Motoman XRC Controller

CC Link (XFB04) User’s Manual

Part Number: 148262-1CD
Revision: 0
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SECTION 1

INTRODUCTION

1.1 About this Document
This manual provides instructions for CC Link (XFB04 Board) and contains the following sections:

SECTION 1 – INTRODUCTION
Provides general information about the structure of this manual, a list of reference documents, and customer service information.

SECTION 2 – SAFETY
Provides information regarding the safe use and operation of the CC Link module.

SECTION 3 — XFB04 BOARD INSTRUCTIONS
Provides detailed information about the CC Link module, including installation, specifications, and operation.

1.2 Reference to Other Documentation
For additional information refer to the following:
- For additional information refer to the following:
  - Concurrent I/O Parameters Manual (P/N 142102-1)
  - Operator’s Manual for General Purpose (P/N 142099-1)
  - Operator’s Manual for Handling (P/N 142100-1)
  - Operator’s Manual for Spot Welding (P/N 142101-1)
  - Operator’s Manual for Arc Welding (P/N 142098-1)
  - 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 (UP6, UP20, etc.)
- Application Type (assembly, handling, etc.)
- Software Version (5.101A, etc.)
- Robot Serial Number (located on the back side of the robot arm)
- Robot Sales Order Number (located on back side of XRC controller)
SECTION 2
SAFETY

2.1 Introduction

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.

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. 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

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 Safety (Section 2.6)
- Operation Safety (Section 2.7)
- Maintenance Safety (Section 2.8)
2.2 Standard Conventions

This manual includes information essential to the safety of personnel and equipment. As you read through this manual, be alert to the four signal words:

- DANGER
- WARNING
- CAUTION
- NOTE

Pay particular attention to the information provided under these headings which are defined below (in descending order of severity).

**DANGER!**

Information appearing under the DANGER caption 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 under the WARNING caption 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 under the CAUTION caption 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 caption 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, section 6.13.4 and 6.13.5, 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 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 measures are available:

• Safety fences and barriers
• Light curtains
• Door interlocks
• Safety mats
• Floor markings
• Warning lights

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 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 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. All personnel involved with the operation of the equipment must understand potential dangers of operation. Programming tips are as follows:

- Any modifications to PART 1 of the MRC controller PLC can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to PART 1. 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.
- Back up all programs and jobs onto a floppy disk whenever 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.
- The concurrent I/O (Input and Output) function allows the customer to modify the internal ladder inputs and outputs for maximum robot performance. Great care must be taken when making these modifications. Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations that may damage the robot or other parts of the system.
- 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 operate the system.
• 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 the E-STOP button on the teach pendant for proper operation before programming.
• Carry the teach pendant with you when you enter the workcell.
• Be sure that only the person holding the teach pendant enters the workcell.
• Test any new or modified program at low speed for at least one full cycle.

2.7 Operation 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. All personnel involved with the operation of the equipment must understand potential dangers of operation. Operation tips are as follows:

• Be sure that only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories are permitted to operate this robot system.
• Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
• Inspect the robot and work envelope to ensure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
• Ensure that all safeguards are in place.
• 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 operate the system.
• Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
• The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
• This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
• 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. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.
2.8 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. All personnel involved with the operation of the equipment must understand potential dangers of operation. Maintenance tips are as follows:

- Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- 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 operate the system.
- Back up all your programs and jobs onto a floppy disk whenever program changes are made. A backup must always be made before any servicing or changes are made to options, accessories, or equipment to avoid loss of information, programs, or jobs.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- Be sure all safeguards are in place.
- Use proper replacement parts.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- 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. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.
- 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).
Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

The YASNAC XRC operator’s manuals above correspond to specific usage. Be sure to use the appropriate manual.

Do not submit this electronic data to the customer.

THIS MATERIAL IS FOR STUDY PURPOSE ONLY. YOU MUST READ THE MANUAL WHICH ENCLOSED WITH A ROBOT.
This manual explains the JARCR-XFB04 board of the YASNAC XRC system and general operations. Read this manual carefully and be sure to understand its contents before handling the YASNAC XRC.

General items related to safety are listed in Section 1: Safety of the Setup Manual. To ensure correct and safe operation, carefully read the Setup Manual before reading this manual.

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 YASNAC XRC.

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.

**NOTE**
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.
Before operating the manipulator, check that servo power is turned off when the emergency stop buttons on the playback panel or programming pendant are pressed. When the servo power is turned off, the SERVO ON READY lamp on the playback panel and the SERVO ON LED on the programming pendant are 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.

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.

Always set the Teach Lock before entering the robot work envelope to teach a job.

