to the CN1 on the XFB04 board. Connect the terminal connector, which is connected to CN300 of the JZNC-YIU01-E unit, to the non-occupied CN1 on the XFB04 board.
3. Connect the CC-Link dedicated cable and the FG cable to the CN2 on the XFB04 board.
 When the CC-Link dedicated cable is connected on the end of the network, connect it to the terminator.

Fig. 4-1: Connection Example 1: In case of the XFB04 Board alone

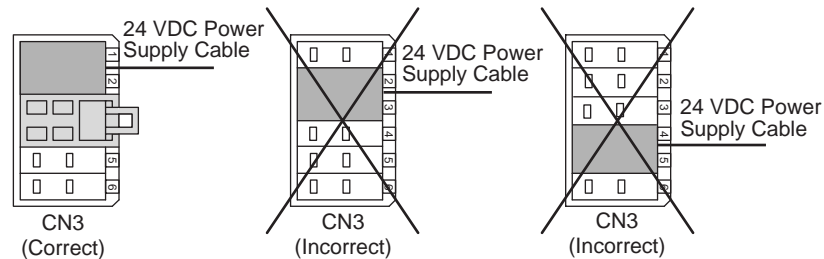




A dummy connector is inserted into the CN3 of the 24 VDC power supply connector on the XFB04 board. Do not remove this connector because it is inserted to prevent incorrect cable connections. Removing this connector may result in incorrect connection of the 24VDC power supply cable to the CN3. This prevents the power being normally supplied to the board, and the board may not start up.



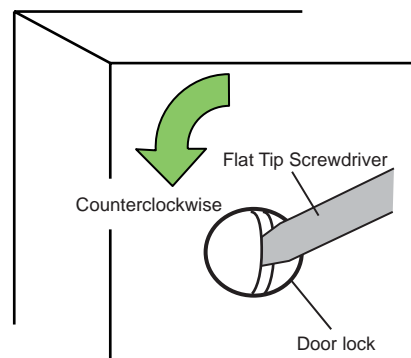
·Correct Connecting Position of 24 VDC Power Supply Cable



(* The 24 VDC power does not normally supplied to the board if the dummy connector is removed and the 24 VDC power supply cable is connected to incorrect position by mistake.)

4.5 Closing the Front Door of the DX100

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



5 I/O Signal Allocation

5.1 I/O Module Setting

In order to use the XFB04 board on the DX100, perform the I/O module setting in the following manner.



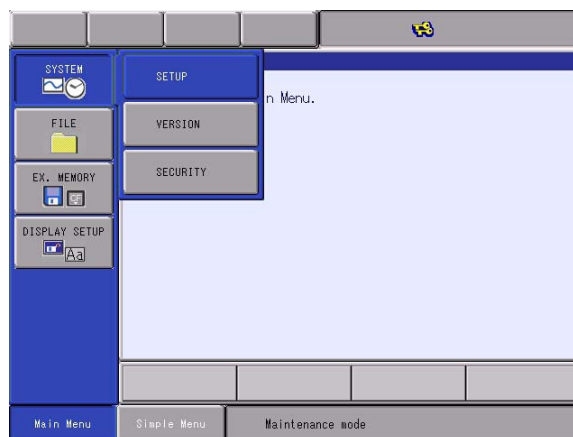
Add an I/O module in the management mode.

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

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



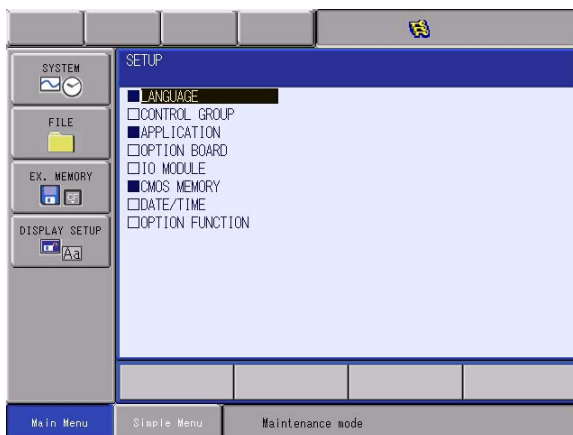
2. Set the security mode to the “MANAGEMENT MODE”
3. Select {SYSTEM} under the main menu
 - The sub menu appears.



5 I/O Signal Allocation
 5.1 I/O Module Setting

4. Select {SETUP}

– The setup display appears.