Operator injury can occur if the Teach Lock is not set and the manipulator is started from the playback panel.

Observe the following precautions when performing teaching operations within the working envelope of the manipulator:
- View the manipulator from the front whenever possible.
- Always follow the predetermined operating procedure.
- 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 manipulator's work envelope and that you are in a safe location before:
- Turning on the YASNAC XRC power
- Moving the manipulator with the programming pendant
- Running check operations
- Performing automatic operations

Injury may result if anyone enters the working envelope of the manipulator during operation. Always press an emergency stop button immediately if there are problems. The emergency stop button is located on the right side of both the YASNAC XRC playback panel and programming pendant.
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 XRC cabinet 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 the Alarm Display in the setup manual before operating the manipulator.

**Definition of Terms Used Often in This Manual**

The MOTOMAN manipulator is the YASKAWA industrial robot product. The manipulator usually consists of the controller, the playback panel, the programming pendant, and supply cables. The MOTOMAN manipulator is the YASKAWA industrial robot product. In this manual, the equipment is designated as follows.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>YASNAC XRC Controller</td>
<td>XRC</td>
</tr>
<tr>
<td>YASNAC XRC Playback Panel</td>
<td>Playback Panel</td>
</tr>
<tr>
<td>YASNAC XRC Programming Pendant</td>
<td>Programming Pendant</td>
</tr>
</tbody>
</table>

---

**CAUTION**
Descriptions of the programming pendant and playback panel keys, buttons, and displays are shown as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming Pendant</td>
<td>Character Keys</td>
</tr>
<tr>
<td></td>
<td>The keys which have characters printed on them are denoted with [ ].</td>
</tr>
<tr>
<td></td>
<td>ex. [ENTER]</td>
</tr>
<tr>
<td>Symbol Keys</td>
<td>The keys which have a symbol printed on them are not denoted with [ ] but depicted with a small picture.</td>
</tr>
<tr>
<td></td>
<td>ex. page key [ ]</td>
</tr>
<tr>
<td></td>
<td>The cursor key is an exception, and a picture is not shown.</td>
</tr>
<tr>
<td>Axis Keys Number Keys</td>
<td>“Axis Keys” and “Number Keys” are generic names for the keys for axis operation and number input.</td>
</tr>
<tr>
<td>Keys pressed simultaneously</td>
<td>When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, ex. [SHIFT]+[COORD]</td>
</tr>
<tr>
<td>Displays</td>
<td>The menu displayed in the programming pendant is denoted with { }.</td>
</tr>
<tr>
<td></td>
<td>ex. {JOB}</td>
</tr>
<tr>
<td>Playback Panel</td>
<td>Buttons</td>
</tr>
<tr>
<td></td>
<td>Playback panel buttons are enclosed in brackets. ex. [TEACH] on the playback panel</td>
</tr>
</tbody>
</table>

**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.
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1 Outline

This manual describes the CC-Link*1 I/O board JARCR-XFB04 (hereinafter called the XFB04 board) to be used in the YASNAC XRC. The application of the XFB04 board enables the general-purpose I/O data exchange between a CC-linked device and the XRC. The XFB04 board is designed only as a remote device station and 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 CC-Link is a registered trademark of Mitsubishi Electric Corporation.

1.1 System Configuration

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

The CC-Link dedicated cable is not included with the XFB04 board.

NOTE
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 "6 Network Specifications."
1.1 System Configuration
2 Hardware Specifications

2.1 External View of the XFB04 Board

CN3: Connector to 24-VDC power supply
CN2: Connector to CC-Link
SW4: CC-Link station address switch (X10)
SW3: CC-Link station address switch (X1)
SW2: CC-Link baud rate switch
SW1: XRC station switch (ST#)
CN1: Connector for I/O data transmission

LEDs for CC-Link

LEDs for XFB04 board

SW10: Switch for setting the number of CC-Link occupied stations (SENYY0)
SW11: Switch for setting the number of CC-Link occupied stations (SENYY1)
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
## 2.2 XFB04 Board Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface to external device</td>
<td>CC-Link</td>
</tr>
<tr>
<td>Board mounting position</td>
<td>Optional board mounting space in the XRC</td>
</tr>
<tr>
<td>Error indicator</td>
<td>LED indicators</td>
</tr>
<tr>
<td>Number of transmission I/O points</td>
<td>Maximum number of I/O points:</td>
</tr>
<tr>
<td></td>
<td>Input: 112; Output: 112 (four CC-Link stations occupied)</td>
</tr>
<tr>
<td></td>
<td>Selectable number of I/O points (one of the followings can be selected):</td>
</tr>
<tr>
<td></td>
<td>Input: 16; Output: 16 (one CC-Link station occupied)</td>
</tr>
<tr>
<td></td>
<td>Input: 48; Output: 48 (two CC-Link stations occupied)</td>
</tr>
<tr>
<td></td>
<td>Input: 80; Output: 80 (three CC-Link stations occupied)</td>
</tr>
<tr>
<td></td>
<td>Input: 112; Output: 112 (four CC-Link stations occupied)</td>
</tr>
</tbody>
</table>

## 2.3 Communication Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission speed</td>
<td>10Mbps / 5Mbps / 2.5Mbps / 625kbps / 156 kbps (Can be selected by setting the SW2 switch.)</td>
</tr>
<tr>
<td>Communication method</td>
<td>Polling method</td>
</tr>
<tr>
<td>Transmission channel</td>
<td>Bus type</td>
</tr>
<tr>
<td>Number of nodes</td>
<td>Maximum 64</td>
</tr>
<tr>
<td>Maximum transmission distance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transmission speed</td>
</tr>
<tr>
<td></td>
<td>10Mbps</td>
</tr>
<tr>
<td></td>
<td>5Mbps</td>
</tr>
<tr>
<td></td>
<td>2.5Mbps</td>
</tr>
<tr>
<td></td>
<td>625kbps</td>
</tr>
<tr>
<td></td>
<td>156kbps</td>
</tr>
<tr>
<td></td>
<td>The above distances are for when the CC-Link dedicated cable FANC-SB (110Ω ) is used. For details, refer to “6 Network Specifications.”</td>
</tr>
<tr>
<td>Transmission cable</td>
<td>CC-Link dedicated cable (Shielded three-core twisted pair cable)</td>
</tr>
<tr>
<td></td>
<td>FANC-SB (110Ω) made by KURAMO Electric Co., Ltd.</td>
</tr>
<tr>
<td></td>
<td>FANC-SBH (130Ω) made by KURAMO Electric Co., Ltd.</td>
</tr>
</tbody>
</table>
2.4 Connector

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.

- 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.

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminator</td>
<td>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)</td>
</tr>
</tbody>
</table>

2.4 Connector

CN2 (connector to CC-Link)

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal Name</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DA</td>
<td>Data transmission line</td>
</tr>
<tr>
<td>2</td>
<td>DB</td>
<td>Data transmission line</td>
</tr>
<tr>
<td>3</td>
<td>DG</td>
<td>Signal ground</td>
</tr>
<tr>
<td>4</td>
<td>SLD</td>
<td>Shield ground</td>
</tr>
<tr>
<td>5</td>
<td>FG</td>
<td>Frame ground</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FG</th>
<th>SLD</th>
<th>DG</th>
<th>DB</th>
<th>DA</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Master station)</td>
<td>(Remote station)</td>
<td>(Local station)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Terminator

FG cable

NOTE
2.4 Connector
3 Setting the Functions

3.1 Function Setting Switches

The section explains the switches that set the functions of the XFB04 board following the instructions. Make the correct settings.

SW1: Sets the stations for the XFB04 board on the XRC.
The range for the station setting is from “1” (ST#01) to “E” (ST#14).
Do not set to “0” because the station is not allocated to “0.” Also do not set to “F” because ST#15 is specially designed for use with the XIU01, the XCO01, or the XCO02 unit.

SW2: Sets a transmission baud rate for the CC-Link.
Choose from 0 (156 kbps) to 4 (10 Mbps).

SW3 and SW4: Sets the CC-Link station address.
The setting range for the station address is from 1 to 64.

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

**NOTE** Set SW6 to “SYS” (normal mode). Never set to “TEST” (test mode) since the test mode is for maintenance only.

SW7 (16BYTE/17BYTE): Sets the transmission mode.
Normally, set to “16BYTE.”
Set the switch to “17BYTE” only when the XRC transmission system is set for 17 bytes.

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.