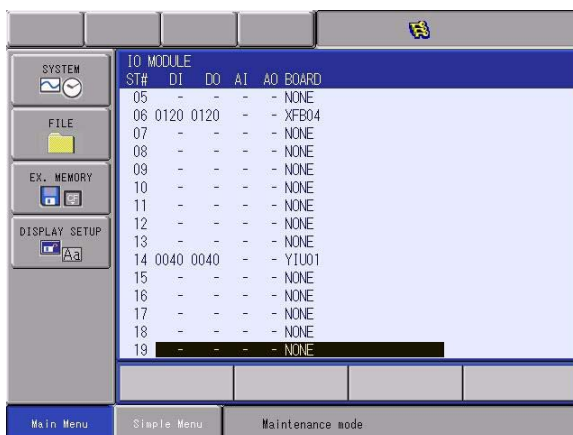


5. Select {IO MODULE}

– The current mounted status of the I/O modules appears as in the following example.



– Press [ENTER] to display the module mounted status for the rest of the stations.



5	I/O Signal Allocation
5.1	I/O Module Setting

6. Confirm the status of the mounted I/O module

- Only the mounted I/O modules are shown on the display. Confirm that each station (ST#) corresponds to the current mounted status of the I/O modules.
- The descriptions on the each ST# on the display are listed as follows:

ST#	Station address of I/O module
DI	Number of digital input points ¹⁾
DO	Number of digital output points ¹⁾
AI	Number of analog input points ¹⁾
AO	Number of analog output points ¹⁾
BOARD	Circuit board type ²⁾

1 A hyphen "-" indicates the corresponding I/O module is not mounted.

2 If the system cannot recognize the circuit board type, "*****" is shown. No problem will occur as long as the values displayed in DI, DO, AI, and AO are correct.

- The following combinations are taken as an explanatory example of the display.

ST#06: JARCR-XFB04 Board

(digital input: 120 points; digital output: 120 points.)

Set the switch SW1 to 6. (The value is to be the ST#.)

ST#14: JZNC-YIU01-E unit

(digital input: 40 points; digital output: 40 points.)

This unit is fixed to ST#14.



The following point should be taken into consideration when reading the display:

For the XFB04 board, as the number of I/O points reserved for the board status exists other than the number of transmission I/O points set at SW10 and SW11, the number of I/O points shown on the display is the number calculated by "the set value of SW10 and SW11 + 8 (for the board status)."

Number of CC-Link occupied stations	SW11 (SENYU1)	SW10 (SENYU0)	Display	
			DI	DO
1 occupied station	OFF	OFF	024	024
2 occupied stations	OFF	ON	056	056
3 occupied stations	ON	OFF	088	088
4 occupied stations	ON	ON	120	120

5 I/O Signal Allocation

5.1 I/O Module Setting

7. Press [ENTER]

- The confirmation dialog box appears.



8. Select {YES}

- Press “YES” if the display corresponds to the current mounted status of the I/O modules. The system parameters are automatically set according to the current mounted status of the hardware. The procedures to add I/O modules are completed.

NOTE

If the display does not correspond to the actual mounted status, recheck the cable connections and switch settings. The suspected causes are as follows:

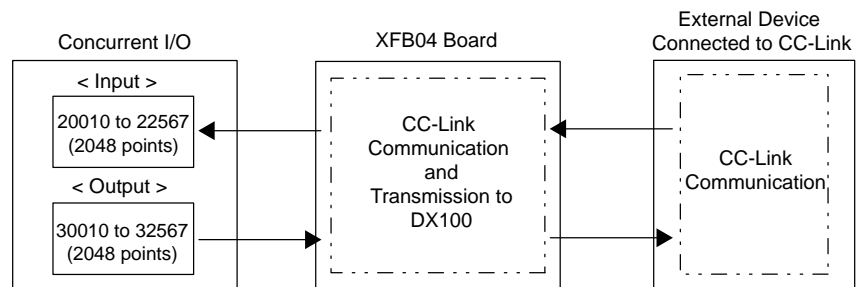
- Improper I/O communication setting
The failure in the setting of the SW7 of the XFB04 board. The DX100 cannot correctly recognize the board if there is a failure in the setting.
- Improper or overlapped station setting
SW1 is set to “0”, “E”, or to “F”, which are the unavailable values. Also, only a single optional board can be selected for each station. Change the SW1 setting, and check that there is no board used other than the XFB04 board.
- Improper connection of the 24 VDC power supply cable and I/O communication cable
The 24VDC power supply cable and the I/O communication cable may not be connected properly. Recheck the cable connection referring to *chapter 4.4 “Connecting Each Cable” at page 4-3*. Improper connection of the 24VDC power supply cable to the CN3 may prevent the board from starting up.
- I/O module failure
If the display does not correspond to the actual mounted status even after having corrected the above settings, a failure of an I/O module is suspected. Contact your YASKAWA representative.

5.2 Transmitting Data

The data to be transmitted from the XFB04 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 XFB04 board.

Therefore, inside the DX100, 8 points (1 byte) for both input and output are reserved for the status of the XFB04 board beside the area for the digital data.

The transmission data from the XFB04 board is allocated to the external I/O signals of concurrent I/O.



Where only a XFB04 board (four occupied stations) is mounted as an optional I/O board, the concurrent I/O allocation of each board is as follows. (20010 to 20057 are used for the standard I/O of the DX100.)

Input	Output
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)

DX100

5 I/O Signal Allocation
 5.2 Transmitting Data

***1** [XFB04 Board Status]

The status of the XFB04 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 XFB04 board allocated number. In the table on the previous page, 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 the CC-Link SW (SW2, SW3, and SW4) setting status. Normal: 0 Error: 1
2xxx3	Unavailable
2xxx4 to 2xxx7	Reserved for the manufacturer. The user cannot use these signals.

	5	I/O Signal Allocation
DX100	5.3	I/O Allocation Examples

5.3 I/O Allocation Examples

Example 1: When only the XFB04 board is connected (with four occupied stations). (Refer to *chapter 4.4 "Connecting Each Cable" at page 4-3.*)
(The YIU01 unit is the standard I/O unit of the DX100.)

Input	Output
20010 to 20057: YIU01 unit 20060 to 20207: XFB04 board	30010 to 30057: YIU01 unit 30060 to 30207: XFB04 board

Example 2: When the XOI01 board and the XFB04 board are connected (with four occupied stations).

Under the condition that the station number of the XOI01 board is smaller than that of the XFB04 board, for example, when the station number of the XOI01 board is ST#01 and that of the XFB04 board is ST#02.

Input	Output
20010 to 20057: YIU01 unit 20060 to 20107: XOI01 board 20110 to 20257: XFB04 board	30010 to 30057: YIU01 unit 30060 to 30107: XOI01 board 30110 to 30257: XFB04 board

DX100	6	Network Specifications
	6.1	CC-Link Terminal Units

6 Network Specifications

6.1 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 XFB04 board is assigned to a remote device station. However, it supports only bit information.

6.2 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:

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

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

6.3 Communication Speed and Cable Length

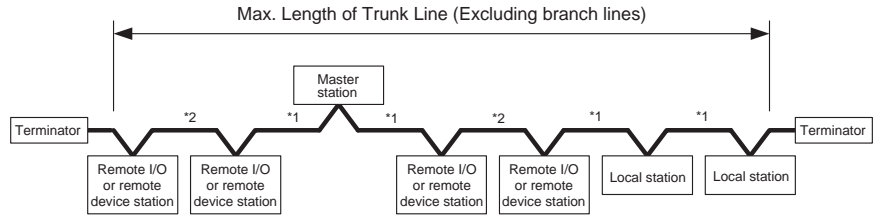


Table 6-2: Using the CC-Link (Ver.1.00) Dedicated Cable (with a characteristic impedance of 100Ω)

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

DX100

6 Network Specifications
6.3 Communication Speed and Cable Length

Table 6-3: 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.