**NOTE** Set SW14 and SW15 to “1.”
Never set to “0” since “0” is for maintenance only.
### 3.2 Switch Setting Method

<table>
<thead>
<tr>
<th>Switches</th>
<th>Setting Method</th>
</tr>
</thead>
</table>
| **SW1 (ST#)**  
Setting of the station on the XRC | Sets the station on the XRC.  
Turn the arrows to the numbers corresponding to the desired station number.  
Use a flat tipped driver.  
The following shows the relation between the switch settings and the station.  
0: Cannot set  
1: ST#01  
2: ST#02  
3: ST#03  
4: ST#04  
5: ST#05  
6: ST#06  
7: ST#07  
8: ST#08  
9: ST#09  
A: ST#10  
B: ST#11  
C: ST#12  
D: ST#13  
E: ST#14  
F: Cannot set  
The value of station number (ST#) is the station number display on the programming pendant of the XRC when setting the I/O modules. |
| **SW2 (RATE)**  
Setting of the CC-Link baud rate | Sets the baud rate of the CC-Link.  
Turn the arrows to the numbers corresponding to the desired baud rate.  
Use a flat tipped driver.  
The following shows the relation between the switch settings and the baud rate.  
0: 156kbps  
1: 625kbps  
2: 2.5Mbps  
3: 5Mbps  
4: 10Mbps  
If the setting is different than those listed above, the ERR LED lights up (setting error). |

**NOTE**  
SW1 cannot be set to 0 or F.  
Do not assign more than one board to the same station number (ST#).
3.2 Switch Setting Method

<table>
<thead>
<tr>
<th>Switches</th>
<th>Setting Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW3 (×1) SW4 (×10) Setting of the CC-Link station address</td>
<td>Sets the CC-Link station address. Turn the arrows to the numbers corresponding to the desired station address. Use a flat tipped driver.</td>
</tr>
</tbody>
</table>

The following shows the relation between the switch settings and the I/O points.

(Examples)

<table>
<thead>
<tr>
<th>SW4</th>
<th>SW3</th>
<th>Station address</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>: 1</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>

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).

<table>
<thead>
<tr>
<th>SW6 (SYS/TEST) Setting of the XFB04 operation mode</th>
<th>Short-circuited between 1 and 2: system mode (SYS) (Factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short-circuited between 2 and 3: test mode (TEST)</td>
</tr>
<tr>
<td></td>
<td>Fix to “SYS.” Never set to “TEST” since “TEST” is for maintenance only.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SW7 (16BYTE/17BYTE) Setting of communication byte mode</th>
<th>Short-circuited between 1 and 2: 16-byte mode (16BYTE) (Factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short-circuited between 2 and 3: 17-byte mode (17BYTE)</td>
</tr>
</tbody>
</table>

Set the byte mode according to the setting of the communication system of the XRC where the XFB04 is mounted. Usually, set the mode to “16BYTE.”
## 3.2 Switch Setting Method

<table>
<thead>
<tr>
<th>Switches</th>
<th>Setting Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW10 (OFF/ON) SW11 (OFF/ON) Number of stations connected to the CC-Link</td>
<td>Sets the number of CC-Link occupied stations:</td>
</tr>
<tr>
<td></td>
<td>1 occupied station (Input 16 points, Output 16 points)</td>
</tr>
<tr>
<td></td>
<td>SW10: Short-circuited between 1 and 2 (OFF)</td>
</tr>
<tr>
<td></td>
<td>SW11: Short-circuited between 1 and 2 (OFF)</td>
</tr>
<tr>
<td></td>
<td>2 occupied stations (Input 48 points, Output 48 points)</td>
</tr>
<tr>
<td></td>
<td>SW10: Short-circuited between 2 and 3 (ON)</td>
</tr>
<tr>
<td></td>
<td>SW11: Short-circuited between 1 and 2 (OFF)</td>
</tr>
<tr>
<td></td>
<td>3 occupied stations (Input 80 points, Output 80 points)</td>
</tr>
<tr>
<td></td>
<td>SW10: Short-circuited between 1 and 2 (OFF)</td>
</tr>
<tr>
<td></td>
<td>SW11: Short-circuited between 2 and 3 (ON)</td>
</tr>
<tr>
<td></td>
<td>4 occupied stations (Input 112 points, Output 112 points)</td>
</tr>
<tr>
<td></td>
<td>SW10: Short-circuited between 2 and 3 (ON) (Factory setting)</td>
</tr>
<tr>
<td></td>
<td>SW11: Short-circuited between 2 and 3 (ON) (Factory setting)</td>
</tr>
<tr>
<td>SW14 (1/0) Reserved for the manufacturer</td>
<td>Short-circuited between 1 and 2: 1 (standard) (Factory setting)</td>
</tr>
<tr>
<td></td>
<td>Short-circuited between 2 and 3: 0 (for maintenance)</td>
</tr>
<tr>
<td></td>
<td>Fix to “1.” Never set to “0” since “0” is for maintenance only.</td>
</tr>
<tr>
<td>SW15 (1/0) Reserved for the manufacturer</td>
<td>Short-circuited between 1 and 2: 1 (standard) (Factory setting)</td>
</tr>
<tr>
<td></td>
<td>Short-circuited between 2 and 3: 0 (for maintenance)</td>
</tr>
<tr>
<td></td>
<td>Fix to “1.” Never set to “0” since “0” is for maintenance only.</td>
</tr>
</tbody>
</table>
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.
Mount the XFB04 board in the following manner.

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

---

**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.
2. With the door locks turned clockwise for 90°, turn the main switch handle to the “OPEN RESET” 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 “3 Setting the Functions.”

---

### 4.3 Mounting the XFB04 Board on the XRC

Fix the XFB04 board on the XRC 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. Disconnect the terminal connector from CN02 on the XIU01, the XCO01, or the XCO02 unit, and connect it 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.

Connection Example 1: when the XFB04 Board is connected to the XIU01 Unit
Connection Example 2: when the XFB04 Board is connected to the XCO01 or the XCO02 Unit
Connection Example 3: when the XOI01 Board and the XFB04 Board are connected to the XIU01 Unit
4.5 Closing the Front Door of the XRC

1. Turn the main switch handle, which is now in the OFF position, to the “OPEN RESET” position, and then slowly close the door.

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 CN02. This prevents power from being supplied normally to the board, and the board may not start up.
2. Turn the two door locks counterclockwise for 90°.
5 I/O Signal Allocation

5.1 I/O Module Setting

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

Make sure that the power supply to the XRC is OFF. Then, mount the XFB04 board with all the switches properly set inside the XRC. For the board mounting method, refer to “4. Mounting the XFB04 Board”.

---

**Operation**

Turn ON the power supply, pressing [TOP MENU] ➔ Set the security mode to the “MANAGEMENT MODE”. ➔ Select {SYSTEM} under the top menu ➔ Select {SETUP} ➔ Select {I/O MODULE} ➔ Confirm the status of the mounted I/O module ➔ Press [ENTER] ➔ Press [ENTER] ➔ Select “YES”

---

**Explanation**

*1 The system display appears.

*2 The setup display appears.
5.1 I/O Module Setting

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

<table>
<thead>
<tr>
<th>Number of CC-Link occupied stations</th>
<th>SW11 (SENYU1)</th>
<th>SW10 (SENYU0)</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 occupied station</td>
<td>OFF</td>
<td>OFF</td>
<td>DI:024  DO:024</td>
</tr>
<tr>
<td>2 occupied stations</td>
<td>OFF</td>
<td>ON</td>
<td>DI:056  DO:056</td>
</tr>
<tr>
<td>3 occupied stations</td>
<td>ON</td>
<td>OFF</td>
<td>DI:088  DO:088</td>
</tr>
<tr>
<td>4 occupied stations</td>
<td>ON</td>
<td>ON</td>
<td>DI:120  DO:120</td>
</tr>
</tbody>
</table>

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

*4 Confirm that the display of each station (ST#) corresponds to the actual mounted status of the I/O module.
5.1 I/O Module Setting

5 The mounted status of the I/O modules for the rest of the stations (ST#) appear. Confirm that they correspond to the actual mounted status.

6 The confirmation dialog box appears.

If the display does not correspond to the actual mounted status, recheck the actual mounted status.

If the mounted status is correct (but the display does not correspond), the following causes are suspected.

- Improper I/O communication setting
  The XFB04 board is set to 16-byte mode using the SW7 as a default. If the short pin CN10 of the XIO01 board or the SW1 of the XCI01 board is set to 17-byte mode, the XRC cannot correctly recognize the board. Reset the XFB04 board to 17-byte mode.

- Improper or overlapped station setting
  A single optional board can be selected for each station. Check if SW4 is not used for a board other than the XFB04 board, by changing the SW1 setting.
  (SW1: F (ST#15) is only for the XIU01, the XCO01, or the XCO02 unit. Do not select it for other boards.)

- Non-applicable system software versions
  Old system software versions are not applicable for the XFB04 board. Check the system software version number, and change to software applicable for the board. Use system software version X5.04A (xx)-00 or later.

- 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 "4.4 Connecting Each Cable."

- 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 system parameters are automatically set according to the current mounted status of the hardware.
The procedures to add I/O modules are completed.

5.2 Transmitting Data

The data to be transmitted from the XFB04 board to inside of the XRC 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 XRC, 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. (2010 to 2057 are used for the standard I/O of the XRC.)