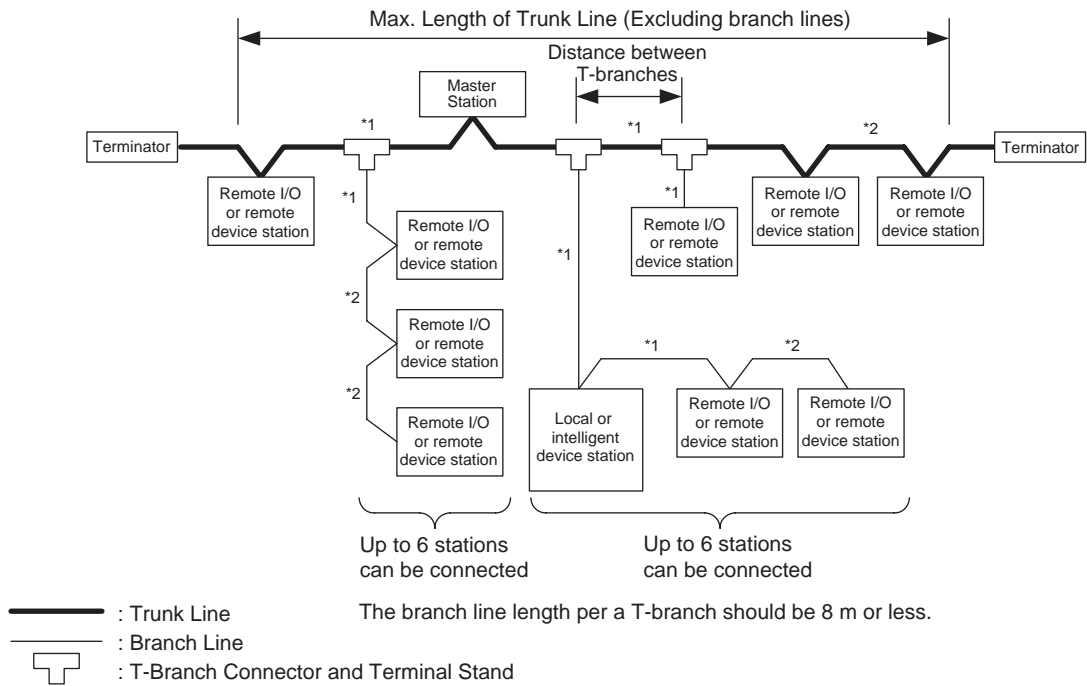
The CC-Link dedicated cable cannot be used together with the CC-Link dedicated high-performance cable.

Table 6-4: 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

6 Network Specifications
 6.3 Communication Speed and Cable Length

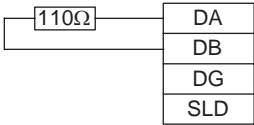
Fig. 6-2: Using a T-branch Connection



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.

DX100

6 Network Specifications
6.3 Communication Speed and Cable Length

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	<p>Terminal stand: standard terminal stand Connector: Connector for FA sensor</p>		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)

6.4 Restrictions of I/O Signals Viewed from CC-Link Master Station

The XFB04 board is a remote device station occupied by one to four stations. Note the following restrictions of the I/O signals as viewed from the CC-Link master station.

- The remote I/Os (RX and RY: bit information) can be used, but the remote registers (RW_r and RW_w: word information) cannot be used.
- The following restrictions exist on the allocation of the remote I/Os in the system area. Note the restrictions to prepare the sequence of the CC-Link master station sequencer.
In the device number, “m” indicates the register number allocated to each remote station, and “n” indicates the last register number of the number of occupied stations.

Device No.	Signal Name	Explanation
RX(m+n)8	Initial data processing request flag	Unavailable
RY(m+n)8	Initial data processing completion flag	Unavailable
RX(m+n)9	Initial data setting completion flag	Unavailable
RY(m+n)9	Initial data setting request flag	Unavailable
RX(m+n)A	Error status flag	Available
RY(m+n)A	Error reset request flag	Unavailable The error occurred at the error status flag and cannot be cleared from the master sequencer side. Outputting this signal does not clear the error. Turn the power supply to the DX100 OFF and then turn it ON again to clear the error.
RX(m+n)B	Remote station ready	Available

DX100	7	Error Indication
	7.1	LED Indicators

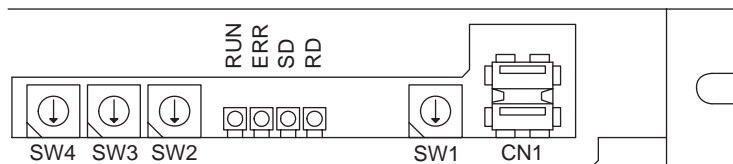
7 Error Indication

7.1 LED Indicators

7.1.1 LEDs for CC-Link

Four LEDs are provided on the front of the XFB04 board to indicate the status of CC-Link communications.