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>2060 to 2067</td>
<td>3060 to 3067</td>
</tr>
<tr>
<td>2070 to 2077</td>
<td>3070 to 3077</td>
</tr>
<tr>
<td>2080 to 2087</td>
<td>3080 to 3087</td>
</tr>
<tr>
<td>2090 to 2097</td>
<td>3090 to 3097</td>
</tr>
<tr>
<td>2100 to 2107</td>
<td>3100 to 3107</td>
</tr>
<tr>
<td>2110 to 2117</td>
<td>3110 to 3117</td>
</tr>
<tr>
<td>2120 to 2127</td>
<td>3120 to 3127</td>
</tr>
<tr>
<td>2130 to 2137</td>
<td>3130 to 3137</td>
</tr>
<tr>
<td>2140 to 2147</td>
<td>3140 to 3147</td>
</tr>
<tr>
<td>2150 to 2157</td>
<td>3150 to 3157</td>
</tr>
<tr>
<td>2160 to 2167</td>
<td>3160 to 3167</td>
</tr>
<tr>
<td>2170 to 2177</td>
<td>3170 to 3177</td>
</tr>
</tbody>
</table>

*Only the board status is used in this range.*

Concurrent I/O

External device connected to CC-Link

XFB04 board

CC-Link communication and transmission to XRC

External device connected to CC-Link

CC-Link communication

Input Output
5.2 Transmitting Data

*1 Explanation of Board Status 2060 to 2067

<table>
<thead>
<tr>
<th>Board Number</th>
<th>Description</th>
<th>Normal</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>2060</td>
<td>CC-Link communication status</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2061</td>
<td>Sequencer CPU status</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2062</td>
<td>Switch (SW) setting status</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2063</td>
<td>Not used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2064</td>
<td>Reserved for the manufacturer (Cannot be used)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2065</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2066</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2067</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[XFB04 Board Status]

The status of the XFB04 board (the first 8 points of the allocation area) is indicated as follows. The value “xx” of the allocated input signals in the table indicates the first number of the XFB04 board allocated number. In the above table, where the allocation numbers were 2060 to 2067, 06 would be “xx.”

<table>
<thead>
<tr>
<th>Signal</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2xx0</td>
<td>Indicates the CC-Link communication status. Normal: 0 Error: 1</td>
</tr>
<tr>
<td>2xx1</td>
<td>Indicates the CPU status of the CC-Link master station sequencer. Normal: 0 Error: 1</td>
</tr>
<tr>
<td>2xx2</td>
<td>Indicates the CC-Link SW (SW2, SW3, and SW4) setting status. Normal: 0 Error: 1</td>
</tr>
<tr>
<td>2xx4 to 2xx7</td>
<td>Reserved for the manufacturer. The user cannot use these signals.</td>
</tr>
</tbody>
</table>
5.3 I/O Allocation Examples

Example 1: When only the XFB04 board is connected (with four occupied stations)
The XIO02 or the XCI02 board is the child board on the XIO01 or the XCI01 board and serves as the standard I/O board of the XRC.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 to 2057: XIO02 or the XCI02 board</td>
<td>3010 to 3057: XIO02 or the XCI02 board</td>
</tr>
<tr>
<td>2060 to 2207: XFB04 board</td>
<td>3060 to 3207: XFB04 board</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 to 2057: XIO02 or the XCI02 board</td>
<td>3010 to 3057: XIO02 or the XCI02 board</td>
</tr>
<tr>
<td>2060 to 2107: XOI01 board</td>
<td>3060 to 3107: XOI01 board</td>
</tr>
<tr>
<td>2110 to 2257: XFB04 board</td>
<td>3110 to 3257: XFB04 board</td>
</tr>
</tbody>
</table>
6  Network Specifications

6.1  CC-Link Terminal Units

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

<table>
<thead>
<tr>
<th>CC-Link Station name</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master station</td>
<td>Controls both remote stations and local stations.</td>
</tr>
<tr>
<td>Standby master station</td>
<td>Continues the data link in the place of the master station if a failure occurs in the master station.</td>
</tr>
<tr>
<td>Local station</td>
<td>Communicates with the master station and other local stations with its own sequencer CPU.</td>
</tr>
</tbody>
</table>

Remote station

<table>
<thead>
<tr>
<th>Remote I/O station</th>
<th>Transmits only bit information.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote device station</td>
<td>Transmits both bit and word information.</td>
</tr>
<tr>
<td>Intelligent device station</td>
<td>Executes transient transmissions.</td>
</tr>
</tbody>
</table>

*Note that 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.

① \((1 \times a) + (2 \times b) + (3 \times c) + (4 \times d) \leq 64\) 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

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:
   Equation ① \(1 \times 22 + 2 \times 8 + 4 \times 5 = 58 \leq 64\)
   Equation ② \(16 \times 22 + 54 \times 8 + 88 \times 5 = 877 \leq 2304\)
6.3 Baud Rate and Cable Length

6.3.1 Using the CC-Link Dedicated Cable or the CC-Link Dedicated High-Performance Cable

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

![Diagram of CC-Link network configuration]

Table 6.1 Using the CC-Link Dedicated Cable (with a Terminating Resistance of 110Ω)

<table>
<thead>
<tr>
<th>Baud Rate</th>
<th>Cable Length between Stations</th>
<th>Max. Transmission Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length①</td>
<td>Length②</td>
</tr>
<tr>
<td>156 kbps</td>
<td>1 m or more</td>
<td>2 m or more</td>
</tr>
<tr>
<td>625 kbps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5 Mbps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Mbps</td>
<td></td>
<td>60 cm or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 cm to 59 cm</td>
</tr>
<tr>
<td>10 Mbps</td>
<td></td>
<td>1 m or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60 cm to 99 cm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 cm to 59 cm</td>
</tr>
</tbody>
</table>

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 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 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.
### Table 6.2 Using the CC-Link Dedicated High-Performance Cable (with a Terminating Resistance of 130Ω)

<table>
<thead>
<tr>
<th>Baud Rate</th>
<th>Cable Length between Stations</th>
<th>Max. Transmission Distance</th>
<th>Max. Number of Remote Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length①</td>
<td>Length②</td>
<td>Length③</td>
</tr>
<tr>
<td>156 kbps</td>
<td>1 m or more</td>
<td>2 m or more</td>
<td>30 cm or more</td>
</tr>
<tr>
<td>625 kbps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5 Mbps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Mbps</td>
<td>60 cm or more</td>
<td>-</td>
<td>150 m</td>
</tr>
<tr>
<td></td>
<td>30 cm or more</td>
<td>160 m</td>
<td>110 m</td>
</tr>
<tr>
<td>10 Mbps</td>
<td>1.0 m or more</td>
<td>-</td>
<td>80 m</td>
</tr>
<tr>
<td></td>
<td>70 cm or more</td>
<td>100 m</td>
<td>50 m</td>
</tr>
<tr>
<td></td>
<td>40 cm to 69 cm</td>
<td>30 m</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>30 cm to 39 cm</td>
<td>20 m</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>40 cm or more</td>
<td>100 m</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>30 cm to 39 cm</td>
<td>80 m</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>30 cm or more</td>
<td>100 m</td>
<td>-</td>
</tr>
</tbody>
</table>

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 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 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.

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.
6.3 Baud Rate and Cable Length

### 6.3.2 Using a T-branch Connection

**Diagram:**
- Max. length of trunk line (excluding branch lines)
- Distance between T-branches
- Terminator
- Remote I/O or remote device station
- Remote I/O or remote device station
- Remote I/O or remote device station
- Remote I/O or remote device station
- Remote I/O or remote device station
- Remote I/O or remote device station
- Local or Intelligent device station
- Remote I/O or remote device station
- Remote I/O or remote device station
- Remote I/O or remote device station

**Legend:**
- : Trunk line
- : Branch line
- : T-branch connector and terminal stand

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

### Table 6.3 Using a T-branch Connection

<table>
<thead>
<tr>
<th>Baud Rate</th>
<th>Cable Length between Stations</th>
<th>Max. Length of the Trunk Line*1</th>
<th>Distance between T-branches</th>
<th>Max Length. of the Branch Line*2</th>
<th>Total Length of the Branch Lines*3</th>
</tr>
</thead>
<tbody>
<tr>
<td>156 kbps</td>
<td>1 m or more</td>
<td>500 m</td>
<td>Not limited</td>
<td>8 m</td>
<td>200 m</td>
</tr>
<tr>
<td></td>
<td>2 m or more</td>
<td>100 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 cm or more</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>625 kbps</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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 T-branch.

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

Notes:
1. The baud rates of 10 Mbps, 5 Mbps, and 2.5 Mbps are not available.
2. Length* indicates the cable length between a specified station such as the master, the local, or the intelligent device station and the next station when only the remote I/O or the remote device station is used.
3. Length* indicates the cable length between a specified station such as the master, the local, or the intelligent device station and the next station when the local or the intelligent device station is used.
4. Length* indicates the cable length between the remote I/O and the remote device station.
6.3 Baud Rate and Cable Length

- 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 100Ω, 1/2W.

Example:
ERDS1TJ111 made by Matsushita Electronic Components Co., Ltd.
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 (RWr and RWw: 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.