LED Indicator	Lit	Unlit	Flashing
RUN (green)	Normal status (Connected in the network)	1. Not connected in the network 2. Time over 3. Resetting hardware	
ERR (red)	1. At occurrence of CRC error 2. CC-Link station address setting out of the range (0 or greater than 64) 3. SW2 (CC-Link baud rate) is set to 5 or greater.	1. Normal 2. Resetting board	The settings of SW2 to SW4 are changed after having been released from the reset status. (Flashes every 0.4 seconds.)
SD (green)	Sending data	1. Not sending data 2. Resetting board	
RD (green)	Receiving data	1. Not receiving data 2. Resetting board	



LED indications during normal CC-Link communications

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

NOTE

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 One of the settings for switches SW2 to SW4 may have been changed after power was supplied to the board. Check the setting of each switch and correct it if necessary, and then turn ON the power again.

The ERR LED is lit.

- ① SW2 (baud rate setting) may be set to 5 or higher (out of the setting range 0 to 4), or the station number set at SW3 and SW4 may be set to 0 or higher than 64. Check the setting of each switch and correct it if necessary, and then turn ON the power again. Refer to *chapter 3 "Setting the Functions" at page 3-1*.
- ② Electric noise may affect communications. Check the following items: Refer to *chapter 6 "Network Specifications" at page 6-1*.
 - Check if the correct terminator is provided at the correct positions and if the resistance is the correct amount. (The amount 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.

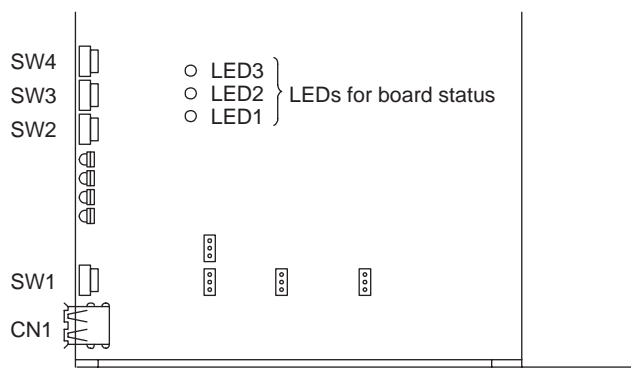
Communications are disabled, and the ERR LED is not lit.

- ① The communication settings disagree with those of the master PLC. Check the settings of both the XFB04 board and the master PLC. Refer to *chapter 3 "Setting the Functions" at page 3-1*.
- ② A 24-VDC power supply may be not supplied to the XFB04 board. Check the connection of the 24-VDC power supply cable to the CN3. Refer to *chapter 4 "Mounting the XFB04 Board" at page 4-1*.
- ③ The 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 CN2. Refer to *chapter 6 "Network Specifications" at page 6-1*.

	7	Error Indication
DX100	7.1	LED Indicators

7.1.2 LEDs for the XFB04 Board

Three LEDs are provided on the side of the XFB04 board to indicate the XFB04 board status.



LED indications during normal operations:

- LED1: Lit
- LED2: Unlit
- LED3: Unlit

Table 7-5: LED Indications

LED1	LED2	LED3	Board Status	Corrective Actions
Lit	Unlit	Unlit	Normally operating	
Unlit	Unlit	Flashing	RAM check error	<ul style="list-style-type: none"> • Turn OFF the power supply to the DX100 OFF and then ON again. • If normal operations are still not restored, replace the XFB04 board.
Lit or unlit	Unlit	Lit	ROM check error	<ul style="list-style-type: none"> • Turn the power supply to the DX100 OFF and then ON again. • If normal operations are still not restored, replace the XFB04 board.
Unlit	Flashing	Unlit	Switch setting error	<ul style="list-style-type: none"> • Check the setting of SW1. (Refer to <i>chapter 3 "Setting the Functions" at page 3-1.</i>)
Lit or unlit	Lit	Unlit	Communication error with the DX100	<ul style="list-style-type: none"> • Check the connection of the cable to CN1 of the XFB04 board.
Lit or unlit	Flashing	Flashing	CPU error (NMI error)	<ul style="list-style-type: none"> • Turn the power supply to the DX100 OFF and then ON again. • If normal operations are still not restored, replace the XFB04 board.

Table 7-5: LED Indications

Unlit	Unlit	Unlit	24-VDC power supply error CPU error (all unlit after all lit)	<ul style="list-style-type: none">• Check if the 24-V voltage power supply is being supplied to the CN3 of the XFB04 board.• Turn the power supply to the DX100 OFF and then ON again.• If normal operations are still not restored, replace the XFB04 board.
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DX100 OPTIONS JARCR-XFB04 BOARD INSTRUCTIONS

FOR CC-LINK

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