<table>
<thead>
<tr>
<th>Device No.</th>
<th>Signal Name</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RX(m+n)8</td>
<td>Initial data processing request flag</td>
<td>Cannot be used</td>
</tr>
<tr>
<td>RY(m+n)8</td>
<td>Initial data processing completion flag</td>
<td>Cannot be used</td>
</tr>
<tr>
<td>RX(m+n)9</td>
<td>Initial data setting completion flag</td>
<td>Cannot be used</td>
</tr>
<tr>
<td>RY(m+n)9</td>
<td>Initial data setting request flag</td>
<td>Cannot be used</td>
</tr>
<tr>
<td>RX(m+n)A</td>
<td>Error status flag</td>
<td>Available</td>
</tr>
<tr>
<td>RY(m+n)A</td>
<td>Error reset request flag</td>
<td>Cannot be used</td>
</tr>
<tr>
<td>RX(m+n)B</td>
<td>Remote station ready</td>
<td>Available</td>
</tr>
</tbody>
</table>

Note: 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.
6.4 Restrictions of I/O Signals Viewed from CC-Link Master Station
# 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.

<table>
<thead>
<tr>
<th>LED Indicator</th>
<th>Lit</th>
<th>Unlit</th>
<th>Flashing</th>
</tr>
</thead>
</table>
| **RUN** (green) | Normal status (Connected in the network) | • Not connected in the network  
• Time over  
• Resetting hardware | - |
| **ERR** (red) | • At occurrence of CRC error  
• Station number setting out of the range (0 or higher than 64)  
• SW2 (transmission speed setting) is set to 5 or higher. | • Normal  
• Resetting hardware | 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 | • Not sending data  
• Resetting hardware | - |
| **RD** (green) | Receiving data | • Not receiving data  
• Resetting hardware | - |

LED indications during normal CC-Link communications
- RUN: Lit
- ERR: Unlit
- SD: Lit
- RD: Lit
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.

![Diagram of LED indicators on the XFB04 board]

**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.**
- 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.**
- 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 “3. Setting the Functions.”
- Electric noise may affect communications. Check the following items: Refer to “6 Network Specifications.”
- 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.**
- The communication settings disagree with those of the master PLC. Check the settings of both the XFB04 board and the master PLC. Refer to “3 Setting the Functions.”
- 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 “4 Mounting the XFB04 Board.”
- 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 “6 Network Specifications.”
LED indicators during normal operations:

LED1: Lit
LED2: Unlit
LED3: Unlit

<table>
<thead>
<tr>
<th>LED1</th>
<th>LED2</th>
<th>LED3</th>
<th>Board Status</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lit</td>
<td>Unlit</td>
<td>Unlit</td>
<td>Normally operating</td>
<td>-</td>
</tr>
<tr>
<td>Unlit</td>
<td>Unlit</td>
<td>Flashing</td>
<td>RAM check error</td>
<td>• Turn OFF the power supply to the XRC OFF and then ON again.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• If normal operations are still not restored, replace the XFB04 board.</td>
</tr>
<tr>
<td>Lit or</td>
<td>Unlit</td>
<td>Lit</td>
<td>ROM check error</td>
<td>• Turn the power supply to the XRC OFF and then ON again.</td>
</tr>
<tr>
<td>unlit</td>
<td></td>
<td></td>
<td></td>
<td>• If normal operations are still not restored, replace the XFB04 board.</td>
</tr>
<tr>
<td>Unlit</td>
<td>Flashing</td>
<td>Unlit</td>
<td>SW setting error</td>
<td>• Check the setting of SW1. (Refer to “3 Setting the Functions.”)</td>
</tr>
<tr>
<td>Lit or</td>
<td>Lit</td>
<td>Unlit</td>
<td>Communication error with the XRC</td>
<td>• Check the connection of the cable to CN1 of the XFB04 board.</td>
</tr>
<tr>
<td>unlit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lit or</td>
<td>Flashing</td>
<td>Flashing</td>
<td>CPU error (NMI error)</td>
<td>• Turn the power supply to the XRC OFF and then ON again.</td>
</tr>
<tr>
<td>unlit</td>
<td></td>
<td></td>
<td></td>
<td>• If normal operations are still not restored, replace the XFB04 board.</td>
</tr>
<tr>
<td>Unlit</td>
<td>Unlit</td>
<td>Unlit</td>
<td>24-VDC power supply error</td>
<td>• Check if the 24-V voltage power supply is being supplied to the CN3 of the XFB04 board.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CPU error (all unlit after all lit)</td>
<td>• Turn the power supply to the XRC OFF and then ON again.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• If normal operations are still not restored, replace the XFB04 board.</td>
</tr>
</tbody>
</table>
7.1 LED Indicators
YASNAC XRC OPTIONS
INSTRUCTIONS
FOR JARCR-XFB04 BOARD